

## A biodiversity assessment of the Centre Hills, Montserrat.

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# 4. Invertebrates of the Centre Hills and Montserrat, with an emphasis on beetles

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## 4.1. Introduction

About three quarters of the world's known organisms are animals (Fig. 4.1). Invertebrate animals alone make up the vast majority of the world's biodiversity, the Arthropoda make up the vast majority of the invertebrates, the Insecta the vast majority of the arthropods, and the beetles the major portion of the insects (Fig. 4.1). In fact, one in 4 described animal species, and one in 5 organisms, is a beetle.

The remainder of the animals, the vertebrates and their relatives, are a minor, tiny slice of the total biodiversity pie, and if the terrestrial vertebrates (i.e. non-fishes) are treated separately, they would virtually disappear. Although, because of their size and economic importance as food, tourist attractions and pets, they are the animals most familiar to the public, on a biodiversity scale, they are nearly insignificant.

The number of terrestrial animal species native to Montserrat is probably several thousands, but the most extensive summary of the fauna to date (Stevens and Waldmann 2001) records only 53 tetrapods and 318 specific records for invertebrates on Montserrat (Table 4.1). Unfortunately, the vast majority of species present on Montserrat, and especially those populations of global conservation importance in terms of unique, endemic elements, are either poorly or not at all documented. The biodiversity of Montserrat is undoubtedly vastly more expansive than one would expect from a quick glance at a globe, but the scientific literature does nothing to indicate this fact, which under-values Montserrat's biodiversity.

This chapter will attempt the near impossible task of documenting the terrestrial invertebrate fauna of Montserrat, focusing on the Centre Hills. The data we have assembled and present below will show that the invertebrate fauna of Montserrat, concentrated mostly in the Centre Hills, ranks the island globally as among the most important areas in terms of density of unique, rare, valuable and endangered biodiversity. We hope to provide the jumping-off point for a discussion of this amazing, and still mostly unknown biodiversity, and the impact that increased knowledge can have on the status of

a small but biotically rich territory. We also give a general discussion of the historical data available, the history of exploration of Montserrat's fauna (*see Box 3*), and some of the challenges faced whilst conducting the invertebrate inventory (*see Box 2*). We concentrated much of the effort of the inventory on the Coleoptera (beetles) as the primary example to illustrate the importance of the Centre Hills and the need for its recognition as a conservation priority.

In an appendix to this report, we provide species lists of, and notes on, the beetles, the non-beetle hexapods (Insects), and the non-hexapod invertebrates of Montserrat. Also provided is a full Coleoptera checklist.

## 4.2. Diversity of the Montserrat invertebrate fauna

### 4.2.1. Results from pre-2000 collecting

In all historical collections (*see Box 3 for detailed discussion*), except Bass and Stevens and Waldmann, the vast majority of specimens originated from south of the Belham Valley. It was clear that the big draw for most visitors was the Soufrière, and the high areas there, plus the area around Plymouth and the road to the south which were the most heavily sampled. The little bit of material coming from north of the Belham was from Woodlands. For instance, Blackwelder's northernmost sites are at Woodlands and Trant's beach. The Baranowskis made three long visits to Montserrat, making theirs perhaps the single greatest effort of any entomologist before 2000, but Slater & Baranowski (2005) report not a single specimen from the Centre Hills. Only the Aitken group, and possibly Fennah, spent much if any time in the north and only Fennah seems to have actually penetrated the mid-to-high elevations of the Centre Hills.

The problem with this approach is that while the highest, wettest and most fertile point on the island before the volcanic crisis was in the southern mountain series, that area was in fact, secondary forest, which has relatively recently regenerated from both agricultural and historical volcanic activity. This fact was not obvious to earlier collectors who followed Darlington's (1943) instruction to head to the tops of the highest peaks. Although we now know that the Centre Hills' old forests are rich, possibly only a single one of the insect collectors who visited Montserrat between 1894 and 2000 went to the specialized higher elevation forests of the Centre Hills, and that was Fennah.

The only previous published summary of the fauna of Montserrat (Stevens and Waldmann 2001), provided a list of invertebrates totalling 455 species, which is summarised in Table 4.1. It is noteworthy, however,

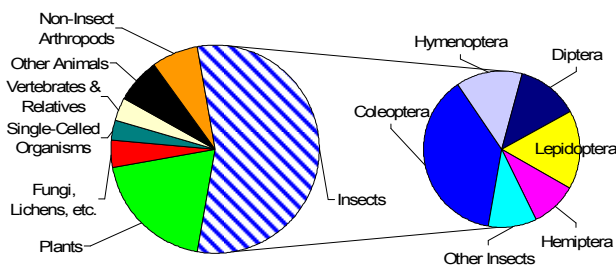


Fig. 4.1. Relative species richness of described taxa (Data from Chapman 2006)

Taxon	N listed	N unrecorded	N corrected	Notes
Protoctista	3	0	3	Disease causing organisms
Plathelminthes	1	0	1	Disease causing organisms
Nemathelminthes	3	0	3	Disease causing organisms
Mollusca	5	0	5	
Onychophora	1	0	1	
Scorpiones	2	0	2	Medically important
Amblypygi	2	1	1	
Araneae	4	0	4	
Acari	6	2	4	Medically & agriculturally important
Crustacea	12	0	12	Some species important as food
Chilopoda	2	0	2	Medically important
Collembola	1	0	1	
Odonata	4	0	4	
Dermaptera	3	0	3	
Blattaria	5	2	3	Pest species
Isoptera	15	0	15	Economically important
Orthoptera	8	1	7	Economically important
Thysanoptera	11	11	0	Economically important
Hemiptera-- Heteroptera	27	21	6	Economically important
Hemiptera -- Homoptera	49	28	21	Economically important
Coleoptera	120	17	94	9 duplicate taxa removed
Hymenoptera	25	10	15	
Trichoptera	1	0	1	
Lepidoptera	87	33	54	
Diptera	58	11	47	Medically important
<b>TOTAL</b>	<b>455</b>	<b>137</b>	<b>318</b>	

Table 4.1. Summary of pre-2000 Montserrat invertebrate records in Stevens and Waldmann (2001). "N Listed" indicates number of species listed in Stevens and Waldmann (2001), "N unrecorded" refers to the number of those species that had never actually been reported specifically from Montserrat, and "N corrected" is the difference between the two.

that Stevens and Waldmann included records of species for Montserrat on the basis of extrapolation. For instance, not one of the 11 records of Thysanoptera (thrips) they list has actually been recorded from Montserrat - they are simply recorded to be widespread in the Lesser Antilles. Fully 30% of the invertebrates listed by Stevens and Waldmann are not accompanied by a record specific to Montserrat (Table 4.1), reducing their recorded total confirmed species by 136. That number is further re-

duced by their inclusion of erroneous records and double-listings (see below). Of those species listed, most are of medical, veterinary, or economic importance (Table 4.1), and hence the list includes a disproportionate number of widespread, exotic and pestiferous species. However, this is no fault of Stevens and Waldmann, but is an accurate depiction of our unbalanced knowledge of the various groups of animals. Erroneous listings and double listings as alternative scientific names are simply

unavoidable in a broad general work such as theirs, but their frustration at finding no published records of groups obviously present on the island understandably lead to their use of non-specific records from neighbouring islands or the region in general. To the extent possible, we have listed all the additions and corrections to Stevens and Waldmann (2001) that we have found, but undoubtedly many remain.

From what we have learned whilst reviewing the historical data, it is possible that another 100 species' records for Montserrat lie buried in the world's primary taxonomic literature, but given factors such as level of taxonomic uncertainty and the low sampling effort of the Centre Hills, the recorded fauna of Montserrat is clearly but a small fraction of reality.

#### 4.2.2. Post-2000 collecting history

In 2000, our group, from the West Indian Beetle Fauna Project at Montana State University, began to work on Montserrat. Initially, a visit at the invitation of the Montserrat Department of Agriculture and the Royal Society for the Protection of Birds in June, 2000 included Michael Aaron Ivie and Kelvin Antonio Guerrero. The impetus was the question of whether Montserrat oriole chicks were starving because of the effects of volcanic ash on their insect food. Several nesting sites in the Centre Hills were visited, although the visit came in an extensive dry period, and relatively little was collected. Our initial impressions lead to a multi-year project, and a return visit in January 2002, by Ivie, Katharine Ann Marske and Kenneth Patrick Puliafico. On that visit, in anticipation of a return, Bridget Beatty, Ann Krakower and her mother, Rosalie Burrows, were recruited to run Malaise and ultraviolet-light traps on a bi-weekly schedule, from January through July 2002. In May, June, and July 2002, Marske, accompanied for part of the time by Ivie, began establishing long-term research sites in the Centre Hills. Monthly canopy fogging samples were taken from 4 sites in the Centre Hills in May-August 2002, then bimonthly from October 2002 through August 2003, by staff of the Montserrat Department of Environment, including Lloyd Martin, James Boatwain, John Martin, James Daley, and Lloyd Aymer. Marske and Ivie, accompanied by LaDonna Lynn Ivie, returned to the island in May and June, 2003 to continue work. A small amount of material was collected in May 2004 during a visit by Ivie for a workshop. On most of these trips, Philemon Murrain and/or Calvin Fenton worked with our collectors, providing access, guidance and advice to maximize the collections.

Most of this work had been concentrated on the mid-elevation forest of the Centre Hills, with repeated samples at Hope Ghaut, Fogarty, Cassava Ghaut and Underwood Ghaut. Other samples were taken around Woodlands, at the Beatty house in Cassava Ghaut, Lawyer Mountain, Gunn Hill, Jack Boy Hill and various other locations around the Centre Hills, as well as by trapping at each of the houses used as residences. The Beatty house and Riverside House in Woodlands were

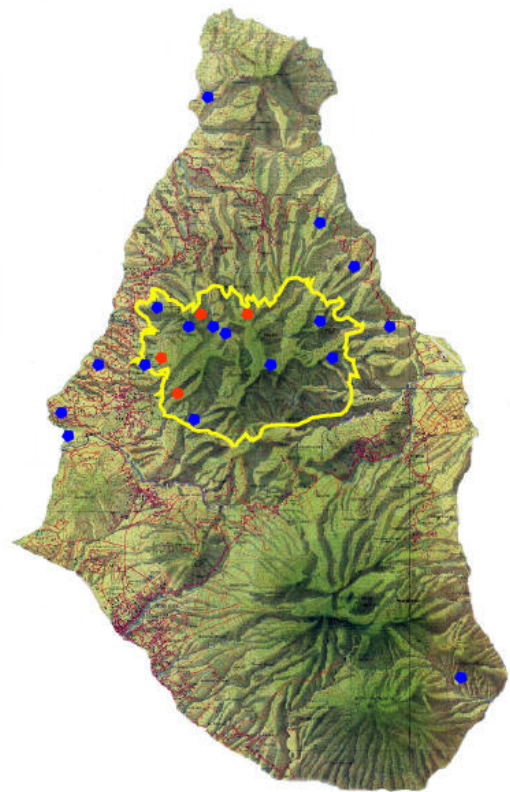


Fig. 4.2. Primary West Indian Beetle Fauna Project collecting localities 2000-2005. Red indicates major long-term canopy fogging sites, blue major trapping localities. Yellow line indicates the boundary of the Centre Hills forest reserve

of particular importance in this regard. Ivie and Marske made separate visits of a few hours each by helicopter into Roaches, with traps left for the week between. This represented the total of our collecting in the south. A helicopter lift to the flanks of Katy Hill gave Ivie an overnight collecting opportunity in June 2003, followed by a hike over the actual top and out via the ridge to the north. This gave the first look at the highest and wettest elevations on the island.

With the goal of expanding the area sampled, the Ivies brought a new team of students to the island in July and August 2005. This team included graduate student Ian Andrew Foley, and undergraduates Vincent Goodwin Martinson, Patrick Edward Hughley, Levi James Lehfeltdt, and Robert Anthony Semplet. They placed Malaise and ultraviolet traps in areas both wetter (Big River, Killicrankie, Jack Boy Hill, Bottomless Ghaut, Katy Hill, Fairy Walk) and drier (Furlong, Cedar Ghaut, Rendezvous Bay) than those previously sampled. [Material collected by this group is labelled "WIBF Group" for the West Indian Beetle Fauna Project, rather than listing individual names.] At the end of this field work, a week was spent by Ivie on Guadeloupe, studying pre-volcano collections in INRA.

The last collecting to be reported here was the result of a visit by the American orithologists/odonatologists Fred Charles Sibley (1933-) and Margaret Pries Sibley (1936-) in October, 2006. Their collections of damselflies and dragonflies are in their private collec-

Taxon	Stevens & Waldman 2001 (Adjusted)	Ivie <i>et al.</i> (2007)
Protocitsta	3	3
Plathelminthes	1	2
Nematoda	3	4
Annelida	0	0
Mollusca	5	15
Onychophora	1	1
Scorpiones	2	2
Amblypygi	1	1
Schizomida	0	1
Araneae	4	6+
Acari	4	4+
Pseudoscorpiones	0	1
Crustacea	12	14+
Chilopoda	2	4+
Diplopoda	0	4+
Symphyla	0	1
Colembola	1	Many
Microcoryphia	0	1
Thysanura	1	2
Ephemeroptera	0	1
Odonata	4	16
Dermoptera	3	8
Blattaria	3	7
Phasmida	0	1
Orthoptera	7	21
Isoptera	15	15
Psocoptera	0	Present
Hemiptera – Homoptera	21	40
Hemiptera—Heteroptera	6	58
Thysanoptera	0	Present
Coleoptera	94	718
Neuroptera	0	11
Hymenoptera	15	105+
Trichoptera	1	7
Lepidoptera	50	54
Diptera	47	130
<b>TOTAL</b>	<b>306</b>	<b>1241</b>

Table 4.2. Summary of increase in Montserrat invertebrate records 2000-2007. The figures from Stevens & Waldman are adjusted according to Table 4.1

tion, with excess material deposited at the University of Texas, the International Odonata Research Institute at Gainesville, Florida, and/or the NMNH.

#### 4.2.3. Results of post-2000 collecting

The result of all of these collection activities was approximately 1 million specimens of arthropods in bulk samples. The goal of the biodiversity assessment work was more an inventory than an ecological association, and establishing within-island distributions for the various species will require future work. From these samples, a selection of ca. 15,000 specimens was mounted and labelled, representing an attempt to extract individuals of all the Coleoptera and Orthoptera species, and representatives of other Orders as time and space allowed. Among 13,044 mounted specimens of beetles, there were 696 species (this is lower than the total of 718 beetles because of 22 previously collected species were not collected in our survey, discussed below). The other specimens were scattered among other Orders, and mostly remain unstudied.

During the taxonomic work, we strongly concentrated on the Coleoptera, enumerating 81 probable single-island endemic beetles. We also managed to add many other groups to the known fauna of the island (Table 4.2), providing both some specific and general records here as well as material of many more for specialists to study. Much of the non-beetle material was sent to other systematisers appropriate to the group. For instance, over a kilogram of samples of both spiders and ants were sent to specialists for study, none of which are reported on here. Already, 31 beetle records, 2 sawfly records, 2 scorpion records, and a fly record have appeared in the scientific literature based on our material (Valentine 2003, de Armas 2005, Chalumeau & Touroult 2005, Smith 2005, Kung & Brown 2006), and many more will do so in the future. We have already raised the number of invertebrate species on Montserrat, either through our own collections, the study of others, or the discovery of previously missed literature records, from Stevens & Waldmann's (2001) 306 to 1,241. Nearly 60% of these species are Coleoptera. Among the non-beetle Hexapods, which are an order of magnitude less-well studied than the beetles, we tallied 32 additional single-island endemics, and a few among the even-more-poorly-known non-hexapod invertebrates. Together, this compares ten-fold to the 12 endemic invertebrates enumerated by Stevens & Waldmann (2001) just 6 years ago. A summary of the total known number of species of a range of invertebrate taxa is given in Table 4.2.

Even with a quadrupling of the total invertebrates known from Montserrat to over 1,240 species, the majority of animal species on the island remain unknown. In order to generate such a prediction, we took the numbers of species predicted to exist globally

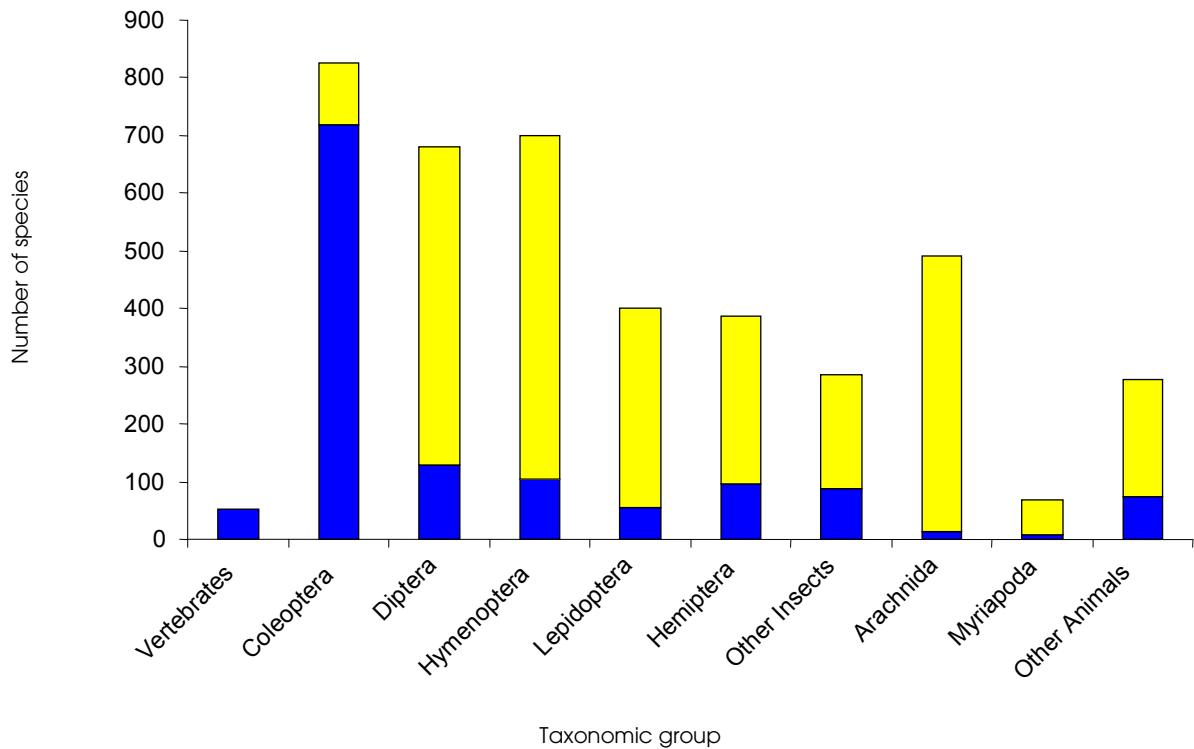


Fig. 4.3. Known and expected species richness of animals in Montserrat. Blue represents the recorded number of species and yellow represents predicted number of species awaiting documentation. For explanation of data source see text.

(Chapman 2006), extracted the data for terrestrial animals, and proportioned the insect portion of those numbers into 6 groups according to the only nearby well-known insect fauna, that of North America (Triplehorn & Johnson 2004). Those numbers provided a percentage-of-the-whole for each group. We then used the mean Chao-1 indicator for total expected beetles, and worked backwards from there to find what would be expected number of each group if Montserrat's total fauna fit the global proportional model. Obviously this is not an exacting analysis, but should be relatively good at making broad predictions of what is still missing. At the least, it provides a hypothesis for future testing.

Considering the total list of beetle species for Montserrat by number of observed specimens as a single collection (Appendix 2), and subjecting it to the Chao-1 estimator:  $S^*_1 = S_{obs} + (a^2/2b)$ , where " $S_{obs}$ " is the number of species observed, " $a$ " is the number of singletons, and " $b$ " is the number of doubles (Chao 1984, Colwell 2005), gives an estimate of a mean expected 827 beetle species, with a 95% CI of 792-876 (Calculated with EstimateS 7.5.1, Colwell 2005). This indicates that the current count of 718 species is probably about 87% of the expected total number of beetles, with a 95% chance that it is between 82 and 91% of the total.

Using this estimate of the total number of beetle species, to extrapolate to the entire Kingdom Animalia, we predicted a total of 4,146 animal species occur on Montserrat. Fig. 4.3 shows the known and predicted number of species of animals, broken down into 10 groups. Only the vertebrates have a full census, and of

the invertebrates, only the Coleoptera have a majority of the expected species discovered. A simple glance at the extent of the yellow on the graph gives an excellent feel for just how much work remains to be done on Montserrat. Given that the majority of rare and endemic species are usually discovered in the last half of an inventory, the need for further work on Montserrat's fauna is obvious.

#### 4.2.4. Results of post-2000 collections - beetles

The Coleoptera are the largest and most diverse Order of living things. The other megadiverse Orders are very heavily biased to one or a few trophic levels (Lepidoptera as herbivores, Diptera as saprophages, Hymenoptera as predators/parasitoids). There are exceptions in all of these cases, but the vast majority of their species do relatively similar things. Not so for the Coleoptera, which are divided among herbivores, fungivores, predators, parasites, parasitoids, lignivores, saprophages, detritivores, and all the other "vores" you can think of, including mosses, algae, slimemolds, carrion, dung and more. Their lifestyles include living just about everywhere -- at the tops of the forest canopy, in leaf litter and the soil; in human houses, bird nests, and bee hives; in and on fresh water; inside other animals; on salt water beaches and in warm springs; under rocks, in the lichens on rocks and where there are no rocks. Therefore, the beetle assemblage reaches farther into the entire ecosystem than any other group. Plus, we believe they are the most beautiful, fascinating and frustrating animals on earth. Therefore, we explored them as the

primary representative of the invertebrate fauna of Montserrat.

As was shown above, the total known, vouchered or validly recorded beetle fauna of Montserrat now stands at 718 species in 63 families, with at least 81 single-island endemics and 53 exotics. An estimate of 827 species has been proposed for the true total. How does this compare to other islands of the West Indies? It is difficult to know, because there are so few comprehensive treatments, the types of data reported vary greatly, and the degree of completeness is so very different. To date, 97 families of beetles are known from the West

Indian Bioregion (Ivie 2007), but no species total is available – not even as a wild guess. Island lists of beetles published in the last 25 years include those for Cuba, Dominica, Grenada and Guana. As expected, giant Cuba leads the pack with 2,673 species in 87 families (Peck 2005). The other islands all have fewer recorded species than Montserrat: Grenada with 507 species of 51 families (Woodruff *et al.* 1998), Guana Island, British Virgin Islands, with 405 species in 55 families (Valentine & Ivie 2005); Dominica with 361 species of 42 families (Peck 2006); and Barbados with 239 species of 32 families (Bennett and Alam 1985). Thus, Cuba has less than 4

Family	Species	Status	First Year	Notes on Habitat and Biology
Carabidae	<i>Glyptolennus chalybaeus</i> (Dejean)	EIS	1981	Anthropophilus
Staphylinidae	<i>Apocellus ustulatus</i> (Erichson)	NEC	1936	In seaweed on beach
Staphylinidae	<i>Cafius</i> ( <i>Euremus</i> ) <i>bistriatus</i> (Erichson)	WN	1936	In seaweed on beach
Staphylinidae	<i>Cafius subtilis</i> Cameron	WIE	1936	In seaweed on beach
Staphylinidae	<i>Neohypnus illucens</i> (Erichson)	WN	1936	In domestic animal dung
Staphylinidae	<i>Espeson moratus</i> Schaufuss	WN	1894	No information
Staphylinidae	<i>Oxytelus incisus</i> Motschulsky	WN	1894	In domestic animal dung
Staphylinidae	<i>Philonthus discoideus</i> (Gravenhorst)	WN	1936	In domestic animal dung
Staphylinidae	<i>Philonthus longicornis</i> Stephens	WN	1894	In domestic animal dung
Staphylinidae	<i>Thinobius exasperatus</i> Blackwelder	WIE	1894	Under stones along lower Belham R.
Staphylinidae	<i>Nacaeus foveolus</i> (Blackwelder)?	IE	1894	Under bark of red cedar
Staphylinidae	<i>Sepedophilus interruptus</i> (Erichson)?	WN	1894	In fungi, under moss and dirt on a rock
Anobiidae	<i>Gibbium aequinoctiale</i> Boieldieu	EIS	1894	Anthropophilus
Nitidulidae	<i>Conotelus conicus</i> (Fabricius)	WIE	1894	In Convolvulaceae flowers on beach
Silvanidae	<i>Telephanus nodicornis</i>	LE	1894	Local endemic, fungivore
Meloidae	<i>Tetraonyx quadrimaculatus</i> (Fabricius)	WN	1894	Widespread parasitoid
Tenebrionidae	<i>Neomida lecontei</i> (Bates)	WN	1894	Widespread fungivore
Tenebrionidae	<i>Cyrtosoma</i> n.sp.	IE	1894	Single Island endemic
Salpingidae	<i>Serrotibia</i> sp. poss. <i>partita</i> Olliff?	LE	1894	Subcortical fungivore
Chrysomelidae	<i>Omophoeta albicornis</i> Fabricius	WN	1975	Pest in gardens and waste areas
Curculionidae	<i>Proeces depressus</i> (Wollaston)	EIS	1894	Invasive, associated with Royal Palm
Curculionidae	<i>Metamasius quadrisignatus</i> (Gyllenhaul)	LIE	1894	Bores in <i>Tillandsia</i> , local island endemic

Table 4.3. Beetle species recorded or collected pre-volcano, not found in post-volcano collections

times as many beetle species as Montserrat, and Montserrat has more than any other recently reviewed island.

However, not much can be made of these figures. Tiny Guana (300 hectares) is one of the most intensively studied islands in the world (Lazel 2005), and is very close (ca. 500 meters) to much larger Tortola. Guana was joined by land to all of the northern Virgin Islands as well as Puerto Rico 18,000 years ago, so of course, it is expected to have more species per hectare than an island like Montserrat, which has always been isolated by the surrounding sea. Peck's (2005) Cuban book is a summary of the existing literature rather than the result of an inventory effort, and cannot be expected to be nearly as complete as the Montserrat work. So it should not really surprise anyone if the total number of beetles on Cuba were to be considerably above only 29% of the current total. Likewise, the Dominica and Grenada figures reflect mostly published records, not an attempt to work up the entire fauna in the way Guana or Montserrat have been done. Barbados is perhaps at an intermediate level of knowledge, with a simplified geography, highly modified environment, and considerable work on the fauna. Just where Montserrat would settle out if all islands were well known is hard to discern, but given what we know today, it seems likely that it would be found to be on the high side of what would be expected based simply on area.

Another way to look at the expectations of diversity is to compare the beetle fauna to the vascular plant flora. Plants are in general more completely censused than invertebrates, and give another base for comparison. A reasonable expectation is that the number of beetle species in any given fauna should approximate the number of vascular plants. This correlation holds broadly, at the global (Chapman 2006 cf. Grimaldi & Engel 2006), the continental (BONAP 1994 cf. Marske & Ivie 2003), local (Lesica 1985 cf. Ivie unpublished data) and insular (Eldredge & Evenhuis 2003, Acevedo-Rodríguez 1996 cf. Ivie unpublished data) scales. There are an estimated 13,000 vascular plants in the West Indies (M. Smith 2005), but no list of the beetles for the whole region. Guana's beetle fauna is 120% of its 339 species of vascular plants (Proctor 2005). At the other end of the scale, Dominica has only 29% as many beetle species as its 1,226 vascular plants (Nicolson 1991). In the same general range, Barbados' beetles total 38% of her 625 native plants (Gooding *et al.* 1965) and Cuba's 40% of its estimated 6,550 vascular plants. At 76% of Montserrat's 941 verified species of plants, (Hamilton *et al.*, this volume), the 718 species of beetles is double the ratio reported for Cuba, Dominica and Barbados, but considerably below that of Guana. This might suggest that Montserrat is simply better sampled than the other islands, but the disparity remains unexplained.

A special effort was made to see which, if any, of the species of beetles either recorded or collected from Montserrat before the volcanic crisis were not recollected after the eruptions. Because of the small number of published records, this might seem an easy task.

However, in far too many cases, this proved very difficult. To our best estimate, there are 106 published pre-volcanic records for Montserrat beetles that seem to be valid. Of these, 22 were not recollected. That 21% of the beetles previously known from Montserrat were not recollected in such an extensive effort seems alarming, but because of the different parts of the island where sampling efforts were concentrated, and our bias away from certain habitats, it may not be of as much concern (Table 4.3).

The most common case of a recorded species not recollected is a widespread species from habitats that we did not emphasize. Since our efforts were initially confined to the habitat of the Montserrat oriole, and later to the Centre Hills, missing 13 widespread, often invasive species associated with human stored products (*Gibbium aequinoctiale* Boieldieu), human gardens or farms [*Glyptolennus chalybaeus* (Dejean), *Proeces depressus* (Wollaston), *Omophoeta albicornis* Fabricius], sea beaches [*Apocellus ustulatus* (Erichson), *Cafius bistriatus* (Erichson), *Cafius subtilis* Cameron, *Conotelus conicus* (Fabricius)], under stones along the lower Belham River (*Thinobius exasperatus* Blackwelder) or dung of domestic animals [*Neohyphus illucens* (Erichson), *Oxytelus incisus* Motschulsky, *Philonthus discoideus* (Gravenhorst), *Philonthus longicornis* Stephens] is not unexpected.

Of the 9 species remaining, one case remains taxonomically unresolved. The single known specimen of *Nacaeus foveolus* was taken by Hubbard, under bark of a Red Cedar (*Cedrela odorata* L., Meliaceae) on Montserrat in 1894. It may well prove to be the same as our *Nacaeus* sp. #1, which differs from the published description only in colour and a possible difference in interpretation of the word "fovae." Until a specialist resolves this in consultation with the type specimen (NMNH), the status of this species is uncertain.

Four widespread species may indeed have been lost on Montserrat: *Espeson moratus* Schaufuss, *Sepedophilus interruptus* (Erichson), *Tetraonyx quadrimaculatus* (Fabricius) and *Neomida lecontei* (Bates). The tiny (1.2-1.5 mm) staphylinid *Espeson moratus* may simply have been overlooked. Apparently never common, Blackwelder (1943) reported only 17 specimens from 11 collecting events spread among 9 islands. Very little is known about this species. Blackwelder (1943) records specimens taken flying in Jamaica, in a rotten banana stem in St. Lucia, and deep in an unspecified cave, probably in Trinidad or Cuba. A specimen taken in a rotten log from the type locality, St. Thomas, was available for comparison.

Another widespread but uncommonly collected staphylinid, *Sepedophilus interruptus*, is a fungivore that should have been recollected if it was present, but was not found. It was taken on Montserrat by Hubbard in 1894, but not found by staphylinid specialist Blackwelder 30 years later. There is not enough known about its biology to speculate as to why we did not find it.

The meloid *Tetraonyx quadrimaculatus* presents an interesting situation. This large (6-12 mm) and showy-



orange-and-black meloid is widespread, known from North Carolina to Trinidad. In reports from the early twentieth century, it apparently was common on many islands, but in the past 30 years of collecting on some 40 West Indian islands, we have collected it only on Hispaniola. Whether this represents a real, region-wide decline or simply bad luck is not known, but the fact that the larvae are parasitoids of bees, and that many studies show a post-WWII decline in native bees throughout the world, is worth noting. If its loss or rarity on Montserrat is simply a post-volcano issue, it may be due to the effects of ash on the phoretic larvae, which ride on the plumose setae of adult bees back to the nest. Volcanic ash is well known to accumulate among these setae (Marske 2004) and could be involved in this loss.

Hubbard took a series of 18 specimens of the moderately large (6 mm) tenebrionid *Neomida lecontei* (Bates) on Montserrat in 1894. This species feeds on shelf fungi on trees and occurs widely from Mexico to Brazil, but is recorded only sporadically among the West Indies. We collect it regularly in Hispaniola. Our failure to collect it on Montserrat post-volcano may well reflect extirpation.

None of the Montserrat populations of these species is of global importance, as they are widespread, and if they are truly extirpated, could be easily reintroduced. The same is not true for the remaining 4 species.

These 4 species reported from Montserrat, but not recollected, represent more critical conservation issues. All are known from either several of the Lesser Antilles [*Metamasius quadrisignatus* (Gyllenhaul)], only Montserrat and Guadeloupe (*Serrotibia* n.sp.), only Montserrat, Guadeloupe and Dominica (*Telephanus nodicornis* Neverman), or Montserrat only [*Cyrtosoma* n.sp.]. Their loss from Montserrat could represent either a major reduction in range or even global extinction.

The handsome black and red weevil *Metamasius quadrisignatus* is the most widespread and largest (up to 17 mm including the beak) of these species, known from Montserrat, Guadeloupe, Dominica and Martinique (Vaurie 1966). Its larva bores in *Tillandsia* (Bromeliaceae), which are among the most likely of all plants to accumulate volcanic ash and acidity. It is never commonly collected, but would have been expected to be taken in canopy fogging samples. We had specimens from Dominica available for comparison.

Leng & Mutchler (1917) recorded the Guadeloupean tenebrionid *Cyrtosoma lherminieri* (Chevrolat) from Montserrat, based on 2 Hubbard specimens in the NMNH. Marcuzzi (1984) has recorded it from several islands from Montserrat to Grenada. We have studied Hubbard's Montserrat specimens, and compared them to specimens of both Guadeloupe *Cyrtosoma* species, *C. lherminieri* and *C. picea* Laporte & Brullé, determined by T. J. Spillman. Our conclusion is that the Montserrat specimens represent an as-yet undescribed species, apparently endemic to Montserrat. The genus is known to be associated with fungi in moist forests, and would be expected to occur in the Centre Hills, within the areas



Fig. 4.4. *Thonalmus* sp. (Photo: M. Ivie, Montana State University)



Fig. 4.5. *Trichodesma* sp. (Photo: M. Ivie, Montana State University)

most intensively surveyed by our projects. Yet, we did not locate this species. At 13 mm in length, this is the second-largest, and only Montserrat single-island endemic, species certainly not recollected post-volcanic crisis.

The silvanid *Telephanus nodicornis* Neverman was described from Montserrat and Guadeloupe. It was recently recorded from Dominica (Peck 2006). Hubbard collected at least 8 specimens on Montserrat in 1894, indicating that it was not rare when he visited the island. Although no biological information is recorded about this species, it belongs to a group of fungivores whose adults (and perhaps larvae) live on the surface of dead, withered and hanging leaves and branches, probably feeding on surface fungi. This expected habitat is among the most exhaustively sampled in our survey, yet we did not detect it. We have not seen any specimens of this species, from any islands.

*Serrotibia* n. sp. is a still-undescribed species that has been taken at least twice on Montserrat. Again, nothing specific is known about its biology, but based on other members of the subfamily, it is probably a subcortical fungivore. Hubbard's collections at the NMNH were the source of Leng and Mutchler's (1917) record of this species, under an Ecuadorian name which had been recorded from Guadeloupe. The species name was then synonymised with a Columbian species, and the Guadeloupe and Montserrat records went with it. In the Chalumeau collection at INRA, we found a single Montser-

rat specimen of this genus, representing an apparently undescribed native species that is not the same as the South American species. It has not been compared with specimens from Guadeloupe, so it is unknown whether 1 or 2 species are involved. This is a beautiful, orange and black species, whose loss would be unfortunate.

An intensive effort should be made to determine the fate of these last three species. Because of the general survey nature of our work on Montserrat, we did not specifically target these species, and they may still exist on the island, but if so, they may be very restricted and rare. A search of the remaining forest remnant at Roache's is critical, as this is the closest remaining habitat to where all 3 were probably last seen. Considering the *Cyrtosoma* and *Serrotibia*, the very idea that two such elegant species might go extinct before even being described, is simply sad.

### 4.3. An evaluation of the importance of Montserrat and the Centre Hills for invertebrate diversity

#### 4.3.1. The importance of Montserrat's invertebrate fauna

Montserrat is certainly special because it harbours endemic species found nowhere else on earth and because it represents the major portion of the range of many other species. However, this can be said of virtually every vegetated West Indian island. Montserrat is, after all, only one small component of the Caribbean Biodiversity Hotspot, so Montserrat is certainly special, but is this kind of "special" really important?

There are several unique things about Montserrat that we believe make it absolutely more important than other special places in the region. Unlike endemic species that are part of a group occurring as closely related species on many Lesser Antillean islands, of which there are very large numbers on all the islands, there are also groups that are significant evolutionary outliers in the Lesser Antilles that occur only on Montserrat, or on Montserrat and a few neighbouring islands are important at a higher, regional level. Examples from the vertebrates are the Montserrat Galliwasp and Mountain Chicken discussed at length in other chapters. It is in this hosting of endemic groups otherwise absent from the region that Montserrat is important from both a conservation and scientific perspective. Two very distinct sister-species of the genus *Thonalmus* (Fig. 4.4) are similar in importance to the Montserrat Galliwasp. They are single-island endemics that represent the only Lesser Antillean members of a small, West-Indian-endemic lineage, otherwise present only in the Greater Antilles and Bahamas. This group is so colourful, abundant and obvious that it seems very unlikely that it has been missed on other Lesser Antillean islands. Further, *Thonalmus* have been on the island long enough to produce other single-island endemics that are mimetic associates, for instance *Strangalia benitiesspinali* Chalumeau.



Fig. 4.6. *Eohomopterus* sp. (Photo: M. Ivie, Montana State University)

Another example of the importance of Montserrat is the radiation of the anobiid *Trichodesma* (Fig. 4.5), with five undescribed species on the island. These are the largest, or among the largest, species of the family in the West Indies, and are by far the most strikingly coloured. Guadeloupe has had its Anobiidae reviewed twice, and has never had a member of this genus reported. No other Lesser Antillean island is known to harbour *Trichodesma*. The closest island known to have *Trichodesma* is in the Greater Antillean Virgin Islands, and those species are very different from the Montserranian species. There are many more examples of this kind of "importance" scattered through this report, but again, a majority of the larger islands in the Antilles can make similar claims to importance, even if based on different details.

So, Montserrat is special and important, but is it an island of such high biodiversity as to be on a unique scale? It is virtually impossible to establish this as fact at any credible level, because virtually any comparison with other islands is not valid due to a number of reasons. Differences in effort, emphasis and reporting make it very difficult to compare any two samples, if and when they exist. Even within Montserrat, different groups of collectors find different things. Comparing the various collections of Montserrat rove beetles (Staphylindae; Appendix 2, Table E), butterflies and flower flies (Syrphidae) shows this very clearly.

There are many examples of groups with new and apparently endemic species on Montserrat scattered through this report that represent apparent outliers, but are members of groups so poorly studied that the reality of the gap cannot be evaluated. The very odd undescribed weevil *Prionarthrus* n. sp. belongs to a group known otherwise from only a single described species from Brazil. The unique *Eohomopterus* (Fig. 4.6) from Katy Hill is one of only 2 extant species of the subfamily

Paussinae known from the West Indies, and with its sister-species from Guadeloupe, are related to fossils in Dominican Amber. Both of these Montserrat endemics are known only from single specimens, and appear to be so rare that only extensive inventory efforts would find them. Are their lineages absent from other islands, or simply undetected? Most of the real biodiversity of islands in the Lesser Antilles remains virtually unknown, so that even though Montserrat has so many more known species per hectare than other islands in the region, it would be foolhardy to assert that this is evidence of Montserrat's special stature.

For the beetles the exception in the Lesser Antilles is Guadeloupe, which is reasonably well-known. Guadeloupe is, however, not an island but an archipelago of many islands that together have an area of 1,706 km<sup>2</sup>. Many, if not most, of the records are for the Department, not an individual island within it, making use of the data an unfair comparison. No Order-level checklist is available for the beetles of Guadeloupe, much less for its individual islands, so only a few groups can be examined. However, examples such as the Anobiidae mentioned above, where well-collected and twice-reviewed Guadeloupe has 25 known species compared to Montserrat's 32, gives one pause. On the face of it, comparison of Montserrat to Guadeloupe gives enough support to the idea of Montserrat's uniqueness that we are still tempted to be amazed.

One possibility of an independent data-set with which to evaluate Montserrat's unique status may be Dominica. In the mid-1960s the Archbold-Breden-Smithsonian Survey of Dominica (ABS) sent the most richly equipped and well-supported expeditions ever seen in the region to that island. Together, the participants formed the largest pool of expertise ever to collect on any island east and south of Puerto Rico (Peck 2006). Their material was assembled at the Smithsonian, and reviews of many groups were published, giving us the best modern reviews of any Lesser Antillean island. Montserrat, on the other hand, has had far less expertise devoted to it. Of the many collectors that participated in our work, only the Ivies were fully trained collectors before arriving on the island. The others, productive and hard-working as they were, received their advanced training on-island during their stay(s). It seems that under these conditions, it is reasonable to expect the relative efforts on the 2 islands should be somewhat comparable, or for Dominica to be a bit better collected than Montserrat.

Dominica is more than 7 times the area of Montserrat, and nearly 1.5 times as high. During our work, the vegetated extent of Montserrat was reduced to half of its area and removed the highest areas from the habitable area for insects, making Dominica nearly 15 times as large and twice as high as functional Montserrat. Thus, if Montserrat were just a normal "special and important" Lesser Antillean island, larger, wetter and higher Dominica would be expected to have many more species than Montserrat – at least twice the number un-

der Darlington's Rule of Thumb (MacArthur & Wilson 1967).

Yet, for the taxon best sampled by our group, Montserrat has 718 beetle species of 63 families, while 40 years after the ABS, 361 species of 42 families are now reported from Dominica (Peck 2006), even though 3 of the ABS participants and 5 other contributors were professional research coleopterists (*loc. cit.*). Perhaps this is an unfair comparison, as we have worked up all the Montserrat beetles, but this has not been done for the Dominica samples. However, even for subgroups of beetles that have been fully worked, the totals do not tell the expected story. For instance, the 26 Scarabaeoidea we record from Montserrat is significantly below the 42 reported from Dominica, but still more (62%) than the less-than-half expected. Another well-worked family is the Cerambycidae, where Montserrat's 33 species, at 79%, is again well above the one/half-level of Dominica's 42 species. For other fully-worked groups the story is also not so different as expected (numbers indicate Dominica and Montserrat respectively): Leiodidae (3,3), Buprestidae (7,7), Scydmaenidae (2,3), Carabidae (40,29).

Moving to another Order, we did not actively seek out aculeate wasps, which hymenopterist Howard Evans targeted on Dominica, yet for the 6 families whose species have been identified from both projects, the expert on Dominica was equalled by the incidental on Montserrat at 29 and 29 species. There were 4 dipterists on the ABS, while we made no special effort to obtain flies on Montserrat, yet Dominica has only 23 reported flower flies, compared to 22 for Montserrat. The 46 Montserrat species of Dolichopodidae is about what is expected compared with Dominica's 113, until you consider that Harold Robinson is a dolichopodid specialist who personally conducted very directed collecting on Dominica, and we only took what fell incidentally into our traps. Further, Dolichopodidae are most diverse in wet habitats, of which Dominica has far, far more than Montserrat.

Our studies on the invertebrate fauna of Montserrat point towards the true number of endemics being in the hundreds of species. There are 81 probable single-island endemics in just the Coleoptera (Section 2), which comprises only one-third of the described Insecta. If local endemics are added in, i.e. those occurring on only a few neighbouring islands, another 54 species are added. Yet another 33 Leeward Island or Northeastern Antilles Endemics are represented. Thus, Montserrat is home to some 167 beetle species that occur either only on Montserrat or on it and a few neighbouring islands. Undoubtedly these numbers are all underestimates, because over 1/3 of the species of beetles are too poorly known to even rank their distribution status. Thus, that 167 species of known conservation concern is nearly 40% of the pool of 445 that have an assigned distribution ranking. Keep in mind that the easiest species to identify are the widespread ones, so the proportion of endemics among the 270+ species still unranked may be higher than in the first 500, indicating that there are probably

more than 100 species of beetles of conservation concern to be added to the total above.

Moving beyond the beetles, there is no reason to expect that the Coleoptera are any more likely to evolve endemics than the rest of the Insecta. We know of 32 more non-beetle single-island endemics, and 3 among the non-insect invertebrates, with nearly again as many local island, Leeward Island and Northeastern Antillean endemics. This means that the density of endemics and species of conservation interest is already so high that it should be measured in endemic species per hectares rather than endemic species per square kilometre on 105 km<sup>2</sup> Montserrat. This density of endemism is a far better indicator of the importance of Montserrat than the number of endemics. With such a density of globally important species, a hectare of development on Montserrat may potentially have a far greater impact on global biodiversity than on Cuba, or Brazil, or Madagascar.

Thus, we have to seriously consider the hypothesis that Montserrat is truly more diverse than expected, particularly when compared to Dominica and other Lesser Antillean islands. Again, we caution that these bits of information are highly suspect due to differences in collecting effort, expertise, technique and reporting, but they at least are strong enough to raise the issue of Montserrat's uniqueness to a level that requires consideration of the possibility that it is more than just another "special and important" West Indian island. Thus, at the current state of knowledge, biodiversity managers can choose to consider these indications of uniqueness to be artefacts, or indications of reality. The consequences of being wrong, however, are very different for these two choices. There is no negative effect of protecting this "special and important" island, even if it is not unique, but to fail to do so and then discover that it was a globally unique place would be unforgivable. Thus, managers responsible for biodiversity would do well to proceed with caution before considering Montserrat an average "special and important" island, and, until data become available to show otherwise, proceed under the assumption that it is also a "uniquely biodiverse island."

#### *4.3.2. The importance of the Centre Hills for Montserrat's invertebrates*

It is well known that the only high-quality forest habitat left on Montserrat at this time is in the Centre Hills. What is less well-known is that this area is also the one most likely to harbour endemic species that evolved on the island (versus those that were once widespread and are now extinct elsewhere, similar to the Mountain Chicken). It is clear from the number of sibling species on Montserrat and Guadeloupe that a pattern of on-island evolution has indeed happened repeatedly. Darlington (1943) correctly pointed out that the oldest elements of a fauna, and usually the most specialized, will be expected on the tops of the highest peaks of islands. However, in this case "highest" assumes the mountain has been habitable for a long time. On Mont-

serrat, a volcanic eruption in the early seventeenth century laid the southern mountain top bare, much as in the current volcanic crisis, forcing any forest and associated animal communities to later recolonise the south, far too short a time to produce the number of endemic species we see. The Centre Hills, on the other hand, has high-elevation montane forest that is old in evolutionary time. If specialized high-elevation species were to evolve on Montserrat, it is in the Centre Hills that they would be found. The great increase in the number of known endemic species we have documented on Montserrat is attributable in large part to increased sampling intensity, but is also the result of the concentrating on this evolutionarily old and biodiversity-rich set of hills.

The exact number of the known species of Montserrat that occur in the Centre Hills is still unknown. However, because our collecting effort was concentrated on the Centre Hills, we tentatively estimate that some 90% of Montserrat's invertebrate species we detected occur there. All but a handful of the known Island Endemics occur in the Centre Hills, and a majority of them are only recorded from that area. Those species not yet known from the Centre Hills are mostly widespread inhabitants of beaches, dry coastal scrub, or invasive species associated with human habitations (stored food or gardens). None of these species are of conservation importance.

In summary, the Centre Hills clearly supports that vast majority of Montserrat's invertebrate fauna, and given the dominance of this group in overall biodiversity it therefore supports the majority of the total biodiversity of Montserrat. If we were to select a species to represent Montserrat's modern fauna, we would choose a globally rare, 3mm-long beetle first discovered in 2002, known only from the Centre Hills from a single individual, and which is either undescribed or cannot be named with certainty. Since this theoretical representative species is a stand-in for literally hundreds of others, and given that the Centre Hills is such a small area, they are therefore perhaps one of the very most critical areas on earth in terms of the density of unique biodiversity per hectare. This is the message in the invertebrate signal on Montserrat that most needs to be addressed.

There are a wide range of large challenges to conducting an invertebrate inventory. Lack of collection data is one problem (more on this later), but the taxonomic impediment is the major factor. The fact is that any knowledgeable amateur naturalist with a single book and binoculars can identify every species of resident breeding bird on the island without ever touching one. The same is true for the amphibians and reptiles. A few hours of training are necessary to be sure of the bat and rat species, and some of them have to actually be held in the hands in order to identify them, but a pair of gloves and a hand lens are the extent of the additional equipment needed. There are significant numbers of people who could identify every resident breeding species of 4 Classes of Montserratian terrestrial vertebrates (Amphibia, Reptilia, Aves, Mammalia). However, no single person alive can authoritatively identify all of the species of any of the major Classes of Invertebrates on Montserrat. Even identifying the major Orders of arachnids and insects is out of the question. There are just too many of them, they are too small, and the literature that does exist is huge, scattered, and of a widely varying quality, with an often convoluted and confusing nomenclature.

The simple numbers of species of invertebrates is the first reason for the imbalance. The 44 native and 9 introduced terrestrial tetrapods on Montserrat contrast with over 718 known beetle species, (plus the 109 or more expected to still be discovered), with probably 2-5 times that number combined in flies, moths, bugs, mites, spiders and wasps/ants/bees. The number of nematodes (undoubtedly huge) is totally up for grabs, but there is no one who could identify them to a level that would allow us to count them anyway. Thus, the simple number of invertebrate species to be determined overwhelms any single naturalist.

Size is the next factor contributing to the problem. Virtually everyone can spot and identify the Soldier Crab or the White Land Crab, but these are the giant outliers of the invertebrates on Montserrat.

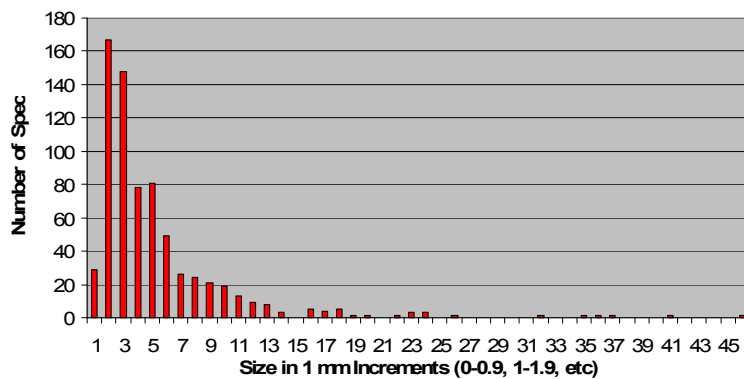


Fig. 4.7. Montserrat beetle species by size class. Includes 705 Species for Which Data Were Available (excludes 13 Scolytinae). Data were taken from a representative Montserrat specimen of each species, or, if not available, for a specimen from another island or the literature

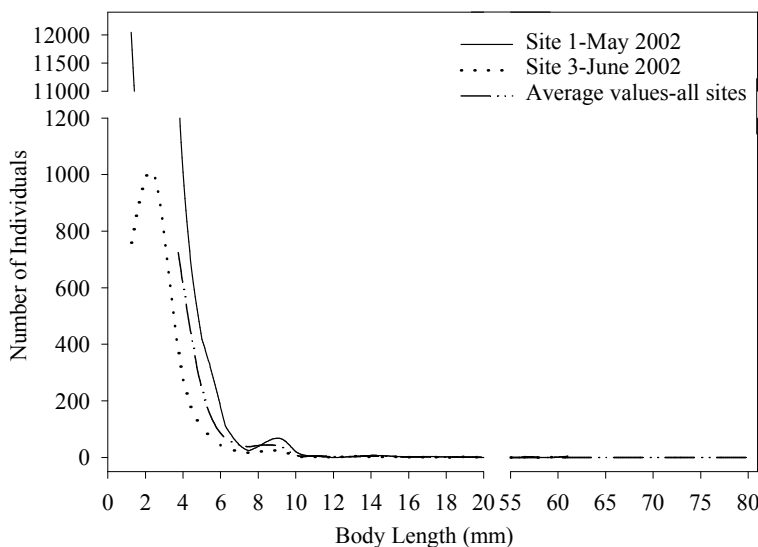


Fig. 4.8. Abundance of arthropods by size in Centre Hills canopy samples. Sites 1 (Hope Ghaut ) and 3 (Fogarty) include all Arthropods from representative samples. Average values includes data from 34 samples, and arthropods ≥ 2.5 mm (from Marske 2004, N = 46,683 individuals).

the White Land Crab, but these are the giant outliers of the invertebrates on Montserrat. The smallest tetrapod, the Cotton Ginner (*Sphaerodactylus fantasticus lingniservulus*) would rank among the largest 2% of beetle species on the island. Few people do not find it easier to identify an eagle species than a warbler, and size is an important part of that equation. Think about that when considering that the average beetle species on Montserrat is 4.55 mm long, and 70% of the species are 4.5 mm or smaller (Fig. 4.7).

Invertebrates, as an aggregate of individuals, average even smaller. Fig. 4.8 shows the size distribution of all arthropods taken from a 10 meter by 10 meter section of forest canopy in the Centre Hills (from Marske 2004). The Fogarty sample, taken 21 June 2002, contained 2,450 arthropods. A month earlier, one from Hope Ghaut taken 16 May 2002, included a stunning 18,916 individual arthropods. Yet, 12,000 of those were in the 1 mm range. It is no wonder that although the number of individuals in this 100 square meters is huge (nearly 190 individuals per square meter), they are seldom noticed by the casual observer.

Tiny species can live in tiny places, and so it takes huge efforts by very knowledgeable specialists in hundreds of very specialized habitats, using equally specialized equipment, to find more than 20% of the invertebrate species in a given area. Seasonality plays a much larger role in the variation in the numbers of invertebrate species than it does in the generally longer-lived tetrapods, and many visits and much

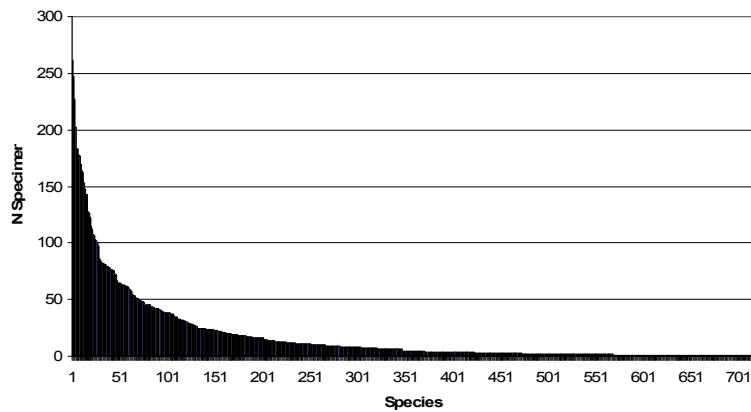


Fig. 4.9. Abundance of each species in the data set.

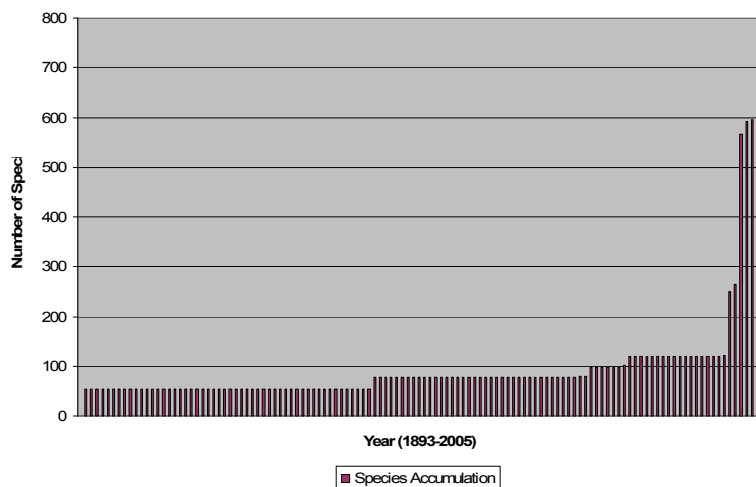


Fig. 4.10. Accumulation of beetle species discovered on Montserrat from 1893 to 2005.

work is needed to find even 50% of the species in a given area. True or perceived rarity is the result, making it a long-term numbers game to encounter the tiny, the specialized, the seasonal and the truly rare. Of the 718 species of beetles now known from Montserrat, more than half are known from 5 or fewer specimens, 149 from only one, another 40 from only 2 (Fig. 4.9).

Keep in mind that these numbers were collected after obtaining and searching through approximately 1 million specimens of arthropods. The effort expended to reach this point has been huge. A reasonably competent amateur can find and identify half the species of tetrapods on Montserrat in the course of a week of concentrated field work, but obviously that is not at all true for invertebrates. Fig. 4.10 shows that it took 98 years to reach the 50% point in discovery of beetles on Montserrat. This is, in large part, because most of the visits to Montserrat by invertebrate zoologists were in the range of a few days, with a few spending a week or two and very few staying for a month or more. Short visits mean that one is most likely to find the same relatively moderate-sized, abundant, and often invasive, anthropophilous and pestiferous species over and over again, without ever really getting to the core of

the fauna. This is why the vast majority of records come from only a handful of investigators. This can be seen very graphically in the pattern of discovery of beetles on Montserrat (Fig. 4.10). There are 5 collectors or groups whose efforts added the vast majority of beetle species over the period starting in 1894 and ending 2005: Hubbard (1894), Blackwelder (1936), Cooter (1975), Chalumeau (1982-1984) and Ivie *et al.* (2000-2005).

Thus, it takes a huge amount of time and effort to find the large number of small species of invertebrates. Identifying them is another major problem. Compounding problems of numbers and size is that fact that there are simply too few invertebrate systematists to do the work, and in general, funding for them is very low. Even after specimens are collected, often there is no one to identify them. Table 4.4 lists the 62 families of beetles known from Montserrat, arranged by numbers of species found. Note that for 2 of the 5 most speciose families, no living specialists exist who can identify the West Indian members of the family, and for only 3 of the 10 largest are there specialists who can deal effectively with the entire fauna. There are no specialists with taxonomic expertise available for 39 of the 62 families of beetles known from Montserrat. In addition, the availability of coleopterists is far better than for specialists who work on mites, spiders, nematodes, flies or parasitic wasps.

Lack of literature resources is the third taxonomic impediment. Even where no specialist is available, the existence of good papers would allow the identification of much collected material by non-specialists. However, while single books or references allow authoritative identification of any bird, amphibian, reptile or mammal on Montserrat, the same is not true for any Class of arthropod. In fact, only for a few small Orders, namely the Dermaptera (earwigs), Odonata (dragonflies and damselflies) and Isoptera (termites), are such works available, and they require the expertise of a specialist in order to use them. Even for the lower taxonomic unit of Family the situation does not become much easier, as very few comprehensive works are available, and most of them are only usable by a specialist. Among the entire Montserrat invertebrate fauna, only the butterflies, a mere 43 species, have an identification guide usable by the lay naturalist.

The quality of the literature that is available is another factor. Unlike a bird field guide, the literature that does exist is very difficult to use. In assembling the list of Coleoptera below, references were consulted that were written in

## Box 2. Challenges of conducting the invertebrate inventory

Table 4.4. Families of Montserrat beetles by number of species, with indication of availability of taxonomic specialists. Yes = specialist(s) available who can identify all species from the West Indies to either named species or state that it is undescribed. Some = specialist(s) available who can identify at least a majority of the species from the West Indies to either named species or state that it is undescribed. Few = specialist(s) available who can identify a minor portion of the species from the West Indies to either named species or state that it is undescribed. No = no specialist available who specializes in the West Indian fauna, although specialists concentrating on other regions may be able to do some determinations. Classification follows Lawrence & Newton (1995) as modified by Ivie (2002).

Family	N species	Expertise available	Family (cont.)	N species	Expertise available
Curculionidae	146	Few	Oedemeridae	4	No
Staphylinidae	125	No	Brentidae	4	No
Chrysomelidae	36	Some	Scydmaenidae	3	No
Cerambycidae	33	Yes	Leiodidae	3	Yes
Anobiidae	32	No	Cleridae	3	No
Carabidae	29	Some	Cantharidae	3	Yes
Tenebrionidae	29	Some	Silvanidae	3	Yes
Scarabaeidae	24	Yes	Phalacridae	3	No
Coccinellidae	24	Yes	Mycetophagidae	3	No
Hydrophilidae	13	Some	Meloidae	3	No
Nitidulidae	12	No	Zopheridae	3	Yes
Attelabidae	12	Yes	Scirtidae	2	No
Elateridae	11	No	Dermestidae	2	No
Laemophloeidae	11	Yes	Melyridae	2	No
Histeridae	10	No	Lycidae	2	Yes
Colydiidae	10	No	Bothrideridae	2	No
Corylophidae	9	No	Latridiidae	2	No
Ciidae	9	No	Rhysodidae	1	Yes
Anthicidae	9	No	Hydraenidae	1	No
Dytiscidae	8	No	Passalidae	1	Yes
Bostrichidae	8	No	Trogidae	1	Yes
Languriidae	8	No	Jacobsoniidae	1	No
Buprestidae	7	Yes	Lymexylonidae	1	Yes
Ptiliidae	6	No	Ptilodactylidae	1	No
Ostomidae	6	No	Lampyridae	1	Yes
Cerylonidae	6	No	Sphindidae	1	No
Eucnemidae	5	No	Smicripidae	1	Yes
Monotomidae	5	No	Cryptophagidae	1	No
Mordellidae	5	Some	Melandryidae	1	No
Salpingidae	5	No	Rhipiphoridae	1	No
Endomycidae	4	No	Mycteridae	1	No

English, Latin, French, German, Spanish, Portuguese and Russian. Some were over 200 years old, and written at a time when the standards for description of a species were very different from today, yet for many groups, nothing more recent has been published. Often the publication has only a description of a single species, and lists nothing comprehensive for the group that would allow one to understand whether the specimen being examined is the same as, or different from, a species reported only from Guadeloupe, or Puerto Rico, or Grenada. These publications include illustrations for fewer than 5% of the Montserrat beetle species, and many of these are of limited use. Most frustrating is that after assembling all these papers, reading and translating all these descriptions, consulting with a whole raft of

specialists, and comparing the specimens with the largest collection of West Indian beetle specimens in existence (Fig. 4.11), only a relative few species can be confidently associated with an existing scientific species name. A few more can with certainty be determined as undescribed, but a huge portion remains in limbo.

Montserrat has been visited by entomologists and invertebrate zoologists since at least 1894. However, no 2 collectors ever find exactly the same things. Because of the incomplete and constantly changing level of work on the taxonomy of invertebrates, the correct names change with further information. It sometimes takes a massive amount of work in the library and museum in order to know whether the species you have just collected is the same species as that recorded from Montserrat 100 years ago, and again recorded under a different name 50 years ago. The voucher specimens that are the key to this system may be in London, UK, for one record, and in Washington, DC, USA, for the second, while we are working in Bozeman, MT, USA, so actual comparison is not practical in the short time available.

Dealing only with literature records is far more difficult than if a voucher specimen is at hand. A few records are clear mistakes, and can be rejected. Other records are suspected, with a high degree of probability, to be misidentifications, and can be placed with confidence under species we collected. Far too many records can neither be associated with species we collected, or confidently excluded as something we did not collect.

Montserrat's plight in this regard is not unique; in fact it is the global norm. As an example of how these factors play out in the real world, we will take the example of the Montserrat Staphylinidae, one of the two most diverse

Fig. 4.11. One representative drawer (of 20) from the Montserrat collection in the WIBF. (Photo: M. Ivie, Montana State University).



families of beetles (Table 4.4). Unlike most of the more speciose families of West Indian beetles, a large portion of the Staphylinidae (excepting the Aleocharinae, Pselaphinae, and Scaphidiinae) were revised as a whole in modern times, and there are descriptions and keys to the species for the entire West Indian fauna known at that time (Blackwelder 1943). As such, the Staphylinidae is a best-case study, with most other families of beetles scattered on a scale of less optimal conditions. The reviser, Richard E. Blackwelder, assisted by his wife, Ruth, spent 2 weeks collecting on Montserrat, from 13-27 July 1936. Blackwelder reported that they collected 15 species of the group to be revised. Interestingly, and as a harbinger of things to come, in the text we find 16 species reported as collected by the Blackwelders on Montserrat. Blackwelder worked at the Smithsonian in Washington, DC, where he had access

to the other large collection of Montserrat beetles of his day – that of Henry Guernsey Hubbard, who spent parts of February, March and April of 1894 on the island. Although Blackwelder was a specialist in the Staphylinidae, was on the island specifically to collect Staphylinidae, and was assisted by his wife, the generalist collector Hubbard bested them, and collected 18 species of the groups of Staphylinidae under revision. Most surprisingly, the two collections had only 2 species in common. So, Blackwelder had a total of 32 species recorded from Montserrat, a 78% increase by the second expedition over the first.

Only a single additional species was recorded from Montserrat between 1943 and the review of the fauna by Stevens and Waldmann (2001), but some already recorded species were treated by various workers, moved from the names used by Blackwelder to other nomenclatural combinations and synonyms. Stevens and Waldmann recorded 34 species of Staphylinidae from Montserrat - all dating to the Blackwelder (1943) revision. It turns out that the increase was due to double reporting of 2 species which had been moved to other genera subsequent to Blackwelder's work, with Stevens and Waldmann then using both the new combination and the one Blackwelder used. So, the real number of recorded species was 33 (Blackwelder's 32 plus one missed by Stevens and Waldmann), not the reported 34 (Table 4.5).

Our work on Montserrat began in 2000, and has involved several person-years of collecting, and trap-years of passive collecting. This represents many times the collecting effort by Hubbard and the Blackwelders, and, not surprisingly, we have again doubled the number of species of Staphylinidae (excepting the Aleocharinae, Pselaphinae,



Box 2. Challenges of conducting the invertebrate inventory

Table 4.5. Comparison of historic collections and nomenclature with current collections and names for Montserrat Staphylinidae (excepting Pselaphinae, Scaphidiinae, and Aleocharinae).

Name in Blackwelder (1943)	Name in Stevens & Waldmann (2001)	Current Name	Hubbard 1894	Blackwelder 1936	WIBF Group
<i>Anacyptus testaceus</i> (LeConte)	<i>Anacyptus testaceus</i> (LeConte)	<i>Anacyptus testaceus</i> (LeConte)	y	n	Y
<i>Oxytelus insignitus</i> Gravenhorst	<i>Anotylus insignitus</i> (Erichson)/ <i>Oxytelus insignitus</i> Gravenhorst*	<i>Anotylus insignitus</i> (Gravenhorst)	n	y	Y
<i>Apocellus ustulatus</i> (Erichson)	<i>Apocellus ustulatus</i> (Erichson)	<i>Apocellus ustulatus</i> (Erichson)	n	y	N
<i>Belonuchus gagates</i> Erichson	<i>Belonuchus gagates</i> Erichson	<i>Belonuchus gagates</i> Erichson	y	n	Y
<i>Bledius caribbaenus</i> Blackwelder	<i>Bledius caribbaenus</i> Blackwelder	<i>Bledius caribbaenus</i> Blackwelder	n	y	Y
<i>Cafius bistriatus</i> (Erichson)	<i>Cafinus bistriatus</i> (Erichson)	<i>Cafius (Euremus) bistriatus</i> (Erichson)	n	y	N
<i>Cafius subtilis</i> Cameron	<i>Cafinus subtilis</i> Cam.	<i>Cafius subtilis</i> Cameron	n	y	N
<i>Carpelimus croceipes</i> (Flauvel)	<i>Carpelimus croceipes</i> (Flauvel)	<i>Thinodromus croceipes</i> Fauvel	y	n	Y
<i>Conosomus interruptus</i> (Erichson)	<i>Conosomus interruptus</i> (Erichson)	<i>Sepedophilus interruptus</i> (Erichson)	y	n	?
<i>Coproporus rutilus</i> (Erichson)	<i>Coproporus rutilus</i> (Erichson)	<i>Coproporus rutilus</i> (Erichson)	y	y	Y
<i>Coproporus sharpi</i> Cameron	<i>Coproporus sharpi</i> Cam.	<i>Coproporus sharpi</i> Cameron	y	n	Y
<i>Echiaster microps</i> Blackwelder	<i>Echiaster microps</i> Blackwelder	<i>Echiaster microps</i> Blackwelder	y	n	Y
<i>Espeson crassulus</i> Fauvel	<i>Espeson crassulus</i> Fauvel	<i>Pseudepeson crassulus</i> (Fauvel)	y	n	Y
<i>Espeson moratus</i> Schaufuss	<i>Espeson moratus</i> Schaufuss	<i>Espeson moratus</i> Schaufuss	y	n	N
<i>Lispinus insularis</i> Fauvel	<i>Lispinus insularis</i> Fauvel	<i>Lispinus insularis</i> Fauvel	y	n	?
<i>Lithocharis dorsalis</i> Erichson	<i>Lithocharis dorsalis</i> Erichson	<i>Lithocharis dorsalis</i> Erichson	y	n	Y
<i>Lithocharis secunda</i> Blackwelder	<i>Lithocharis secunda</i> Blackwelder	<i>Lithocharis secunda</i> Blackwelder	n	y	Y
<i>Lithocharis sororcula</i> Kraatz	<i>Lithocharis sororcula</i> Kraatz	<i>Lithocharis sororcula</i> Kraatz	n	y	Y
<i>Xantholinus illucens</i> Erichson	<i>Neohypnus illucens</i> (Erichson)/ <i>Xantholinus illucens</i> Erichson**	<i>Neohypnus illucens</i> (Erichson)	n	y	N
<i>Oligolinus hubbardi</i> Blackwelder	<i>Oligolinus hubbardi</i> Blackwelder	<i>Neoxantholinus hubbardi</i> (Blackwelder)	y	n	Y

Table 4.5 contd.

Name in Blackwelder (1943)	Name in Stevens & Waldmann (2001)	Current Name	Hubbard 1894	Blackwelder 1936	WBF Group
<i>Oxytelus incisus</i> Motschulsky	<i>Oxytelus incisus</i> Motschulsky	<i>Oxytelus incisus</i> Motschulsky	y	y	N
<i>Philonthus discoideus</i> (Gravenhorst)	<i>Philonthus discoideus</i> (Gravenhorst)	<i>Philonthus discoideus</i> (Gravenhorst)	n	y	N
<i>Philonthus hepaticus</i> Erichson	<i>Philonthus hepaticus</i> Erichson	<i>Philonthus hepaticus</i> Erichson	n	y	Y
<i>Philonthus longicornis</i> Stephens	<i>Philonthus longicornis</i> Steph.	<i>Philonthus longicornis</i> Stephens	y	n	N
<i>Philonthus ventralis</i> (Gravenhorst)	<i>Philonthus vernalis</i> (Gravenhorst)	<i>Philonthus ventralis</i> (Gravenhorst)	n	y	Y
<i>Pseudolispinodes impar</i> (Cameron)	<i>Pseudolispinodes impar</i> Cam.	<i>Nacaeus impar</i> (Cameron)	y	n	Y
<i>Pseudolispinodes foveolus</i> Blackwelder	<i>Pseudolispinodes foveola</i> Blackwelder	<i>Nacaeus foveolus</i> (Blackwelder)	y	n	?
<i>Pseudolispinodes nigrifrons</i> (Fauvel)	<i>Pseudolispinodes nigrifrons</i> (Fauvel)	<i>Nacaeus nigrifrons</i> Fauvel	y	n	Y
<i>Thinobius exasperatus</i> Blackwelder	<i>Thinobius exasperatus</i> Blackwelder	<i>Thinobius exasperatus</i> Blackwelder	n	y	N
<i>Thoracophorus simplex</i> Wendeler	<i>Thoracophorus simplex</i> Wendeler	<i>Thoracophorus simplex</i> Wendeler	y	n	Y
<i>Xantholinus attenuatus</i> Erichson	<i>Xantholinus attenuatus</i> Erichson	<i>Neohypnus attenuatus</i> (Erichson)	n	y	Y
<i>Xantholinus humeralis</i> Erichson	<i>Xantholinus humeralis</i> (Erichson)	<i>Neohypnus humeralis</i> (Erichson) New Comb.	n	y	Y

\*Stevens & Waldmann used both of the duplicate names *Oxytelus insignus* Gravenhorst and *Anofylus insignitus* (Erichson), but these names refer only to a single species. The spelling of the species name in the first combination is a *lapsus calami*, as is the attribution to Erichson in the second.

\*\*Stevens & Waldmann used both of the duplicate names *Xantholinus illucens* Erichson and *Neohypnus illucusens* (Erichson), but these names refer only to a single species.

and Scaphidiinae) to 77 or more, up to 80. Although we can say that we have collected 67 species of this group on Montserrat, we cannot say for certain how many of the previously reported 33 species we have collected, nor how many of our species are not among the 33 that were included in the 1943 treatment of the whole West Indian fauna, because the literature is simply inadequate. The 1943 paper is 658 pages long, includes keys to 468 species, but includes only 8 illustrations. Given the nature of a key, each of our specimens is likely to key out to some species, but if that species is known from Puerto Rico, how can we know whether it is the same species as the one we have, or something unique and different?

This discussion illustrates 3 points: the fauna of Montserrat is poorly documented, allowing the near doubling of the known species between the first visit by a beetle specialist and the second, and again by our group; that a simple listing by a non-specialist of all the names ever used for a fauna will be prone to a great deal of error; and that summary works (including this one) must be checked against the original literature and voucher specimens before being used for significant management decisions.

Until recently, invertebrate collections from Montserrat were themselves small, scattered and even today they are incomplete. No comprehensive history documenting the discovery process for invertebrate zoology on Montserrat exists, but by carefully noting the label data on specimens we have seen, and those recorded in the primary literature, some of the more important visits can be reconstructed. This listing is incomplete, and biased towards the collectors of groups we have studied, but it gives some picture of the situation. Most of the information concerns entomologists, with a few references to other disciplines extracted from Stevens and Waldmann's (2001) review of the fauna or the odd record. The impact of these workers on our knowledge of the beetle fauna is particularly noted. No attempt has been made to include unicellular groups, nor parasites of medical or veterinary importance, as that literature is of an entirely different character and beyond our expertise.

The first person known to have collected invertebrates from Montserrat for scientific study is assumed to be Sir Rawson William Rawson (1812-1899), who sent 5 species of terrestrial snails from Montserrat to Thomas Bland for determination prior to 1875. Sir Rawson was Governor of Barbados and Governor-in-Chief of the Windward Islands (1868-1875), which did not include Montserrat (Anon. 1900). Exactly if and when he personally visited Montserrat is uncertain, but from this material, Bland (1875) described *Amphibulimus rawsonis* Bland, the first invertebrate we know of to be named from the island.

The first entomologists to collect on Montserrat were apparently the head of the United States Department of Agriculture's Division of Entomology, Charles Valentine Riley (1834-1895) and his assistant Henry Guernsey Hubbard (1850-1899). Riley's work on biological control of citrus pests seems to be the basis for the earliest reports of specific insects from the island. Montserrat had begun exporting lime juice in the 1850's and production peaked in 1884. Shortly after, an outbreak of scale insects attacked the lime trees, affecting the island's lime juice industry. Riley was the most famous economic entomologist of his day, and had directed the successful control of the cottony cushion scale on California citrus using a ladybird beetle. Probably as a result of this fame, Riley received a letter dated 10 May 1890 from the Montserrat Company in Birmingham, England, asking him to send some of the ladybirds to control a scale said to be related to the cottony cushion scale. Because of the very specific nature of the food habits of the ladybird in question, Riley requested that a sample of the scales be sent to him by the Company's attorney in Montserrat, Mr. H. de C. Hamilton. When the specimens arrived, those from lime included the recently described snowy citrus scale [*Unaspis citri* (Comstock, 1883), then called *Chionaspis citri* Comstock] and the purple scale [*Mytilaspis citricola* (Packard)]. However, in the same package was indeed a new species of the same genus as the cottony cushion scale, albeit from *Chrysophyllum* leaves, not lime. Riley and H. C. Howard described this new cottony cushion scale as *Icerya montserratensis* Riley & Howard. This trio of records may be the earliest insect report from Montserrat (Riley & Howard 1890). Whether the ladybird beetle that was the original reason for the correspondence was ever sent to Montserrat seems to remain unreported, and we did not find that species on the island, nor any records of it from the intervening years. Correspondence between Riley and agriculturalists in the region continued, and in 1893 Riley published a note listing scale insects collected by Mr. C. L. Barber (cited as C. A. Barber in some sources), Superintendent of Agriculture in the Leeward Islands, including 6 species from Montserrat (Riley 1893).

By 1894 the scale problems on lime trees were becoming very serious (Innanen 1998). Following up on the initial relationships, Riley and Hubbard visited Montserrat in February, March and April of 1894, officially looking for parasitoids of citrus pests (Smith and Smith 1996). Interestingly, a lack of official authorization for this trip led to Riley's resignation from his post, ending the career of one of the most celebrated entomologists of all time (Smith and Smith 1996). Riley and Hubbard material is deposited at the Smithsonian's National Museum of Natural History, Washington (NMNH).

Only a few Montserrat specimens with Riley's collection labels survive, but Hubbard was prodigious in his efforts, and hundreds, if not thousands, of specimens bear his collecting label. Even today, this is the second largest collection of Montserrat insect specimens in existence. Hubbard did not describe any of the species himself, but his material has formed the basis for the majority of published records of Montserratian beetles to date. He concentrated mainly on beetles, and records of at least 57 of the 107 species of beetles previously recorded in the literature from Montserrat date to his material (Table 4.6).

The first 27 beetle species records in the literature for Montserrat (Hopkins 1915, Leng & Mutchler 1917) seem to be totally derived from Hubbard's material, but his material has continued to be studied, so that another 32 (or 33, origin of one is uncertain) first reports of Montserrat beetles have appeared in 19 papers by 16 different authors over the years, one as recently as 2006 (Table 4.6). It is likely, even certain, that more, perhaps many more, first collections remain undiscovered, scattered through the tens of thousands of drawers of beetles at the Smithsonian. For practical reasons, it would be impossible to effectively search them all to reassemble exactly everything Hubbard found, but his records will continue to appear in the literature as groups are revised. Hubbard's contribution has been honoured with four Montserrat insects that bear the species epithet *hubbardi* (Stevens and Waldmann 2001). Although this was Hubbard's only trip to Montserrat, the literature sometimes incorrectly reported a specimen from 1923 (e.g. Vaurie 1966). In fact, the label on these specimens reads "Mar. 19-23" and lacks a year, leading to the misinterpretation.

**Table 4.6.** Beetle records from Montserrat pre-2000, including records based on synonyms that proved to be the same species (does not include unsubstantiated Stevens & Waldmann 2001 records)

Current Name	Published Name	Source of Specimen	First Citation
<i>Mioptachys</i> sp.	<i>Mioptachys autumnalis</i> Bates	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Pentagonica flavipes</i> (LeConte)	<i>Pentagonica flavipes</i> (LeConte)	prob. Hubbard or Blackwelder	Bell 1985
<i>Glyptolennus chalybaeus</i> (Dejean)	<i>Glyptolennus chalybaeus</i> (Dejean)	R. S. Miller 1981	Liebherr 1997
<i>Aeletes lissosternus</i> Wenzel	<i>Aeletes lissosternus</i> Wenzel	H. G. Hubbard 1894	Wenzel 1944
<i>Enochrus bartletti</i> Short	<i>Enochrus (Methydrus)</i>	H. G. Hubbard	Short 2004
<i>Dactylosternum abdominale</i> (F.)	<i>Dactylosternum abdominale</i> (F.)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Atholus confinus</i> (Erichson)	<i>Atholus confinus</i> (Erichson)	J. & J. Cooter 1975	Cooter 1983
<i>Tropisternus chalybeus</i> Laporte	<i>Tropisternus chalybeus</i> Laporte	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Oligota minuta</i> Cameron	<i>Oligota minuta</i> Cameron	F. D. Bennet 1973	Frank, Bennet, Comroy 1992
<i>Anacyptus testaceus</i> (LeConte)	<i>Anacyptus testaceus</i> (LeConte)	H. G. Hubbard 1894	Blackwelder 1943
<i>Anotylus insignitus</i> (Gravenhorst)	<i>Oxytelus insignitus</i> Gravenhorst	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Apocellus ustulatus</i> (Erichson)	<i>Apocellus ustulatus</i> (Erichson)	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Belonuchus gagates</i> Erichson	<i>Belonuchus gagates</i> Erichson	H. G. Hubbard 1894	Blackwelder 1943
<i>Bledius caribbaenus</i> Blackwelder	<i>Bledius caribbaenus</i> Blackwelder	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Cafius (Euremus) bistriatus</i> (Erichson)	<i>Cafius bistriatus</i> (Erichson)	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Cafius subtilis</i> Cameron	<i>Cafius subtilis</i>	R. E. & R. M.	Blackwelder 1943
<i>Thinodromus croceipes</i> Fauvel	<i>Carpellimus croceipes</i> (Fauvel)	H. G. Hubbard 1894	Blackwelder 1943
<i>Sepedophilus interruptus</i> (Erichson)	<i>Conosomus interruptus</i> (Erichson)	H. G. Hubbard 1894	Blackwelder 1943
<i>Coproporus rutilus</i> (Erichson)	<i>Coproporus rutilus</i> (Erichson)	H. G. Hubbard 1894	Blackwelder 1943
<i>Coproporus sharpi</i> Cameron	<i>Coproporus sharpi</i> Cameron	H. G. Hubbard 1894	Blackwelder 1943
<i>Echiaster microps</i> Blackwelder	<i>Echiaster microps</i> Blackwelder	H. G. Hubbard 1894	Blackwelder 1943
<i>Pseudepeson crassulus</i> (Fauvel)	<i>Espeson crassulus</i> Fauvel	H. G. Hubbard 1894	Blackwelder 1943
<i>Espeson moratus</i> Schaufuss	<i>Espeson moratus</i> Schaufuss	H. G. Hubbard 1894	Blackwelder 1943
<i>Lispinus insularis</i> Fauvel	<i>Lispinus insularis</i>	H. G. Hubbard	Blackwelder 1943

Table 4.6 contd.

Current Name	Published Name	Source of Specimen	First Citation
<i>Lithocharis dorsalis</i> Erichson	<i>Lithocharis dorsalis</i> Erichson	H. G. Hubbard 1894	Blackwelder 1943
<i>Lithocharis secunda</i> Blackwelder	<i>Lithocharis secunda</i> Blackwelder	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Lithocharis sororcula</i> Kraatz	<i>Lithocharis sororcula</i> Kraatz	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Neohypnus illucens</i> (Erichson)	<i>Xantholinus illucens</i> Erichson	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Neoxantholinus</i> <i>hubbardi</i> (Blackwelder)	<i>Oligolinus hubbardi</i> Blackwelder	H. G. Hubbard 1894	Blackwelder 1943
<i>Oxytelus incisus</i> Motschulsky	<i>Oxytelus incisus</i> Motschulsky	H. G. Hubbard 1894	Blackwelder 1943
<i>Philonthus discoideus</i> (Gravenhorst)	<i>Philonthus discoideus</i> (Gravenhorst)	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Philonthus hepaticus</i> Erichson	<i>Philonthus hepaticus</i> Erichson	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Philonthus longicornis</i> Stephens	<i>Philonthus longicornis</i> Stephens	H. G. Hubbard 1894	Blackwelder 1943
<i>Philonthus ventralis</i> (Gravenhorst)	<i>Philonthus ventralis</i> (Gravenhorst)	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Nacaeus impar</i> (Cameron)	<i>Pseudolispinodes</i> <i>impar</i> (Cameron)	H. G. Hubbard 1894	Blackwelder 1943
<i>Nacaeus foveolus</i> (Blackwelder)	<i>Pseudolispinodes</i> <i>foveolus</i> Blackwelder	H. G. Hubbard 1894	Blackwelder 1943
<i>Nacaeus nigrifrons</i> Fauvel	<i>Pseudolispinodes</i> <i>nigrifrons</i> (Fauvel)	H. G. Hubbard 1894	Blackwelder 1943
<i>Thinobius exasperatus</i> Blackwelder	<i>Thinobius exasperatus</i> Blackwelder	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Thoracophorus simplex</i> Wendeler	<i>Thoracophorus</i> <i>simplex</i> Wendeler	H. G. Hubbard 1894	Blackwelder 1943
<i>Neohypnus attenuatus</i> (Erichson)	<i>Xantholinus</i> <i>attenuatus</i> Erichson	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Neohypnus humeralis</i> (Erichson) New Comb.	<i>Xantholinus humeralis</i> Erichson	R. E. & R. M. Blackwelder 1936	Blackwelder 1943
<i>Ateuchus insulare</i> (Fleutiaux & Sallé)	<i>Choerisium insulare</i> Chevrolat	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Aphodius pseudolividus</i> Balthasar	<i>Aphodius lividus</i> (Olivier)	R. E. & R. M. Blackwelder 1936	Chapin 1940
<i>Aphodius nigrita</i> (F.)	<i>Aphodius</i> <i>cuniculus</i> Chevrolat	R. E. & R. M. Blackwelder 1936	Chapin 1940
<i>Ataenius scutellaris</i> Harold	<i>Ataenius frater</i> Arrow	R. E. & R. M. Blackwelder 1936	Chapin 1940
<i>Ataenius howdeni</i> Chalumeau	<i>Ataenius luteomargo</i> Chapin	R. E. & R. M. Blackwelder 1936	Chapin 1940
<i>Phyllophaga</i> <i>montserratensis</i> Arrow	<i>Phyllophaga</i> <i>montserratensis</i> Arrow	H. G. Hubbard 1894	Arrow 1920
<i>Phyllophaga cneda</i> Saylor	<i>Phyllophaga cneda</i> Saylor	H. G. Hubbard 1894	Saylor 1940

Table 4.6 contd.

Current Name	Published Name	Source of Specimen	First Citation
<i>Ligrus cuniculus</i> (Fabricius)	<i>Ligrus cuniculus</i> (Fabricius)	J. & J. Cooter 1975	Cooter 1983
<i>Rutela s. striata</i> (Olivier)	<i>Rutela s. striata</i> (Olivier)	F. Chalumeau 1982 or 1984	Chalumeau 1985
<i>Chalcolepidius</i> n. sp.	<i>Chalcolepidius</i> <i>obscurus</i> (Laporte)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Heteroderes amplicollis</i> Gyllenhal	<i>Heteroderes</i> sp.	J. & J. Cooter 1975	Cooter 1983
<i>Tylocerus picipennis</i> Leng & Mutchler	undetermined cantharid	J. & J. Cooter 1975	Cooter 1983
<i>Aspisoma ignitum</i> Linneaus	<i>Aspisoma ignitum</i> Linneaus	J. & J. Cooter 1975	Cooter 1983
<i>Thonalmus hubardi</i> Leng & Mutchler	<i>Thonalmus hubardi</i> Leng & Mutchler	H. G. Hubbard 1894	Leng & Mutchler 1922
<i>Thonalmus sinuaticostis</i> Leng & Mutchler	<i>Thonalmus</i> <i>sinuaticostis</i> Leng & Mutchler	H. G. Hubbard 1894	Leng & Mutchler 1922
<i>Trogoderma ornatum</i> Say	<i>Trogoderma ornatum</i> Say	J. & J. Cooter 1975	Cooter 1983
<i>Xylomeira tridens</i> (Fabricius)	<i>Xylomeira torquata</i> (Fabricius)	H. G. Hubbard 1894	Fisher 1950
<i>Gibbium psylloides</i> Czempinski	<i>Gibbium</i> <i>aequinoctiale</i> Boieldieu	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Carpophilus dimidiatus</i> (Linneaus)	<i>Carpophilus</i> <i>dimidiatus</i> (Linneaus)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Contotelus conicus</i> (Fabricius)	<i>Contotelus conicus</i> (Fabricius)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Macrostola verraci</i> Grouvelle	<i>Macrostola lutea</i> Murray	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Telephanus nodicornis</i> Neverman	<i>Telephanus nodicornis</i> Neverman	H. G. Hubbard 1894	Nevermann 1932
<i>Philothermus puberulus</i> Schwarz	<i>Philothermus</i> <i>puberulus</i> Schwarz	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Cycloneda sanguinea</i> <i>limbifer</i> Casey	<i>Cycloneda</i> <i>sanguinea limbifer</i> Casey	J. & J. Cooter 1975	Cooter 1983
<i>Scymnus floralis</i> (Fabricius)	<i>Scymnus loewii</i> <i>Mulsant</i>	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Coccidophilus cariba</i> Gordon	<i>Coccidophilus cariba</i> Gordon	H. G. Hubbard 1894	Gordon 1978
<i>Neaptera viola</i> Gordon	<i>Neaptera viola</i> Gordon	R. E. & R. M. Blackwelder 1936	Gordon 1991
<i>Litargus balteatus</i> LeConte	<i>Litargus balteatus</i> LeConte	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Tetraonyx</i> <i>quadrimaculatus</i> (Fabricius)	<i>Tetraonyx</i> <i>quadrimaculatus</i> (Fabricius)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Synchita</i> sp. #1	<i>Synchita laticollis</i> LeConte	H. G. Hubbard 1894	Leng & Mutchler 1917

Table 4.6 contd.

Current Name	Published Name	Source of Specimen	First Citation
<i>Monoedus lecontei</i> Fleutiaux & Sallé	<i>Monoedus lecontei</i> Fleutiaux & Sallé	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Rhipidandrus cornutus</i> (Arrow)	<i>Eutomus</i> <i>cornutus</i> Arrow	R. E. & R. M. Blackwelder 1936	Blackwelder 1945
<i>Neomida lecontei</i> Bates	<i>Neomida</i> <i>lecontei</i> Bates	H. G. Hubbard 1894	Triplehorn 2006
<i>Gondwanocrypticus</i> sp.	<i>Crypticus</i> sp.	J. & J. Cooter 1975	Cooter 1983
<i>Phaleria fulva</i> Fleutiaux & Sallé	<i>Phaleria fulva</i> Fleutiaux & Sallé	J. & J. Cooter 1975	Cooter 1983
<i>Cyrtosoma</i> n.sp.	<i>Cyrtosoma lherminieri</i> (Chevrolat)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Uloma retusa</i> (Fabricius)	<i>Uloma retusa</i> (Fabricius)	R. E. & R. M. Blackwelder 1936	Blackwelder 1945
<i>Ulomoides ocularis</i> Casey	<i>Palembus ocularis</i> Casey	H. G. Hubbard 1894?	Triplehorn 1965
<i>Serrotibia</i> n. sp.	<i>Parlindria partia</i> Olliff	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Neolema dorsalis</i> (Olivier)	<i>Lema</i> sp.	J. & J. Cooter 1975	Cooter 1983
<i>Charidotella</i> <i>sexpunctata</i> (Fabricius)	<i>Metronia trisignata</i>	J. & J. Cooter 1975	Cooter 1983
<i>Acalyma innubum</i> (Fabricius)	<i>Diabrotica</i> <i>melanocephala</i> (Fabricius)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Diabrotica ochreatea</i> Fabricius	<i>Diabrotica ochreatea</i> Fabricius	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Neolochmaea</i> <i>obliterata</i> (Olivier)	<i>Galerucella tropica</i>	J. & J. Cooter 1975	Leng & Mutchler 1917
<i>Exora encaustica</i> (Germar)	<i>Exora detritum</i> (F.)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Cyrsylus montserrati</i> Blake	<i>Cyrsylus montserrati</i> Blake	H. G. Hubbard 1894	Blake 1949
<i>Omophoeta albicornis</i> Fabricius	<i>Omophoeta</i> <i>albicornis</i> Fabricius	J. & J. Cooter 1975	Cooter 1983
<i>Chlorida festiva</i> (Linnaeus)	<i>Chlorida festiva</i> (Linnaeus)	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Eburia decemmaculata</i> (F.)	<i>Eburia</i> <i>decemmaculata</i> (F.)	J. & J. Cooter 1975	Cooter 1983
<i>Elaphidion glabratum</i> (F.)	<i>Elaphidion</i> sp.	S. T. Danforth 1935	Danforth 1939
"	<i>Elaphidion</i> <i>tomentosum</i>	R. E. & R. M. Blackwelder 1936	Blackwelder 1945
<i>Strangalia benitiespinali</i> Chalumeau	<i>Strangalia</i> <i>benitiespinali</i> Chalumeau	F. Chalumeau 1982	Chalumeau 1985
<i>Adetus lherminieri</i> Fleutiaux & Sallé	<i>Adetus lherminieri</i> Fleutiaux & Sallé	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Cyrtinus hubbardi</i> Fisher	<i>Cyrtinus hubbardi</i> Fisher	H. G. Hubbard 1894	Fisher 1926

Table 4.6 contd.

Current Name	Published Name	Source of Specimen	First Citation
<i>Brentus anchorago</i> Linneaus	<i>Brentus anchorago</i> Linneaus	H. G. Hubbard 1894	Leng & Mutchler 1917
<i>Sitophilus linearis</i> (Herbst)	<i>Sitophilus linearis</i> (Herbst)	J. & J. Cooter 1975	Cooter 1983
<i>Metamasius hemipterus</i> (Linneaus)	<i>Metamasius</i> <i>hemipterus</i> (Linneaus)	S. T. Danforth 1935/H. G. Hubbard 1894	Danforth 1939, Vaurie 1966
<i>Metamasius</i> <i>quadrisignatus</i> (Gyllenhaul)	<i>Metamasius</i> <i>quadrisignatus</i> (Gyllenhaul)	H. G. Hubbard 1894	Vaurie 1966
<i>Pseudopentarthrum</i> sp. #1	<i>Pseudopentarthrum</i> sp.	H. G. Hubbard 1894	Champion 1909
<i>Proeces depressus</i> (Wollaston)	<i>Eucoptus depressus</i> Wollaston	H. G. Hubbard 1894	Buchanan 1947
<i>Pseudomus</i> sp. #1	<i>Pseudomus</i> sp.	J. & J. Cooter 1975	Cooter 1983
<i>Diaprepes abbreviatus</i> (Linneaus) <i>sensu lat.</i>	<i>Diaprepes</i> <i>abbreviatus</i> (Linneaus)	J. & J. Cooter 1975	Cooter 1983
<i>Diaprepes famelicus</i> (Olivier) <i>sensu</i> Pierce	<i>Diaprepes famelicus</i> (Olivier)	J. & J. Cooter 1975	Cooter 1983
<i>Lachnopus curvipes</i> (Fabricius)	<i>Lachnopus villosipes</i> (Boheman)	?	Ingram 1981
"	<i>L. curvipes</i> -group	J. & J. Cooter 1975	Cooter 1983
<i>Litostylus pubens</i> (Boheman)	<i>Litostylus pubens</i> (Boheman)	P. C. Drummond	Ingram 1981
"	<i>Litostylus strangulatus</i> (Chevrolat)	7-May-1968	O'Brien and Wibner 1982
<i>Coccotrypes cyperi</i> (Beeson)	<i>Coccotrypes</i> <i>hubbardi</i> Hopkins	H. G. Hubbard 1894	Hopkins 1915

Several other entomologists are known to have followed Riley and Hubbard after the turn of the century, most for only a short period of time and collecting only a few specimens, or specializing on a particular narrow group. The English entomologist Harold Maxwell Lefroy (1877-1925) collected on Montserrat in August, 1901, before achieving fame as the entomologist to the Government of India (Rehn 1905), and Henry Arthur Ballou (1872-1937), the Entomologist of the Imperial Department of Agriculture based in Barbados, collected on Montserrat in January, 1904 (Rehn 1905, Rehn and Hebard 1927) around the time (1905) another scale, the green shield scale (*Coccus viridus* Green) was recorded attacking young lime trees (Ballou 1912, Innanen 1998). The specimens of Lefroy and Ballou are scattered among the collections of specialists. Another USDA entomologist, the Lepidopterist August Busck (1870-1944) has been reported to have been on the island in June 1905 (Thompson 1981, specimens in NMNH). However, these specimens were actually collected at Montserrat, Trinidad (see label data cited in Stone & Knight 1957).

In 1906, the Curator of the Montserrat Botanic Station, W. Robson, sent 2 species to the Imperial Commissioner of Agriculture in Bridgetown, which formed the basis of a published record (Robson 1906). Rounding out the first decade of the twentieth century, Thompson (1981) reports fly specimens in the NMNH from an unnamed collector on the island in March of 1910.

Amos Peaslee Brown (1864-1917), Professor of Geology and Mineralogy at the University of Pennsylvania, was, among other things, an avid malacologist interested in both paleontology and land snails (Stone 1918). The fact that he collected snails on Montserrat in 1913 is documented only through the existence of his specimens in the Academy of Natural Sciences, Philadelphia. He is known to have visited Antigua in July and August of that year, and he published a paper on the geology of that island (Brown 1913). Exactly what his purpose was on Montserrat, be it pursuit of his interest in malacology, paleontology, geology, or some other reason is unknown.



From 1910 to 1922, we find no records of visits to Montserrat that yielded insect specimens. Stuart T. Danforth (1900-1938) of the University of Puerto Rico is best known as an ornithologist, but was also an accomplished entomologist. He visited Montserrat on 4 short visits in July 1922, July 1931, June 1935, and August 1935. Finally, in February 1937, he made a more extended visit. He collected insect and avian specimens on the island, and performed several bird stomach dissections that yielded insect and snail records (Danforth 1939, Thompson 1981). His insect collection is now at the Museum of Comparative Zoology, Harvard University.

The Montserrat resident, historian and naturalist T. W. Savage-English collected the first Onychophorans known from Montserrat in April 1924. His specimens are in the NMNH and BMNH (Clark 1929, Read 1988). Brooks (1998) reports a bee in the NMNH collected on Montserrat on 13 September 1925, but the collector is not reported, and this date does not match any of the known collectors. In July, 1929, William A. Hoffman of the School of Tropical Medicine in San Juan, and his assistant José Oliver-González (later of the University of Puerto Rico) bred several species of mosquitoes from a crab hole which found their way to Belkin and Heinemann (1975) (see below). These specimens became the source of the original mosquito records for the island (Belkin and Heinemann 1975). No report of other material Hoffman and Oliver-González may have collected has been found.

Richard Eliot Blackwelder (1909-2001), assisted by his wife Ruth MacCoy Blackwelder (1910-1989), spent 2 weeks in July, 1936 collecting on Montserrat, under a W. R. Bacon Fellowship (1935-1938) at the Smithsonian Institution. He published a detailed list of his localities and collecting efforts (Blackwelder 1943). Although the Blackwelders were concentrating on Staphylinidae, they picked up numerous other groups as well, most of which can be found in the NMNH. Their collecting has been the basis for the second largest group of published beetle records for the island (Table 4). Later in his career, he produced the most recently published checklist and bibliography of Neotropical beetle species (Blackwelder 1944-57), and still later became one of the foremost scholars of J. R. R. Tolkien! His efforts on Montserrat are described in more detail above.

The famous Homopterist Ronald Gordon Fennah (1910-1987) spent much of his career in the British West Indies, first as Lecturer in Zoology (1935), then the Citrus Entomologist for the Windward and Leeward Islands (1937-1942), and finally Officer-in-Charge for the Food-Crop Investigation for the Windward and Leeward Islands (1942-1948), all three at the Imperial College of Agriculture in Trinidad (now University of West Indies). His visits to Montserrat ended when he became Entomologist of the Department of Agriculture for Trinidad (1948). Originally from the Welsh Marches, he left Trinidad after 22 years in the West Indies (1958), and joined the Commonwealth Institute of Entomology in London, where he finished his career as Director. His 1937 hire required him to investigate a mysterious die-off of lime trees in Montserrat (Lapointe 2000). He visited the island several times, starting in January 1938 (and at least in September, 1939 and May, 1941). He reported numerous Fulgoroidea from the island in the 17 papers he published on the Homoptera of the West Indies. He described 10 of the 12 species of Fulgoroidea known from the island today, including all 6 of the single-island endemics. In addition, Fennah recorded several economically important species in his agricultural papers, and provided specimens of many groups to others (Thompson 1981). Type material from his West Indian period is deposited in the NMNH, and his later material is mostly deposited in The Natural History Museum, London (Wilson 1988).

Botanist George R. Proctor (1920- ) collected a specimen of dung beetle (Matthews 1966), a ground beetle (G. Ball pers. com.), and perhaps other specimens, in February, 1959. His material is deposited at the Science Museum, Institute of Jamaica, Kingston. The Smithsonian-Bredin Caribbean Expedition, on the Research Vessel *Freelance*, apparently made a port call at Montserrat in April, 1959, yielding specimens of Crustacea collected by Thomas Elliot Bowman III (1918-1995) on the beach at Fox's Bay. Several records of marine species undoubtedly date to this voyage. Other specimens of Crustacea at the NMNH date to an M. S. Carson, collected in December, 1963.

Reference to a single Montserrat lygaeid in the Leiden Museum, Netherlands (Slater & Baranowski 2005), collected 15 July 1965 by a Mrs. E. Geijskes, indicates a potentially unstudied collection at that museum. Ester "Ettie" Sollewijn Gelpke (1909-1994) was the wife of Dutch Odonatologist Dirk Cornelis Geijskes (1907-1985), famous for his work in Suriname. To our knowledge, that single specimen is the only indication of a visit by one or both of them to Montserrat.

In October, 1966, a team visited Montserrat led by the well-known Yale University medical entomologist Thomas Henry Gardiner Aitken (1912- ), who was then at the Trinidad Regional Virus Laboratory (TRVL). Aitken, along with TRVL staffers Ambrose Guerra and Raymond Martinez, surveyed Montserrat's mosquitoes for the Mosquitoes of Middle America Project (Belkin and Heinemann 1975, 1976). They visited 134 localities (Belkin and Heinemann 1976), covering the island better than any other invertebrate collectors. Their thoroughness is the reason the mosquitoes, along with the butterflies, are the best known group of invertebrates on the island. After a few stops along the way, the collections from this project are now at the NMNH.

Dutch zoologist Pieter Wagenaar Hummelinck (1907-2003) collected for a single day, 20 July, 1967 (not August as reported in Stevens & Waldmann 2001), as part of an area-wide survey of various animal groups (Wagenaar Hummelinck 1981). His insect collections are deposited mostly in the Leiden Museum.

The Charles W. O'Brien collection contains weevil specimens collected in May 1968 and October 1971 by Peter Call Drummond (1937 - ), an isopod specialist from Santa Fe Community College, Florida. These specimens were submitted to O'Brien for identification by M. Sommeijer (presumably the Dutch entomologist Marinus J. Sommeijer, who worked for the UN Food and Agriculture Organization in Trinidad from 1971-1974) (C. W. O'Brien, in lit.).

Montserrat specimens collected in November 1967 and July-August 1971 by Hawaiian biocontrol specialist Noel Louis Hilmer Krauss (1910-1996) are in the NMNH (Brooks 1998, Thompson 1981, Kung and Brown 2006). Fred D. Bennett, another biological control specialist based at the Commonwealth Institute of Biological Control in Trinidad, collected on Montserrat in February 1964, November 1973 and May 1974 yielding specimens of biological control agents (Gordon 1978, Frank *et al.* 1992). A citation of an unpublished report from a survey of plant parasitic nematodes (Braithwaite 1973) indicates that someone collected these common but oft-overlooked animals on Montserrat in the early 1970's, most likely someone named C. W. D. Braithwaite from Trinidad. An original copy of this paper has not been located, but it contains the earliest records of non-medical nematodes from Montserrat.

Montserrat has benefited from its proximity to the French Antilles, with several French scientists visiting Montserrat while working on Guadeloupe. The French entomologist Jacques Bonfils reported on some Montserrat species (Bonfils 1969), and he may have collected on the island during one of his visits to the French West Indies (Bonfils 1969). Specimens collected by Père (Father) R. Pinchon and P. Enrico in December 1967 formed the basis for the first list of butterflies for the island (Pinchon & Enrico 1969). Malacologist Jean-Pierre Pointier, of the Université de Perpignan, collected aquatic snails in 1974 (Pointier 1975), apparently on a side trip from work in the French Antilles. His work was focused on the intermediate hosts of schistosomiasis. Fortuné Chalumeau of the Institut de Recherches entomologiques de la Caraïbe in Guadeloupe, collected insects, mostly beetles, on Montserrat in March 1982, December 1983 and March 1984. His material is now in the collection of the Conseil Général de la Guadeloupe at the Institut National de la Recherche Agronomique (INRA), Petit-Borg, Guadeloupe. Also from Guadeloupe, the husband/wife team of entomologists Bernard LaLanne-Cassou and Jeanne le Duchat d'Aubigny collected on Montserrat in December 1983. Their Montserrat material is also at INRA-Guadeloupe. The collections at INRA constitute the third largest insect collections from Montserrat.

Following the schistosomiasis work of Pointier, M. A. Prentice collected aquatic snails in 1977 [identified as "Prantice" in Stevens and Waldmann 2001] (Prentice 1980) as a Rockefeller Foundation staffer based in St. Lucia.

The English coleopterist Jonathan Cooter (1949- ) published (Cooter 1983) a brief report on a collection he made with his father (the designer of postage stamps, including many for Montserrat) John Edward Cooter (1913-2001) in August, 1975. He listed 20 species of beetles, 19 of them first records (Table 4). This represented only a portion of their specimens, all of which are deposited in the Natural History Museum, London (pers. com. J. Cooter). These collections, combined with others in London, are probably fifth in size among Montserrat insect collections. Coleopterist Robert Eugene Woodruff (1933 - ) of the Florida State Department of Agriculture visited the island in June of 1977, and ran an ultraviolet light trap at Fox's Bay. His collections in the Florida State Collection of Arthropods (Gainesville), (along with records from Baranowski and Walker, below) form the basis for several Montserrat records included in Woodruff *et al.* (1998). Another coleopterist, Richard Stuart Miller (1945 - ) collected a few specimens while vacationing on Montserrat in July 1981. Most of his material is now in the West Indian Beetle Fauna Project collection in Bozeman, with some remaining in his private collection.

One of the few synthetic works specifically on the invertebrates of Montserrat was published by Schwartz and Jimenez (1982) on the island's butterflies. The new material was based mainly on collections made between June 1980 and February 1981 by Peter L. Richel and Geoffrey L. Blattin, who were resident on Montserrat at the time, attending medical school at the American University of the Caribbean. Additions to the butterfly fauna were made by Schwartz (1991), based on collections by herpetologist Robert W. Henderson in November 1987, and José Escobio in May 1990. This material is now deposited in the Milwaukee Public Museum.

Hemipterist Richard Matthew Baranowski (1928- ) of the University of Florida, accompanied by his wife Helen B. Venn Baranowski, collected on Montserrat in June-July 1991, July-August 1992, and June 1993 as part of the work that led to a major volume on the Lygaeidae of the West Indies (Slater and Baranowski 2005). This material is largely housed in his private collection, with some in the Charles W. O'Brien collection and perhaps some at the FSCA. Baranowski's collection also contains Montserrat material collected at ultraviolet lights run by P. Jeffers at Brades, in October 1992 and April-May 1993, as well as at Groves, in June 1993. No further information is available for Jeffers.

Thomas J. Walker, University of Florida, visited Montserrat to collect Orthoptera in 1992. His material is in his private collection in Gainesville, and may be the source for some of the Montserrat records in Woodruff *et al.* (1998). In

August, 1992 and again in August 1993, another husband/wife team, Lee Denmar Miller (1935 - ) and Jacqueline Yvonne Miller (1944 - ), collected butterflies on the island, and included their records in their book (Smith *et al.* 1994). Their specimens are in the Florida Museum of Natural History, Gainesville.

Canadian entomologist Christopher Kenneth Starr, Senior Lecturer at the St. Augustine campus of the University of the West Indies (Trinidad) collected briefly on the island in July 1994, and his small batch of material is in the UWI collection. [This collection may also house unreported specimens from Ballou, Fennah, Bennett or others.]

While serving as a Fulbright Scholar at the University of the West Indies (Cave Hill) T. David Bass (1956 - ) of the University of Central Oklahoma (UCO) visited Montserrat in June 1996 to collect aquatic invertebrates. He obtained the first, and to date, the only, known mayfly in Lawyer's River. That specimen is deposited at Texas A&M University (Baumgardner *et al.* 2003), but material of 24 more species he collected, including snails, decapods, ephemeropterans, odonates, hemipterans, trichopterans, coleopterans and dipterans are in the Caribbean Invertebrate Freshwater Invertebrate Collection at UCO (Bass 2003).

Germans Michael Stevens and George Waldmann, from the Heinrich-Heine-Universität (Germany) and University of Coventry (United Kingdom) respectively, collected more extensively on the island in 1999, preparing their checklist of the fauna of Montserrat (Stevens and Waldmann 2001). They were assisted by several residents, including Bridgett Beatty and Ingrid Rapuano. Much of their insect material was donated to the West Indian Beetle Fauna Project, reported below, while other portions were distributed to specialists.

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# Appendix 2. Species lists of the beetles, non-beetle hexapods and non-hexapod invertebrates of Montserrat

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## The beetles of Montserrat: an annotated checklist

Below are listed all of the beetles known to us from Montserrat, organized by family. Each has a name at the level we are able to assign it. Each has a code indicating the species' distributional status (Table A), from single island endemic to invasive exotic. The symbol "?" associated with this ranking, indicates our lack of knowledge of a particular taxon. Following the distributional code is the original citation (if any) of the species from Montserrat, as well as any notes. This format is also followed for the sections on non-beetle hexapods and the non-hexapods invertebrates.

Table A. Key to Distributional Status

Distributional status	Code	Description
Island Endemic	IE	Montserrat only
Local Endemic	LE	Few islands, i.e St. Kitts, Montserrat & Guadeloupe
Leeward Island Endemic	LIE	Sombrero to Dominica
North Eastern Caribbean Endemic	NEC	Puerto Rico to Dominica
Lesser Antilles Endemic	LAE	Sombrero to Grenada
West Indian Endemic	WIE	Not on mainland, or only south Florida
Widespread Native	WN	West Indies and Mainland
S. America and Lesser Antilles Native	SA	Sombrero to Grenada & S. America
Native	N?	Full distribution unknown
Exotic	EIS	Invasive Species (exotic species not introduced on purpose)
Biological Control Agent	EBC	Exotic spp introduced for beneficial purpose
Status Uncertain	?	Identity not yet ascertained, or range in dispute

## COLEOPTERA

### Rhysodidae

*Clinidium* (s.str.) n.sp. nr *planum* IE

Carabidae (determined by George Ball and Danny Shpeley, with individual species determined by Wendy Moore, James Liebherr and Terry Erwin)

*Cicindela trifasciata* Fabricius WN

*Eohomopterus* n.sp. (being described by W. Moore) IE

*Aspidoglossa schach* (Fabricius) WN

<i>Bembidion darlingtoni</i> Mutchler	WIE
<i>Mioptachys</i> sp.	? [Leng & Mutchler (1917) recorded <i>Mioptachys autumnalis</i> Bates from Montserrat. This species was described from Central America, and has been reported from Cuba and Guadeloupe. However, this genus has never been revised, and the limits of <i>M. autumnalis</i> never delimited. Therefore, this published record and our specimens are treated here as <i>M. sp.</i> until the specimens involved can be brought together and critically examined.]
<i>Elaphropus singularis</i> Andrews	EIS
<i>Tachys ensenada</i> Mutchler	WN
<i>Paratachys (Eotachys) blemoides</i> Jeannel	EIS
<i>Paratachys</i> sp. #1	?
<i>Paratachys</i> sp. #2	?
<i>Paratachys</i> sp. #3	?
<i>Micratopus insularis?</i> Darlington	NEC
<i>Glyptolennus chalybaeus</i> (Dejean)	WN [Liebherr (1997), not recollected]
<i>Selenophorus alternans</i> Dejean	WIE?
<i>Selenophorus chalybaeus</i> Dejean	WIE
<i>Selenophorus sinuatus</i> Gyllenhal	WIE?
<i>Selenophorus</i> n.sp.?	IE?
<i>Selenophorus subquadratus</i> Putzeys	WIE
<i>Selenophorus discopunctatus</i> Dejean	WN
<i>Selenophorus propinquus</i> Putzeys	NEC
<i>Notiobia pallipes</i> Bates	EIS
<i>Athrostrichus paganus</i> Dejean	WN
<i>Pentagonica flavipes</i> (LeConte)	WN
<i>Zuphium</i> sp.	?
<i>Perigona nigriceps</i> Dejean	EIS
<i>Apenes marginalis</i> Dejean	WN
<i>Apenes chalumeaui</i> Ball & Shpeley	LIE
<i>Menidius amandus</i> Newman	EIS?/WN?
<i>Lebia pleurodera</i> Chaudior	WN

**Rejected Record:** Erwin and Sims 1984 recorded the very large, rare South American and Trinidadian species *Enceladus gigas* Bonelli from Montserrat, but it seems certain that this was either a mislabeled or misinterpreted specimen. Since Montserrat is a common place name in Latin America, including a place name in Trinidad, the specimen must have been from a Montserrat in Trinidad or northern South America. A search for the specimen in question at the NMNH in 2007 did not turn up the source of the record, but at some point between 1984 and 2007, Erwin dropped the record from his distributional database (T. Erwin, pers. com.).



Fig. A. *Eohomotperus* n.sp. (Photo: Wendy Moore)

#### Dytiscidae

<i>Bidessonotus</i> sp.	N?
<i>Copelatus</i> sp. nr. <i>posticalus</i> (F.)	N?
<i>Hydrovatus</i> sp.	N?
<i>Laccophilus proximus</i> (Say)	WN
<i>Laccophilus</i> sp.	N?
<i>Megadytes gigantea</i> LaPorte	WN
<i>Rhantus calidus</i> (Fabricius)	WN
<i>Thermonectes basilaris</i> (Harris)	WN

#### Histeridae (some determinations by A. Ramsdale)

<i>Omalodes laevigatus</i> Quensel	WN
<i>Aeletes lissosternus</i> Wenzel	IE
<i>Bacanius</i> sp. #1	N?
<i>Bacanius</i> sp. #2	N?
<i>Hister servus</i> Erichson	WN
<i>Atholus confinus</i> (Erichson)	WIE [Cooter 1983, Stevens & Waldmann as <i>A. confirmis</i>
(lapsus)]	
<i>Hypocaccus</i> sp.	N?
<i>Carcinops?</i> sp.	N?
<i>Teretriosoma</i> sp.	N?
<i>Paromalus?</i> sp.	N?

#### Hydrophilidae

<i>Dactylosternum abdominale</i> (F.)	WN [Leng & Mutchler 1917]
<i>Hydrophilus insularis actorum</i>	WN

<i>Cercyon atricapillus</i> (Marshall)	WN
<i>Cercyon variegatus</i> Sharp	WN
<i>Aculomicrus</i> n.sp.	IE
<i>Tropisternus lateralis</i> Laporte	WN
<i>Tropisternus chalybeus</i> Laporte	WN [Leng & Mutchler 1917]
<i>Phaenonotum exstriatum</i> (LeConte)	WN
<i>Pelosoma</i> sp.	N?
<i>Berosus</i> sp.	N?
<i>Omicrus subopacus</i> Smetana	WN
<i>Parachymus confusus</i> Woodridge	WN
<i>Enochrus bartletti</i> Short	WIE [Short 2004]
Scydmaenidae	
<i>Scydmaenus guadeloupensis</i> Franz	NEC
<i>Euconnus</i> sp. 1	N?
<i>Euconnus</i> sp. 2	N?
Hydraenidae	
<i>Hydraena guadeloupensis</i> d'Orchymont	
Ptiliidae	
<i>Bambara</i> sp. #1 (+)	N?
<i>Bambara</i> sp. #2	N?
<i>Oligella?</i> sp.	N?
<i>Ptiliolium?</i> sp.	N?
<i>Ptinella</i> sp.	N?
<i>Actinopteryx</i> sp.	N?
Leiodidae	
<i>Zeadolopus</i> sp. #1	IE
<i>Zeadolopus</i> sp. #2	IE
<i>Zeadolopus</i> sp. #3	IE
Staphylinidae	
PSELAPHINAE	
<i>Burus/Bythinophysis?</i> sp.	N?
<i>Hamotus (Hamotoides) hirtus</i> Raffray	LAE
<i>Eupsenius</i> sp.	N?
<i>Decarthron</i> nr. or = <i>insulare</i> Raffray	N?
<i>Ramelbida</i> sp.	N?
TACHYPORINAE	
<i>Coproporus sharpi</i> Cameron	LAE [Blackwelder 1943]
<i>Coproporus rutilus</i> Erichson	WN [Blackwelder 1943]
<i>Coproporus</i> n.sp.	IE?
<i>Sepedophilus interruptus</i> (Erichson)	WN [Blackwelder 1943, not recollected]
<i>Sepedophilus</i> sp. ("scriptus group")	?
<i>Bryoporus</i> sp. #1	?
<i>Bryoporus</i> sp. #2	?

SCAPHIDIINAE

<i>Baeocera</i> sp. #1	?
<i>Baeocera</i> sp. #2	?
<i>Baeocera</i> sp. #3	?
<i>Baeocera</i> sp. #4	?

ALEOCHARINAE

<i>Adinopsis</i> sp. #1	?
<i>Anacyptus testaceus</i> LeConte	WN [Blackwelder 1943]
<i>Aleochara</i> sp. #1	?
<i>Aleochara</i> sp. #2	
<i>Oligota minuta</i> Cameron	WN [Frank, Bennet, Comroy 1992]
<i>Oligota guadeloupae</i> Frank	LE
Hypocyphtini sp. #1	?
Hypocyphtini sp. #2	?
Hypocyphtini sp. #3	?
Hypocyphtini sp. #4	?
Hypocyphtini sp. #5	?
Athetini sp. #1	?
Aleochorinae #1	?
Aleochorinae sp. #2	?
Aleochorinae sp. #3	?
Aleochorinae sp. #4	?
Aleochorinae sp. #5	?
Aleochorinae sp. 6	?
Aleochorinae sp. #7	?
Aleochorinae sp. #8	?
Aleochorinae sp. #9	?
Aleochorinae sp. #10	?
Aleochorinae sp. #11	?
Aleochorinae sp. #12	?
Aleochorinae sp. #13	?
Aleochorinae sp. #14	?
Aleochorinae sp. #15	?
Aleochorinae sp. #16	?
Aleochorinae sp. #17	?
Aleochorinae sp. #18	?
Aleochorinae sp. #19	?
Aleochorinae sp. #20	?
Aleochorinae sp. #21	?





Fig. B. Aleocharinae #22, a representative Aleocharinae. (Photo: Ian Foley and Michael Ivie)

#### PIESTINAE

*Piestus pygmaeus* (Laporte) WN

#### OSORIINAE

*Clavilispinus guadeloupensis* Irmeler WN

*Clavilispinus megacephalus* (Fauvel) WN

*Clavilispinus politus* (Sharp) WN

*Clavilispinus exiguus* (Erichson) WN

*Espeson moratus* Schaufuss WN [Blackwelder 1943, not recollected]

*Lispinus* sp.? *attenuatus* WN

*Lispinus insularis* Fauvel WN [Blackwelder 1943]

*Nacaeus impar* (Cameron) WN [Blackwelder 1943]

*Nacaeus nigrifrons* (Fauvel) WIE [Blackwelder 1943]

*Nacaeus foveolus* (Blackwelder) IE [Blackwelder 1943, not recollected or poss. =

*Nacaeus* sp. #1]

*Nacaeus* sp. #1 ?

*Thoracophorus simplex* Wendeler WIE [Blackwelder 1943]

*Thoracophorus guadelupensis* Cameron WN

*Pseudepeson crassulus* (Fauvel) LAE [Blackwelder 1943]

*Holotrochus* sp. #1 ?

*Holotrochus* sp. #2 ? *minor* WN

#### OXYTELINAE

*Anotylus insignitus* Gravenhorst WN [Blackwelder 1943]

*Anotylus glareosus* (Wollaston) EIS

<i>Apocellus ustulatus</i> (Erichson)	WIE [Blackwelder 1943, not recollected]
<i>Bledius caribbeanus</i> Blackwelder	WN [Blackwelder 1943]
<i>Carpelimus</i> sp.#1	?
<i>Carpelimus</i> sp. #2 prob. <i>correctus</i> Blackwelder	WIE
<i>Carpelimus</i> sp.#3	?
<i>Carpelimus</i> sp.#4	?
<i>Carpelimus</i> sp. #5	?
<i>Carpelimus</i> sp.#6	?
<i>Oxytelus incisus</i> Motschulsky	WN [Blackwelder 1943, not recollected]
<i>Thinobius exasperatus</i> Blackwelder	WIE [Blackwelder 1943, not recollected]
<i>Thinodromus croceipes</i> Fauvel	WIE [Blackwelder 1943]

#### PAEDERINAE

<i>Biocrypta fulvipes</i> (Erichson)	WN
<i>Echiaster microps</i> Blackwelder	IE [Blackwelder 1943]
<i>Lobrathium nitidum</i> (Erichson)	WIE
<i>Lithocharis dorsalis</i> Erichson	WN [Blackwelder 1943]
<i>Lithocharis limbatus</i> Erichson	WN
<i>Lithocharis secunda</i> Blackwelder	WN [Blackwelder 1943]
<i>Lithocharis sororcula</i> Kraatz	WN [Blackwelder 1943]
<i>Lithocharis</i> sp.#1	N?
"Medon" complex sp. #1	?
"Medon" complex sp. #2	?
"Medon" complex sp. #3	?
"Medon" complex sp. #4	?
<i>Microlinus pasio</i> (LeConte)	WN
<i>Pinophilus</i> sp. poss. <i>vermiformis</i> Cameron	LAE
<i>Palaminus</i> sp. #1	?
<i>Palaminus</i> sp. #2	?
<i>Palaminus</i> sp. #3	?
<i>Palaminus</i> sp. #4	?
<i>Palaminus</i> sp. #5	?
<i>Scopaeus</i> sp.	?
<i>Stammoderus</i> sp.	?
<i>Sunius debilicornis</i> Wollaston	WN

#### STAPHYLININAE

<i>Atanygnathus</i> sp. 1	?
<i>Atanygnathus</i> sp. 2	?
<i>Belonuchus gagates</i> Erichson	WIE [Blackwelder 1943]
<i>Belonuchus</i> sp. 1	?
<i>Belonuchus</i> sp. 2	?
<i>Belonuchus</i> sp. 3	?
<i>Cafius (Euremus) bistratus</i> (Erichson)	WN [Blackwelder 1943, not recollected]
<i>Cafius subtilis</i> Cameron	WIE [Blackwelder 1943, not recollected]
<i>Diochus nanus</i> Erichson	WN
<i>Holius</i> sp. #1	?
<i>Holius</i> sp. #2	?

<i>Neohypnus attenuatus</i> (Erichson)	WN [Blackwelder 1943]
<i>Neohypnus humeralis</i> (Erichson) New Comb.	WIE [Blackwelder 1943]
<i>Neohypnus illucens</i> (Erichson)	SA [Blackwelder 1943, not recollected]
<i>Neoxantholinus hubbardi</i> (Blackwelder)	IE [Blackwelder 1943]
<i>Philonthus discoideus</i> (Gravenhorst)	WN [Blackwelder 1943, not recollected]
<i>Philonthus hepaticus</i> Erichson	WN [Blackwelder 1943]
<i>Philonthus havaniensis</i> (Laporte).	WIE
<i>Philonthus longicornis</i> Stephens	WN [Blackwelder 1943, not recollected]
<i>Philonthus ventralis</i> (Gravenhorst)	WN [Blackwelder 1943]
Passalidae	
<i>Spasylus crenatus</i> M'Lea	WN
Trogidae	
<i>Omorgus suberosus</i> (Fabricius)	WN
Scarabaeidae	
Scarabaeinae	
<i>Ateuchus insulare</i> (Fleutiaux & Sallé)	LE [Leng & Mutchler 1917 as <i>Choerisium insulare</i> Chev-
rolat, Matthews 1966 as <i>A. illaesus</i> Harold]	
<i>Onthophagus gazella</i> (F.)	EIS
Aphodiinae (dets by P. Skelley)	
<i>Aphodius nigritus</i> (F.)	EIS [Chapin (1940) as <i>Aphodius cuniculus</i> Chevrolat]
<i>Aphodius pseudolividus</i> Balthasar	EIS [Chapin (1940) as <i>Aphodius lividus</i> (Olivier)]
<i>Ataenius vincentiae</i> Arrow	LAE
<i>Ataenius gracilis</i> (Melsheimer)	EIS
<i>Ataenius scutellaris</i> Harold	WN or EIS
(Chapin 1940 as <i>A. frater</i> Arrow)	
<i>Ataenius cameneni</i> Chalumeau & Gruner	LE
<i>Ataenius scabrellus</i> Schmidt	WN
<i>Ataenius liogaster</i> Bates	EIS
<i>Ataenius brevicollis</i> (Wollaston)	EIS
<i>Ataenius temperei</i> Chalumeau & Gruner	LIE
<i>Ataenius howdeni</i> Chalumeau	LE [= <i>Ataenius luteomargo</i> Chapin of Chapin 1940,
MisID]	
<i>Iguazua blackwelderi</i> (Chapin)	NEC
Melolonthinae	
<i>Phyllophaga montserratensis</i> Arrow	LE [Arrow 1920]
<i>Phyllophaga cnedata</i> Saylor	LE [Saylor 1940]
Rutelinae	
<i>Anomala</i> n.sp. <i>insularis</i> group	IE
<i>Leucothyreus guadulpiensis</i> Burmeister	LIE
<i>Macraspis tristis</i> Castelnau	LE
<i>Rutela s. striata</i> (Olivier)	LE ssp. [Chalumeau 1985]



Fig. C. *Rutela s. striata* (Olivier) Adult, larva and pupa in rotten wood. (Photo: Michael Ivie)

Dynastinae

<i>Cyclocephala mafaffa</i> Burmeister	SA
<i>Ligyryus cuniculus</i> (Fabricius)	WN [Cooter 1983]
<i>Phileurus valgus</i> Linneaus	WN
<i>Strategus syphax</i> (Fabricius)	LE

Scirtidae

<i>Scirtes</i> n.sp. 1	IE
<i>Scirtes</i> n.sp. 2, testaceus group	IE

Buprestidae

<i>Polycesta</i> n.sp.	IE
<i>Chrysobothris</i> sp. <i>thoracica</i> group	LE
<i>Micrasta</i> sp. #1, nr. <i>uniformis</i>	IE
<i>Micrasta</i> sp. #2, yellow tarsi	IE
<i>Micrasta</i> sp. #3, yellow tibia - big parameres	IE
<i>Micrasta</i> sp. #4, olive-elytra-blue-pronotum	IE
<i>Micrasta</i> sp. #5, bright-blue-wide	IE

Elateridae

<i>Conoderus</i> sp.	WN
<i>Physorrhinus insularis</i> Candeze	LE
<i>Chalcolepidius</i> n. sp.	IE [Recorded by Leng & Mutchler (1917) and Casari (2002) (cited by Peck 2006) as <i>Ch. obscurus</i> , however we have not yet seen the Casari paper, and all true <i>Ch. obscurus</i> are dark green, while all Montserrat <i>Chalcolepidius</i> are bright red.]
<i>Drapetes nigricans</i> Bonvouloir	WN
<i>Heteroderes amplicollis</i> Gyllenhal	LAE [Cooter, 1983 as <i>H.</i> sp.]
<i>Dicrepidius ramicornis</i> P. de Beauvois	WN
<i>Dicrepidius distinctus</i> Fleutiaux & Sallé	LE
<i>Lacon subcostatus</i> (Candeze)	WIE
<i>Anchastus</i> sp. #1	IE
<i>Anchastus</i> sp. #2	IE
<i>Anchastus</i> sp. #3	IE

Eucnemidae

<i>Adelothyreus curtis</i> Fleutiaux	LE
<i>Adelothyreus dufai</i> Fleutiaux	LE
<i>Fornax</i> sp.	N?
<i>Serrifornax</i> sp. #1	N?
<i>Serrifornax</i> sp. #2	N?

Ptilodactylidae

<i>Ptilodactyla macrophthalma</i> LeGross	WIE
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Cantharidae (determined by A. Ramsdale)

<i>Tytthonyx</i> n. sp.	IE
<i>Tylocerus picipennis</i> Leng & Mutchler	IE [Cooter 1983, as undet.]
<i>Tylocerus</i> n.sp.	IE

Lampyridae

*Aspisoma ignitum* L. EIS/WN [Cooter 1983, Stevens & Waldmann's record from Blackwelder is an error, Blackwelder (1945) did not include Montserrat for this species]

Lycidae

*Thonalmus hubardi* Leng & Mutchler IE [Robson's 1906 record of an undetermined lampyrid is really for a *Thonalmus*, but could be either of these species, first certain record the description by Leng & Mutchler 1922] (move this to after next *Thonalmus*)

<i>Thonalmus sinuaticostis</i> Leng & Mutchler	IE [Leng & Mutchler 1922]
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Fig. D. *Thonalmus* sp. (Photo: Michael Ivie)

Dermestidae

<i>Dermestes maculatus</i> DeGeer	EIS
<i>Trogoderma ornatum</i> Say	EIS (Cooter 1983)

Bostrichidae

<i>Melalgus caribeanus</i> (Lesne)	LAE
<i>Amphicerus cornutus</i> (Pallas)	EIS?/WN
<i>Tetrapriocera longicornis</i> (Olivier)	EIS?/WN
<i>Xylomeira tridens</i> (Fabricius)	EIS?/WN [Fisher 1950]
<i>Xylopsocus capucinus</i> (Fabricius)	EIS
<i>Dinoderus minutus</i> (Fabricius)	EIS
<i>Lyctus caribbeanus</i> Lesne	WN

**Rejected record.** *Apate monarchus* Boh. (sic) unsupported record Stevens and Waldmann 2001

Anobiidae

<i>Xyletinus marmoratus</i> Pic	LE
<i>Protheca</i> sp. 1	N?
<i>Protheca</i> sp. 2	N?
<i>Tricorynus ?pierrii</i> (Lepesme)	LIE?
<i>Pseudodorcatomus ?mariei</i> Lepesme	LE
<i>Calymmaderus</i> sp. nr. <i>dufau</i> Pic	IE?
<i>Microzogus</i> sp. 1	N?
<i>Microzogus</i> sp. 2	N?
<i>Microzogus</i> sp. 3	N?
<i>Caenocara maculatum</i> Fisher	NEC
<i>Cryptorama carinatum</i> White	NEC
<i>Cryptorama megalops</i> White	NEC
<i>Cryptorama ?antillensis</i> White	WN
<i>Cryptorama sericeum aureum</i> (Lepesme)	LE
<i>Cryptorama</i> sp. 1	IE
<i>Cryptorama</i> sp. nr. <i>impunctatum</i> White	IE?
<i>Cryptorama</i> sp. nr. <i>tortolensis</i> White	IE?
<i>Cryptorama</i> sp. nr. <i>minor</i> Fall	IE?
<i>Cryptorama</i> sp. nr. <i>rufescens</i> White	IE?
<i>Petalium</i> sp. 1	N?
<i>Petalium</i> sp. 2	N?
<i>Petalium ?antillarum</i> Pic	WN
<i>Trichodesma</i> sp. 1	IE?
<i>Trichodesma</i> sp. 2	IE?
<i>Trichodesma</i> sp. 3	IE?
<i>Trichodesma</i> sp. 4	IE?
<i>Trichodesma</i> sp. 5	IE?
<i>Stichtoptenus</i> n.sp. nr. <i>dufau</i> Pic	IE
<i>Megorama</i> sp.	N?
<i>Ptinus strangulates</i> Fall	WN
<i>Ptinus dufau</i> Pic	LE
<i>Gibbium aequinoctiale</i> Boieldieu Czempinski]	EIS [Leng & Mutch. 1917 as <i>Gibbium psylloides</i>



Fig. E. *Trichodesma* sp. (Photo: Ian Foley and Michael Ivie)

Jacobsoniidae

*Derolathrus* or near sp. ?

Trogossitidae

*Tenebroides transversicollis* Jacquelin du Val WN  
*Temnochila obscura* Reitter WN?  
*Temnochila* sp. IE?  
*Colydobi* n.sp. IE  
*Nemosoma* n.sp. IE

Cleridae (determinations assisted by W. Opitz)

*Neorthopleura murina* (Klug) WIE  
*Madoniella pici* Lapesme LIE  
*Pelonium* n.sp. LIE

Melyridae

*Melyrodes* n.sp. LE?  
*Albrechrus* n.sp. IE

Lymexylidae

*Atractocerus brasiliensis* Lapeletier & Audinet-Ser. WN

Sphindidae

*Sphindus* sp. N?

Nitidulidae

*Lobiopa insularis* (Castelnau) WN  
*Epuraea (Haptoncus) luteolus* (F.) WN

<i>Stelidota strigosa</i> (Gyllenhal)	WIE
<i>Stelidota coenosa</i> Erichson	WIE
<i>Stelidota ruderata</i> Erichson	WIE
<i>Macrostola vertraci</i> Grouvelle	LIE
<i>Carpophilus humeralis</i> (Fabricius)	EIS
<i>Carpophilus dimidiatus</i> (Linneaus)	EIS [Leng & Mutchler 1917]
<i>Carpophilus</i> sp.	N?
<i>Colopterus infimus</i> (Erichson)	N?
<i>Cilleaus</i> n.sp.	IE
<i>Contotelus conicus</i> (Fabricius)	WIE [Leng & Mutchler 1917]
<b>Smicripidae</b>	
<i>Smicrips</i> sp.	N?
<b>Monotomidae</b>	
<i>Europs</i> sp. #1	N?
<i>Europs</i> sp. #2	N?
<i>Europs</i> sp. #3	N?
<i>Europs</i> sp. #4	N?
<i>Monotoma</i> sp.	?
<b>Silvanidae</b>	
<i>Silvanoprus scuticollis</i> (Walker)	EIS
<i>Monanus concinnus</i> (Walker)	EIS
<i>Telephanus nodicornis</i> Neverman	LE [Described from Montserrat and Guadeloupe by Nevermann 1932, not recollected. Stevens and Waldmann's assertion of single-island endemic status in error.]
<b>Laemophloeidae</b>	
<i>Cryptolestes unicolornis</i> (Reitter)	WN
<i>Laemeophoelus</i> sp. #1	N?
<i>Laemeophoelus</i> sp. #2	N?
<i>Placonotus ?patruellus</i> Thomas	WN
<i>Placonotus planifrons</i> Thomas	LAE
<i>Placonotus modestus</i> (Say)	WN
<i>Placonotus politissimus</i> (Wollaston)	EIS
<i>Placonotus ?patruellus</i> Thomas	WN
<i>Placonotus</i> sp. nr. <i>pallentipennis</i> & <i>patruellus</i>	N?
<i>Dysmerus</i> sp.	N?
<i>Lepidophloeus</i> n.sp.?	IE?
<i>Lathropus pictus</i> Schwarz	WN





Fig. F. *Lepidophloeus* sp. (Photo: Ian Foley and Michael Ivie)

Phalacridae

<i>Ochrolitus tristriatus</i> Casey	WN
<i>Olibrus</i> sp.	N?
<i>Litolibrus</i> sp.	N?

Cryptophagidae

<i>Ephistemus</i> sp.	N?
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Languriidae

<i>Toramus</i> #1	N?
<i>Toramus</i> #2	N?
<i>Loberus</i> sp.	N?
<i>Hapalips angulosus</i> Grouvelle	LIE
<i>Hapalips</i> nr. <i>guadeloupensis</i> Grouvelle	IE?
<i>Cryptophilus integer</i> (Heer)	EIS
<i>Platoberus dufau</i> Grouvelle	LE
<i>Telmatoscius</i> sp.	N?

Cerylonidae. (some determinations by S. S. Ślipiński)

<i>Philothermus puberulus</i> Schwarz	WN [Leng & Mutchler 1917]
<i>Euxestes erithacus</i> (Chevrolat)	EIS
<i>Mychocerus sharpi</i> (Champion)	WN
<i>Ostomopsis neotropcalis?</i>	N?
<i>Botrodus</i> sp#1 <i>dufau</i> ?	N?
<i>Botrodus</i> sp#2 <i>estriatus?</i>	N?
<b>Bothrideridae</b>	
<i>Sosylus</i> sp.	N?
<i>Bothrideres dufau</i> Grouvelle	LE
<b>Endomycidae</b>	
n. genus #1 sp.	N?
n. genus #2 sp.	N?
<i>Displotera</i> sp.	EIS
<i>Holopamecus</i> sp.	EIS
<b>Coccinellidae (dets by R. Gordon)</b>	
<i>Cycloneda sanguinea limbifer</i> Casey	WIE [Cooter 1983]
<i>Coelophora inaequalis</i> (F.)	EBC
<i>Cryptolaemus monstrouzieri</i> Mulsant	EBC
<i>Chilocerus cactus</i> (L.)	EBC
<i>Psyllobora lineola</i> (F.)	NEC
<i>Diomus ochroderus</i> (Mulsant)	WIE
<i>Diomus</i> #1	N?
<i>Diomus</i> #2	N?
<i>Diomus</i> #3	N?
<i>Diomus</i> #4	N?
<i>Diomus roseicollis</i> (Mulsant)	WN
<i>Neaptera viola</i> Gordon	IE [Gordon 1991]
<i>Nephaspis</i> n. sp	LE
<i>Scymnus phloeus</i> Mulsant	NEC
<i>Scymnus floralis</i> (Fabricius)	NEC [Leng & Mutchler 1917 as <i>S. loewii</i> ]
<i>Scymnus</i> ( <i>Pullus</i> ) sp.	N?
<i>Zilus</i> sp.	IE
<i>Stethorus albipes</i> (Mulsant)	WIE
<i>Decadiomus hubbardi</i> Chapin	NEC
<i>Coccidophilus cariba</i> Gordon	SA [Gordon 1978]
<i>Prodilis</i> n.sp.	LE
<i>Delphastus nebulosus</i> Chapin	WIE
<i>Calloeneis</i> n.sp.	IE
<i>Hyperaspis</i> sp.	N?
<b>Corylophidae</b>	
<i>Arthrolips</i> sp. # 1	N?
<i>Arthrolips</i> sp. # 2	N?
<i>Arthrolips</i> sp. # 3	N?
<i>Arthrolips</i> sp. # 4	N?

<i>Arthrolips</i> sp. # 5	N?
<i>Clypastraea</i> sp.	N?
<i>Holopsis</i> sp. #1	N?
<i>Holopsis</i> sp. #2	N?
Corylophid sp. #1	N?
Latridiidae	
<i>Cortodere constricta</i> (Gyllenhal)	EIS
<i>Cortilena picta</i> (LeConte)	EIS
Mycetophagidae	
<i>Litargus balteatus</i> LeConte	WN [Leng & Mutchler 1917]
<i>Thrimolus minutus</i> Casey	WN
<i>Berginus</i> sp.	N?
Ciidae	
<i>Orthocis</i> sp. #1	N?
<i>Orthocis</i> sp. #2	N?
<i>Cis</i> sp. #1	N?
<i>Cis</i> sp. #2	N?
<i>Cis</i> sp. #3	N?
<i>Cis creberrimus</i> Mellie	WN
<i>Cis melliei</i> Coquerel	WN
<i>Ceracis</i> #1	N?
<i>Ceracis</i> #2	N?
Mordellidae	
<i>Glipostenoda pallida</i> (Champion)	LAE
<i>Tolidomordella</i> sp.	N?
<i>Mordella</i> sp. #1	N?
<i>Mordella</i> sp. #2	N?
<i>Falsomordellistena</i> sp.	N?
Meloidae	
<i>Cissites maculata</i> (Swederus)	WN
<i>Pseudozonitis marginata</i> (Fabricius)	WIE
<i>Tetraonyx quadrimaculatus</i> (Fabricius)	WN [Leng & Mutchler 1917, not recollected]
Melandryidae	
<i>Orchesia</i> sp.	N?
Rhipiphoridae	
<i>Macrosaigon cruenta</i> Germar	WN



Fig. G. *Macrossaigon cruenta* Germar. (Photo: Ian Foley and Michael Ivie)

#### Zopheridae

<i>Hyporrhagus</i> sp.	?
<i>Pycnomerus biimpressus</i> (Reitter)	WN
<i>Pycnomerus uniformis</i> Ivie & Ślipiński	LIE

#### Colydiidae

<i>Lemnis lhermimieri</i> Grouvelle.	LE
<i>Bitoma</i> sp.	?
<i>Colydodes mammalaris</i> (Pascoe)	WN
<i>Synchita</i> sp. #1	? [Leng & Mutchler 1917 as <i>S. laticollis</i> ]
<i>Synchita</i> sp. #2	?
<i>Paha guadeloupensis</i> Dajoz	LIE
<i>Aulonium bidentatus</i> (Fabricius)	WN.
<i>Monoedus lecontei</i> Fleutiaux & Sallé	NEC [Leng & Mutchler 1917. Contrary to statements by Stevens and Waldmann (2001), this species was named from Guadeloupe.]
<i>Monoedus obscurus</i> Grouvelle	LIE
<i>Nematidium filiforme</i> LeConte	WN

#### Tenebrionidae

Lagriinae	
<i>Lorelus</i> n. sp.	IE
Phrenapatinae	
<i>Diodeus guadeloupensis</i> Fleutiaux & Sallé	LE
Tenebrioninae	
<i>Palorus cerylonoides</i> Pascoe	EIS
<i>Rhipidandrus cornutus</i> (Arrow)	WN [Blackwelder 1945, as <i>Eutomus cerylonoides</i> ]
<i>Tribolium castaneum</i> (Herbst)	EIS
<i>Uloma retusa</i> (Fabricius)	WN [Blackwelder 1945]
<i>Blapstinus opacus</i> Mulsant & Rey	NEC
<i>Diastolinus puncticollis</i> Mulsant & Rey	WIE
<i>Diastolinus</i> sp. nr. <i>barbudensis</i> Marcuzzi	LE
<i>Opatrinus clathratus</i> (Fabricius)	WN
Alleculinae	

<i>Hymenorus antillensis</i> Campbell or nr.	LE
<i>Hymenorus</i> n.sp.	IE
<i>Lobopoda</i> n.sp.	IE
Diaperinae	
<i>Platydema excavataum</i> Say	WN
<i>Neomida lecontei</i> Bates found post volcano]	WN [Triplehorn 2006, from Hubbard 1894 NMNH, not
<i>Neomida suilla</i> Champion	WN
<i>Adelina pici</i> (Ardoin)	WN
<i>Gnatocerus curvicornis</i> (Champion)	EIS
<i>Gnatocerus guatemalensis</i> Champion	EIS
<i>Phaleria fulva</i> Fleutiaux & Sallé	WN [Cooter (1983)]
<i>Phaleria picipes</i> Say	WN
<i>Gondwanacrypticus</i> sp.	N? [Cooter (1983) as <i>Crypticus</i> sp.]
<i>Corticeus</i> n.sp.	IE
<i>Cryptozoon</i> n.sp.	IE
<i>Ulomoides ocularis</i> (Casey)	EIS [Triplehorn 1965, as <i>Palembus ocularis</i> Casey]
Stenochiinae	
<i>Nesocyrtosoma</i> n.sp.	IE
<i>Cyrtosoma</i> n.sp. loupean <i>Cyrtosoma lherminieri</i> (Chevrolat), but examination of the specimens in the NMNH show it to be an undescribed species. It was not recollected]	IE [Leng & Mutchler (1917) recorded this as the Guade-
<i>Strongylium delauneyi</i> Fleutiaux & Sallé	LE
<i>Talanus</i> sp.	IE?
Mycteridae	
<i>Physicus faciatus</i> Pic	NEC
Salpingidae	
<i>Inopeplus praeustus</i> Chevrolat	WIE
<i>Inopeplus striatulus</i> Blackwelder	LE
<i>Aprostomis cephalotes</i> Grouvelle	LE
<i>Serrotibia</i> n. sp. <i>partia</i> Olliff, described from Ecuador. Olliff's species had been recorded from Guadeloupe (Fleutiaux & Sallé 1889), and was later synonymized with the Columbian <i>Serrotibia bicolor</i> Reitter. Comparison of a Montserrat specimen in IREC taken in 1984 at Riley's Estate, does not match typical South American <i>S. bicolor</i> , but no Guadeloupe specimens are available for comparison. This group is under revision by H. Escalona, and we leave it to him to resolve the issue. This species was not recollected on Montserrat post-volcano]	LE? [Recorded by Leng & Mutchler (1917) as <i>Parlindria</i>
Prostominiinae sp.	N?
Aderidae	
<i>Aderus brunipennis</i> (LeConte)	WN
<i>Cnopus</i> sp. #1	N?
<i>Ganascus</i> sp #1	N?
<i>Ganascus</i> sp #2	N?
<i>Ganascus</i> sp #3	N?
<i>Ganascus</i> sp #4	N?
<i>Pseudariotes</i> sp #1	N?
<i>Zonates</i> sp. #1	N?



Fig. H. Aderidae. (Photo: Ian Foley and Michael Ivie)

#### Anthicidae

*Anthicus tobias* Marseul EIS

#### Oedemeridae

*Hypasclera simplex* (Waterford) WN

*Oxycopsis* #1 N?

*Oxycopsis* #2 N?

*Oxycopsis* #2 N?

#### Chrysomelidae

##### Bruchinae

*Acanthoscelides johnique* Johnson WIE [Johnson (1990) mentioned an existing Montserrat record for *Acanthoscelides flavescens* (Fähræus), but the source of that record is unknown. This record is placed here as *A. johnique*, a member of the *Flavescens* species group, common on Montserrat, that went unrecognized until 1983, and is easily confused with *A. flavescens*.]

*Acanthoscelides* sp. #1 N?

*Ctenocolum crotonae* (Fähræus) WN

*Stator monachus* (Sharp) WN

*Mimosestes mimosae* (Fabricius) WN

*Sennius rufomaculatus* (Motschulsky) WN

##### Criocerinae

*Neolema dorsalis* (Olivier) WIE [Cooter 1983 as *Lema* sp.]

##### Hispinae

*Chalepus sanguinicollis* (Linneaus) WN

*Charidotella sexpunctata* (Fabricius) WN [Cooter 1983 as *Metronia trisignata*]

*Chelymorpha cribraria* (Fabricius) WN



**Fig. 1.** *Hilarocassis exclamationis* (Linnaeus) (Photo: Caroline Caboo)

Galerucinae

<i>Acalymma innubum</i> (Fabricius)	WN [Leng & Mutchler 1917 recorded <i>Diabrotica melanocephala</i> (Fabricius), a syn. of <i>Acalymma vittata</i> (F.) (Smith & Lawrence 1967), a species name widely confused with this and other species in the West Indian literature. Until Hubbard's specimens are examined, this record will be treated here.]
<i>Ceratoma ruficornis</i> (Olivier)	WN
<i>Diabrotica ochreate</i> Fabricius	LE [Leng & Mutchler 1917]
<i>Neolochmaea oblitterata</i> (Olivier)	NEC [Cooter 1983, as <i>Galerucella tropica</i> ]
<i>Exora encaustica</i> (Germar)	? [Leng & Mutchler 1917 as <i>E. detritum</i> (Fabricius)]
<i>Altica occidentalis</i> Suffrian	WN
<i>Disanycha</i> sp.	?
<i>Megistops</i> n. sp. nr. granulate	IE
<i>Parchicola</i> sp.	?
<i>Epitrix cucumeris</i> (Harris)	WN
<i>Epitrix fasciata</i> Blatchley	WN
<i>Epitrix</i> sp.	?
<i>Homoschema</i> n.sp.	IE
<i>Cyrsylus montserrati</i> Blake	IE [Blake 1949]
<i>Aedmon ?stenotrachela</i> Blake	LIE?
<i>Omophoita albicornis</i> Fabricius	WN [Cooter 1983 as <i>Homophoeta albicornis</i> ]
Eumolpinae	
<i>Typophorus</i> sp.	?
<i>Megascelis</i> n. sp.	IE
<i>Colaspis</i> sp.	?
<i>Metachroma</i> sp. #1	?
<i>Metachroma</i> sp. #2	?

Cryptocephalinae

<i>Cryptocephalus</i> sp. #1	?
<i>Cryptocephalus</i> sp. #2	?
<i>Diachus</i> sp.	?
<i>Pachybrachis</i> sp.	?

Cerambycidae. Most of the cerambycid records from this project were included (with our permission) in Chalumeau & Touroult (2005), who included keys and illustrations to our species. Only where our records differ from theirs are there notations below.

Prioninae

<i>Stenodontes maxillosus</i> (Drury)	LAE
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Cerambycinae

<i>Methia necydalea</i> (F.)	WN
<i>Achryson surinamum</i> (L.)	EIS
<i>Ochrus ornatus</i> (Fisher)	LE
<i>Chlorida festiva</i> (L.)	EIS [Leng & Mutchler (1917)]
<i>Eburia decemmaculata</i> (F.)	NEC [Cooter (1983)]
<i>Eburia inermis</i> (F. & S.)	LE
<i>Eburia octomaculata</i> Chevrolat	LE
<i>Elaphidion glabratum</i> (F.) (1945) as <i>E. tomentosum</i> ]	NEC [Danforth (1939) as <i>Elaphidion</i> sp., Blackwelder
<i>Nesanoplium</i> n.sp.	IE [Based on a misidentification communicated by Ivie, this species was recorded by Chalumeau & Touroult (2005) as <i>Nesanoplium puberulum</i> (Fleutiaux & Sallé), but further examination shows this to be a different species]
<i>Nesanoplium</i> sp.	LE
<i>Curtomerus flavus</i> (F.)	EIS
<i>Neocompsa cylindricollis</i> (F.)	WN
<i>Caribbomerus attenuatus</i> (Chevrolat)	WIE
<i>Plectromerus fasciatus</i> (Gahan)	LAE [Recorded by Chalumeau & Touroult (2005) as <i>Plectromerus</i> n.sp., Gino Nearn, who is revising this genus, has since informed us that the Montserrat specimens are in fact very large <i>P. fasciatus</i> .]
<i>Gourbeyella</i> n. sp.	IE
<i>Tillomorphini</i> n.g. near <i>Euderces</i>	IE
<i>Oxymerus aculeatus lebasi</i> Dupont	WN
Lepturinae	
<i>Strangalia benitiespinali</i> Chalumeau	IE [Chalumeau 1985]



Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Rhysodidae	<i>Clinidium (s.str.)</i> n.sp. nr <i>planum</i>	4	25-Jun-2000	5
Carabidae	<i>Cicindela trifasciata</i> Fabricius	7	25-May-2002	6.6
Carabidae	<i>Eohomotperus</i> n.sp.	1	14-Aug-2005	5
Carabidae	<i>Aspidoglossa schach</i> (Fabricius)	5	31-Jul-2005	7
Carabidae	<i>Bembidion darlingtoni</i> Mutchler	2	26-Jul-2005	3
Carabidae	<i>Mioptachys</i> sp. (= <i>M. autumnalis</i> of authors)	4	1-Jan-1900	1.8
Carabidae	<i>Elaphropus singularis</i> Andrews	2	11-Jun-2002	1.9
Carabidae	<i>Tachys ensenada</i> Mutchler	1	26-Jul-2005	2.5
Carabidae	<i>Paratachys (Eotachys) blemoides</i> Jeannel	1	1-Aug-2005	2.3
Carabidae	<i>Paratachys</i> sp. #1	28	21-Jun-2000	2.6
Carabidae	<i>Paratachys</i> sp. #2	8	13-Jan-2002	2.1
Carabidae	<i>Paratachys</i> sp. #3	1	23-Mar-2002	2.3
Carabidae	<i>Micratopus insularis?</i> Darlington	1	8-Aug-2005	1.6
Carabidae	<i>Selenophorus alternans</i> Dejean	8	25-Jun-1971	7.2
Carabidae	<i>Selenophorus chalybaeus</i> Dejean	7	29-May-1982	10.5
Carabidae	<i>Selenophorus sinuatus</i> Gyllenhal	10	25-Jun-1971	5
Carabidae	<i>Selenophorus</i> n.sp.?	18	20-Jun-2000	5.2
Carabidae	<i>Selenophorus subquadratus</i> Putzeys	1	7-Aug-2005	6
Carabidae	<i>Selenophorus discopunctatus</i> Dejean	35	30-Jun-1935	7
Carabidae	<i>Selenophorus propinquus</i> Putzeys	65	1-Feb-1959	8.7
Carabidae	<i>Notiobia pallipes</i> Bates	3	12-Dec-1983	10
Carabidae	<i>Athrostichus paganus</i> Dejean	7	24-Jul-1936	8.5
Carabidae	<i>Pentagonica flavipes</i> (LeConte)	76	13-Jan-2002	3.7
Carabidae	<i>Zuphium</i> sp.	2	25-Jul-2005	6.2
Carabidae	<i>Perigona nigriceps</i> Dejean	25	1-Mar-1982	2.8
Carabidae	<i>Apenes marginalis</i> Dejean	4	11-Jan-2002	10.1
Carabidae	<i>Apenes chalumeaui</i> Ball & Shpeley	4	11-Jan-2002	6.5
Carabidae	<i>Menidius amandus</i> Newman	2	21-Jun-2002	7.1
Carabidae	<i>Glyptolennus chalybaeus</i> (Dejean)	1	22-Aug-1981	7.4

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Carabidae	<i>Lebia pleurodera</i> Chaudior	2	25-Jul-2005	4.9
Dytiscidae	<i>Bidessonotus</i> sp.	1	26-Jul-2005	2
Dytiscidae	<i>Copelatus</i> sp. nr. <i>posticalus</i> (F.)	42	8-Jan-2002	6
Dytiscidae	<i>Hydrovatus</i> sp.	1	26-Jul-2005	2.5
Dytiscidae	<i>Laccophilus proximus</i> (Say)	2	1-Jan-2002	4.5
Dytiscidae	<i>Laccophilus</i> sp.	16	21-Jun-2000	3.8
Dytiscidae	<i>Megadytes gigantea</i> LaPorte	1	1-Jan-2001	40
Dytiscidae	<i>Rhantus calidus</i> (Fabricius)	2	23-Mar-2002	11
Dytiscidae	<i>Thermonectes basilaris</i> (Harris)	1	7-Aug-2005	10.7
Staphylinidae	<i>Burus/Bythinophysis?</i> sp.	2	25-Jun-2000	1.2
Staphylinidae	<i>Hamotus (Hamotoides) hirtus</i> Raffray	3	21-Jun-2002	1.9
Staphylinidae	<i>Eupsenius</i> sp.	3	30-May-2002	1.1
Staphylinidae	<i>Decarthron</i> nr. or = <i>insulare</i> Raffray	4	26-Jul-2005	1.5
Staphylinidae	<i>Ramelbida</i> sp.	16	23-Mar-2002	0.9
Staphylinidae	<i>Coproporus sharpi</i> Cameron	8	1-Jan-1900	1.9
Staphylinidae	<i>Coproporus rutilus</i> Erichson	4	1-Jan-1900	1.6
Staphylinidae	<i>Coproporus</i> n.sp.	5	21-Jun-2000	1.5
Staphylinidae	<i>Sepedophilus</i> sp. ("scriptus group")	6	25-Jun-2000	1.5
Staphylinidae	<i>Bryoporus</i> sp. #1	7	5-Jan-2002	3.5
Staphylinidae	<i>Bryoporus</i> sp. #2	1	7-Aug-2005	5.2
Staphylinidae	<i>Baeocera</i> sp. #1	9	17-Jun-2000	1
Staphylinidae	<i>Baeocera</i> sp. #2	19	20-Jun-2000	1.4
Staphylinidae	<i>Baeocera</i> sp. #3	29	23-Jun-2000	1.9
Staphylinidae	<i>Baeocera</i> sp. #4	13	8-Jun-2002	1
Staphylinidae	<i>Adinopsis</i> sp. #1	1	7-Aug-2005	2
Staphylinidae	<i>Anacyptus testaceus</i> LeConte	1	1-Jan-1900	1
Staphylinidae	<i>Aleochara</i> sp. #1	6	24-Apr-2001	4.6
Staphylinidae	<i>Aleochara</i> sp. #2	2	23-Jul-2005	4
Staphylinidae	<i>Oligota minuta</i> Cameron	19	1-Nov-1973	0.5
Staphylinidae	<i>Oligota guadeloupae</i> Frank	6	23-Jun-2000	0.4

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Staphylinidae	Hypocyphitini sp. #1	2	22-May-2002	0.9
Staphylinidae	Hypocyphitini sp. #2	2	16-May-2002	0.7
Staphylinidae	Hypocyphitini sp. #3	2	30-May-2002	0.6
Staphylinidae	Hypocyphitini sp. #4	2	21-Jun-2002	1
Staphylinidae	Hypocyphitini sp. #5	2	16-May-2002	0.7
Staphylinidae	Athetini sp. #1	27	25-Jun-2002	1.2
Staphylinidae	Aleochoarinae #1	76	21-Jun-2000	2
Staphylinidae	Aleochoarinae sp. #2	29	17-Jun-2000	1.6
Staphylinidae	Aleochoarinae sp. #3	2	25-Jun-2002	2.5
Staphylinidae	Aleochoarinae sp. #4	2	18-Jun-2000	1.5
Staphylinidae	Aleochoarinae sp. #5	35	20-Jun-2000	2.6
Staphylinidae	Aleochoarinae sp. 6	1	14-Jun-2002	2.1
Staphylinidae	Aleochoarinae sp. #7	42	11-Mar-2002	1.9
Staphylinidae	Aleochoarinae sp. #8	8	5-Feb-2002	2
Staphylinidae	Aleochoarinae sp. #9	2	21-May-2002	2
Staphylinidae	Aleochoarinae sp. #10	1	10-Jan-2002	2.6
Staphylinidae	Aleochoarinae sp. #11	4	21-Jun-2002	2.2
Staphylinidae	Aleochoarinae sp. #12	44	20-Jun-2000	1.6
Staphylinidae	Aleochoarinae sp. #13	17	25-Jun-2000	2.4
Staphylinidae	Aleochoarinae sp. #14	7	23-Mar-2002	2.2
Staphylinidae	Aleochoarinae sp. #15	38	30-Jun-2002	1.5
Staphylinidae	Aleochoarinae sp. #16	1	10-Jan-2002	1.2
Staphylinidae	Aleochoarinae sp. #17	42	24-May-2003	1.7
Staphylinidae	Aleochoarinae sp. #18	1	14-Aug-2005	2
Staphylinidae	Aleochoarinae sp. #19	2	1-Jun-2003	1.5
Staphylinidae	Aleochoarinae sp. #20	1	7-Aug-2005	2.2
Staphylinidae	Aleochoarinae sp. #21	1	5-Feb-2002	2.4
Staphylinidae	Aleochoarinae sp. #22	1	25-Jun-2002	1.9
Staphylinidae	Aleochoarinae sp. #23	4	21-May-2002	1.2
Staphylinidae	Aleochoarinae sp. #24	1	21-May-2002	1.1

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Staphylinidae	<i>Aleocharinae</i> sp. #25	2	14-Jun-2002	1.2
Staphylinidae	<i>Pleustes pygmaeus</i> (Laporte)	12	17-Jun-2000	4.3
Staphylinidae	<i>Clavilispinus guadeloupensis</i> (Irmeler)	17	30-May-2002	1.9
Staphylinidae	<i>Clavilispinus politus</i> (Sharp)	2	23-May-2002	1.6
Staphylinidae	<i>Clavilispinus megacephalus</i> (Fauvel)	2	6-Jun-2002	3.8
Staphylinidae	<i>Clavilispinus exiguus</i> (Erichson)	1	23-Mar-2002	2.3
Staphylinidae	<i>Lispinus insularis</i> Fauvel ?	2	1-Jan-1900	3.3
Staphylinidae	<i>Lispinus</i> sp.? <i>attenuatus</i>	7	18-Jun-2000	4.4
Staphylinidae	<i>Nacaeus impar</i> (Cameron)	3	1-Jan-1900	3
Staphylinidae	<i>Nacaeus nigrifrons</i> (Fauvel)	4	1-Jan-1900	2.2
Staphylinidae	<i>Nacaeus</i> sp. #1	9	5-Jan-2002	2.2
Staphylinidae	<i>Thoracophorus simplex</i> Wendeler	6	1-Jan-1900	1.6
Staphylinidae	<i>Thoracophorus guadelupensis</i> Cameron	2	1-Aug-2005	1.8
Staphylinidae	<i>Pseudepeson crassulus</i> (Fauvel)	2	1-Jan-1900	2.3
Staphylinidae	<i>Holotrochus</i> sp. #1	25	8-Jun-2002	3.2
Staphylinidae	<i>Holotrochus</i> sp. #2 ? <i>minor</i>	2	24-Jun-2000	2.8
Staphylinidae	<i>Anotylus insignitus</i> Gravenhorst	3	1-Jul-1936	3
Staphylinidae	<i>Anotylus glareosus</i> (Wollaston)	3	23-Mar-2002	1.5
Staphylinidae	<i>Bledius caribbeanus</i> Blackwelder	1	1-Jul-1936	2.5
Staphylinidae	<i>Apocellus ustulatus</i> (Erichson)	1	1-Jul-1936	2.1
Staphylinidae	<i>Cafius (Euremus) bistratus</i> (Erichson)	1	1-Jul-1936	6
Staphylinidae	<i>Cafius subtilis</i> Cameron	1	1-Jul-1936	4
Staphylinidae	<i>Neohypnus illucens</i> (Erichson)	1	1-Jul-1936	8.5
Staphylinidae	<i>Espeson moratus</i> Schaufuss	1	1-Jan-1900	1.4
Staphylinidae	<i>Oxytelus incisus</i> Motschulsky	1	1-Jan-1900	3
Staphylinidae	<i>Philonthus discoideus</i> (Gravenhorst)	1	1-Jul-1936	5.7
Staphylinidae	<i>Philonthus longicornis</i> Stephens	1	1-Jan-1900	7.5
Staphylinidae	<i>Thinobius exasperatus</i> Blackwelder	1	1-Jan-1900	1
Staphylinidae	<i>Nacaeus foveolus</i> (Blackwelder) ?	1	1-Jan-1900	2
Staphylinidae	<i>Sepedophilus interruptus</i> (Erichson) ?	1	1-Jan-1900	2.3

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Family	Species	N	First Date	Length (mm)
Staphylinidae	<i>Carpelimus</i> sp. #1	8	13-Jan-2002	1.8
Staphylinidae	<i>Carpelimus</i> sp. #2 prob. <i>correctus</i> Blackwelder	3	6-Jun-2002	2.7
Staphylinidae	<i>Carpelimus</i> sp. #3	2	21-Jun-2002	2.5
Staphylinidae	<i>Carpelimus</i> sp. #4	1	8-Aug-2005	2.7
Staphylinidae	<i>Carpelimus</i> sp. #5	26	13-Jan-2002	1.6
Staphylinidae	<i>Carpelimus</i> sp. #6	1	21-Jun-2002	1
Staphylinidae	<i>Thinodromus croceipes</i> Fauvel	7	18-Jun-2000	2.8
Staphylinidae	<i>Biocrypta fulvipes</i> (Erichson)	63	23-Jun-2000	7.2
Staphylinidae	<i>Echiaster microps</i> Blackwelder	5	20-Jun-2000	2.4
Staphylinidae	<i>Lobrathium nitidum</i> (Erichson)	6	26-Jul-2005	3.4
Staphylinidae	<i>Lithocharis dorsalis</i> Erichson	1	1-Jan-1900	2.9
Staphylinidae	<i>Lithocharis limbatus</i> Erichson	10	5-Feb-2002	4.2
Staphylinidae	<i>Lithocharis secunda</i> Blackwelder	1	1-Jul-1936	3
Staphylinidae	<i>Lithocharis sororcula</i> Kraatz	2	1-Jul-1936	3.2
Staphylinidae	<i>Lithocharis</i> sp.	1	1-Jun-2003	2.2
Staphylinidae	"Medon" complex sp. #1	12	23-Mar-2002	3.8
Staphylinidae	"Medon" complex sp. #2	8	25-Jun-2000	4.2
Staphylinidae	"Medon" complex sp. #3	1	23-Jun-2000	6
Staphylinidae	"Medon" complex sp. #4	1	25-Jul-2005	2.3
Staphylinidae	<i>Microlinus pasio</i> (LeConte)	2	6-Jun-2002	2.6
Staphylinidae	<i>Pinophilus</i> sp. poss. <i>vermiformis</i> Cameron	3	25-Jul-2005	6.5
Staphylinidae	<i>Palaminus</i> sp. #1	2	23-Jun-2000	5.3
Staphylinidae	<i>Palaminus</i> sp. #2	7	25-Jun-2002	2.5
Staphylinidae	<i>Palaminus</i> sp. #3	3	14-Aug-2005	5
Staphylinidae	<i>Palaminus</i> sp. #4	3	19-Jun-2002	3.6
Staphylinidae	<i>Palaminus</i> sp. #5	14	1-May-2002	3.2
Staphylinidae	<i>Scopaeus</i> sp.	6	13-Jan-2002	2.5
Staphylinidae	<i>Stamnoderus</i> sp.	7	20-Jun-2000	2.9
Staphylinidae	<i>Sunius debilicornis</i> Wollaston	1	2-Aug-2005	2

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Family	Species	N	First Date	Length (mm)
Staphylinidae	<i>Atanygnathus</i> sp. 1	4	5-Feb-2002	4
Staphylinidae	<i>Atanygnathus</i> sp. 2	1	25-Jun-2000	3.5
Staphylinidae	<i>Belonuchus gagates</i> Erichson	5	1-Jan-1900	8.5
Staphylinidae	<i>Belonuchus</i> sp. 1	46	5-Feb-2002	8
Staphylinidae	<i>Belonuchus</i> sp. 2	1	15-Aug-2005	8.3
Staphylinidae	<i>Belonuchus</i> sp. 3	3	26-Jun-2003	8.6
Staphylinidae	<i>Diochus nanus</i> Erichson	25	18-Jun-2000	2.9
Staphylinidae	<i>Holius</i> sp. #1	31	23-Mar-2002	2.3
Staphylinidae	<i>Holius</i> sp. #2	11	17-Jun-2000	4.3
Staphylinidae	<i>Neohypnus attenuatus</i> (Erichson)	11	1-Jul-1936	6
Staphylinidae	<i>Neohypnus humeralis</i> (Erichson) New	12	1-Jul-1936	5
Staphylinidae	<i>Neoxantholinus hubbardi</i> (Blackwelder)	1	1-Jan-1900	4
Staphylinidae	<i>Philonthus hepaticus</i> Erichson	13	1-Jul-1936	5
Staphylinidae	<i>Philonthus havaniensis</i> (Laporte).	3	31-Jul-2005	7
Staphylinidae	<i>Philonthus ventralis</i> (Gravenhorst)	1	1-Jul-1936	5.7
Histeridae	<i>Omalodes laevigatus</i> Quensel	38	18-Jun-2000	7.5
Histeridae	<i>Aeletes lissosternus</i> Wenzel	77	21-Jun-2000	1
Histeridae	<i>Bacanius</i> sp. 1	1	23-Jul-2005	0.8
Histeridae	<i>Bacanius</i> sp. 2	1	21-Jun-2000	0.8
Histeridae	<i>Hister servus</i> Erichson+B221	2	27-May-2002	4.5
Histeridae	<i>Atholus confinus</i> (Erichson)	3	1-Aug-1975	3.8
Histeridae	<i>Hypocaccus</i> sp.	6	12-Jun-2002	3
Histeridae	<i>Carcinops?</i> sp.	4	16-Jun-2000	2.7
Histeridae	<i>Teretriosoma</i> sp.	5	23-Mar-2002	3.4
Histeridae	<i>Paromalus?</i> sp.	8	18-Jun-2000	1.9
Hydrophilidae	<i>Dactylosternum abdominale</i> (F.)	6	1-Jan-1900	4.5
Hydrophilidae	<i>Hydrophilus insularis</i> actorum	6	4-Jun-2002	36.5
Hydrophilidae	<i>Cercyon atricapillus</i> (Marshall)	4	24-Jun-2000	1.5
Hydrophilidae	<i>Cercyon variegatus</i> Sharp	40	5-Feb-2002	2.7

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Family	Species	N	First Date	Length (mm)
Hydrophilidae	<i>Aculomicrus</i> n.sp.	2	5-Jul-2005	0.8
Hydrophilidae	<i>Tropisternus lateralis</i> Laporte	1	15-Jun-2002	9.5
Hydrophilidae	<i>Tropisternus chalybeus</i> Laporte	1	1-Jan-1900	10.5
Hydrophilidae	<i>Phaenonotum exstriatum</i> (LeConte)	7	10-Jan-2002	3.1
Hydrophilidae	<i>Pelosoma</i> sp.	23	14-Aug-2005	2.5
Hydrophilidae	<i>Berosus</i> sp.	3	15-Jun-2005	5.75
Hydrophilidae	<i>Omicrus subopacus</i> Smetana	10	7-Aug-2005	1.5
Hydrophilidae	<i>Parachymus confusus</i> Woodridge	2	13-Jan-2002	2
Hydrophilidae	<i>Enochrus bartletti</i> Short	63	13-Jan-2002	4
Scydmaenidae	<i>Scydmaenus guadeloupensis</i> Franz	1	7-Aug-2005	1.2
Scydmaenidae	<i>Euconnus</i> sp. 1	1	25-Jun-2000	1
Scydmaenidae	<i>Euconnus</i> sp. 2	7	23-Jun-2000	1
Hydraenidae	<i>Hydraena guadeloupensis</i> d'Orchymont	5	23-Jun-2000	1.5
Ptiliidae	<i>Bambara</i> sp. #1 (+)	12	17-Jun-2000	0.6
Ptiliidae	<i>Bambara</i> sp. #2	1	21-May-2002	0.6
Ptiliidae	<i>Oligella?</i> sp.	1	10-Aug-2005	0.4
Ptiliidae	<i>Ptilolum?</i> sp.	1	12-Jun-2003	0.5
Ptiliidae	<i>Ptinella</i> sp.	3	22-May-2002	0.5
Ptiliidae	<i>Actinopteryx</i> sp.	10	21-May-2002	0.9
Leiodidae	<i>Zeadolopus</i> sp. #1	3	1-Jun-2002	1.2
Leiodidae	<i>Zeadolopus</i> sp. #2	4	1-Jun-2003	1.5
Leiodidae	<i>Zeadolopus</i> sp. #3	2	1-Jun-2003	1.3
Passalidae	<i>Spasslus crenatus</i> M'Lea	50	25-Jun-2000	17
Trogidae	<i>Omorgus suberosus</i> (Fabricius)	22	20-May-2003	12.5
Scarabaeidae	<i>Ateuchus insulare</i> (Fleutiaux & Sallé)	83	1-Jan-1900	5.7
Scarabaeidae	<i>Onthophagus gazella</i> (F.)	21	24-Jun-2000	10.5
Scarabaeidae	<i>Aphodius nigrinus</i> (F.)	9	1-Jul-1936	3.7
Scarabaeidae	<i>Aphodius pseudolivinus</i> Olivier	6	1-Jul-1936	4.5
Scarabaeidae	<i>Ataenius vincentiae</i> Arrow	48	16-Jun-2000	3.2
Scarabaeidae	<i>Ataenius gracilis</i> (Melsheimer)	1	21-Jun-2002	2.9
Scarabaeidae	<i>Ataenius scutellaris</i> Harold	13	1-Jul-1936	4.5
Scarabaeidae	<i>Ataenius cameneri</i> Chalumeau & Gruner	3	20-Jun-2002	3.9
Scarabaeidae	<i>Ataenius scabrellus</i> Schmidt	2	1-Jan-2002	3.5

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Family	Species	N	First Date	Length (mm)
Scarabaeidae	<i>Ataenius liogaster</i> Bates	6	4-May-2002	4.2
Scarabaeidae	<i>Ataenius brevicollis</i> (Wollaston)	2	7-Jul-2002	3.8
Scarabaeidae	<i>Ataenius temperei</i> Chalumeau & Gruner	2	21-Jun-2000	4
Scarabaeidae	<i>Ataenius howdeni</i> Chalumeau	78	1-Jul-1936	4.1
Scarabaeidae	<i>Iguazua blackwelderi</i> (Chapin)	8	18-Jun-2000	3
Scarabaeidae	<i>Phyllophaga montserratensis</i> Arrow	48	1-Jan-1900	17.5
Scarabaeidae	<i>Phyllophaga cneda</i> Saylor	43	1-Jan-1900	10
Scarabaeidae	<i>Anomala</i> n.sp. <i>insularis</i> group	81	1-Mar-1982	12.2
Scarabaeidae	<i>Leucothyreus guadulpiensis</i> Burmeister	19	1-Mar-1982	11.1
Scarabaeidae	<i>Macraspis tristis</i> Castelnau	24	18-Jun-2000	25.5
Scarabaeidae	<i>Rutela s. striata</i> (Olivier)	39	1-Mar-1982	16.5
Scarabaeidae	<i>Cyclocephala mafaffa</i> Burmeister	20	1-Mar-1982	22.5
Scarabaeidae	<i>Ligyris cuniculus</i> (Fabricius)	81	1-Aug-1975	16.5
Scarabaeidae	<i>Phileurus valgus</i> Linneaus	57	1-Mar-1982	22.2
Scarabaeidae	<i>Strategus syphax</i> (Fabricius)	2	11-May-2004	34
Scirtidae	<i>Scirtes</i> n.sp. 1	5	8-Apr-2002	2.7
Scirtidae	<i>Scirtes</i> n.sp. 2, <i>testaceus</i> group	2	31-Jul-2005	4
Buprestidae	<i>Polycesta</i> n.sp.	1	28-Jul-2005	19
Buprestidae	<i>Chrysobothris</i> sp. <i>thoracica</i> group	9	16-Jun-2000	5.1
Buprestidae	<i>Micrasta</i> n. sp. #1, nr. <i>uniformis</i>	35	23-Mar-2002	1.9
Buprestidae	<i>Micrasta</i> n.sp. #2, yellow tarsi	5	6-Dec-2002	1.4
Buprestidae	<i>Micrasta</i> n.sp. #3, yellow tibia - big parameres	3	8-Apr-03	1.7
Buprestidae	<i>Micrasta</i> n.sp. #4, olive-elytra-blue-pronotum	5	22-May-03	2.1
Buprestidae	<i>Micrasta</i> n.sp. #5, bright-blue-wide	1	16-May-02	2.1
Dermestidae	<i>Dermestes maculatus</i> DeGeer	2	12-Jun-2002	8
Dermestidae	<i>Trogoderma ornatum</i> (Say)	10	1-Aug-1975	3.2
Jacobsoniidae	<i>Derolathrus</i> or near sp.	1	18-Jun-2000	0.6
Trogossitidae	<i>Tenebroides transversicollis</i> Jacquelin du Val	25	11-Mar-2002	6.5
Trogossitidae	<i>Temnochila obscura</i> Reitter	2	1-Mar-1982	12
Trogossitidae	<i>Temnochila</i> sp.	1	20-May-2003	7.5
Trogossitidae	<i>Colydobius</i> n.sp.	6	3-Jan-2002	3.9



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Family	Species	N	First Date	Length (mm)
Trogossitidae	<i>Nemosoma</i> n.sp.	1	30-Jul-2003	3.1
Trogossitidae	<i>Nemosoma</i> n.sp.	1	21-Feb-2003	1.3
Cleridae	<i>Neorthopleura murina</i> (Klug)	5	16-Jun-2000	4.7
Cleridae	<i>Madoniella minor</i> Pic	4	10-Oct-2002	3
Cleridae	<i>Pelonium</i> n.sp.	22	16-Jun-2000	10.5
Melyridae	<i>Melyrodes</i> n.sp.	1	6-Jun-2000	2
Melyridae	<i>Albrechrus</i> n.sp.	2	3-Jan-2002	1.3
Lymexylidae	<i>Atractocerus brasiliensis</i> Lepeletier & Audinet-Ser.	15	24-Apr-2001	23.5
Elateridae	<i>Conoderus</i> sp.	72	1-Mar-1982	15.5
Elateridae	<i>Physorhinus insularis</i> Candeze	10	17-Jun-2000	11.9
Elateridae	<i>Chalcolepidius</i> n. sp.	4	1-Jan-1900	35
Elateridae	<i>Drapetes nigricans</i> Bonvouloir	6	21-Jun-2000	4.5
Elateridae	<i>Heteroderes amplicollis</i> Gyllenhal	25	1-Aug-1975	9
Elateridae	<i>Dicrepidius ramicornis</i> P. de Beauvois	3	1-Mar-1982	16
Elateridae	<i>Dicrepidius distinctus</i> Fleutiaux & Sallé	177	21-Jun-2000	9
Elateridae	<i>Lacon subcostatus</i> (Candeze)	9	24-Apr-2002	15
Elateridae	<i>Anchastus</i> sp. #1	2	30-May-2002	9.7
Elateridae	<i>Anchastus</i> sp. #2	2	21-Jun-2002	8.4
Elateridae	<i>Anchastus</i> sp. #3	2	29-Mar-2001	7.7
Eucnemidae	<i>Adelothyreus curtis</i> Fleutiaux	9	24-Apr-2001	3.1
Eucnemidae	<i>Adelothyreus dufau</i> Fleutiaux	8	23-Apr-2002	3
Eucnemidae	<i>Fornax</i> sp.	1	1-Mar-1982	9
Eucnemidae	<i>Serrifornax</i> sp. #1	24	18-Jun-2000	8
Eucnemidae	<i>Serrifornax</i> sp. #2	2	19-Jun-2002	5.1
Ptilodactylidae	<i>Ptilodactyla macrophthalma</i> LeGross	58	23-Jun-2000	3.2
Cantharidae	<i>Tytthonyx</i> n. sp.	170	20-Jun-2000	3.7
Cantharidae	<i>Tylocerus picipennis</i> Leng & Mutchler	227	1-Mar-1984	7
Cantharidae	<i>Tylocerus</i> n.sp.	9	25-Jun-2002	5.2
Lampyridae	<i>Aspisoma ignitum</i> L.	183	1-Aug-1975	12.2
Lycidae	<i>Thonalmus hubardi</i> Leng & Mutchler	183	1-Jan-1900	11.6

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Family	Species	N	First Date	Length (mm)
Lycidae	<i>Thonalmus sinuaticostis</i> Leng & Mutchler	164	1-Jan-1900	12
Bostrichidae	<i>Melalgus caribeanus</i> (Lesne)	24	11-Mar-2002	12.6
Bostrichidae	<i>Amphicerus cornutus</i> (Pallas)	9	5-Jan-2002	12.5
Bostrichidae	<i>Tetrapriocera longicornis</i> (Olivier)	19	10-Jan-2002	4.8
Bostrichidae	<i>Xylomeira tridens</i> (Fabricius)	107	1-Jan-1900	4
Bostrichidae	<i>Xylopsocus capucinus</i> (Fabricius)	1	20-May-2003	4.2
Bostrichidae	<i>Dinoderus minutus</i> (Fabricius)	1	21-Jun-2002	2.7
Bostrichidae	<i>Lyctus caribbeanus</i> Lesne	4	10-Jan-2002	2.7
Bostrichidae	<i>Minthea rugicollis</i> (Walker)	4	1-Jan-1999	2.7
Anobiidae	<i>Xyletinus marmoratus</i> Pic	87	5-Feb-2002	4.2
Anobiidae	<i>Protheca</i> sp. 1	3	5-Jan-2002	1.5
Anobiidae	<i>Protheca</i> sp. 2	11	13-Jan-2002	1.8
Anobiidae	<i>Tricorynus ?pierriei</i> (Lepesme)	51	23-Mar-2002	2.3
Anobiidae	<i>Pseudodorcatomus ?mariei</i> Lepesme	4	20-Jun-2000	1.4
Anobiidae	<i>Calymmaderus</i> sp. nr. <i>dufaui</i> Pic	3	30-May-2002	3.2
Anobiidae	<i>Microzogus</i> sp. 1	4	30-May-2002	1.1
Anobiidae	<i>Microzogus</i> sp. 2	4	21-Jun-2002	1
Anobiidae	<i>Microzogus</i> sp. 3	6	22-May-2002	1.3
Anobiidae	<i>Caenocara maculatum</i> Fisher	11	10-Jan-2002	1.2
Anobiidae	<i>Cryptorama carinatum</i> White	40	21-Jan-2002	2.3
Anobiidae	<i>Cryptorama megalops</i> White	31	21-Jan-2002	2.2
Anobiidae	<i>Cryptorama ?antillensis</i> White	3	16-May-2002	1.5
Anobiidae	<i>Cryptorama sericeum aureum</i> (Lepesme)	3	23-Mar-2002	2
Anobiidae	<i>Cryptorama</i> sp. 1	143	20-Jun-2000	1.5
Anobiidae	<i>Cryptorama</i> sp. nr. <i>impunctatum</i> White	11	21-Jan-2002	2.5
Anobiidae	<i>Cryptorama</i> sp. nr. <i>tortolensis</i> White	9	20-Jun-2000	1.6
Anobiidae	<i>Cryptorama</i> sp. nr. <i>minor</i> Fall	24	16-May-2002	2.1
Anobiidae	<i>Cryptorama</i> sp. nr. <i>rufescens</i> White	10	5-Feb-2002	2.4
Anobiidae	<i>Petalium</i> sp. 1	10	16-May-2002	1.5
Anobiidae	<i>Petalium</i> sp. 2	10	16-May-2002	1.3

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Anobiidae	<i>Petalium ? antillarum</i> Pic	9	5-Jan-2002	1.5
Anobiidae	<i>Trichodesma</i> sp. 1	18	17-Jun-2000	6
Anobiidae	<i>Trichodesma</i> sp. 2	15	20-Jun-2000	4.3
Anobiidae	<i>Trichodesma</i> sp. 3	2	11-Mar-2002	5.3
Anobiidae	<i>Trichodesma</i> sp. 4	1	3-Jun-2003	5.5
Anobiidae	<i>Trichodesma</i> sp. 5	1	28-Jul-2005	5
Anobiidae	<i>Stichtoptenus</i> n.sp. nr. <i>dufaui</i> Pic	14	21-Jan-2002	4.1
Anobiidae	<i>Megorama</i> sp.	11	24-May-2002	5
Anobiidae	<i>Ptinus strangulatus</i> Fall	12	4-Mar-2002	2.6
Anobiidae	<i>Ptinus dufai</i> Pic	178	1-Mar-2001	2.2
Anobiidae	<i>Gibbium aequinoctiale</i> Boieldieu	1	1-Jan-1900	3.2
Sphindidae	<i>Sphindus</i> sp.	3	5-Feb-2002	1.5
Nitidulidae	<i>Lobiopa insularis</i> (Castelnau)	79	19-Jun-2000	7
Nitidulidae	<i>Eपुरaea (Haptoncus) luteolus</i> (F.)	46	19-Jun-2000	2.4
Nitidulidae	<i>Stelidota strigosa</i> (Gyllenhal)	123	19-Jun-2000	3.5
Nitidulidae	<i>Stelidota coenosa</i> Erichson	2	8-Jan-2002	2.2
Nitidulidae	<i>Stelidota ruderata</i> Erichson	42	23-Jun-2000	2.6
Nitidulidae	<i>Macrasta vertraci</i> Grouvelle	16	1-Jan-1900	5
Nitidulidae	<i>Carpophilus humeralis</i> (Fabricius)	3	29-May-2002	4.2
Nitidulidae	<i>Carpophilus dimidiatus</i> (Linneaus)	4	1-Jan-1900	2.2
Nitidulidae	<i>Carpophilus</i> sp.	1	1-Jun-2003	2.3
Nitidulidae	<i>Colopterus infimus</i> (Erichson)	4	23-Mar-2002	2
Nitidulidae	<i>Cilleaus</i> n.sp.	4	26-May-2003	7.4
Nitidulidae	<i>Conotelus conicus</i> (Fabricius)	1	1-Jan-1900	3.2
Smicripidae	<i>Smicrips</i> sp.	24	23-Jun-2000	1.5
Monotomidae	<i>Europs</i> sp. #1	10	13-Jan-2002	2.4
Monotomidae	<i>Europs</i> sp. #2	50	18-Jun-2000	1.9
Monotomidae	<i>Europs</i> sp. #3	24	17-Mar-2002	2.1
Monotomidae	<i>Europs</i> sp. #4	3	2-Aug-2005	2.1
Monotomidae	<i>Monotoma</i> sp.	1	23-Mar-2002	2

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Silvanidae	<i>Silvanoprus scuticollis</i> (Walker)	4	1-Jan-2002	2.4
Silvanidae	<i>Monanus concinnus</i> (Walker)	5	23-Mar-2002	2.1
Silvanidae	<i>Telephanus nodicornis</i> Nevermann	6	1-Jan-1900	4
Laemophloeidae	<i>Cryptolestes unicornis</i> (Reitter)	14	21-Jun-2000	1.7
Laemophloeidae	<i>Laemeophoelus</i> sp. #1	4	30-May-2002	3
Laemophloeidae	<i>Laemeophoelus</i> sp. #2	3	23-Mar-2002	2.4
Laemophloeidae	<i>Placonotus planifrons</i> Thomas	20	21-Jun-2000	2.1
Laemophloeidae	<i>Placonotus modestus</i> (Say)	5	3-Jan-2002	1.9
Laemophloeidae	<i>Placonotus politissimus</i> (Wollaston)	4	5-Jan-2002	1.8
Laemophloeidae	<i>Placonotus</i> ? <i>patruellus</i> Thomas	1	3-Jan-2002	2
Laemophloeidae	<i>Placonotus</i> sp. nr. <i>patruellus</i>	1	23-Mar-2002	1.5
Laemophloeidae	<i>Dysmerus</i> sp.	2	5-Feb-2002	1.8
Laemophloeidae	<i>Lepidophoeus</i> n.sp.?	2	21-May-2002	1.1
Laemophloeidae	<i>Lathropus pictus</i> Schwarz	3	10-Aug-2005	1.1
Phalacridae	<i>Ochrolitus tristriatus</i> Casey	83	5-Jan-2002	2.7
Phalacridae	<i>Olibrus</i> sp.	4	7-Jan-2002	1.9
Phalacridae	<i>Litolibrus</i> sp.	21	17-Jul-2005	1.8
Cryptophagidae	<i>Ephistemus</i> sp.	2	26-Jul-2005	1
Languriidae	<i>Toramus</i> #1	98	17-Jun-2000	1
Languriidae	<i>Toramus</i> #2	17	20-Jun-2000	1.3
Languriidae	<i>Loberus</i> sp.	47	17-Jun-2000	1.9
Languriidae	<i>Haplips angulosus</i> Grouvelle	1	10-Jul-2005	4
Languriidae	<i>Haplips</i> nr. <i>guadeloupensis</i> Grouvelle	33	20-Jun-2000	4.5
Languriidae	<i>Cryptophilus integer</i> (Heer)	23	10-Jan-2002	2
Languriidae	<i>Platoberus dufauli</i> Grouvelle	2	24-Jul-2005	3.1
Languriidae	<i>Telmatoscius</i> sp.	13	6-Aug-2005	3.3
Cerylonidae	<i>Philothermus puberulus</i> Schwarz	4	1-Jan-1900	1.8
Cerylonidae	<i>Euxestes erithacus</i> (Chevrolat)	9	16-Jun-2000	2
Cerylonidae	<i>Mychocerus sharpi</i> (Champion)	6	26-Jun-2002	1.6
Cerylonidae	<i>Ostomopsis neotropcalis</i> ?	3	30-Jun-2002	1
Cerylonidae	<i>Botrodus</i> sp#1 <i>dufaul</i> ?	2		1.7

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Family	Species	N	First Date	Length (mm)
Cerylonidae	<i>Botrodox</i> sp#2 <i>estriatus?</i>	1		1.7
Bothrideridae	<i>Sosylus</i> sp.	23	1-Jan-2002	4
Bothrideridae	<i>Bothrideres dufau</i> Grouvelle	21	16-May-2002	3.2
Endomycidae	n. genus #1 sp.	4	21-Feb-2003	1
Endomycidae	n. genus #2 sp.	4	21-May-2002	0.9
Endomycidae	<i>Displotera</i> sp.	1	21-Jun-2002	1.5
Endomycidae	<i>Holoparamecus</i> sp.	2	6-Jun-2002	0.7
Coccinellidae	<i>Cycloneda sanguinea limbifer</i> Casey	85	1-Aug-1975	4.2
Coccinellidae	<i>Coelophora inaequalis</i> (F.)	79	18-Jun-2000	5
Coccinellidae	<i>Cryptolaemus monstrouzieri</i> Mulsant	32	16-Jun-2000	4.5
Coccinellidae	<i>Chilocerus cactus</i> (L.)	14	23-Jun-2000	6.4
Coccinellidae	<i>Psyllobora lineola</i> (F.)	153	25-Jun-2000	2.3
Coccinellidae	<i>Diomus ochroderus</i> (Mulsant)	62	23-Jun-2000	7.5
Coccinellidae	<i>Diomus</i> #1	1	1-Jan-2002	1.3
Coccinellidae	<i>Diomus</i> #2	1	8-Jan-2002	1.9
Coccinellidae	<i>Diomus</i> #3	1	16-Jun-2000	1.1
Coccinellidae	<i>Diomus</i> #4	24	17-Jun-2000	1.4
Coccinellidae	<i>Diomus roseicollis</i> (Mulsant)	24	10-Jan-2002	1.5
Coccinellidae	<i>Neaptera viola</i> Gordon	32	24-Jul-1936	1
Coccinellidae	<i>Nephaspis</i> n. sp	7	16-May-2002	1
Coccinellidae	<i>Scymnus (Pullus) phloeus</i> Mulsant	62	11-Jan-2002	2
Coccinellidae	<i>Scymnus (S.) floralis</i> (Fabricius)	31	1-Jan-1900	2.1
Coccinellidae	<i>Scymnus (Pullus)</i> sp.	1	1-Jun-2003	1.2
Coccinellidae	<i>Zilus</i> sp.	2	22-May-2002	1.1
Coccinellidae	<i>Stethorus albipes</i> (Mulsant)	8	21-May-2002	0.9
Coccinellidae	<i>Decadiomus hubbardi</i> Chapin	1	14-Jun-2002	1
Coccinellidae	<i>Coccidophilus cariba</i> Gordon	46	1-Jan-1900	0.9
Coccinellidae	<i>Prodilis</i> n.sp.	4	16-May-2002	1.5
Coccinellidae	<i>Delphastus nebulosus</i> Chapin	19	16-May-2002	1
Coccinellidae	<i>Calloeneis</i> n.sp.	8	21-May-2002	1.6
Coccinellidae	<i>Hyperaspis</i> sp.	2	4-Aug-2005	2.7

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Family	Species	N	First Date	Length (mm)
Corylophidae	<i>Arthrolips</i> sp. # 1	11	3-Jan-2002	1.2
Corylophidae	<i>Arthrolips</i> sp. # 2	25	22-May-2002	1.1
Corylophidae	<i>Arthrolips</i> sp. # 3	5	3-Apr-2002	0.9
Corylophidae	<i>Arthrolips</i> sp. # 4	4	23-Mar-2002	1
Corylophidae	<i>Arthrolips</i> sp. # 5	2	14-Jun-2002	0.7
Corylophidae	<i>Clypastraea</i> sp.	38	21-May-2002	0.9
Corylophidae	<i>Holopsis</i> sp. #1	37	27-May-2000	0.9
Corylophidae	<i>Holopsis</i> sp. #2	3	21-May-2002	0.5
Corylophidae	Corylophid sp. #1	1	1-May-2002	1
Latridiidae	<i>Cortodere constricta</i> (Gyllenhal)	1	23-Mar-2002	1.4
Latridiidae	<i>Cortilena picta</i> (LeConte)	1	3-Jan-2002	1.1
Mycetophagidae	<i>Litargus balteatus</i> LeConte	8	1-Jul-1936	1.6
Mycetophagidae	<i>Thrimolus minutus</i> Casey	4	18-Jun-2000	0.9
Mycetophagidae	<i>Berginus</i> sp.	1	15-Aug-2005	1
Ciidae	<i>Orthocis</i> sp. #1	1	22-May-2002	1.1
Ciidae	<i>Orthocis</i> sp. #2	2	21-May-2002	0.8
Ciidae	<i>Cis</i> sp. #1	1	15-Jun-2002	2
Ciidae	<i>Cis</i> sp. #2	1	21-Jun-2002	1.2
Ciidae	<i>Cis</i> sp. #3	59	22-May-2002	1.1
Ciidae	<i>Cis creberrimus</i> Mellie	26	7-Jan-2002	2
Ciidae	<i>Cis melliei</i> Coquerel	13	4-Aug-2005	1.5
Ciidae	Ceracis. #1	11	18-Jun-2000	1.5
Ciidae	Ceracis. #2	4	22-Jun-2002	1.2
Mordellidae	<i>Glipostenoda pallida</i> (Champion)	262	20-Jun-2000	3.2
Mordellidae	<i>Tolidomordella</i> sp.	247	20-Jun-2000	2.7
Mordellidae	<i>Mordella</i> sp. #1	3	24-Apr-2001	4.6
Mordellidae	<i>Mordella</i> sp. #2	2	30-May-2002	4.3
Mordellidae	<i>Falsomordellistena</i> sp.	4	16-May-2002	3.2
Meloidae	<i>Cissites maculata</i> (Swederus)	1	14-May-2002	31
Meloidae	<i>Pseudozonitis marginata</i> (Fabricius)	17	1-Jan-1900	12.2
Meloidae	<i>Tetraonyx quadrimaculatus</i> (Fabricius)	4	1-Jan-1900	10
Melandryidae	<i>Orchesia</i> sp.	1	30-May-2002	4.7
Rhipiphoridae	<i>Macrosaigon cruenta</i> Germar	1	21-Jun-2002	4.5

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Family	Species	N	First Date	Length (mm)
Zopheridae	<i>Hyporrhagus</i> sp.	5	22-Jul-1981	4.9
Zopheridae	<i>Pycnomerus biimpressus</i> (Reitter)	2	18-Jun-2000	3.3
Zopheridae	<i>Pycnomerus uniformis</i> Ivie & Ślipiński	3	21-Jul-2005	3.3
Colydiidae	<i>Lemnis lhermimieri</i> Grouvelle.	2	29-May-1982	3.1
Colydiidae	<i>Bitoma</i> sp.	61	21-Jun-2000	2.5
Colydiidae	<i>Colydodes mammalaris</i> (Pascoe)	2	8-Jun-2002	4.7
Colydiidae	<i>Synchita</i> sp. #1	21	1-Jan-1900	1.9
Colydiidae	<i>Synchita</i> sp. #2	8	3-Jan-2002	1.6
Colydiidae	<i>Paha guadeloupensis</i> Dajoz	8	23-Apr-2002	2
Colydiidae	<i>Aulonium bidentatus</i> (Fabricius)	54	1-Jan-2002	5.8
Colydiidae	<i>Monoedus lecontei</i> Fleutiaux & Sallé	2	1-Jan-1900	1.9
Colydiidae	<i>Monoedus obscurus</i> Grouvelle	33	25-Jun-2002	2.4
Colydiidae	<i>Nematidium filiforme</i> LeConte	82	23-Mar-2002	4.8
Tenebrionidae	<i>Lorelus</i> n. sp.	38	28-Jun-2002	2
Tenebrionidae	<i>Diodeus guadeloupensis</i> Fleutiaux & Sallé	46	9-May-2004	3.2
Tenebrionidae	<i>Palorus cerylonoides</i> Pascoe	6	21-Jun-2000	2.3
Tenebrionidae	<i>Rhipidandrus cornutus</i> (Arrow)	25	1-Jul-1936	4.1
Tenebrionidae	<i>Tribolium castaneum</i> (Herbst)	4	21-Jun-2000	4
Tenebrionidae	<i>Uloma retusa</i> (Fabricius)	64	1-Jul-1936	11
Tenebrionidae	<i>Blapstinus opacus</i> Mulsant & Rey	19	1-Mar-1982	4.8
Tenebrionidae	<i>Diastolinus puncticollis</i> Mulsant & Rey	2	3-Jan-2002	9
Tenebrionidae	<i>Diastolinus</i> sp. nr. <i>barbudensis</i> Marcuzzi	11	1-Mar-1982	5.4
Tenebrionidae	<i>Opatrinus clathratus</i> (Fabricius)	9	5-Jan-2002	10
Tenebrionidae	<i>Hymenorus antillensis</i> Campbell or nr.	2	26-Jul-2005	6.5
Tenebrionidae	<i>Hymenorus</i> n.sp.	9	6-Jun-2002	5.5
Tenebrionidae	<i>Lobopoda</i> n.sp.	16	17-Jun-2000	8
Tenebrionidae	<i>Platydema excavataum</i> Say	1	22-Jul-1981	5.1
Tenebrionidae	<i>Neomida lecontei</i> (Bates)	18	1-Jan-1900	6
Tenebrionidae	<i>Neomida suilla</i> Champion	11	3-Jan-2002	2.1
Tenebrionidae	<i>Adelina pici</i> (Ardoin)	20	7-Jan-2002	4.1
Tenebrionidae	<i>Gnatocerus curvicornis</i> (Champion)	6	13-Jan-2002	3.5
Tenebrionidae	<i>Gnatocerus guatemalensis</i> Champion	8	16-Jun-2000	3.2
Tenebrionidae	<i>Phaleria fulva</i> Fleutiaux & Sallé	26	1-Aug-1975	4.9

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Family	Species	N	First Date	Length (mm)
Tenebrionidae	<i>Phaleria picipes</i> Say	4	1-Mar-1982	5.1
Tenebrionidae	<i>Gondwanacrypticus</i> sp.	5	1-Aug-1975	4.2
Tenebrionidae	<i>Corticeus</i> n.sp.	2	23-Mar-2002	2.2
Tenebrionidae	<i>Cryptozoon</i> n.sp.	1	2-Aug-2005	1.2
Tenebrionidae	<i>Ulomoides ocularis</i> (Casey)	2	1-Jan-1900	3.8
Tenebrionidae	<i>Nesocyrtosoma</i> n.sp.	13	1-Jan-1900	6
Tenebrionidae	<i>Cyrtosoma</i> n.sp.	2	1-Jan-1900	13
Tenebrionidae	<i>Strongylium delauneyi</i> Fleutiaus & Sallé	18	21-Jun-2000	8.4
Tenebrionidae	<i>Talanus</i> sp.	3	1-Mar-1982	5.6
Mycteridae	<i>Physicus faciatus</i> Pic	177	19-Jun-2000	2.4
Salpingidae	<i>Inopeplus praeustus</i> Chevrolat	38	3-Jan-2002	2.1
Salpingidae	<i>Inopeplus striatulus</i> Blackwelder	5	22-May-2002	4
Salpingidae	<i>Aprostomis cephalotes</i> Grouvelle	5	16-May-2002	1.7
Salpingidae	<i>Serrotibia</i> n. sp.	2	1-Jan-1900	5
Salpingidae	Prostominiinae sp.	6	21-Jun-2002	3
Aderidae	<i>Aderus brunipennis</i> (LeConte)	2	6-Dec-2002	1.6
Aderidae	<i>Cnopus</i> sp. #1	3	5-Jan-2002	1.2
Aderidae	<i>Ganascus</i> sp #1	43	23-Jun-2000	1.7
Aderidae	<i>Ganascus</i> sp #2	8	16-May-2002	1.9
Aderidae	<i>Ganascus</i> sp #3	63	21-May-2002	1.8
Aderidae	<i>Ganascus</i> sp #4	18	5-Jan-2002	1.7
Aderidae	<i>Pseudariotes</i> sp #1	24	16-May-2002	1.8
Aderidae	<i>Zonates</i> sp. #1	3	22-May-2002	1.5
Anthicidae	<i>Anthicus tobias</i> Marseul	7	21-Jun-2002	3.4
Oedemeridae	<i>Hypasclera simplex</i> (Waterford)	65	16-Jun-2000	8.7
Oedemeridae	<i>Oxycopis</i> #1	102	1-Mar-1982	9.5
Oedemeridae	<i>Oxycopis</i> #2	33	21-Jun-2000	6.6
Oedemeridae	<i>Oxycopis</i> #3	6	13-Jan-2002	9
Chrysomelidae	<i>Acanthoscelides johnique</i> Johnson	100	10-Jan-2002	3.1
Chrysomelidae	<i>Acanthoscelides</i> sp. #1	2	17-Jul-2005	2.8
Chrysomelidae	<i>Ctenocolum crotonae</i> (Fåhræus)	49	6-Jun-2002	3.7
Chrysomelidae	<i>Stator monachus</i> (Sharp)	4	10-Jan-2002	3.1
Chrysomelidae	<i>Mimosestes mimosae</i> (Fabricius)	2	26-Jul-2005	4.7



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Family	Species	N	First Date	Length (mm)
Chrysomelidae	<i>Sennius rufomaculatus</i> (Motschulsky)	1	1-Aug-2005	3
Chrysomelidae	<i>Neolema dorsalis</i> (Olivier)	7	1-Aug-1975	4.7
Chrysomelidae	<i>Chalepus sanguinicollis</i> (Linneaus)	16	6-Jul-2002	6.9
Chrysomelidae	<i>Charidotella sexpunctata</i> (Fabricius)	38	1-Aug-1975	5.9
Chrysomelidae	<i>Chelymorpha cribraria</i> (Fabricius)	3	5-Jun-2002	7.9
Chrysomelidae	<i>Hilarocassis exclamationis</i> (Linnaeus)	1	26-May-2002	9.6
Chrysomelidae	<i>Acalymma innubum</i> (Fabricius)	73	1-Jan-1900	7.4
Chrysomelidae	<i>Ceratoma ruficornis</i> (Olivier)	15	12-Jan-2002	5.2
Chrysomelidae	<i>Diabrotica ochreatea</i> Fabricius	15	1-Jan-1900	6.6
Chrysomelidae	<i>Neolochmaea obliterated</i> (Olivier)	1	1-Aug-1975	7.1
Chrysomelidae	<i>Exora encaustica</i> (Germar)	128	1-Jan-1900	9.4
Chrysomelidae	<i>Altica occidentalis</i> Suffrian	37	19-Jun-2002	5.1
Chrysomelidae	<i>Disanycha</i> sp.	2	10-Jan-2002	6.9
Chrysomelidae	<i>Megistops</i> n. sp. nr. <i>granulate</i>	6	23-May-2002	4.4
Chrysomelidae	<i>Parchicola</i> sp.	18	5-Feb-2002	5
Chrysomelidae	<i>Epitrix cucumeris</i> (Harris)	1	22-Jul-1981	1.5
Chrysomelidae	<i>Epitrix fasciata</i> Blatchley	14	9-May-2004	1.4
Chrysomelidae	<i>Epitrix</i> sp.	12	21-May-2002	1.6
Chrysomelidae	<i>Homoschema</i> n.sp.	3	4-Aug-2005	2.5
Chrysomelidae	<i>Crysilus montserratii</i> Blake	2	18-Mar-1894	3.2
Chrysomelidae	<i>Aedmon ? stenotrachela</i> Blake	2	7-Aug-2005	2.8
Chrysomelidae	<i>Omophoeta albicornis</i> Fabricius	8	1-Aug-1975	6.2
Chrysomelidae	<i>Typophorus</i> sp.	108	13-Jun-2002	5.8
Chrysomelidae	<i>Megascelis</i> n. sp.	115	22-May-2002	5.7
Chrysomelidae	<i>Colaspis</i> sp.	16	1-Jan-2002	4.5
Chrysomelidae	<i>Metachroma</i> sp. #1	4	23-Apr-2002	4.1
Chrysomelidae	<i>Metachroma</i> sp. #2	3	20-Jun-2002	3
Chrysomelidae	<i>Cryptocephalus</i> sp. #1	103	13-Jan-2002	4.2
Chrysomelidae	<i>Cryptocephalus</i> sp. #2	25	13-Jan-2002	4.4
Chrysomelidae	<i>Diachus</i> sp.	1	17-Jun-2000	1.9
Chrysomelidae	<i>Pachybrachis</i> sp.	16	21-Jan-2002	3
Cerambycidae	<i>Stenodontes maxillosus</i> (Drury)	7	8-Jan-2002	45
Cerambycidae	<i>Methia necydalea</i> (F.)	143	5-Jan-2002	9.7

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Cerambycidae	<i>Achryson surinamum</i> (L.)	49	7-Jan-2002	15.5
Cerambycidae	<i>Ochrus ornatus</i> (Fisher)	11	10-Jan-2002	11.5
Cerambycidae	<i>Chlorida festiva</i> (L.)	67	1-Jan-2002	21.5
Cerambycidae	<i>Eburia decemmaculata</i> (F.)	20	1-Aug-1975	18
Cerambycidae	<i>Eburia inermis</i> (Fleutiaux & Sallé)	6	5-Feb-2002	22
Cerambycidae	<i>Eburia octomaculata</i> Chevrolat	41	11-Mar-2002	17.5
Cerambycidae	<i>Elaphidion glabratum</i> (F.)	3	1-Feb-1937	15
Cerambycidae	<i>Nesanoplium</i> n.sp.	52	19-Feb-2001	7.5
Cerambycidae	<i>Nesanoplium</i> sp.	16	25-Jun-1977	6.7
Cerambycidae	<i>Curtomerus flavus</i> (F.)	112	27-Feb-2001	10
Cerambycidae	<i>Neocompsa cylindricollis</i> (F.)	51	1-Mar-2001	8.2
Cerambycidae	<i>Caribbomerus attenuatus</i> (Chevrolat)	11	5-Jan-2002	6.5
Cerambycidae	<i>Plectromerus fasciatus</i> (Gahan)	8	21-Jan-2002	9
Cerambycidae	<i>Gourbeyella</i> n.sp.	13	24-Apr-2002	5
Cerambycidae	Tillomorphini n.g. near <i>Euderces</i>	7	24-Apr-2002	4.3
Cerambycidae	<i>Oxymerus aculeatus lebasi</i> Dupont	10	11-Jun-2002	9.6
Cerambycidae	<i>Strangalia benitiespinali</i> Chalumeau	2	29-May-1982	10.7
Cerambycidae	<i>Ecyrus hirtipes</i> Gahan	6	11-Mar-2002	9.1
Cerambycidae	<i>Adetus lherminieri</i> Fleutiaux & Sallé	1	1-Jan-1900	8.2
Cerambycidae	<i>Mimestoloides benardi</i> Breuning	3	23-Mar-2002	7.9
Cerambycidae	<i>Cacostola ornata</i> (Fleutiaux & Sallé)	3	1-Mar-1982	8.1
Cerambycidae	<i>Oreodera glauca</i> (L.)	1	11-Mar-2002	23.5
Cerambycidae	<i>Lagocheirus araneiformis</i> (L.)	4	13-Jan-2002	23.7
Cerambycidae	<i>Amniscus assimilis</i> (Gahan)	65	1-Mar-2001	10.5
Cerambycidae	<i>Styloleptus posticalis</i> (Gahan)	22	18-Feb-2001	7
Cerambycidae	Acanthocinini ? <i>Styloleptus</i> n.sp.	1	1-Aug-2005	8
Cerambycidae	<i>Urgleptes guadeloupensis</i> (Fleutiaux &	23	19-Feb-2001	4.9
Cerambycidae	<i>Urgleptes cobbeni</i> Gilmour	55	27-Feb-2001	3.7
Cerambycidae	<i>Epectasis similis</i> Gahan	1	5-Dec-2002	8.9
Cerambycidae	<i>Decarthria</i> n.sp.	18	3-Jan-2002	2.1
Cerambycidae	<i>Cyrtinus hubbardi</i> Fisher	44	1-Jan-1900	2
Anthribidae	<i>Ormiscus</i> sp. #1	22	16-May-2002	2

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Anthribidae	<i>Ormiscus</i> sp. #2	65	19-Jun-2000	2
Anthribidae	<i>Ormiscus</i> sp. #3	41	5-Jan-2002	2.1
Anthribidae	<i>Homocloeus</i> #1	14	22-May-2002	3.5
Anthribidae	<i>Homocloeus</i> sp. #2	9	5-Jan-2002	3.9
Anthribidae	<i>Homocloeus</i> sp. #3	2	17-Jun-2000	5.3
Anthribidae	<i>Holostilpna</i> sp. #1	1	16-May-2002	1.2
Anthribidae	Anthribidae sp. #1	1	22-May-2002	0.9
Anthribidae	Anthribidae sp. #2	1	26-Jul-2005	1.5
Anthribidae	Anthribidae sp. #3	1	20-May-2003	1.6
Anthribidae	Anthribidae sp. #4	3	16-Jul-2002	1.5
Attelabidae	<i>Auletobius</i> sp.	37	20-Jun-2000	1.7
Brentidae	<i>Apion</i> sp.	8	16-May-2002	2.2
Brentidae	<i>Brentus anchorago</i> Linneaus	148	1-Jan-1900	17
Brentidae	Brentidae sp. #1	9	17-Jun-2000	13.4
Brentidae	<i>Cylas formicarius</i> (F.)	1	21-Jun-2002	6.5
Curculionidae	<i>Sitophilus linearis</i> (Herbst)	5	1-Aug-1975	4.4
Curculionidae	<i>Cosmopolites sordidus</i> (Germar)	1	7-Jun-2002	11
Curculionidae	<i>Metamasius hemipterus</i> (L.)	12	1-Jan-1900	11.5
Curculionidae	<i>Metamasius quadrisignatus</i> (Gyllenhaul)	2	1-Jan-1900	17
Curculionidae	<i>Sphenophorus</i> sp.	2	3-Jan-2002	9
Curculionidae	<i>Sphenophorus venatus?</i> (Say)	16	24-Jun-2000	9.5
Curculionidae	<i>Anthonomus alboannulatus</i> Boheman	2	25-Jul-2005	3.5
Curculionidae	<i>Anthonomus flavescens</i> Boheman	18	21-Jun-2002	3
Curculionidae	<i>Anthonomus</i> sp. #1	1	6-Aug-2005	2.4
Curculionidae	<i>Anthonomus</i> sp. #2	1	12-Jan-2002	2.7
Curculionidae	<i>Anthonomus</i> sp. #3	1	21-Jun-2002	2.6
Curculionidae	<i>Anthonomus</i> sp. #4	1	9-Aug-2005	2.4
Curculionidae	<i>Anthonomus</i> sp. #5	1	30-May-2002	2.5
Curculionidae	<i>Anthonomus squamulosus?</i> Schenkling & Marshall	14	6-Jun-2002	2.1
Curculionidae	<i>Ceratopus</i> sp. #1	1	14-Jun-2002	5.9
Curculionidae	<i>Ceratopus</i> sp. #2	3	5-Feb-2002	5.2
Curculionidae	<i>Phyllotrox palidus</i> Fähræus	4	16-May-2002	1.6

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Curculionidae	<i>Piazorhinus</i> n.sp. #1	3	21-Jun-2002	2.6
Curculionidae	<i>Piazorhinus</i> n.sp. #2	7	22-May-2002	2.6
Curculionidae	<i>Smicronyx</i> sp.	1	8-Aug-2005	2
Curculionidae	<i>Sibinia</i> sp. #1	1	15-Aug-2005	2.1
Curculionidae	<i>Chalcobaris guadeloupensis?</i> Hustache	1	18-Jun-2000	2.4
Curculionidae	<i>Limnobaris?</i> sp.	1	16-Jun-2000	2.5
Curculionidae	<i>Notesia</i> sp.	1	23-Jul-2005	4
Curculionidae	<i>Copturus</i> sp. nr. <i>dufaui</i> Hustache	3	11-Mar-2002	3.9
Curculionidae	<i>Eulechriops</i> sp. #1	12	11-Mar-2002	1.4
Curculionidae	<i>Eulechriops</i> sp. #2	3	22-May-2002	1.2
Curculionidae	<i>Eulechriops</i> sp. #3	4	21-May-2002	1.7
Curculionidae	Cossoninae sp. #1	30	10-Jul-2005	1.3
Curculionidae	<i>Cossonus guadeloupensis?</i> Hustache	11	25-Jun-2000	4
Curculionidae	<i>Cossonus impressus</i> Boheman	2	4-Mar-2002	3.5
Curculionidae	<i>Cossonus sulcatifrons?</i> Hustache	4	14-Jun-2002	3.3
Curculionidae	<i>Cossonus sulcatirostris?</i> Hustache	1	23-Jul-2005	5.2
Curculionidae	<i>Cossonus vitrac?</i> Hustache	7	23-Jul-2005	4.2
Curculionidae	<i>Prionathrus</i> n. sp.	1	7-Aug-2005	4.3
Curculionidae	<i>Acamptus</i> n.sp.	39	21-Jun-2000	1.6
Curculionidae	<i>Catolethrus?</i> sp.	7	28-Jun-2002	4.3
Curculionidae	<i>Dryotribus mimeticus</i> Horn	1	19-Jun-2002	2.8
Curculionidae	<i>Micromimus</i> sp.#1	16	22-May-2002	2.6
Curculionidae	<i>Stenomimus?</i> sp.	2	15-Aug-2005	2
Curculionidae	<i>Pseudopentarthrum</i> sp. #1	16	1-Jan-1900	2.4
Curculionidae	<i>Stenotribus</i> sp. #1	3	25-Jun-2002	3.1
Curculionidae	<i>Stenotribus</i> sp. #2	10	20-Jun-2000	2.3
Curculionidae	<i>Stenotribus</i> sp. #3	46	25-Jun-2002	1.8
Curculionidae	<i>Macroscytalus?</i> sp.	2	10-Aug-2005	2.7
Curculionidae	<i>Proeces depressus</i> (Wollaston)	1	1-Jan-1900	1.8
Curculionidae	Cryptorhynchinae sp. #1	4	17-Jun-2000	5.1

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Family	Species	N	First Date	Length (mm)
Curculionidae	Cryptorhynchinae sp. #2	1	18-Jun-2000	2.5
Curculionidae	<i>Homoeostethus</i> sp. #1	13	20-Jun-2000	4
Curculionidae	<i>Homoeostethus?</i> sp. #2	5	18-Jun-2000	7.4
Curculionidae	<i>Macromerus lanipes</i> (Olivier)	1	23-Jun-2000	9.5
Curculionidae	n.g. "Elephantine" sp. #1	2	23-Jun-2000	6
Curculionidae	n.g. "Elephantine" sp. #2	5	28-May-2002	6.2
Curculionidae	n.g. "Elephantine" sp. #3	2	29-Mar-2000	4.6
Curculionidae	<i>Neotylodes</i> sp. #1	1	20-May-2003	4
Curculionidae	<i>Neotylodes</i> sp. #2	4	28-May-2002	4.4
Curculionidae	<i>Neotylodes</i> sp. #3	30	16-Jun-2002	4.3
Curculionidae	<i>Neotylodes</i> sp. #4	9	17-Jun-2000	7.2
Curculionidae	<i>Pappista aurulenta</i> (Chevrolat)	13	17-Jun-2000	8.5
Curculionidae	<i>Semnorhynchus clericus</i> Chevrolat	18	25-Jun-2000	3.5
Curculionidae	<i>Semnorhynchus vacillatus</i> (Boheman)	37	25-Jun-2000	2.8
Curculionidae	<i>Semnorhynchus?</i> sp. #1	4	20-Jun-2000	3.8
Curculionidae	<i>Semnorhynchus?</i> sp. #2	4	18-Mar-2002	3.3
Curculionidae	<i>Sternochetus mangiferae</i> (Fabricius)	6	29-May-2002	8.2
Curculionidae	<i>Styracopus phaseoli</i> Marshall	1	6-Aug-2005	3.4
Curculionidae	<i>Troezon</i> sp. #1	10	19-Jun-2002	5
Curculionidae	<i>Acalles</i> sp. #1	46	20-Jun-2000	2.5
Curculionidae	<i>Acalles</i> sp. #2	2	24-Jul-2005	2.5
Curculionidae	<i>Tyrannion</i> sp. #1	162	23-Mar-2002	6
Curculionidae	<i>Faustinus</i> sp.	3	5-Jul-2002	4.2
Curculionidae	<i>Lembodes</i> sp. #1	1	9-Aug-2005	3.4
Curculionidae	<i>Microxypterus?</i> sp. #1	1	5-Jul-2002	1.8
Curculionidae	<i>Oxypteroopsis?</i> sp. #1	1	1-Aug-2005	4.9
Curculionidae	<i>Pseudomopsis</i> sp. #1	77	4-Mar-2002	3.7
Curculionidae	<i>Pseudomopsis</i> sp. #2	10	20-May-2003	4
Curculionidae	<i>Pseudomus</i> sp. #1	10	1-Aug-1975	4.2
Curculionidae	<i>Ulosominus</i> sp. #1	4	6-Jun-2003	2.1

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Curculionidae	<i>Ulosominus</i> sp. #2	20	16-May-2002	2
Curculionidae	<i>Diaprepes abbreviatus</i> (Linneaus) <i>sensu lat.</i>	13	1-Jul-1936	16
Curculionidae	<i>Diaprepes famelicus sensu</i> Pierce	73	1-Aug-1975	15
Curculionidae	<i>Lachnopus curvipes</i> (Fabricius)	54	1-Aug-1975	10
Curculionidae	<i>Lachnopus</i> sp. #1	13	22-May-2002	8.1
Curculionidae	<i>Litostylus pudens</i> (Boheman)	202	1-Aug-1975	7.5
Curculionidae	<i>Polydacrys</i> sp.	1	15-Aug-2005	5.5
Curculionidae	Molytinae sp. #1	11	10-Jan-2002	9.5
Curculionidae	<i>Anchonus</i> sp. nr. <i>interruptus</i> Fårhraeus	78	19-Jun-2000	4.7
Curculionidae	<i>Anchonus suillus</i> (Fabricius)	46	19-Jun-2000	4.5
Curculionidae	<i>Geobyrsa</i> sp.	5	11-Jan-2002	5
Curculionidae	<i>Cholus zonatus</i> (Swederus)	2	24-Jul-2005	13
Curculionidae	<i>Conotrachelus cinnamonumeus</i> Hustache	1	4-Jun-2003	5.1
Curculionidae	<i>Conotrachelus cristatus</i> Fårhraeus	5	18-Jun-2000	5.2
Curculionidae	<i>Conotrachelus</i> sp. #1	11	12-May-2002	4.4
Curculionidae	<i>Conotrachelus</i> sp. #2	1	1-Aug-2005	5.3
Curculionidae	<i>Heilpus?</i> sp.	1	16-May-2002	4
Curculionidae	<i>Heilus sinuatus</i> (Boheman)	2	23-Mar-2002	11
Curculionidae	<i>Ozoctenus dufau</i> Hustache	8	22-May-2002	5.2
Curculionidae	<i>Decuanellus</i> n. sp.	1	5-Jan-2002	2
Curculionidae	<i>Dorytomorpha?</i> sp.	1	15-Aug-2005	3.1
Curculionidae	<i>Chalcodermus insularis</i> Chevrolat	35	16-Jun-2002	4.8
Curculionidae	<i>Sternechus vicinus</i> Fleutiaux & Sallé	18	24-Apr-2001	5
Curculionidae	<i>Pycnarthrum hispidum</i> (Ferrari)	8		1.8
Curculionidae	<i>Gymnochilus reitteri</i> Eichhoff	17		2
Curculionidae	<i>Cryptocarenum seriatus</i> Eggers	3		2.2
Curculionidae	<i>Cryptocarenum heveae</i> (Hagedorn)	2		1.6
Curculionidae	<i>Coccotrypes cyperi</i> (Beeson)	27	1-Jan-1900	1.9
Curculionidae	<i>Coccotrypes dactyliperda</i> (Fab.)	11		2.1
Curculionidae	<i>Coccotrypes advena</i> Blandford	2		1.7

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Curculionidae	<i>Ambrosiodmus lecontei</i> Hopkins	2		2.7
Curculionidae	<i>Ambrosiodmus devexus</i> Wood	1		2
Curculionidae	<i>Xyleborus affinis</i> Eichhoff	62	21-Jun-2000	2.1
Curculionidae	<i>Xyleborus ferrugineus</i> (Fab.)	122	24-Jun-2000	2.6
Curculionidae	<i>Xyleborus volvulus</i> (Fab.)	127		2.5
Curculionidae	<i>Xyleborus spinulosus</i> Blandford	6		2.3
Curculionidae	<i>Chramesus</i> sp. A	17		2
Curculionidae	<i>Chramesus</i> sp. B	2		2
Curculionidae	<i>Microborus</i> sp.	1		
Curculionidae	<i>Scolytodes striatus</i> Wood	22		1.7
Curculionidae	<i>Scolytodes schwarzi</i> (Hopkins)	29		1.5
Curculionidae	<i>Scolytodes</i> spp.	2		
Curculionidae	<i>Pseudothysanoes</i> n.sp.	12		
Curculionidae	<i>Pseudothysanoes</i> sp.	1		
Curculionidae	<i>Hylocurus</i> sp. 1	1		
Curculionidae	<i>Hylocurus</i> sp. 2	1		
Curculionidae	<i>Araptus</i> sp. A	2		
Curculionidae	<i>Araptus</i> sp. B	4		
Curculionidae	<i>Corthylus</i> sp.	6		
Curculionidae	<i>Premnobius cavipennis</i> Eichhoff	12		2.5
Curculionidae	<i>Xylosandrus compactus</i> (Eichhoff)	4		1.4
Curculionidae	<i>Cladoctonus</i> sp.	1		
Curculionidae	<i>Cnemonyx ficus</i> Schwarz	4		2.3
Curculionidae	<i>Cnemonyx vagabundus</i> Wood	2		1.5
Curculionidae	<i>Cnesinus</i> sp. A	3		
Curculionidae	<i>Cnesinus</i> sp. B	1		
Curculionidae	<i>Hypothenemus dolosus</i> Wood	1		1.6
Curculionidae	<i>Hypothenemus eruditus</i> Westwood	28		1.2
Curculionidae	<i>Hypothenemus pubescens</i> Hopkins	13		1.1
Curculionidae	<i>Hypothenemus brunneus</i> (Hopk.)	4		1.4

Table B. Total list of Beetle Species with date of first collection, number of specimens observed (N) and size

Family	Species	N	First Date	Length (mm)
Curculionidae	<i>Hypothenemus obscurus</i> (Fab.)	14		1.3
Curculionidae	<i>Hypothenemus gossypii</i> (Hopk.)	5		1
Curculionidae	<i>Hypothenemus birmanus</i> (Eichh.)	5		1.7
Curculionidae	<i>Hypothenemus comosus</i> Bright	2		1.7
Curculionidae	<i>Hypothenemus plumeriae</i> (Nordlinger)	2		
Curculionidae	<i>Hypothenemus</i> spp.	10	1-Jan-1900	1.5
Curculionidae	<i>Euplatypus parallelus</i> (Fabricius)	82	11-Mar-2002	4.4
Curculionidae	<i>Euplatypus hians</i> (Chapuis)	32	8-Jan-2002	4.1
Curculionidae	<i>Teloplatus</i> sp.	19	11-Mar-2002	3
<b>TOTAL N</b>		<b>13065</b>		
<b>NUMBER OF SPECIES RECORDED</b>		<b>718</b>		

\* Species recorded or collected pre-volcano, but not recollected, with either number of specimens number seen, reported in literature, or if not seen or recorded in literature, assumed to be 1

#### Notes

All IREC material dated 01 March 1982, but may be 1982, 1983, 1981

Chapin records assumed to be from Blackwelder

Leng & Mutclher assumed to be from Hubbard

Arrow 1920 assumed to be from Hubbard

First Records in Blackwelder, assumed to be from Blackwelder

Champion 1909 assumed to be from Hubbard

Triplehorn 1961 assumed to be from Hubbard

Fisher 1950 assumed to be from Hubbard

Measurements were taken from a representative Montserrat specimen. For cases where no Montserrat specimen was available, data were taken from published references to the species or a closely related congener.

Empty cells indicate data not available, and not included in analyses



## The non-beetle hexapods

NOTE: No records for Protura, Diplura, Zoraptera, Mantodea, Embidina, Phthiraptera, Siphonaptera, and Strepsiptera are included, in spite of the fact that most, if not all of these Orders will be found to occur on Montserrat. All Orders listed below, even those without specific records, have vouchers in the WIBF collections, or have been deposited elsewhere as noted.

### COLLEMBOLA

Stevens & Waldmann (2001) reported a single published record of an Isotomidae from Montserrat. However, several families of this group are present on Montserrat, and springtails are abundant and speciose in the soil, canopy and litter layers. Study of this group would yield many new species records for Montserrat.



Fig. K. A small sample of the collembolan diversity in the Centre Hills. (Photo: Michael Ivie)

### MICROCORYPHIA

Not reported from Montserrat by Stevens & Waldmann (2001), an unidentified species of this family was taken commonly in the Centre Hills.

#### Meinertellidae

Undetermined species ?

### THYSANURA

Not reported from Montserrat by Stevens & Waldmann (2001), an invasive member of this order was reported from Montserrat in 1995, and another undetermined species is very common in the Centre Hills.

#### Lepismatidae

*Ctenolepisma rothschildi* Silvestri EIS [Irish 1995]

#### Nicoletiidae

Undetermined species ?

### EPHEMEROPTERA

*Allenhyphes flinti* (Allen) WN [Baumgardner *et al.* 2003]

### ODONATA

Determinations by T. W. Donnelly, additional records by F. Sibley from his Montserrat collections of October 2006). The dragonflies and damselflies are widely used as indicators of environmental health. Cooter (1983) provides the only 4 published records of this group for Montserrat, which we expand to 16. Given the sensitivity of this group to water conditions, we were surprised at the number which have survived the volcano's deposits in Montserrat's fresh water habitats. Two species are local endemics, both only recently discovered from Guadeloupe (Donnelly 2007).

#### Aeshnidae

<i>Anax junius</i> (Drury)	WN
<i>Triacanthagyna trifida</i> (Rambur)	WN

#### Libellulidae

<i>Brachymesia herbida</i> (Gundlach)	WN
<i>Dythemis</i> sp. (♀♀)	?
<i>Erythrodiplax umbrata</i> (Linnaeus)	WN
<i>Erythemis vesiculosa</i> (Fabricius)	WN
<i>Macrothemis</i> n. sp.	LE
<i>Miathyria marcella</i> (Selys)	WN
<i>Orthemis macrostigma</i> (Rambur)	LAE
<i>Pantala flavescens</i> (Fabricius)	WN
<i>Tramea abdominalis</i> (Rambur)	WN

#### Coenagrionidae

<i>Enallagma coecum</i> (Hagen)	WN
<i>Ischnura capreola</i> (Hagen)	WN
<i>Ischnura ramburii</i> (Selys)	WN

#### Lestidae

<i>Lestes forficula</i> Rambur	WN
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#### Protoneuridae

<i>Protoneura romanae</i> Meurgety	LE
------------------------------------	----

#### ORTHOPTERA/BLATTERIA/PHASMIDA

These orders are the subject of reviews in preparation by Marske and Otte, and are not treated here. One Phasmid, 7 roaches, and 21 Orthopterans are listed by Marske (2004), and more were added in 2005.



Fig. L. *Nesonotus* sp., a long-horned grasshopper used as food by the Montserrat oriole. (Photo: Michael Ivie)



Fig. M. *Microcentrum* sp., a long-horned grasshopper used as food by the Montserrat oriole. (Photo: Michael Ivie)

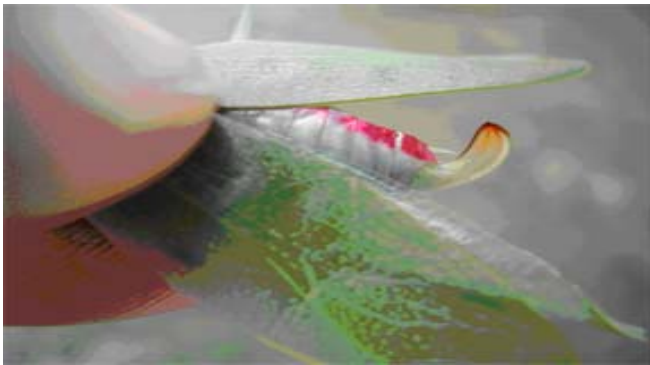


Fig. N. The brightly colored dorsum of the cryptically-patterned *Microcentrum* sp. (Photo: Michael Ivie)



Fig. O. An undescribed forest cricket of the genus *Amphiacusta* (Phalangopsinae: Gryllidae). (Photo: Gerardo Garcia/Durrell, determination by D. Otte)

#### DERMAPTERA

Because the earwigs have been revised for the West Indies (Brindle 1971), little attention was paid to this group, and only 14 mounted specimens were preserved. This proved to be a mistake, as 8 species are represented, 4 of which cannot be identified using Brindle! Obviously, here is a place for more collecting.

#### Carcinophoridae

<i>Euborellia stali</i> (Dohrn)	EIS [Cooter 1983, not recollected]
<i>Euborellia caraiba</i> Hebard	WN [Brindle 1971]

#### Forficulidae

<i>Doru</i> sp. nr. <i>albipes</i> (Fabricius)	?
--	---

#### Labiidae

<i>Labia curvicauda</i> (Motschulsky)	EIS
<i>Labia dorsalis</i> (Burmeister)	EIS [Brindle 1971]

<i>Marava</i> sp.	?
Sp. #1	?
Sp. #2	?

## ISOPTERA

Stevens & Waldmann (2001) recorded 15 species of termites from Montserrat. We did not work with this group, and have found no further literature records.

## HEMIPTERA: HOMOPTERA

This moderately diverse section of the Hemiptera includes many economic pest species, as well as some endemics of conservation concern. Many more species are yet to be discovered on Montserrat.

### Aleyrodidae

*Aleurodicus cocois* (Curtis)  
as *Aleurodiscus cocois*] EIS [Woodruff *et al.* 1998, Stevens & Waldmann (2001)]

*Bemisia argentifolii* (Bellows & Perring) EIS [Ryckewaert & Alauzet 2001]

### Aphidiidae

*Aphis gossypii* Glover EIS or WN

### Pseudococcidae

*Dysmicoccus boninsis* (Kuwana) EIS [Grey sugarcane mealybug, Ben-Dov 1994]

*Maconellicoccus hirsutus* (Green) EIS [Williams 1985]

*Phenacoccus madeirensis* Green EIS [Cassava or Madeira mealybug Ben-Dov 1994]

### Ortheziidae

*Orthezia praelonga* Douglas EIS [Miller *et al.* 2001]

### Diaspididae

*Aonidomytilus albus* (Cockerell) EIS or WN [Woodruff *et al.* 1998]

*Aspidiella sacchari* Cockerell EIS [Woodruff *et al.* 1998]

*Aspidiotus aurantii* Maskell EIS [Riley 1893]

*Aspidiotus destructor* Signoret EIS or WN [Gordon 1978]

*Howardia biclavata* (Comstock) EIS [Fennah 1947]

*Lepidosaphes beckii* (Newman) EIS or WN [Woodruff *et al.* 1998]

*Pseudaulacaspis pentagona* (Targioni) EIS or WN [Fennah 1947]

*Selenaspis articulatus* (Morgan) EIS or WN [Woodruff *et al.* 1998]

*Unaspis citri* (Comstock) EIS [Citrus snow scale, Riley and Howard (1890) as

*Chionaspis citri* Comstock]

*Mytilaspis citricola* (Packard) EIS or WN [Riley and Howard 1890]

**Rejected Record:** *Chionaspis minor* var *angustior* is cited from Montserrat by Riley 1893, but this is a *nomen nudum*, and should not be used. Further, the species it refers to cannot be identified. If it is attributed to *C. minor*, the current correct name is *Pinnaspis strachani* (Cooley), an invasive species known from Antigua, St. Kitts and the Virgin Islands, but this cannot be considered verified.

### Margarodidae

*Icerya montserratensis* Riley & Howard  
ard 1890] WIE? [described from Montserrat by Riley and Howard 1890]

### Coccidae

<i>Ceroplastes cirripediformis</i> Comstock (2001) as <i>Cercoplastes cirripediformis</i> ]	EIS or WN [Woodruff <i>et al.</i> 1998, Stevens & Waldmann
<i>Ceroplastes floridensis</i> Comstock (2001) as <i>Cercoplastes floridensis</i> )	EIS or WN [Woodruff <i>et al.</i> 1998, Stevens & Waldmann
<i>Coccus hesperidum</i> Linnaeus	EIS or WN [Woodruff <i>et al.</i> 1998]
<i>Parlatoria pergandei</i> Comstock (2001) as <i>P. perganei</i> Comstock]	EIS or WN [Ballou (1912) , Stevens & Waldmann
<i>Saissetia oleae</i> (Olivier) Waldmann (2001) as <i>Saissetia oleae</i> Oliver in Coccidae and as <i>Saissaetia oleae</i> in Diaspididae]	EIS or WN [Woodruff <i>et al.</i> (1998) and Stevens &
<i>Saissetia coffeae</i> (Walker) spelling of <i>L. hemisphaericum</i> ] Targioni-Tozzetti]	EIS [Riley 1893 as <i>Lecanium hemisphaericum</i> [sic, mis-
<i>Vinsonia stellifera</i> (Westwood)	EIS [Riley 1893]
<b>Asterolecaniidae</b>	
<i>Asterolecanium pustulans</i> (Cockerell)	EIS [Cockerell 1893, Riley 1893]
<i>Asterolecanium bambusae</i> Boisduval	EIS [Riley 1893]
<b>Cicadidae</b>	
<i>Proarna hilaris</i> (Germar)	WIE
<b>FULGOROIDEA</b> (Extracted from R. G. Fennah's 17 West Indian papers, courtesy of Lois O'Brien, with additions from WIBF collections in O'Brien collection)	
<b>Cixiidae</b>	
<i>Bothriocera eborea</i> Fennah	WIE
<i>Cyclopoliarus montserratensis</i> Fennah	IE
<i>Cubana</i> sp.	?
<b>Derbidae</b>	
<i>Patara mimula</i> Fennah	LIE
<b>Kinnaridae</b>	
<i>Paraprosotropis marmorata</i> Fennah	IE [Described from the "Central Hills"]
<b>Flatidae</b>	
<i>Flatoidinus caesalpiniai</i> Fennah	IE
<i>Antillormenis albicostalis</i> Fennah	IE
<i>Petrusa epilepsis</i> (Kirkaldy)	LIE
<i>Illesia septempunctata</i> (Fennah)	IE
<b>Acanaloniidae</b>	
<i>Acanalonia bonducellae</i> Fennah	LE
<i>Acanalonia viriditerminata sylvestris</i> Fennah	LE ssp.
<b>Achilidae</b>	
<i>Catonia montserratensis</i> Fennah	IE

#### HEMIPTERA: HETEROPTERA

The true bugs are diverse and ubiquitous on Montserrat, and include pest species, predators, fungivores in the terrestrial and aquatic environment. Presented here is but a tip of the iceberg of this fauna.

Enicocephalidae		
Sp. #1		?
Sp. #2		?
Sp. #3		?
Scizopteridae		
Sp. #1		?
Veliidae		
Sp. #1		?
Sp. #2		?
Gerridae		
Sp. #1		?
Naucoridae (det. by R. Sites)		
Pelocoris sp. #1 named to species.]		WN [A single female was taken, which cannot be
Notonectidae		
Sp. #1		?
Sp. #2		?
Reduviidae		
<i>Barce fraterna</i> (Say)		WN [Stevens & Waldmann 2001]
<i>Zelus longipes</i> Linneaus		WN
Emesinae sp.		
Miridae		
Many species present		?
Tingidae		
Present		?
Aradidae		
Sp. #1		?
Sp. #2		?
Sp. #3		?
Cydnidae		
<i>Ammestus</i> sp.		?
Pentatomidae (Determinations by David A. Rider)		
Asopinae		
<i>Podisus sagitta</i> (Fabricius)		WN
Edessinae		
<i>Edessa meditabunda</i> (Fabricius)?		WN [Ingram 1981]
<i>Edessa bifida</i> (Say)?		WN

Pentatominae	
<i>Arvelius albopunctatus</i> (DeGeer)	WN
<i>Chinavia marginata</i> (Palisot de Beauvois)	WN
<i>Cyptocephala antiguensis</i> (Westwood)	WN
<i>Loxa viridis</i> (Palisot de Beauvois)	WN
<i>Mecidea longula</i> Stål	WIE
<i>Mormidea cubrosa</i> (Dallas)	WN
<i>Mormidea ypsilon</i> (Linnaeus)	WN
<i>Nezara viridula</i> (Linnaeus)	WN [Ingram 1981]
<i>Oebalus pugnax</i> (Fabricius)	WN
<i>Proxys victor</i> (Fabricius)	SA
<i>Thyanta perditor</i> (Fabricius)	WN
<i>Thyanta testacea</i> (Dallas)	SA
<i>Vulsirea nigrorubra</i> Spinola	WIE
Scutelleridae (Determinations by David A. Rider)	
<i>Augocoris</i> sp.	?
<i>Diolcus</i> sp.	?
<i>Tetyra antillarum</i> Kirkaldy	WIE
Tessaratomidae (determination by David A. Rider)	
<i>Piezosternum subulatum</i> (Thunberg)	WN
Lygaeidae	
<i>Blissus antillus</i> Leonard	WN [Slater & Baranowski 2005, most West Indian re-
ords of <i>B. insularis</i> Barber belong here]	
<i>Neopamera albocincta</i> (Barber)	WN [Slater & Baranowski 2005]
<i>Neopamera bilobata</i> (Say)	WN [Slater & Baranowski 2005]
<i>Neopamera vicarious</i> (Barber)	WIE [Slater & Baranowski 2005]
<i>Neortholomus jamaicensis</i> (Dallas)	WN [Slater & Baranowski 2005]
<i>Ochrinnus collaris</i> (Fabricius)	WIE [Slater & Baranowski 2005]
<i>Oncopeltus aulicus</i> (Fabricius)	WIE [Slater & Baranowski 2005]
<i>Oncopeltus faciatus</i> (Dallas)	WN [Robson 1906, Slater & Baranowski 2005]
<i>Ozophora quinque maculata</i> Barber	WIE [Slater & Baranowski 2005]
<i>Pachygrontha minarum saileri</i> Slater	LAE spp. [Slater & Baranowski 2005]
<i>Paragonatas divergens</i> (Distant)	WN [Slater & Baranowski 2005]
<i>Paromius longulus</i> (Dallas)	WN [Slater & Baranowski 2005]
<i>Prytanes formosa</i> (Distant)	WN [Slater & Baranowski 2005]
<i>Pseudopachybrachius vinctus</i> (Say)	WN [Slater & Baranowski 2005]
<i>Xyonysius californicus</i> (Stål)	WN [Slater & Baranowski 2005]
Pyrrhocoridae	
<i>Dysdercus discolor</i> Walker	WN [Fennah 1947, Ingram 1981, Stevens & Waldmann
2001 as <i>D. discolori</i> ]	
<i>Dysdercus andreae</i> (Linnaeus)	WIE [Irving 1978]
Coreidae	
Sp. #1	?
Sp. #2	?

## THYSANOPTERA (Thrips)

None of the species listed by Stevens & Waldman (2001) have actually been recorded from Montserrat, and no other records have been found, but thrips are speciose and abundant, both as plant pests (probably invasive species), and as native plant feeders, fungivores and predators in forest litter and canopy. Fig. P gives an idea of the diversity from a single canopy fogging sample.



**Fig. P.** A selection of forest canopy thrips species on a Eastern Caribbean dime. (Photo: Michael Ivie)

## PSOCOPTERA

No members of this Order have been reported from Montserrat, but they are both abundant and speciose on the island. Another group that would prove a fertile field of investigation into Montserrat's biodiversity.

## NEUROPTERA (determined By J. B. Johnson)

This small holometabolous Order is exclusively predacious, and important in the biological control of several plant pests.

### Coniopterygidae

<i>Coniopteryx ?dominica</i> Meinander	LIE
<i>Coniopteryx ?virginum</i> Meinander	NEC

### Hemerobiidae

<i>Micromus subanticus</i> (Walker)	WN
<i>Nusalala</i> sp.	?

### Chrysopidae

<i>Ceraeochrysa</i> sp.	?
<i>Chrysoperla ?externa</i> (Hagen)	?
<i>Chrysopodes</i> sp. 1	?
<i>Chrysopodes</i> sp. 2	?

### Dilaridae

<i>Nallachus americanus</i> (McLachlan)	WN
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### Ascelaphidae

<i>Ullulodes</i> sp. poss. <i>cajennensis</i> (Fabricius)	?
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Myrmeleontidae

*Myrmeleon ?insertus* Hagen ?

HYMENOPTERA

One of the huge megadiverse Orders, the sawflies, wasps, ants and bees can be expected to approach the Coleoptera in number of species. The number of hymenopterous parasitoids alone to be found on Montserrat will number in the hundreds.

Pergidae (described for this study by David R. Smith)

*Acordulecera montserratensis* Smith LIE [Smith 2005]

*Acordulecera longica* Smith LIE [Smith 2005]

Ceraphronidae -- present

Evaniidae

*Evania appendigaster* (Linnaeus) EBC

Braconidae – many ?

Ichneumonidae -- many

Trichogrammatidae

*Trichogramma australicum* Girault WN?

*Trichogramma japonicum* Ashmead WN?

*Brachyufens osborni* (Dozer) WN? [as *Ufens osborni* in Fennah 1942 (not 1947, and Wolcott 1951, not Walcott 1947, as recorded in Stevens & Waldmann 2001)]

Eulophidae – many ?

Aphelinidae – represented ?

Signiphoridae – represented ?

Encyrtidae – represented ?

Agaonidae – represented ?

Torymidae

*Tormyoides cecidomyidae* (Ashmead) WN [Woodruff *et al.* 1998]

Pteromalidae -- many

Eucharitidae (determined by J. Heraty)

*Pseudochalcura americana* WN

*Obeza grenadensis* LAE

*Orasema smithi* WN

*Kapala sulcifacies* complex n. sp. IE?



Fig. Q. Two Montserrat endemics, the microhymenopteran *Kapala sulcifacies* complex n. sp. (Eucharitidae) and the long-horned beetle *Cyrtinus hubbardi* Fisher (Cerambycidae). The longhorns are normally considered a group of large beetles, but *Kapala* is a parasitoid of ants

Perilampidae – represented	?
Eurytomidae – represented	?
Chalcididae – represented	?
Eucoilidae – represented	?
Diapriidae – represented	?



Fig. R. A small sampling of the diversity of the unstudied microhymenoptera of Montserrat Scelionidae (Norman F. Johnson determiner)

<i>Calotelea</i> sp.	?
<i>Oethecoctonus</i> sp.	?
<i>Baeus</i> sp.	?
<i>Phanuromyia</i> sp. #1	?
<i>Phanuromyia</i> sp. #2	?
<i>Phanuromyia</i> sp. #3	?
<i>Telenomus</i> sp. <i>podisi</i> -group	?

*Telenomus* sp. #2 ?

Platygastridae – represented ?

Figitidae – represented ?

Dryinidae – represented ?

#### Formicidae

Stevens & Waldmann (2001) recorded 6 species of ants from Montserrat. Several thousand specimens of many species from the WIBF have been deposited with E. O. Wilson at Harvard's Museum for Comparative Zoology.

NOTE: The following 6 families (Tiphidae, Scolyidae, Pompilidae, Vespidae, Eumenidae and Sphecidae) were the subject of a review by Evans (1972) of material collected by the Bredin-Archbold-Smithsonian Biological Survey of Dominica. It is interesting to compare the relative numbers of species (Table C) produced with targeted collecting by wasp specialists and others on the much-larger-and-higher island of Dominica, to those collected incidentally by coleopterists on Montserrat. From standard island biogeographic theory, we would expect 1.5-2.5 times more species on Dominica than occur on Montserrat, with a correction for the bias of the 2 groups of collectors pushing the difference higher. However, Montserrat's total for the 6 families equal those of Dominica, although the family-by-family totals vary. However, in none of the cases is Dominica's recorded fauna as large as would be expected.

Table C. Relative numbers of Species of Selected Aculeate Wasp Families from Dominica and Montserrat. Dominica Figures from Evan (1972).

Family	Dominica	Montserrat
Tiphidae	4	3
Scolyidae	1	3
Pompilidae	7	6
Vespidae	1	2
Eumenidae	1	4
Sphecidae	15	11
<b>TOTAL</b>	<b>29</b>	<b>29</b>

#### Tiphidae

*Myzinum haemorrhoidale* (Fabricius)

*Tiphia paupi* Allen & Krombein WIE

*Tiphia* sp. nr. *dominicae* Allen ?

#### Scolyidae

*Campsomeris dorsata* (Fabricius) WN?

*Campsomeris trifasciata* (Fabricius) WN?

*Campsomeris ?atrata* (Fabricius) ?

Pompilidae. Six species for this group shows unexpected diversity, given that Evans (1972) reported only 7 from much-larger Dominica, after that island was collected by a Smithsonian survey which included a specialist in this group.

*Pepsis rubra* (Drury) WIE

*Pepsis ruficornis* (Fabricius) WN

*Ageniella* sp. ?

*Priochilus splendidum opacifrons* (Fox) WN

<i>Poecilopompilus mixtus</i> (Fabricius)	WIE
<i>Anoplius americanus ambiguus</i> (Dahlbom)	WN

#### Vespidae

*Polistes crinitus* (Felton) WIE [The "Jack Spaniard." = *Polistes* cf. *annularis* of Stevens and Waldman (2001), not Fabricius. The true *P. annularis* is North American.] recorded from Montserrat by Richards (1978).

*Polistes dominicus* Vallot [= *P. cinctus* Lepeletier] EBC. [The "Buderman." Recorded from Montserrat by Richards (1978) and Snelling (1983). Ballou (1915) reported that the attempt to establish this species on Montserrat was unsuccessful. Mr William P. Ryan of the Montserrat Department of Agriculture (retired, pers. com.) told me that it was established through the efforts of a Mr. Budderman around the 1940's, and the species' common name on Montserrat therefore became "Budderman." EBC

#### Eumenidae

<i>Pachodynerus nasidens</i> (Latreille)	WN
<i>Pachodynerus atratus</i> (Fabricius)	WIN [Menke 1986]
<i>Pachodynerus guadeloupensis</i> (Sassure)	LAE [ Menke 1986, not seen post-volcano]
<i>Stenodynerus</i> sp.	?

#### Sphecidae

<i>Sceliphron assimile</i> (Dalbom)	WN
<i>Sceliphron caementarium</i> (Drury)	WN
<i>Stictia signata</i> (Linnaeus)	WN
<i>Ectemnius</i> sp.	?
<i>Rhopalum</i> sp.	?
<i>Prionyx thomae</i> (Fabricius)	WN
<i>Tachyta chrysopyga argentipes</i> Smith	WIE
<i>Liris fuliginosa</i> (Dalbom)	WIE
<i>Liris labiata</i> (Fabricius)	WIE
<i>Liris</i> n.sp.	IE?
<i>Sphex</i> sp.	?

#### Colletidae

<i>Hylaeus</i> sp.	?
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#### Halictidae

<i>Lasioglossum</i> sp.	?
Halictidae sp. # 1	?
Halictidae sp. # 2	?
Halictidae sp. # 3	?
Halictidae sp. # 4	?
Halictidae sp. # 5	?
Halictidae sp. # 6	?
Halictidae sp. # 7	?
Halictidae sp. # 8	?
Halictidae sp. # 9	?
Halictidae sp. # 10	?
Halictidae sp. # 11	?
Halictidae sp. # 12	?
Halictidae sp. # 13	?

Megachilidae

<i>Chalicodoma lanata</i> (Fabricius)	EIS
<i>Coelioxys</i> sp.	?
<i>Megachile</i> sp.	?
Megachilid sp. #1	?
Megachilid sp #2	?

Apidae

<i>Apis mellifera</i> Linnaeus	EIS
<i>Anthophora tricolor</i> (Fabricius)	WIE [Brooks 1999]
<i>Anthophora footei</i> Crawford	LE [Brooks (1999) reports a single female in the USNM determined by Sandhouse as this species, but did not examine it. It may prove to be <i>A. tricolor</i> ]
<i>Melipona variegatipes</i> Gribodo	LE



**Fig. 5.** *Melipona variegatipes* Gribodo male guarding a nest entrance in a Mahogany tree at Woodlands. The black area above the bee is a tarry wax sheet over an opening, and the dark spots scattered across the surface are ventilation holes. (Photo: Michael Ivie)

<i>Centris</i> sp. #1	?
<i>Centris</i> sp. #2	?
<i>Centris</i> sp. #3	?
<i>Centris</i> sp. #4	?
<i>Exomalopsis</i> sp. #1	?
<i>Exomalopsis</i> sp. #2	?
<i>Melissodes?</i> sp.	?
<i>Mesoplia</i> sp.	?
<i>Xylocopa caribea</i> Lepeltier	LAE [Hurd 1978, followed by Woodruff <i>et al.</i> 1998 and Stevens and Waldmann 2001, records this species from Montserrat.]

*Xylocopa mordax* Smith WIE [Hurd 1978, followed by Woodruff *et al.* 1998 and Stevens and Waldmann 200, records this species from Montserrat.]

*Xylocopa* sp. ? [Hurd 1978, followed by Woodruff *et al.* 1998 and Stevens and Waldmann 2001, records 2 species of this genus from Montserrat. We have collected one, which species it is, is unknown]

## TRICHOPTERA

This group includes many important water-quality indicators. Botosaneanu (1973) reported an early instar *Oxyethira* sp. (as *Oxyethira* by Stevens & Waldmann 2001) from Montserrat, but no adults have been reported (Botosaneanu 2002). He recorded a total of 360 species from the West Indies, although this number is inflated by inclusion of species from islands in the southern Caribbean that lie within the South American biogeographic region (Botosaneanu 2002). Flint and Sykora (1993) list 22 species from the Lesser Antilles, none from north of Guadeloupe. Botosaneanu (1994) added six more new species from Guadeloupe. Seven species are now recorded from Montserrat, and given that these are from only a few samples, and that we did not try to collect this group, at least double that number are expected. Oliver Flint did the determinations.

### Family Hydropsychidae

*Smicridea* (*Smicridea*) *karukerae* Botosaneanu LE

### Family Hydroptilidae

*Alisotrichia lobata* Flint LE

*Neotrichia iridescens* Flint LAE

*Ochrotrichia ponta* Flint LAE

*Oxyethira* sp. ? [Botosaneanu 1973]

### Family Philopotamidae

*Chimarra* (*Chimarra*) *haesitationis* Botosaneanu LE

### Family Xiphocentronidae

*Xiphocentron albolineatum* Flint LAE

## LEPIDOPTERA

The third of the megadiverse Orders, the vast majority of the biodiversity in this group is not in the well-known and highly visible butterflies, nor even in the so-called macromoths, but in the tiny microlepidoptera that are so understudied throughout the world. Many plant pests and biological control agents are included in this order. We made absolutely no effort to inventory this group, and our additions below are what can happen purely accidentally.

Butterflies. Perhaps, with the mosquitoes, the best studied insect group world-wide. Our material was highly size-biased, missing entirely the smaller-sized species. Smith *et al.* covered the West Indian fauna extensively. Yet, even with all of the work done on this group, we added 2 species of butterflies to those known from the island (Table D). Lack of a collection record in the Ivie *et al.* material should not be construed to indicate the species was absent, as we simply did not even try to collect any of the small species, nor anything that had to be chased down.

Table D. Butterflies of Montserrat, comparing 3 collections. Stevens & Waldmann (2001) summarized the records of Pinchon & Enrico (1969) and Schwartz & Jimenez (1982)

Family	Genus	Species	Pinchon & Enrico 1969	Schwartz & Jimenez 1982	Ivie <i>et al.</i> 2000-2006
Danaidae	<i>Danaus</i>	<i>plexippus</i>	X	x	no
Apaturidae	<i>Anaea</i>	<i>minor</i>	no	x	no
Nymphalidae	<i>Junonia</i>	<i>evarete</i>	X	x	x
	<i>Anartia</i>	<i>jatrophae</i>	X	x	x
	<i>Biblis</i>	<i>hyperia</i>	X	x	x
	<i>Antillea</i>	<i>pelops</i>	no	x	x
	<i>Vanessa</i>	<i>cardui</i>	X	x	no
	<i>Marpesia</i>	<i>petreus</i>	no	no	x
	<i>Eunica</i>	<i>monima</i>	no	no	x
Heliconidae	<i>Heliconius</i>	<i>charitonius</i>	X	x	x
	<i>Dryas</i>	<i>iulia</i>	X	x	no
	<i>Agraulis</i>	<i>vanillae</i>	X	x	x
Lycaenidae	<i>Chlorostrymon</i>	<i>simaethis</i>	no	x	no
	<i>Strymon</i>	<i>acis</i>	X	x	no
	<i>Strymon</i>	<i>bubastus</i>	X	x	no
	<i>Electrostrymon</i>	<i>angerona</i>	X	x	x
	<i>Leptotes</i>	<i>cassius</i>	X	x	no
	<i>Hemiargus</i>	<i>hanno</i>	X	x	no
Pieridae	<i>Ascia</i>	<i>monuste</i>	X	x	x
	<i>Appias</i>	<i>drusilla</i>	X	x	x
	<i>Eurema</i>	<i>leuce</i>	no	x	x
	<i>Eurema</i>	<i>venusta</i>	X	x	x
	<i>Eurema</i>	<i>elathea</i>	no	x	no
	<i>Eurema</i>	<i>lisa</i>	X	x	x
	<i>Anteos</i>	<i>maerula</i>	no	x	no
	<i>Phoebis</i>	<i>sennae</i>	X	x	x
	<i>Phoebis</i>	<i>trite</i>	X	no	x
Papilionidae	<i>Battus</i>	<i>polydamas</i>	X	x	sight

Family	Genus	Species	Pinchon & Enrico 1969	Schwartz & Jimenez 1982	Ivie <i>et al.</i> 2000-2006
Hesperiidae	<i>Epargyreus</i>	<i>zestos</i>	X	x	no
	<i>Polygonus</i>	<i>leo</i>	no	x	no
	<i>Polygonus</i>	<i>manueli</i>	no	x	no
	<i>Urbanus</i>	<i>proteus</i>	X	x	no
	<i>Urbanus</i>	<i>obscurus</i>	X	x	x
	<i>Achlyodes</i>	<i>papinianus</i>	X	x	no
	<i>Pyrgus</i>	<i>oileus</i>	X	x	x
	<i>Wallengrenia</i>	<i>ophites</i>	X	x	no
	<i>Hylephila</i>	<i>phyleus</i>	X	x	no
	<i>Calpodus</i>	<i>ethlius</i>	no	x	no
	<i>Panoquina</i>	<i>sylvicola</i>	X	x	no
	<i>Nyctelius</i>	<i>nyctelius</i>	X	no	no
	N taken			29	36
<b>TOTAL</b>			<b>29</b>	<b>38</b>	<b>40</b>

Moths. There are hundreds of moths on Montserrat, but aside from a few pest species, there are virtually no published records. Stevens & Waldmann (2001) could locate only 12 species, all pests (1 Lyonetiidae, 1 Gelichiidae, 2 Pyralidae, 8 Noctuidae) with actual Montserrat records. To hopefully spur someone to the work on the moths of Montserrat, we give 2 new records of very large and beautiful moths that are recorded from the island in the scientific literature for the first time.

Noctuidae. This huge family is well represented on Montserrat. The largest moth on the island, well-known as the "Rat-Bat," belongs here (Fig. T)

*Ascalapha odorata* (L.)

WN



Fig. T. The Black Witch [*Ascalapha odorata* (L.)], one of Montserrat's largest moths. (Photo: Kenneth Puliafico)



Sphingidae. The very large and colorful frangipani worms that appear on ornamental and wild trees from time to time are our representative of this family. The adult is large, but rather dull. Several other, smaller, species are more attractive.

*Pseudosphinx tetrio* (Linnaeus)

WN [Fig. U]



Fig. U. The Frangipani Worm, *Pseudosphinx tetrio* on leaves of frangipani, *Plumeria* sp.. (Photo: Michael Ivie)

#### DIPTERA

(Except as noted, determinations by Richard L. Hurley). The fourth and last of the megadiverse Orders, the number of flies in a Malaise trap sample can easily overwhelm. Montserrat, with over 130 species now recorded, can be expected to yield hundreds more species.

#### Ceratopogonidae

*Culicoides furens* (Poey)

WN [Woodruff *et al.* 1998]

#### Chaoboridae

*Corethrella* spec. 21

? [Belkin & Heinemann 1976]

*Corethrella* spec. 22

? [Belkin & Heinemann 1976]

#### Culicidae

Stevens & Waldmann (2001) gave an extensive review of the mosquitoes of Montserrat, recording 20 species. We have nothing to add to this beyond a few spelling corrections, and the reader is referred to their treatment.

*Aedes* (*Howardina*) *busckii* (Coquillett) [in Stevens & Waldmann (2001) as *Aedes* (*Howardia*) *busckii* (Coquillett)]

*Aedes* (*Ochlerotatus*) *taeniorhynchus* (Wiedemann) [in Stevens & Waldmann (2001) *Aedes* (*Ochlerotarsus*) *taeniorhynchus* (Weidemann)]

*Aedes* (*Ochlerotatus*) *tortilis* (Theobald) [in Stevens & Waldmann (2001) as *Aedes* (*Ochlerotarsus*) *tortilis* (Theobald)]

*Aedes* (*Stegomyia*) *aegypti* (Linnaeus)

*Anopheles* (*Nyssorhynchus*) *albimanus* Weidemann

*Anopheles* (*Nyssorhynchus*) *aquasalis* Curry

*Anopheles* (*Nyssorhynchus*) *argyritarsis* Robineau-Desvoidy

*Culex* (*Culex*) *bahamensis* Dynar & Knab

*Culex* (*Culex*) *declarator* Dynar & Knab

*Culex* (*Culex*) *habilitator* Dynar & Knab

*Culex* (*Culex*) *nigripalpus* Theobald

*Culex* (*Culex*) *quinquefasciatus* Say

*Culex (Melanoconion) atratus* Theobald  
*Culex (Melanoconion) madininensis* Senevet  
*Culex (Micraedes) bisulcatus* (Coquillett)  
*Deinocerites magnus* (Theobald)  
*Psorophora (Grabhamia) sp. nr. cingulata* (Fabricius)  
*Toxorhynchites (Lynchiella) guadeloupensis* (Dynar & Knab)  
*Toxorhynchites (Lynchiella) portoricensis* Roeder  
*Wyeomyia (Wyeomyia) grayii* Theobald

#### Anisopodidae

*Olbiogaster* sp. ?

#### Cecidomyiidae

*Contarinia gossypii* Felt WIE [Ingram 1981]  
*Porricondyla gossypii* (Coquillett) SA [Ballou 1912]

#### Sciaridae – present

#### Stratiomyidae

*Hermetia illucens* (Linnaeus) EIS or WN [Danforth 1939]

#### Asilidae (Determinations by A. Scarbrough)

*Efferia* n.sp. IE  
*Ommatius prolongatus* Scarbrough IE  
*Leptogastrinae* n. sp. 1 IE?  
*Leptogastrinae* n. sp. 2 IE?

#### Bombyliidae

*Heterostylus* sp. ?

Dolichopodidae (Determinations by Richard Hurley and Justin Runyon). This family is one of the most dramatic examples of what remains to be discovered on Montserrat. A relatively large family of small, obscure predaceous flies, the dolies are often overlooked. Not a single previous record of the family for Montserrat exists. Because of the interest of Hurley and Runyon, we made a special effort to obtain samples of this group, and what they discovered is an amazing 46 species from Montserrat. The group was revised for Dominica by Robinson (1975), providing a solid framework for evaluating the Montserrat fauna. The 46 species on Montserrat, obtained without the assistance of a Dipterist, compare with 113 species known from Dominica (Robinson 1975). Running the Chao1 estimator (classic option in EstimateS 7.5.1, Colwell 2007) on the 735 specimens of the 46 species gives a mean estimate of 78 species (95% CI = 53-176 species). Some species of this group are shore and beach specialists, habitats we did not sample, leaving the real expected total of Montserratian dolies unresolved.

*Amblypsilopus* n.sp. *luteus* (Robinson) IE  
*Amblypsilopus* n.sp. nr. *bredini* (Robinson) IE  
*Asyndetus* sp. #1 N?  
*Asyndetus* sp. #2 N?  
*Chrysotus acutus* Aldrich WN  
*Chrysotus apicalis* Aldrich WIE  
*Chrysotus hirsutus* Aldrich WN  
*Chrysotus lamellicaudus* Robinson LIE  
*Chrysotus mexicanus* Robinson WN  
*Chrysotus minimus* Robinson LIE

<i>Chrysotus spectabilis</i> (Loew)	WN
<i>Chrysotus</i> n.sp. nr. <i>callichromus</i> Robinson	IE
<i>Chrysotus</i> n.sp. nr. <i>integer</i> Robinson	IE
<i>Chrysotus</i> n.sp. nr. <i>pseudoniger</i> Robinson	IE
<i>Chrysotus</i> n.sp. nr. <i>pseudopacus</i> Robinson	IE
<i>Chrysotus</i> n.sp. nr. <i>robustus</i> (Robinson)	IE
<i>Chrysotus</i> n.sp. nr. <i>subcaudatus</i> Robinson	IE
<i>Chrysotus orichalceus</i> Gosseries	LAE
<i>Chrysotus proximus</i> Aldrich	LAE
<i>Chrysotus spinipes</i> Van Duzee	WIE
<i>Diaphorinae females</i>	N?
<i>Chrysotus xiphostoma</i> Robinson	LAE
<i>Coeloglutus concavus</i> Aldrich	WIE
<i>Condyllostylus longicornis</i> (Fabricius)	EIS
<i>Condyllostylus</i> n.sp. nr. <i>nigripilosus</i>	IE
<i>Condyllostylus peripilosus</i> Robinson	LIE
<i>Condyllostylus quadricolor</i> (Walker)	WN
<i>Dactylomyia decora</i> (Aldrich)	LAE
<i>Diaphorus contiguous</i> Aldrich	WN
<i>Diaphorus</i> n.sp. nr. <i>flavipes</i>	IE
<i>Diaphorus</i> n.sp. nr. <i>mundus</i>	IE
<i>Diaphorus</i> n.sp. nr. <i>parvulus</i>	IE
<i>Medetera</i> n. sp. nr. <i>crassicauda</i> Robinson	IE
<i>Medetera dominicensis</i> Robinson	LIE
<i>Medetera</i> n.sp. 1	IE
<i>Medetera</i> n.sp. 2	IE
<i>Neurigona fuscicosta</i> Robinson	LIE
<i>Plagioneurus univittatus</i> Loew	WN
<i>Systemus</i> sp.	N?
<i>Systemus</i> n. sp.	IE
<i>Thrypticus</i> n. sp. nr. <i>delicatus</i>	IE
<i>Thrypticus</i> sp. 1	N?
<i>Thrypticus</i> sp. 2	N?
<i>Thrypticus violaceus</i> Van Duzee	WIE
<i>Viridigona thoracica</i> (Van Duzee)	WN
<i>Xanthina rubromarginata</i> Robinson	LIE

#### Empididae -- present

Phoridae [Determinations by Brian Brown, vouchers deposited in Los Angeles County Museum of Natural History]  
For comparison, 82 species are reported from Dominica (Borgmeier 1969).]

<i>Dohrniphora dispar</i> (Enderlein)	WN [Kung and Brown 2006]
<i>Dohrniphora</i> sp.	?
<i>Coniceromyia latimana</i> (Malloch)	WIE
<i>Megaselia aurea</i> (Aldrich)	WIE
<i>Megaselia femoralis</i> (Enderlein)	WN
<i>Megaselia luteicauda</i> (Borgmeier)	WN
<i>Megaselia striativentris</i> Borgmeier	WN

Syrphidae. (Determinations by F. C. Thompson and R. L. Hurley) The flower flies are one of the few relatively speciose groups of insects with a comprehensive West Indian revision that records all of the specimens involved (Thompson 1981). As such, it provides an excellent opportunity to study the discovery and accumulation of records. There are 22 species of flower flies now known from Montserrat. Table 10 shows the relationship of Thompson's (1981) original list, Stevens & Waldmann's (2001) list, the WIBF material mounted in the early part of the project and the specimens mounted and labeled in 2005-2006. The Chao 1 estimate of total species for Montserrat is 25, with a 95% confidence interval ranging from 22-37 -- an amazing diversity considering that the entire Lesser Antilles have only 31 recorded species.

<i>Allograpta limbata</i> (Fabricius)	NEC
<i>Copeostylum apicale</i> Loew	WN
<i>Copeostylum discale</i> ?	?
<i>Copeostylum vacuum</i> (Fabricius)	WIE
<i>Copeostylum</i> n.sp.?	IE?
<i>Lepidomyia</i> n.sp.	IE
<i>Meromacrus unicolor</i> (Wulp)	LE
<i>Meromacrus</i> n.sp.	IE
<i>Ocyptamus cylindricus</i> (Fabricius)	WIE
<i>Ocyptamus dimidiatus</i> (Fabricius)	WN
<i>Ocyptamus stenogaster</i> group sp. A	LAE
<i>Ocyptamus</i> sp.	?
<i>Ornidia obesa</i> (Fabricius)	EIS
<i>Palpada vinetorum</i> (Fabricius)	WN
<i>Pseudodoros clavatus</i> (Fabricius)	WN
<i>Toxomerus arcifer</i> (Loew)	WN
<i>Toxomerus dispar</i> (Fabricius)	WN
<i>Toxomerus ferroxida</i> (Hull)	LAE
<i>Toxomerus floralis</i> (Fabricius)	WN
<i>Toxomerus musicus</i> (Fabricius)	WN
<i>Toxomerus pulchellus</i> (Macquart)	WN
<i>Xanthandrus tricinctus</i> Thompson	LIE

#### Calliphoridae

<i>Chrysomyia</i> sp.	?
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#### Hippoboscidae (incl. Streblidae)

<i>Megistopoda aranea</i> (Coquillett) as <i>Pterellipsis aranea</i>	WN [Coquillett (1899), in Stevens & Waldmann (2001)]
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Muscidae—represented	?
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Sarcophagidae—represented	?
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Tachinidae—represented	?
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#### Micropezidae

<i>Hoplocheiloma</i> sp.	?
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<i>Odontomera</i> sp.	?
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#### Neriidae

<i>Odontoloxozus</i> sp.	?
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Lonchaeidae – present	?
Tephritidae – present	?
Ulidiidae (Otitidae) – present	?
Lauxaniidae	?
<i>Pachyopella</i> sp.	?
Agromyzidae	
<i>Liriomyza trifolii</i> (Burgess)	EIS [Ingram 1981]
Anthomyzidae	
<i>Anthomyza</i> sp.	?
Clusiidae	
<i>Chaetoclusia</i> sp.	?
<i>Sobarocephala</i> sp.	?
Chloropidae	
<i>Pseudogaurax lancifer</i> (Coquillett) 1947 as in Stevens & Waldmann 2001]	WIE [Coquillett (1900) and Wolcott (1951) (not Walcott
Drosophilidae	
<i>Drosophila carcinophila</i> Wheeler	WIE [Carson 1967]
<i>Drosophila pulchella</i> Sturtevant	LAE [Grimaldi 1988]
<i>Drosophila richardsoni</i> Vilela	NEA [Grimaldi 1988]
<i>Zygothrica insularis</i> Grimaldi <i>nomen nudem</i> descripton, and it was used by Stevens & Waldmann, but it has never been validated, making it a <i>nomen nudem</i> (literally a naked name).]	LAE [Grimaldi (1988) coined this name without a valid

Table E. Discovery of Syrphidae on Montserrat. Thompson (1981) records 34 species from the Lesser Antilles, 10 of which are endemic. Four of these are NOT Lesser Antillean in the biogeographic sense, occurring only in the Greater Antilles, including the Virgin Islands. One species (*Toxomerus watsoni*) was recorded from Grenada, but not listed as Lesser Antillean. Thus, the recorded fauna of the biogeographic Lesser Antilles is 31 species (34-4+1). Montserrat now has 19-22 species, with a predicted total of 25.

Species	Number of Specimens Recorded (or citation if no specimens seen)						Distribution
	Thompson 1981	Stevens & Waldman	Ivie <i>et al.</i> batch 1	Ivie <i>et al.</i> batch 2	Ivie <i>et al.</i> total	Total	
<i>Allograpta limbata</i> (Fabricius)	6	Thompson 1981	2	0	2	8	NEC
<i>Copeostylum apicale</i> Loew	0	-	6	11	17	17	WN
<i>Copeostylum discale</i> ?	0	-	0	4	4	4	?
<i>Copeostylum vacuum</i>	2	Thompson 1981	0	1	1	3	WIE
<i>Copeostylum n.sp.?</i>	0	-	0	4	4	4	IE?
<i>Lepidomyia n.sp.</i>	0	-	2	0	2	2	IE
<i>Meromacrus unicolor</i> (Wulp)	0	-	1	0	1	1	LE
<i>Meromacrus n.sp.</i>	0	-	4	2	6	6	IE
<i>Ocyptamus cylindricus</i> (Fabricius)	13	Thompson 1981	14	10	24	37	WIE
<i>Ocyptamus dimidiatus</i> (Fabricius)	7	Thompson 1981	0	10	10	17	WN
<i>Ocyptamus stenogaster</i> group sp. A	0	-	1	0	1	1	LAE
<i>Ocyptamus sp.</i>	0	-	0	1	1	1	?
<i>Ornidia obesa</i> (Fabricius)	0	Danforth 1939	20	7	27	27	EIS
<i>Palpada vinetorum</i> (Fabricius)	Doesburg 1970	Thompson 1981	0	5	5	5	WN
<i>Pseudodorus clavatus</i> (Fabricius)	21	Thompson 1981	5	8	13	34	WN
<i>Toxomerus arcifer</i> (Loew)	1	Thompson 1981	0	2	2	3	WN

Species	Number of Specimens Recorded (or citation if no specimens seen)						Distribution
	Thompson 1981	Stevens & Waldman	Ivle <i>et al.</i> batch 1	Ivle <i>et al.</i> batch 2	Ivle <i>et al.</i> total	Total	
<i>Toxomerus dispar</i> (Fabricius)	1	Thompson 1981	0	0	0	1	WN
<i>Toxomerus ferroxida</i> (Hull)	0	Woodruff <i>et al.</i> 1998	4	3	7	7	LAE
<i>Toxomerus floralis</i> (Fabricius)	1*	Thompson 1981	0	0	0	1	WN
<i>Toxomerus musicus</i> (Fabricius)	4	Thompson 1981	0	1	1	5	WN
<i>Toxomerus pulchellus</i> (Macquart)	1	Thompson 1981	0	0	0	1	WN
<i>Xanthandrus tricolor</i> Thompson	0	-	1	1	2	2	LIE
<b>TOTAL N</b>	<b>57</b>		<b>60</b>	<b>70</b>	<b>130</b>	<b>187</b>	
Species Recorded	11	13	11	15	19	22	
Number of Singletons	3		3	4	5	5	
Number of doubles	2		2	2	4	3	
<b>Chao 1 Est. of expected species richness</b>						<b>24.5</b>	<b>95% C.L. 22-37</b>

\*excludes Thompson's Busck specimen, which actually refers to Montserrat, Trinidad.

## Non-hexapod invertebrates of Montserrat

PROTOCTISTA. We have nothing to add to the 3 medically important taxa reported by Stevens and Waldmann (2001).

PLATYHELMINTHES. Stevens & Waldmann (2001) reported one species, the trematode agent of human bilharziasis, to which we add another Class for Montserrat.

Additions to Stevens and Waldman (2001):

TUBULARIA (Flat Worms). A land planarian, possibly of the genus *Rhynchodemus*, occurs in the Centre Hills (Fig. V).



Fig. V. An unidentified land planarian. (Photo: Gerardo Garcia)

NEMATODA (Round Worms). Stevens & Waldmann listed 3 human parasites from this group, all exotic. We discovered only one further record of an economically important plant-pest nematode from Montserrat, from what must be hundreds more plant parasitic, animal (including insect and other invertebrate) parasitic, and free-living species on the island.

Additions to Stevens and Waldman (2001):

*Rotylenchulus reniformis* Linford & Oliveira, 1940 (reniform nematode) Braithwaite (1973);

ANNELIDA. Earthworms of the Class Oligochaeta occur on Montserrat, but none seem to have been recorded.

ONYCHOPHORA (Onychophorans). A *Peripatus* has been repeatedly recorded from Montserrat (Clark 1929, Peck 1975, Read 1988, Stevens & Waldman 2001) as both *Peripatus* sp and *Peripatus antiguensis* Bouvier, all apparently based on a series collected in 1924 by T. W. Savage-English (not "J. W.", as per Stevens & Waldmann 2001. Clark reported that Savage-English reported the population "now nearly exterminated." Whatever the correct name, after 78 years, it was recollected in the Centre Hills at Hope Ghaut Spring in May 2003. The group is globally sensitive, and of high conservation interest (New, 1995)

MOLLUSCA. The many marine species are beyond the scope of this review. Often, marine shells end up on land because of their use by soldier (or hermit) crabs, but should not be confused with snail species that actually live on land or in fresh water. Data and determinations below were kindly provided by Gary Rosenberg and David Robinson.

GASTROPODA (Snails and Slugs) Stevens & Waldman (2001) listed 5 species of snails from Montserrat -- 4 aquatic and one terrestrial species. One more aquatic species has been recorded since then (Bass 2003). Additions below include the terrestrial snails that made up the first 5 invertebrates reported from Montserrat (Bland 1875). Two terrestrial species were found among the collections of the Academy of Natural Sciences in Philadelphia (ANSP), and three species added from our collections, one a new record of an invasive pest (Fig. X), for a total of 14 snails and one unidentified slug (Fig. W). More terrestrial snail species have been sighted, and given the number of species known from St. Martin and Gua-



deloupe, 30 or more species might be expected, with additions to the one single-island endemic known to date. David Robinson of the USDA, based at the Academy of Natural Sciences in Philadelphia, is planning a much needed survey of the land snails of Montserrat in 2007. Land snails are often among the most sensitive of island species, and are a priority group for conservation monitoring.



Fig. W. An unidentified slug from the Centre Hills. (Photo: Gerardo Garcia)

#### Terrestrial Snails

##### Buliminidae

*Amphibulimus rawsonis* Bland in 1894 (ANSP) IE [Described from Montserrat, recollected by Hubbard

*Bulimulus guadalupensis* (Bruguière) (1974) as *B. guadeloupensis*. ? [Recorded by Bland (1875) as "*B. exilis*," and Breure

*Bulimulus* sp. ? [A specimen we collected in Hope Ghaut differs from the above species, D. Robinson, in lit.]

##### Helicinidae

*Helicina fasciata* (Lamarck) (1939), and a specimen is in the ANSP, collected by A. P. Brown in 1913. The record of *Helicina picta* (Bland) by Bland (1875) may be a synonym of this species.] ? [Recorded from a Trembler stomach by Danforth

*Helicina guadelupensis* (Bland) ? [Recorded by Bland (1875)]

##### Pleurodontidae

*Pleurodonte josephinae* (Ferussac) collected by A. P. Brown, 1913 (ANSP). ? [Recorded by Bland (1875) as "*H. josephinae*." Recol-

##### Subulinidae

*Subulina octona* (Bruguière, 1792) WN [from a specimen we collected in Hope Ghaut, det. D. Robinson. This species serves as a second intermediate host for the trematode *Postharmostomum gallinum*, which infects domestic chickens.]

##### Succineidae

*Omalyonx felinus* Guppy ? [in ANSP, collected by Hubbard, 1894]

##### Strophocheilidae (det. G. Rosenberg)

*Megalobulimus oblongus* Müller EIS [Giant South American Land Snail, an invasive pest] (Fig. X)

## Aquatic Snails

### Hydrobiidae

*Potamopyrgus* sp.,

### Physidae

*Physa cubensis* Pfeiffer

### Planorbidae

*Biomphalaria glabrata* (Say)

### Thiaridae

*Melanooides tuberculata* (Müller)

### Neritidae

An unnamed member of this family was recorded by Bass (2003).



**Fig. X.** The Giant South American Land Snail, *Megalobulimus oblongus* Müller, an invasive threat to Montserrat's biodiversity. (Photo: Michael Ivie)

ARACHNIDA. This very large group has at least 6 Orders present on Montserrat. For this group, Stevens & Waldmann's (2001) records are all listed, along with new records.

SCORPIONES (Scorpions). Two species of scorpions have been recorded from Montserrat, and both were recovered post-volcano (de Armas 2005).

*Centroides pococki* Sissom & Francke

LE (Sissom & Francke 1983)

*Oieclus purvesii* (Becker)

LIE [Lorenço 1987. As *Oieclus purvesii* (Becker) by de

Armas 2005.]

AMBLYPYGI (Tailless Whip Scorpions). A single species of this group has a verified record for Montserrat (Quintero 1981). It was commonly seen post-volcano.



Fig. Y. the Anancy of Montserrat (*Phrynus goesii* Thorell). (Photo: Gerardo Garcia)

SCHIZOMIDA. A species of this group, probably a member of the genus *Schizomus*, was taken repeatedly in the Centre Hills, but remains unidentified.

OPILIONES (Harvestmen). Common and diverse in Centre Hills forests. Specimens have been sent to the American Museum of Natural History.

ARANEAE (Spiders). Stevens & Waldmann (2001) listed 4 species of Montserrat spiders, to which we add 2 additional published records. This number represents but a drop in the bucket for what actually occurs on the island. Several thousand specimens, of what appeared to be a few dozen species, were sent to Norman Platnick at the American Museum of Natural History for eventual determination. The spiders recorded so far are:

Tetragnathidae

*Alcimosphenus licinus* Simon  
Levi 2005.]

WIE [*Thonalmus* mimic, recorded from Montserrat by



Fig. Z. *Alcimosphenus licinus* Simon. (Photo: Quentin Bloxam)

Salticidae

*Lyssomanes michae* Brignoli

IE [Brignoli 1984]

Theraphosidae

*Cyrtopholis femoralis* Pocock

IE [Pocock 1903]



Fig. A1. The Montserrat tarantula, *Cyropholis femoralis* Pocock. (Photo: Gerardo Garcia)

Theridiidae

*Latrodectus geometricus* (Koch)

WN (Stevens & Waldmann 2001)

Araneidae

*Argiope argentata* (Fabricius)

WN (Stevens & Waldmann 2001)

*Gasteracantha cancriformis* (Linnaeus)

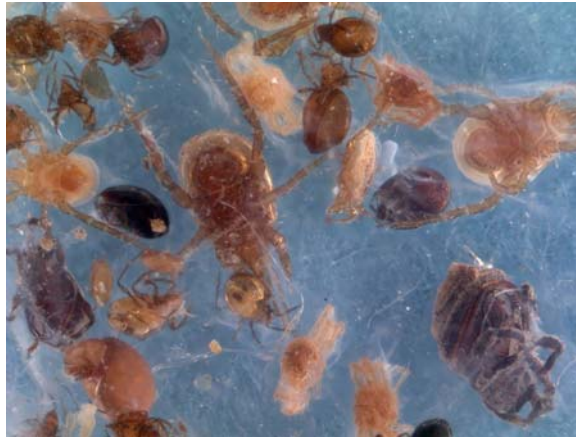
[Wolcott (not Walcott) 1951, as *Gasteracanthia* (sic) by

Stevens & Waldmann 2001]



Fig. A2. An unidentified Montserratian spider. (Photo: Gerardo Garcia)

ACARI (Mites and Ticks). Berlese samples, canopy fogging, beating vegetation, and infested insects indicated that there are hundreds (at least) of species of mites to be discovered on Montserrat. The variety of forms, sizes, colors (Fig. A3) and lifestyles make this a fascinating, but little known group. The opportunities for endemism are many. Unfortunately, they are beyond our expertise and efforts.



**Fig. A3.** An indication of the richness of mites present on Montserrat is hinted at by this photo of a sample of mites from leaf litter in the Centre Hills. (Photo: Michael Ivie)

Eriophyidae

*Acalitus gossypii* (Banks)

EIS or WN (Irving 1981)

*Phyllocoptura oleivora* (Ashmead)  
(2001)]

EIS (Ballou 1912 [= *P. oleivorus* of Stevens & Waldmann

Tetranychidae

*Tetranychus gloveri* Banks

EIS or WN (Irving 1978)

Ixodidae

*Amblyomma variegatum* (Fabricius)

EIS [The African invasive pest known as the Tropical

Bont Tick previously recorded from Montserrat has been provisionally eradicated from the island (Pegram *et al.* 2004).]

More ticks are present, but are as yet unrecorded (Fig. A4).



**Fig. A4.** An unidentified soft tick engorged on a *Bufo*. (Photo: Gerardo Garcia)

PSEUDOSCORPIONES (pseudoscorpions). We found no published records for this group, but one or more species were taken and more seen in the field.

CRUSTACEA. To the list of 6 crabs and 6 freshwater shrimps in Stevens & Waldmann (2001) should be added Amphipods and Isopods, unidentified species of both, which occur in abundance on the island.

The only records we found for this group are 2 Isopods.

Philosciidae

*Philoscia* sp. ? [2 specimens without dates are in the NMNH, taken by Plant Quarantine officials from pineapple roots sent from the Montserrat Botanic Station to Washington, DC.]

Corallanidae

*Excirolana braziliensis* Richardson Eight specimens in the NMNH from the black sand beach at Fox's Bay on 20 Apr 1959 by Thomas E. Bowman, of the Smithsonian - Bredin Caribbean Expedition.

This is a fertile field of further work, which may identify both invasive and native, if not endemic, species.

CHILOPODA. Stevens & Waldmann (2001) found only 2 records for centipeds, both Scolopendridae, from Montserrat. A good variety of species of several Orders await formal identification, including members of the Scutigleromorpha and Geophilomorpha, both of which are well represented.

DIPLOPODA. That no species of millipeds have been recorded from Montserrat is a surprise to anyone familiar with the island. Many species of several Orders occur on the island, from Polydesmidae, Polyxenidae, Julidae and Spirobolidae.

SYMPHYLA. One or more species of these tiny and cryptic animals were seen in berlese samples from the Centre Hills.

## Appendix 4. Information on invertebrate voucher specimens

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Because of the level of taxonomic uncertainty involved in the identification of species from Montserrat, vouchers are critical to being able to track these records in the future. All records in this paper are vouchered with museum specimens, or by a citation from the literature, which themselves usually cite vouchers. The only exceptions are in the case of a few of the photos used to illustrate the non-insect section, which were either taken by people not directly involved with this inventory, and which were not vouchered.

Even well-known species sometimes need to be re-examined, and less-known species are always subject to re-evaluation. Undoubtedly, mistakes in identification have been made. Mistakes in species concepts are also expected. For many groups no literature exists to guide the delimitation of species, and we and our collaborators have been forced to use a best-guess for species limits. It is expected that the number of times we have listed multiple species as one will approximately equal out with the number of single species we have split one as more than one, but only time will tell if this expectation holds. Vouchers are the key to determining this. Vouchers allow these identifications and concepts to be treated as testable hypotheses, subject to review and correction as needed. In any case, our listing represents our best understanding of the situation at the current time, and we hold sole responsibility for the errors that will be discovered.

The vast majority of voucher specimens for this publication are in the West Indian Beetle Fauna Project Collection at Montana State University, Bozeman. However, it has been better to place all or portions of certain groups in other institutions, where they will be more accessible to researchers. These are listed below:

- Mollusca: Department of Malacology, Academy of Natural Sciences, Philadelphia.
- Arachnida -- Araneae and Opiliones – Department of Entomology, American Museum of Natural History, New York. Scorpiones -- Instituto de Ecología y Sistemática, Havana.
- Hemiptera: Pentatomoidea – Department of Entomology Collection, North Dakota State University, Fargo. Fulgoroidea – Lois O'Brien Collection, Green Valley, Arizona. Naucoridae – Enns Entomology Museum, University of Missouri, Columbia.
- Hymenoptera: Symphyta -- Department of Entomology, National Museum of Natural History, Washington. Scelionidae and other microhymenoptera – Charles A. Triplehorn Collection, Department of Entomology, The Ohio State University. Apoidea – Division of Entomology, University of Kansas Natural History Museum, Lawrence. Formicidae – Museum of Comparative Zoology, Harvard University, Cambridge.
- Diptera: Phoridae – Entomology Section, Natural History Museum of Los Angeles County, Los Angeles. Syrphidae – Department of Entomology, National Museum of Natural History, Washington.
- Trichoptera - Department of Entomology, National Museum of Natural History, Washington.
- Lepidoptera - McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville .
- Neuroptera – James B. Johnson collection, University of Idaho, Moscow.
- Odonata – Thomas W. “Nick” Donnelly collection, Binghamton, New York. Fred Sibley collection, Alpine, New York.
- Orthoptera – Department of Entomology, Academy of Natural Sciences, Philadelphia.