



Figure 1. Epiphyte-laden tree in the lush rainforest of Lamington National Park, Queensland. (Photo: P. Cerretti)

Chasing tachinids 'Down Under'

Expeditions of the Phylogeny of World Tachinidae Project

Part II

Eastern Australia



Figure 2. *Rutilia regalis* Guérin-Méneville, one of the first tachinids described from Australia (from Guérin-Méneville 1831: pl. 21).

Preamble

Last year we documented in the pages of this newsletter an expedition to the Western Cape of South Africa in search of tachinids for the “Phylogeny of World Tachinidae” project (Cerretti *et al.* 2013). The project itself was discussed in a separate article (Stireman *et al.* 2013). In this issue of *The Tachinid Times* we discuss our expedition to eastern Australia in late 2013. This trip took place so recently that we have yet to fully identify our material and as a result cannot record here all of the taxa we collected. Instead, we will add the taxa to a webpage we have created about this expedition. The webpage is up and running and currently provides specific information about each collecting locality and includes images of most of the places. The webpage is located here:

<http://www.nadsdiptera.org/Tach/WorldTachs/TachPhylo/PhyloexpeditionAustralia2013.html>

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Introduction

There is a mystique about Australia that dates back to the earliest accounts of this island continent. Merchant ships from Europe and later voyages of discovery through the 1600s and 1700s told about a vast land inhabited by strange animals quite unlikely those of anywhere else. Gradually, specimens of the more conspicuous and common species began to trickle back to Europe and were eagerly examined and named by specialists of the day.

on a specimen in the Banks collection (now housed in the Natural History Museum, London) that was possibly collected during one of the voyages of Captain Cook in the latter half of the 1700s (Crosskey 1973a).

The first tachinid genera to be described from Australian material were named *Rutilia* and *Palpostoma* by French dipterist Robineau-Desvoidy (1830), who in this same work also described more than a dozen other currently-valid genera that have since been recorded from Australia. Some of the prettiest rutiliine species were described soon after by French entomologist Guérin-Méneville (1831, 1838, 1843) and given the sort of names usually reserved for more prized catches like beetles, butterflies and birds: *decora*, *imperialis*, *mirabilis* and *regalis* (Fig. 2).

The peculiarities of the Australian bird fauna led Sclater (1858) to recognize the Australian Region as one of six "natural primary ontological divisions of the earth's surface". The Australian Region of Sclater was not so different from the Australasian[/Oceanian] Region of today, comprising as it did Australia, New Guinea, New Zealand, and many islands in the Pacific Ocean. Wallace (1876) reviewed and synthesized a wealth of knowledge about the distribution of animals and concluded that the six regions founded on birds by Sclater (1858) worked well for other animals too, after some fine tuning of the boundaries.

The six biogeographic regions of Sclater and

"Jusqu'à ce jour les Rutilies comprennent les plus magnifiques Myodaires connues."
— Robineau-Desvoidy (1830: 319) in his description of the genus *Rutilia*.

"Australia possesses a rich and varied tachinid fauna, most of which is still undescribed."
— first line of Preamble in Crosskey (1973: 4).

"Arguably the best hilltop in the world is Mount Moffatt in Queensland, Australia."
— caption to fig. 32 in Skevington (2008: 1801).

Tachinids were not generally well represented among the first insects collected from foreign lands, but in Australia there exists a tribe that is almost entirely confined to the Australasian Region, the Rutiliini, of considerable diversity and sometimes dazzling metallic colouration. It is thus not surprising that the first tachinid to be described from Australia was a rutiliine, named by the famed Danish entomologist and former student of Linnaeus, J.C. Fabricius. It was described as *Musca retusa* Fabricius (1775: 775) (now *Rutilia retusa*), based

Wallace have been carried through to the present day with little change. The impact of these works is seen throughout biology and is especially noticeable in the treatments of faunas and floras. Within Diptera, for instance, this is seen in the current "regional" catalogues; the *Catalog of the Diptera of the Australasian and Oceanian Regions* (Evenhuis 1989 and online) being the relevant one here, and more particularly the Tachinidae chapter by Cantrell & Crosskey (1989).

Australian Tachinidae

We knew our time would be limited so we chose to visit only Australia within the Australasian Region. It was our good fortune that the Tachinidae of Australia had been recently catalogued as part of the Australian Faunal Directory (AFD) and is available online (<http://www.biodiversity.org.au/afd/taxa/TACHINIDAE>). This inventory was based largely on the conspectus of Crosskey (1973b) and catalogue of Cantrell & Crosskey (1989) and then updated with the addition of literature published since the latter. According to the Statistics page for Tachinidae on the AFD website, the described fauna presently stands at 145 genera and 519 species (plus a few unrecognized species). This is about 100 species more than catalogued by Crosskey (1973b).

If one were to take the number of valid species of Australian Tachinidae as a close approximation of the true fauna, then birds would well outnumber tachinids in Australia. The truth is much different. Many taxonomists have dabbled in the tachinids of Australia but few have specialized on them. There have been a few significant revisions (e.g., Crosskey 1973a, Cantrell 1984, Barraclough 1992, Colless 2012), but on the whole the fauna is both under-studied and under-sampled. [Note to would-be tachinid systematists: new species abound in Australia both in collections and in nature!]

The one saving grace for anyone venturing into the tachinids of Australia is Crosskey's (1973b) *A conspectus of the Tachinidae (Diptera) of Australia, including keys to the supraspecific taxa and taxonomic and host catalogues*. Without this we would be lost. It provides keys to subfamilies, tribes and genera, a discussion and description of each subfamily and tribe, host data, and a complete catalogue of names and types. It does, however, have serious drawbacks for the modern user because of its now out-dated classification and the inadequacy of the named and unnamed material available to Crosskey at the time it was written. For us attempting to identify our Australian material, keying specimens in Crosskey (1973b) is proving a challenge.

Let us return to the question of how many species of Tachinidae are in Australia. The first estimate was made by Crosskey (1973b). He examined specimens in various museums and noted the abundance of undescribed species. He concluded the described fauna "represents only a small proportion of the species" and suggested "that when fully worked out the Australian Tachinidae will muster some 1500–2000 species" (Crosskey 1973b: 4). One of us (JEOH) collected in Australia in October 2002 and was impressed by the huge number of species he was able to collect in just

a few days, especially in Carnarvon National Park in Queensland. He and two colleagues collected on three hilltops in three days in Carnarvon and caught 1116 specimens representing 167 morphospecies (O'Hara *et al.* 2004). Surely Crosskey (1973b) was right about the high number of undescribed species. Using admittedly scanty data from Carnarvon, O'Hara *et al.* (2004) estimated that "460 species of Tachinidae for Carnarvon N.P. is reasonable and perhaps conservative" (p. 9) and suggested "the total Tachinidae fauna of Australia to be roughly in the order of 3500–4000 species" (p. 10).

Australian Expedition, November 28 – December 18, 2013

The joint destination for the four of us in 2013 was eastern Australia. We decided early on to concentrate on collecting in national parks, since these contain among the best undisturbed habitats on the continent and have good access. Our time was limited so we chose a route through eastern New South Wales and southern Queensland that would include coastal and inland sites and habitats ranging from sand dunes to eucalypt forests to wet and dry rainforests (Fig. 1). We also planned to split up our team, with Pierfilippo and Jim arriving first and collecting in New South Wales, followed by the four of us collecting together in Queensland, and then John and Isaac collecting for a few days north of Brisbane after the departure of Pierfilippo and Jim. We documented our intentions in permit applications to the New South Wales and Queensland governments and were successful in obtaining permits for most of the parks we wanted to visit. With collecting permits arranged, we were then able to secure the necessary export permits to take specimens out of the country. As is usual with permits of this sort, any holotypes that might be designated from material we collected will (i.e., must) be deposited in an Australian institution.

The major stops along our route are shown in Fig. 3 and are numbered chronologically. They are reviewed briefly below and accompanied by some images of places and tachinids. More specific information about localities and taxa collected are given on the [webpage](#) about this trip.

1. Myall Lakes National Park, 29.xi.–1.xii.2013 (PC & JEOH)

This park is situated about 200 kilometres north of Sydney and comprises a patchwork of 47,500 hectares of lakes, coastal sand dunes, wetlands, eucalypt forest,

and wet and dry rainforest. We collected along the coast at such places as Dark Point and Hawks Nest (both consisting of dunes), Robinsons Fire Trail (eucalypt forest), Mungo Brush Road (rainforest). At an inland site, we collected under The Grandis, a giant flooded gum tree thought to be the tallest tree in New South Wales (a remnant of old-growth forest). Of special interest, and a place to which we returned three times, was O’Sullivan’s Gap along Wootton Way (a.k.a. the Old Pacific Highway). In addition to tachinids, we sought and found the “McAlpine’s fly” (Kutty *et al.* 2010), an enigmatic fly about 2 mm in length that strongly resembles a muscid except for robust legs and a stance in which the wings are held slightly apart (although not always) as do sev-

eral oestroids. In the same place Pierfilippo captured a female of *Axinia* sp. (Rhinophoridae) in a pan trap for a study on rhinophorids he is pursuing with Thomas Pape (Natural History Museum of Denmark, Copenhagen).

Among the Tachinidae collected at O’Sullivan’s Gap were several males of a species of *Zosteromeigenia* Townsend, a blondeline with particularly well-developed sexual patches ventrolaterally on the 5th abdominal segment (Figs. 13, 14).

2. New England National Park, 2–4.xii.2013 and adjacent Cunnawarra National Park, 4.xii.2013 (PC & JEOH)

This is a magnificent park with large tracts of undisturbed forest within the boundaries of its approximately 72,000 hectares. Situated in the New England Tablelands, it is best known for the precipitous cliffs that line the Great Escarpment. One particularly scenic spot along the cliffs has been developed into Point Lookout with a parking lot, picnic areas, and trails to overlooks. The combination of a drop of over 1000 metres to the valley below and the fact that the Lookout juts out from the irregular line of cliffs may account for it being a superb hilltopping site for a wide variety of Tachinidae. Monty Wood had great success here in late December of 2005 and recommended Point Lookout to us. We had great weather, good collecting (just shy of our expectations), and this proved to be our best site in New South Wales.

Upon arriving at Point Lookout we were greeted by an intense buzzing coming from the bushes alongside the parking lot. To our disappointment, however, we quickly realized that much of the buzzing was produced by flies of the genus *Calliphora* Robineau-Desvoidy (Calliphoridae) (Fig. 4). Interestingly, among the thousands of *Calliphora* we managed to collect some interesting Tachinidae that were impressive in their resemblance to calliphorids in shape and colour and also mimicked the posture of the wings at rest, held along the body rather than slightly apart as is the rule for most tachinids. A pretty smaller-sized *Rutilia* (subgenus *Microrutilia* Townsend) with dark metallic reflections was one of the most abundant tachinid species at Point Lookout (Fig. 5). Along the path leading between overlooks we caught a few long-legged dexiines of the genus *Senostoma* Macquart on tree trunks (Fig. 6).



Figure 3. Map of major stops along our route during our collecting trip to eastern Australia.

3. Mount Lindesay Hwy. near Queensland border, 5.xii.2013 (PC & JEOH)

We stopped here for about an hour to look for tachinids along a gated track that followed a slight incline through a eucalypt forest. The track ended at a high point with a double line of fencing running as far as we could see, presumably marking the boundary between New South Wales and Queensland. Our catch was meagre and we did not linger long because we were anxious to press on to our next location.

4. Lamington National Park, 5–6.xii.2013 and O'Reilly's Rainforest Retreat in the middle of the park, 5.xii.2013 (PC & JEOH)

Lamington National Park is divided into the western Green Mountains Section and eastern Binna Burra Section. Both require a significant drive from the nearest town so we prearranged accommodation for one night at the privately-owned O'Reilly's Rainforest Retreat in the Green Mountains Section of the park. We wanted to spend the night in the park so we could collect at light after dark. We were rewarded with a nice collection of a yellow nocturnal species belonging to *Palpostoma* Robineau-Desvoidy, a tachinid that parasitizes adult scarabaeoid beetles. Despite spending the next morning on trails in the rainforest (Fig. 1) and walking along the park road, our collecting was poor.

5. D'Aguilar National Park, 7.xii.2013 (PC, JEOH, JOS & ISW)

D'Aguilar National Park is a narrow strip of parkland straddling the rugged D'Aguilar Range and extends southeastward into the city of Brisbane. Despite its proximity to the city and its well-groomed lookouts and picnic areas, it is still home to extensive tracts of eucalypt forest and rainforest. Pierfilippo and Jim spent the day driving along Mount Nebo Road in the South D'Aguilar Section of the park, stopping to collect at several places along the way (Scrub Road, Jolly's Lookout, Boombana and Westridge Lookout). Meanwhile, John and Isaac stepped off their plane in Brisbane, rented a car, and proceeded to the northern Mount Mee Section of the park. Here they collected at Somerset Lookout, Western Escarpment Forest Drive and Mill Rainforest Walk. The four of us met that evening at a motel in the small town of Kilcoy within a few hours' drive from our next day's destination. It was a moderately successful day.

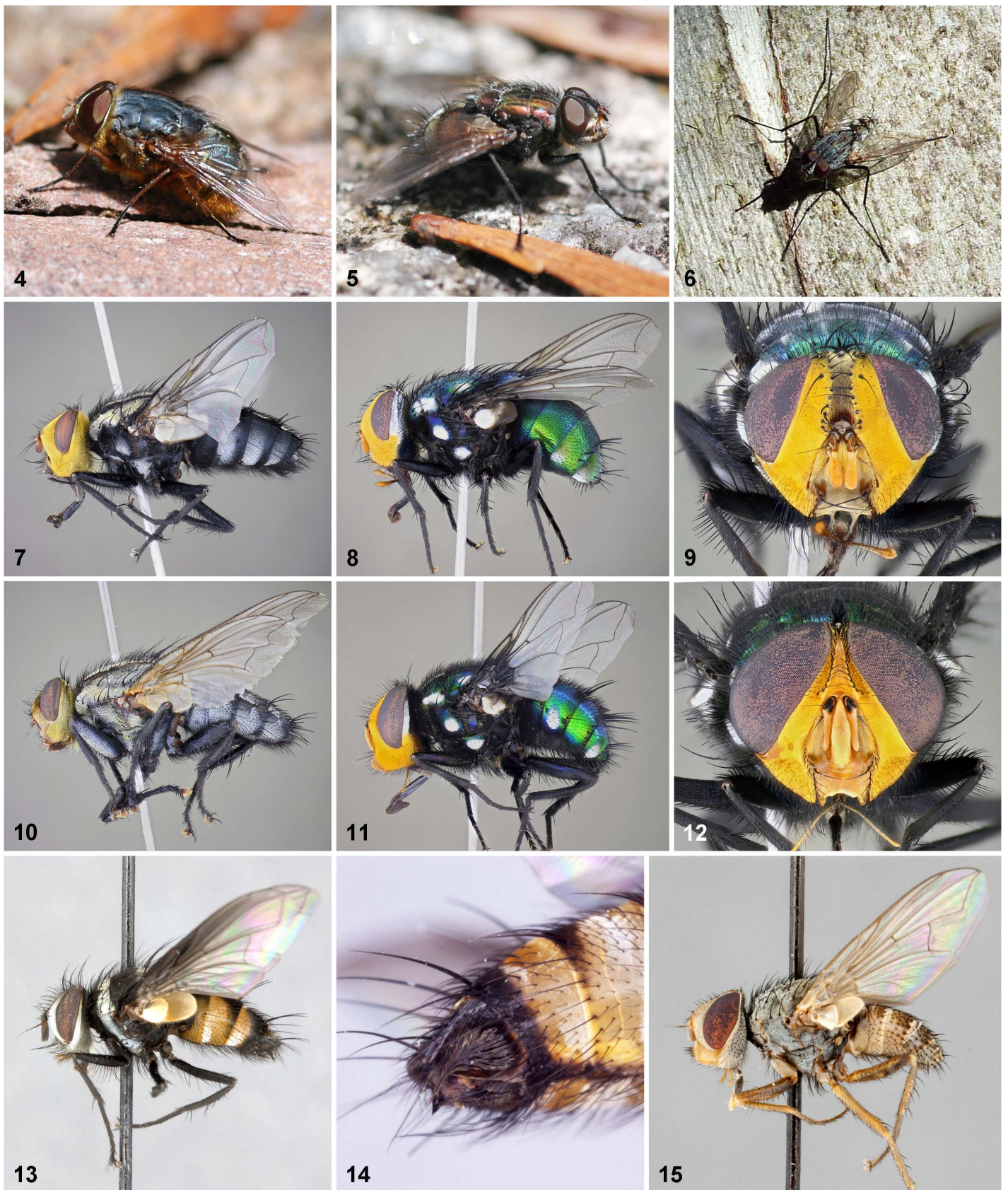
6. Bunya Mountains National Park, 8–9.xii.2013 (PC, JEOH, JOS & ISW)

Bunya Mountains National Park covers about 12,000 hectares and encompasses most of the Bunya Mountains. This isolated portion of the Great Dividing Range is northwest of Brisbane and about 150 kilometres inland from the coast. In addition to its eucalypt and rainforest habitats, this park is especially noted for its tall bunya pines (*Araucaria bidwillii*) with dome-shaped crowns and unusual-looking grass trees (*Xanthorrhoea glauca glauca*). We spent a couple of days here, collecting in a variety of habitats: hilltopping at Mt. Kiangarow among the grass trees, exploring grassland 'balds' rich in rare plants (but seemingly not tachinids), hiking trails through eucalypt forest and rainforest, and taking flies at the lights of our rented cottage on the edge of the park. In all, our efforts resulted in a nice but not spectacular collection of tachinids.

We were fortunate as well to catch several specimens of a remarkable new genus and species of rhinophorid that will soon to be described by Thomas Pape and Pierfilippo. Isaac caught the first one while sweeping on the summit of Mt. Kiangarow. Later, while stopped to talk to a couple of hikers on the trail, John spotted another on the trunk of a sunlit tree. He collected it and a short time later another fly appeared to take the place of the first. John and Jim collected a fly at a time for about 15 minutes, catching in total about ten rhinophorids, all males. These "station taking" males were awaiting females with which to mate. Pierfilippo caught several males and one female on a nearby tree that was also being used for the same purpose by these flies. If the males were competing for the best spots then this would constitute lekking behavior, but although we seldom saw more than one male on the tree trunk at one time we are hesitant to speculate too much about what was going on.

7. Carnarvon National Park, 10–15.xii.2013 (PC, JEOH, JOS & ISW)

Carnarvon National Park is located about 600 kilometres northwest of Brisbane in the Central Queensland Sandstone Belt. The park is both large (almost 300,000 hectares) and ecologically diverse. We were here to visit two of the four sections: the remote Mt. Moffatt Section and the popular Carnarvon Gorge Section. We were especially excited about the former because it is commonly considered the best place in Australia to catch tachinids. This reputation was further enhanced when Jim and others collected here in 2002 (see above



Figures 4–15. Some of the flies we collected in Australia. **4–6.** Point Lookout, New England N.P. **4.** *Calliphora* sp. (Calliphoridae). **5.** *Rutilla (Microrutilla)* sp. (Tachinidae). **6.** *Senostoma* sp. (Tachinidae) on tree trunk in typical, obliquely downward-facing, stance. **7.** *Zita* sp. (Tachinidae), mimic of sarcophagid flies such as the one shown below it, Mt. Moffatt, Carnarvon N.P. **8–9.** Dexiine fly (Tachinidae), mimic of the calliphorid fly shown below it, Carnarvon Gorge, Carnarvon N.P. **8.** Lateral view. **9.** Anterior view of head. **10.** Sarcophagid fly (Sarcophagidae), Mt. Moffatt, Carnarvon N.P. **11–12.** *Amenia* sp. (Calliphoridae), Mt. Allan, Conondale N.P. **11.** Lateral view. **12.** Anterior view of head. **13–14.** Male of *Zosteromeigenia* sp. (Tachinidae), O’Sullivans Gap, Myall Lakes N.P. **13.** Lateral view. **14.** Tip of abdomen in ventrolateral view showing sexual patch within a concave area of tergum 5. **15.** *Eustacomyia* sp. (Tachinidae), Fly Hill, Mt. Moffatt Section of Carnarvon N.P.

and Hansen 2003, O'Hara 2003, O'Hara *et al.* 2004). But before we could discover whether Carnarvon would meet our expectations on this trip, we had to get there. Mt. Moffatt Section is not the sort of place where one can drive in for a quick look around. The entrance is about 120 kilometres to the northwest of the nearest town (Injune, population ca. 1000) and for much of this distance the road is dirt (or mud, if raining). One must plan ahead and carry in all food and upon leaving carry out all trash. These logistical matters only heightened our sense of anticipation as we drove along the minimally marked Mt. Moffatt Road, checking our GPS periodically to ensure we were on the right route.

Once in the park, we proceeded to the 'barracks', a cottage-like building with a kitchen, four bedrooms, a bathroom/laundry area, and a large central room with tables and assorted furniture. The Ranger in Charge at Mt. Moffatt, Greg Keith, had kindly offered us free use of the barracks before we left for Australia. We had camping gear along in case we needed it but camping is not an ideal situation when there are lots of specimens to prepare and a need to keep alcohol-preserved material cool for DNA preservation. There is no accommodation within Mt. Moffatt Section for tourists other than camping areas, and few of these have water. Mt. Moffatt Section does not get a lot of visitors but we were nonetheless surprised to not see a single tourist during our five days here.

We all climbed to the top of 'Fly Hill' the first day after arrival, despite a partly overcast sky. Such weather often makes for poor collecting on a hilltop, but we actually caught a great number of tachinids. This was the same hilltop that was phenomenally rich in tachinids in 2002 (e.g., O'Hara 2003) and still looked much the same in 2013. Interestingly, the summit of Fly Hill is only 100 metres above the ground level of the surrounding eucalypt forest and does not give the impression that it has much to offer (Fig. 16). Perhaps the hill's almost perfect conical shape and its small area at the summit work in its favour.

One of the commoner tachinids we encountered on Fly Hill was a species of *Eustacomyia* Malloch (Fig. 15). These small (5 mm long) rather muscid-like flies flew about the lower fronds of the lone cycad. They, like members of the related genus *Palpostoma* men-

tioned above, parasitize adult scarabaeoid beetles. Near the end of our day's collecting we posed for our only group picture of the trip (Fig. 17).

The second day was supposed to be an ascent of the more formidable Mt. Moffatt, but a completely overcast sky and periodic light rain forced a change in plans. We visited The Tombs area instead and hiked the loop trail, nets in hand, but caught little. That evening we drove to a place where a small stream crosses the road and tried blacklighting, but again with little success.



Figure 16. The summit of Fly Hill in the Mt. Moffatt Section of Carnarvon National Park is barely 100 metres above the surrounding forest but is a mecca for hilltopping tachinids (and tachinidologists). (Photo: J. O'Hara)

Fortunately for us, day three was sunny and Mt. Moffatt was beckoning. Or at least it was for Pierfilippo, John and Isaac; Jim had hilltopped there in 2002 and was anxious to try a hilltop he had spotted to the west of Fly Hill. Mt. Moffatt proved to be a challenging climb, especially just below the summit where a short vertical stretch is hard to avoid. This is not a big mountain, only 730 m above sea level, and it only took about an hour to ascend, but there is no trail and much of the climb is over ankle-busting basalt boulders derived from ancient volcanic eruptions. Apparently there is a "good way" up, but our group did not find it and had to do a little low-grade rock climbing, throwing our nets up ahead during the tricky parts, and thus committing ourselves to the climb. The actual summit is about 150x75 m, almost flat, with tall eucalypt trees and smaller shrubs. It doesn't actually seem like a very good hilltopping site given the heavy tree cover, but as we reached the top and heard the low buzzing of tachinid wings all

thoughts of the treacherous climb vanished. We each patrolled the summit, trying different spots, and collecting tachinids almost as fast as we could get them into our kill jars. After a while, we even started ignoring the beautiful *Rutilia*, which seemed in endless supply. The best spots seemed to be lower sunlit bushes and small trees, but one could collect at least some tachinids almost anywhere on the top of the mountain. A horizontal branch of one standing dead tree on the edge of the top was a hot spot for a species of *Zita* Curran (Parer-

ered an even more perilous route for our descent. We are still in the process of sorting and identifying this material, and though it does not quite match the record collecting from Fly Hill of O'Hara *et al.* (2004) in 2002 (581 specimens), we caught at least 570 specimens between us, making it one of the best days collecting tachinids that we have ever had.

The hill that Jim had chosen in lieu of Mt. Moffatt was not as well-shaped as it had appeared from a distance. Reaching the summit and not seeing the wealth of tachinids he had been expecting, Jim switched to Fly Hill for the rest of the day and had his best collecting of the trip (Fig. 18).

The next day was our last in Mt. Moffatt Section. John stayed back in barracks to finish preparing his specimens from the day before while the rest of us drove up to the Consuelo Tableland in the northern part of the park. We had a couple of exciting encounters along the way: a spectacular and highly venomous eastern brown snake (*Pseudonaja textilis*) was warming up in a sunny spot on the road (Fig. 19), and three dingoes drinking from a puddle were briefly sighted before they disappeared into the low grass. We stopped to collect at a couple of spots before reaching our final destination, the lush Mahogany Forest. The area was blanketed in thick waist-high grass, with scattered palms and bushes under the tall open mahogany forest. Sweeping was



Figure 17. Collectors take a break for a group picture while hilltopping on Fly Hill. Left to right: Jim O'Hara, Pierfilippo Cerretti, Isaac Winkler and John Stireman. (Photo: J. Stireman)

very effective here but we could not stay long because we wanted to reach the Carnarvon Gorge Section by early evening. We were actually only a few kilometres from the head of Carnarvon Gorge while in the Mahogany Forest but by road we were more than five hours away. We would have to drive southeast to Injune, then north along the main road, and finally west to follow the secondary road to the Gorge.

igoniini) as well as the sarcophagids it apparently mimics (cf. Figs. 7 and 10). A nondescript tree trunk near the northern edge of the summit was the favoured spot for a species of *Euthera* Loew, and the dappled sunlit branches of a small tree, standing perhaps 3 m in height, was the only spot where we collected what we think is a new genus of Glaurocarini (see Fig. 1h in article by Winkler *et al.* elsewhere in this newsletter). Amidst all this activity a single diminutive fly was spotted running jerkily along on the leaf litter, moving its wings like a sepsid in the shade of a big cactus. Upon capture it was recognized as a species of *Catharosia* Rondani, surely an undescribed species since both the genus and the tribe Catharosiini were previously unrecorded from the Australasian Region, and both are unrecorded from the adjacent Oriental Region. In the afternoon, the "action" began to taper off, and by 3 p.m., hot and weary from all the net-swinging, we decided to head back to the barracks to examine our catch. On our way we discov-

We had called Kieran Hoey, Ranger in Charge at Carnarvon Gorge Section, a few days earlier to ask whether we could use the barracks at the Gorge for a couple of nights. This he readily agreed to and we were able to move in as soon as we arrived. We prepared our specimens collected that morning from the Consuelo Tableland, and the next morning set off to collect within the breathtakingly scenic (and correspondingly popular) Carnarvon Gorge. Jim and Isaac spent the day hiking deep into the Gorge and collecting along the main trail, stopping along the way to see the spectacular aboriginal

rock art at the ‘Art Gallery’ in a side canyon. Pierfilippo and John went first to Boolimba Bluff before also collecting along the Gorge trail. They had hoped Boolimba Bluff would be perfect for hilltopping but it proved disappointingly unattractive to tachinids. We caught some taxa we had not seen before but on the whole our single day in the Gorge did not yield many tachinids. We cannot say that the eucalypt forest in the Mt. Moffatt Section has a greater diversity of tachinids than the rich habitats of the Gorge, but the hilltops in the former are better for collecting than Boolimba Bluff and paths through the Gorge.

Early the next day Pierfilippo and Jim left on their long drive back to Brisbane. They would spend the following day at the Queensland Museum and fly out from Brisbane and back to Italy and Canada the day after. Meanwhile, John and Isaac proceeded on to their next destination.

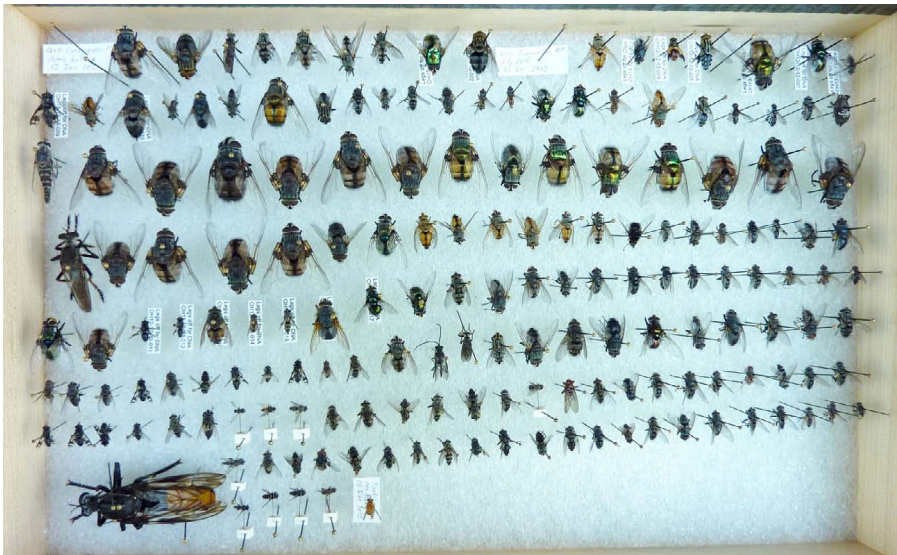


Figure 18. Specimens collected by Jim on 13 December 2013, consisting mostly of tachinids from Fly Hill. (Photo: J. O’Hara)

8. Great Sandy National Park (JOS & ISW)

As Jim and Pierfilippo headed back to Brisbane, Isaac and John drove east to the coast to Tin Can Bay, where we lodged in a nice motel, hardly more than a stone’s throw from the beach, near the northern end of Great Sandy National Park. This coastal park of sand dunes, scrubby woodland and rainforest consists of two sections, the Fraser Island Section (at 56,000 ha, apparently the world’s largest sand island and a very popular tourist destination) and the mainland Coloola Section (over 18,000 ha, and part of the larger 61,750 ha Coloola Recreation Area), which we visited. The coastal forest and “sandblows” were impressive and beautiful

(Fig. 20), but yielded few tachinids. Therefore, after a 5 km or so walk, we decided to try the Bymien Picnic Area, a more inland rainforest area. The forest was impressive, with large buttressed trees and strangling figs reminiscent of forest we had seen in the Neotropics. One plant we were especially struck by was a vining bamboo-like plant (*Flagellaria indica*), which reached at least 10 m up into the canopy by attaching itself to other plants with stiff, tightly coiled leaf tips. Despite intermittent showers and our relatively late arrival, we managed to collect a few tachinids in sunlit tree fall gaps and along trails.

9. Tewantin National Park, Mt. Tinbeerwah (JOS & ISW)

Mt. Tinbeerwah has a good reputation among tachinid collectors in Queensland for several reasons: first, it is close to Brisbane, second, you can drive

nearly to the top (one has to walk only a kilometer or so to the summit), and third, because there are lots of tachinids there! The summit of Mt. Tinbeerwah is primarily solid rock, with low vegetation in a few places with sufficient soil, and a few areas of short, shrubby trees. The observation tower that sits on the peak has great views of the surrounding valleys and hills and is a popular spot for sightseers. The day that we (John and Isaac) visited was not ideal, with some cloudiness and howling winds, yet we still were able to collect a fairly diverse array of tachinids, including some nice *Rutilia* and several taxa of Parerigonini. The best collecting was not on the observation tower itself as we had heard, but in the lower rocky areas around the tower – perhaps because of the fierce winds. We can only imagine how good this spot might be for collecting on a sunny, still morning.

Our favorite specimens from this spot were of an unidentified genus of Dexiini that are remarkable mimics of the distinctive co-occurring calliphorid genus *Amenia* Robineau-Desvoidy (cf. Figs. 8, 9, 11, 12), having metallic green coloration with white pollinose spots and a yellow head. Species of several different Australian tachinid genera mimic *Amenia*, including *Rutilia* subgenera *Ameniamima* Crosskey and *Graphostylum* Macquart and, to a lesser degree, the ernestiine genus *Chlorotachina* Townsend, which we also caught here. As with the sarcophagid-mimicking *Zita*, the uncanny similarity of these tachinids to *Amenia* begs the ques-

tion of why would a tachinid benefit from looking like a calliphorid (assuming that this is the direction of the mimicry, which we believe is likely)? One possibility, suggested to us by Monty Wood, is that many female calliphorids and sarcophagids may be able to cause myiasis if eaten by, say, a nestling bird. Thus, birds or other visual predators may avoid these taxa, and anything that closely resembles them. We don't have space to fully ponder this question here, but we plan to examine the issue more thoroughly in a future article.

10. Conondale National Park (JOS & ISW)

After leaving Mt. Tinbeerwah, we traveled slightly inland to try collecting in Conondale National Park, a moderate-sized (35,500 ha) mountain park encompassing the Conondale Mountain Range, somewhat similar



Figure 19. An eastern brown snake (*Pseudonaja textilis*) slithers to safety after being disturbed on the dirt road to the Consuelo Tableland in Carnarvon National Park. This is ranked as the world's second most venomous snake in some listings and is responsible for more snakebite deaths in Australia than any other snake.

in size and vegetation to Bunya Mountains National Park (even boasting the characteristic bunya pines of the latter). The park was very pleasant and scenic, with clear cool streams, diverse forests, and rounded mountain tops. Here, we decided to make use of the sleeping bags and tents we brought by camping for two nights in the Booloumba Creek campground. The kookaburras were accustomed to people and regularly visited the campground looking for handouts. The “bushies” (bush turkeys) were even more brazen, and one slyly snuck up and stole John's morning sausage as it was cooling next to the fire. We placed pan traps near the creek and tried blacklighting at the campground (which was swamped

by mayflies and caddisflies due to the proximity of the creek), but our main collecting event was on the top of Mt. Allan. A 7 km or so hike took us to the top of this local peak, which was fairly large and broadly rounded. Although ringed by trees, in the center of the summit there was a clearing where vegetation had been replaced with a large fire tower. Unfortunately the fire tower was under repairs and access was closed. The collecting was nothing like Mt. Moffat, but there were tachinids here and there, and we spent several hours patrolling key bushes and grassy hillocks along the top. Perhaps our best find was *Myiotrixia prosopina* Brauer & Bergenstamm (see Fig. 1g in article by Winkler *et al.* elsewhere in this newsletter), individuals of which were perching on a utility pole near the top. They were so un-tachinid-like in appearance (e.g., upright “push-up” posture, wings completely folded over the back), that we just assumed they were muscids and only collected a few specimens. Only later did we realize that they were a completely new tribe of tachinids for us (Myiotrixini)!

Acknowledgements

We owe a debt of gratitude to a number of people for making our expedition possible and successful. Our permit application for collecting in national parks in Queensland were endorsed by James Wallman (University of Wollongong, Wollongong) and Monty Wood (Canadian National Collection of Insects, Ottawa [CNC]). We received tips on where to collect in eastern Australia, in addition to various road and park maps, from Monty Wood, Brad Sinclair (Canadian Food Inspection Agency and CNC, Ottawa) and Jeff Skevington (CNC). Dan Bickel (Australian Museum, Sydney [AMS]) provided advice about collecting in Australia and hosted

Jim and Pierfilippo's visit to the AMS collection on their first day in Australia. Chris Lambkin (Queensland Museum, Brisbane [QM]) kindly hosted Jim and Pierfilippo's visit to the QM on their last full day in-country, and did the same for John and Isaac three days later. Special thanks are extended to Greg Keith (Ranger in Charge, Mt. Moffatt Section, Carnarvon National Park) for allowing us to stay at the barracks in the Mt. Moffatt Section for five days. Both Greg and Brent Tangey (Resource Ranger, Queensland Parks and Wildlife Service, Roma) made us feel welcome in the park and facilitated our efforts to catch tachinids in whatever way they could. Kieran Hoey (Ranger in Charge, Carnar-



Figure 20. View of Carlo Sandblow in the aptly named Great Sandy National Park.

von Gorge Section, Carnarvon National Park) kindly allowed us to stay at the barracks in Carnarvon Gorge Section for a couple of nights. Kelvin Quinn (Ranger in Charge, Bunya Mountains National Park) provided maps and helpful advice prior to our visit to Bunya Mountains National Park. Support for this expedition from U.S. NSF DEB-1146269 is gratefully acknowledged.

References

- Barraclough, D.A. (1992) The systematics of the Australasian Dexiini (Diptera: Tachinidae: Dexiinae) with revisions of endemic genera. *Invertebrate Taxonomy*, 6, 1127–1371.
- Cantrell, B.K. (1984) Synopsis of the Australian Phasiinae, including revisions of *Gerocyptera* Townsend and the Australian species of *Cylindromyia* Meigen (Diptera: Tachinidae). *Australian Journal of Zoology. Supplement Series*, 102, 60 pp.
- Cantrell, B.K. & Crosskey, R.W. (1989) Family Tachinidae. Pp. 733–784. *In*: Evenhuis, N.L., ed., *Catalog of the Diptera of the Australasian and Oceanian Regions*. Bishop Museum Special Publication 86. Bishop Museum Press, Honolulu and E.J. Brill, Leiden. 1155 pp.
- Cerretti, P., O’Hara, J.E., Stireman, J.O. III, Winkler, I.S. & Kirk-Spriggs, A.H. (2013) To ‘Die Hel’ and back. Expeditions of the Phylogeny of World Tachinidae Project. Part I: Western Cape, South Africa. *The Tachinid Times*, 26, 20–29.
- Colless, D.H. (2012) The *Froggattimyia*-*Anagonia* genus group (Diptera: Tachinidae). *Records of the Australian Museum*, 64, 167–211.
- Crosskey, R.W. (1973a) A revisionary classification of the Rutiliini (Diptera: Tachinidae), with keys to the described species. *Bulletin of the British Museum (Natural History). Entomology Supplement*, 19, 167 pp.
- Crosskey, R.W. (1973b) A conspectus of the Tachinidae (Diptera) of Australia, including keys to the supraspecific taxa and taxonomic and host catalogues. *Bulletin of the British Museum (Natural History). Entomology Supplement*, 21, 221 pp.
- Evenhuis, N.L., ed. (1989) *Catalog of the Diptera of the Australasian and Oceanian Regions*. Bishop Museum Special Publication 86. Bishop Museum Press, Honolulu and E.J. Brill, Leiden. 1155 pp. Available online with updates by the editor at: <http://hbs.bishopmuseum.org/aocat>.
- Guérin [-Méneville], F.E. (1831) Insectes. Pls. 20–21. *In*: Duperrey, L.I., ed., *Voyage autour du monde, exécuté par ordre du Roi, sur la corvette de sa Majesté, La Coquille, pendant les années 1822, 1823, 1824 et 1825*. Zoologie. Atlas. A. Bertrand, Paris. 21 pls.
- Guérin-Méneville, F.E. (1838) Première Division. Crustacés, arachnides et insectes. *In*: Duperrey, L.I., ed., *Voyage autour du monde, exécuté par ordre du Roi, sur la corvette de sa Majesté, La Coquille, pendant les années 1822, 1823, 1824 et 1825*. Zoologie. Tome Second. 2e Partie. A. Bertrand, Paris. xii + 319 pp.
- Guérin-Méneville, F.E. (1843) Note monographique sur le genre de muscides auquel M. Robineau Desvoidy a donné le nom de *Rutilia*, précédée de l’établissement d’un nouveau genre voisin de celui-ci. *Revue Zoologique*, 1843, 262–274.
- Fabricius, J.C. (1775) *Systema entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Kortii, Flensburgi et Lipsiae [= Flensburg and Leipzig]. [30] + 832 pp.
- Hansen, D.E. (2003) Notes on tachinids *in copula* from hilltops in Carnarvon N.P., Queensland, Australia. *The Tachinid Times*, 16, 3–5.
- Kutty, S.N., Pape, T., Wiegmann, B.M. & Meier, R. (2010) Molecular phylogeny of the Calyptratae (Diptera: Cyclo-rhapha) with an emphasis on the superfamily Oestroidea and the position of Mystacinobiidae and McAlpine’s fly.

- Systematic Entomology*, 35, 614–635.
- O’Hara, J.E. 2003. The tachinid fauna of Carnarvon National Park, Queensland, as revealed by hilltop collecting. *The Tachinid Times*, 16, 5–8.
- O’Hara, J.E., Skevington, J.H. and Hansen, D.E. (2004) A reappraisal of tachinid diversity in Carnarvon N.P., Australia, and estimation of the size of the Australian Tachinidae fauna. *The Tachinid Times*, 17, 8–10.
- Robineau-Desvoidy, J.-B. (1830) Essai sur les myodaires. *Mémoires présentés par divers savans a l’Académie Royale des Sciences de l’Institut de France. Sciences Mathématiques et Physiques*, Sér. 2, 2: 1–813.
- Sclater, P.L. (1858) On the general geographical distribution of the members of the class Aves. *Journal of the Proceedings of the Linnean Society. Zoology*, 2, 130–145.
- Skevington, J.H. (2008) Hilltopping. Pp. 1799–1807. In: Capinera, J.L., ed., *Encyclopedia of Entomology*. Second Edition. Vol. 2, D–K. Springer, Dordrecht. lxiii + 1145–2095 + pls. 33–64.
- Stireman, J.O. III, O’Hara, J.E., Moulton, K., Cerretti, P. & Winkler, I.S. (2013) Progress towards a phylogeny of world Tachinidae. Year 1. *The Tachinid Times*, 26, 4–9.
- Wallace, A.R. (1876) *The geographical distribution of animals. With a study of the relations of living and extinct faunas as elucidating the past changes of the earth’s surface*. 2 volumes. Macmillan & Co., London, and Harper & Brothers, New York. xxi + [1] + 503 pp. + [5] maps + pls. I–XIII [Vol. 1]; viii + [1] + 607 pp + [2] maps + pls. XIV–XX [Vol. 2].