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Beetles of the Tristan da Cunha Islands: Poignant new findings, and checklist of the archipelagos species, mapping an exponential increase in alien composition (Coleoptera)

C. HÄNEL & M.A. JÄCH

Abstract

Results of a Coleoptera collection from the Tristan da Cunha Islands (Tristan and Nightingale) made in 2005 are presented, revealing 16 new records: Eleven species from eight families are new records for Tristan Island, and five species from four families are new records for Nightingale Island.

Two families (Anthribidae, Corylophidae), five genera (*Bisnius* STEPHENS, *Bledius* LEACH, *Homoeodera* WOLLASTON, *Micrambe* THOMSON, *Sericoderus* STEPHENS) and seven species *Homoeodera pumilio* WOLLASTON, 1877 (Anthribidae), *Sericoderus* sp. (Corylophidae), *Micrambe gracilipes* WOLLASTON, 1871 (Cryptophagidae), *Cryptolestes ferrugineus* (STEPHENS, 1831) (Laemophloeidae), *Cartodere* ? *constricta* (GYLLENHAL, 1827) (Latridiidae), *Bisnius sordidus* (GRAVENHORST, 1802) (Staphylinidae) and *Bledius* sp. (Staphylinidae), have not previously been recorded from the Tristan da Cunha Archipelago. Amongst the new findings from Tristan da Cunha Island is the flightless *Liodessus involucer* (BRINCK, 1948) (Dytiscidae), known as endemic to the other three main islands in the Tristan group. We discuss this intriguing new record and present an observed scenario involving the possible role of Atlantic Yellow-nosed Albatross (*Thalassarche chlororhynchos* GMELIN, 1789) in transferring the species from Nightingale.

A summary of all the coleopteran species known from the Tristan da Cunha Islands to date is provided with comparisons to those known previously, revealing an increase at Tristan Island of 133 % in 67 years being principally alien species, and for the still incompletely surveyed archipelago as a whole, an increase over 40 years of 42 %, being all alien species.

Key words: Coleoptera, Beetles, Gough, Inaccessible, Nightingale, Tristan da Cunha, St. Helena, Atlantic, Islands, alien, endemic.

Introduction

The remote islands of the Tristan da Cunha Archipelago lie in the mid South Atlantic Ocean, at the border zone of the roaring forties. The closest continent is Africa, with South Africa being ± 2,800 km to the east, where Cape Town's harbour provides the nearest port of convenient call. Of the archipelago's four islands, three lie within 40 km of each other around 37°16'S, 12°28'W, being Tristan da Cunha (hereinafter referred to as 'Tristan'); Nightingale (with its associated Middle and Stoltenhoff Islets) and Inaccessible. The fourth, Gough Island, is positioned some 350–426 km further to the south-south-east of Tristan, at 40°18'S, 09°56'W (see Fig. 1).

Tristan is the largest of the islands in the group with an area of almost 100 km^2. It is made up of steep cliffs, intersected by deep ravines that fall off to the sea from the 2060 m central peak. It is the only island that has a permanent human settlement; the total population comprising of around 280 people.

Nightingale is the smallest of the four islands with an area of ± 4 km^2. Two hill masses with a valley between form its profile, with the highest on the eastern side reaching ± 380 m. The island is known for its seabirds, including the Northern Rockhopper Penguin (*Eudyptes chrysocome*

moseleyi MATHEWS & IREDALE, 1921) and Great Shearwater (*Puffinus gravis* O'REILLY, 1818) that have been a sought after source of food and oil by Tristanians since the first settlers arrived in the early 19th century, and their visits to the island became a regular seasonal event from ± 1870 (WACE & HOLDGATE 1976: 30). To accommodate their stays, some 30 shacks were erected on the north-north-eastern coast.

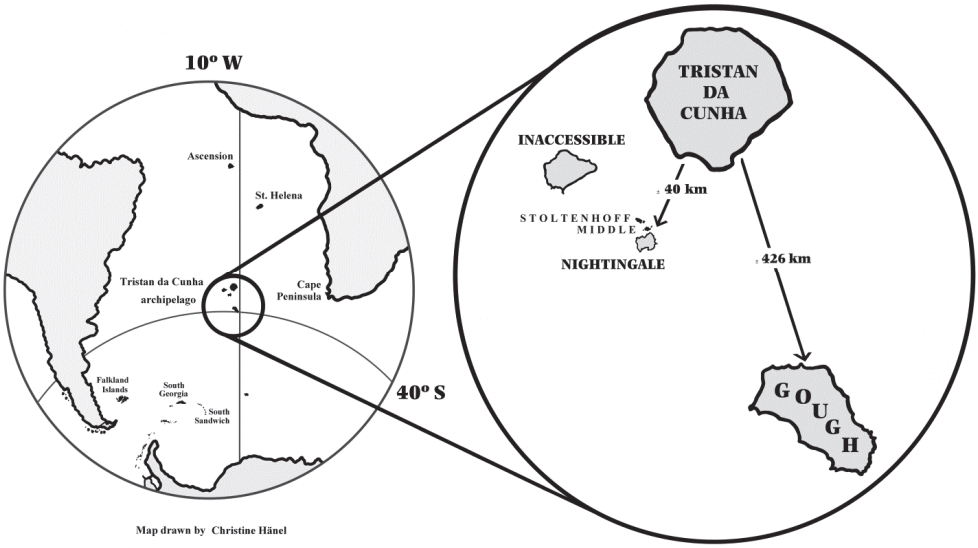

Fig. 1: Position of the Tristan da Cunha Archipelago and its constituent islands in the mid Atlantic Ocean.

With the advent of motorized transport and the increasing popularity of the Tristan da Cunha Archipelago as a tourist destination, visits to and between the islands have increased in frequency, as have the number of people gaining access onto mainly Tristan and Nightingale, particularly from foreign places. The nearest permanent human settlement is St. Helena Island, which lies ± 2400 km to the north of Tristan at 15°55'S, 5°42'W. The Tristan da Cunha Archipelago together with St. Helena and Ascension Island, are classed as Overseas Territories of the United Kingdom. The governor, who is resident at St. Helena, is represented on Tristan by an administrator of the Tristan Archipelago, who is advised by the Tristan Island Council.

By agreement, South Africa has maintained a weather station on Gough Island since 1956 that is continuously staffed by a core team of six people. During relief voyages, the South African government supply ship also provides Tristanians with goods and a means of transport, as do the vessels of fishing and tourist enterprises utilising the archipelagos resources. Fishing on a commercial scale commenced in 1948 with two vessels of a Cape Town based company, which through their commuting provided the first regular supply and transport route and a source of revenue and employment for the islanders. This situation has maintained and expanded, supplemented by tourist ventures, which have increased in frequency and size exponentially.

For further information about the Tristan da Cunha Islands see RYAN (2007).

Faunal composition and historical account relating to the exploration of the Coleoptera of the Tristan da Cunha Islands

Classed as having a cool temperate climate, the islands of the Tristan da Cunha Archipelago are volcanic in origin, which together with their isolated position within the vast ocean and being subjected to the prevailing westerly winds, have been the main determinants in shaping their biota. Amongst the components, the terrestrial invertebrates are least known, although it is evident that the fauna is relatively depauperate. However, of the better known insecta, close to 50 % have been known to comprise native species, of which in turn half constituted endemics. Most of the latter are contained in two of the 11 known orders, namely the Diptera and Coleoptera which are also the most speciose orders (HÄNEL 2007).

The first notable coleopteran collection from the Tristan da Cunha Islands was made in 1873 between the 15th and 17th October during the round-the-world voyage of H.M.S. Challenger. Material was collected from all the three northern islands and notes made in respect of them (WILLEMÖES-SUHM 1876). The scientific information later published, however, only contained results for specimens from Inaccessible and Nightingale, being six species belonging to the families Dytiscidae, Hydrophilidae, Staphylinidae and Curculionidae (WATERHOUSE 1884). The weevils of the latter were surmised to represent the same species observed on Tristan almost a half a century earlier as "three small species of Curculio" (CARMICHAEL 1818), being the only previous coleopteran related record from the islands.

This remained the level of knowledge about the order until the 1930s, when the first extensive invertebrate survey was carried out by the Norwegian Scientific Expedition to Tristan da Cunha (NSET) between early December 1937 and the end of March 1938. Planned to include Gough, unforeseen circumstances made it impossible to get there and thus work had to be restricted to the three northern islands. Two weeks were spent on Nightingale from January 28th, which included a day each on Middle and Stoltenhoff islets; three weeks on Inaccessible between February 15th and March 7th, and the remaining time on Tristan. There was no dedicated entomologist in the team, but the land zoologist, whose expertise and focus was birds, made a concerted effort in collecting invertebrates (CHRISTOPHERSEN 1946). The findings as published by BRINCK (1948) revealed that the coleopteran fauna for the northern islands totalled nine families containing 33 species, of which 20 (61 %) were endemics and the remaining 13 (39 %) aliens. At individual island level the composition however differed substantially, with Inaccessible reflecting as the least human accessed of the three, an overwhelming dominance in endemic species, while inhabited Tristan, where aliens represented the largest contingent, showed the opposite. The species numbers were made up as follows:

1938	Total	Endemics	Aliens
Tristan:	15	5 (33 %)	10 (67 %)
Nightingale:	12	8 (67 %)	4 (33 %)
Inaccessible:	16	12 (75 %)	4 (25 %)

Between November 13th 1955 and May 13th 1956, the fauna of Gough Island was for the first time studied comprehensively and a collection of invertebrates from 60 stations made by the Gough Island Scientific Survey (GISS) (HEANEY & HOLDGATE 1957). By 1965 the findings had been processed, as had those from a collection made during the Royal Society Expedition to Tristan (RSET) that looked at the effects of the 1961 volcanic eruption at Tristan between January 29th and March 20th 1962 (GASS 1963). The results, together with those of the NSET provided the information about the various faunal components of all the islands, such that an overview could for the first time be obtained about the archipelago's status quo. This was

summarised by HOLDGATE (1965). Accordingly the Coleoptera composition comprised 13 families with a total of 43 species, of which 21 (49 %) were endemics and the remaining 22 (51 %) aliens. As such, the Coleoptera contained by far the highest proportion of indigenous species (exclusively endemics), and was the second most abundant across the entire spectrum of the archipelagos terrestrial invertebrates known at that time, next to the Diptera that only had three more species. At the individual islands, the proportional situation at Inaccessible was the same; at Gough it differed only by the fact that the number of endemics were on par with those of the Diptera, and at Nightingale and Tristan they were second to the Diptera. The species numbers were made up as follows:

1965	Total	Endemics		Aliens	
Tristan:	20	5	(25 %)	15	(75 %)
Nightingale:	12	8	(67 %)	4	(33 %)
Inaccessible:	16	12	(75 %)	4	(25 %)
Gough:	10	5	(50 %)	5	(50 %)

In comparison to the 1938 figures, these show an increase in exclusively the aliens at Tristan by five species having come to the fore through the findings of the RSET. They included for the first time a carabid, a coccinellid, as well as two cosmopolitan agricultural pests of the Curculionidae, namely *Naupactus* (= *Pantomorus*) *cervinus* (BOHEMAN, 1840) and *Phlyctinus callosus* SCHÖNHERR, 1826, commonly known as the Fuller Rose Beetle and the Vine Snout Beetle respectively (BAIRD 1965). The latter two "were feeding densely on *Rumex obtusifolius*" in the Settlement, while the coccinellid was already widespread over the island despite its recent arrival (BAIRD 1965). The Fuller Rose Beetle, which according to HOLDGATE (1965: 393) was seen in the boats and the Settlement after a load of hay had been landed in 1955 had, together with two lepidopteran pest species, been well established at Tristan and caused damage to potato crops, giving rise to control measures having been taken against them. Following the 1961 volcanic eruption and consequently evacuation of the entire human population from Tristan, the potato crops were destroyed, but the insects were able to use other food plants, including native species.

By 2003 the overall status quo was known to have changed quite significantly. The number of Coleoptera families represented within the archipelago had increased to 19, and the total number of species had risen to 54, the latter being an increase by 11 of exclusively alien species. At the individual islands this change was reflected most dramatically at Gough, where the total number of coleopteran species had been found to have doubled; the increase having been made up of nine alien species and one inter-island imported endemic. This information came to the fore in main through the findings of the extensive Gough Island Terrestrial Invertebrate Survey (GITIS) conducted between 1999 and 2001 (JONES et al. 2003b). At Inaccessible there had also been an increase in the form of one alien species that had been found during a three week study of the islands invertebrate fauna (focused mainly on the aquatic habitats) conducted between October and November 1989 (KLIMASZEWSKI et al. 2002)[1]. At Tristan the total number of coleopteran

[1] According to KLIMASZEWSKI et al. (2002) two new alien introductions were found on Inaccessible in 1989. It has since been established that one of these, *Atheta* (*Xenota*) *pseudoinsulana* KLIMASZEWSKI, 2002 (currently regarded as a junior synonym of *Atheta* (*Mycetota*) *pasadenae* (BERNHAUER, 1906)), had already been collected from Inaccessible, Nightingale and Tristan by the NSET during 1937–1938, as recorded by BRINCK (1948: 35) under the name "*Atheta* sp. prope *laticollis*". BRINCK (1948) distinguished his "*Atheta* sp. prope *laticollis*" from *A. laticollis* STEPHENS, 1832 "in having the last antennal joints strongly transverse". According to V. Assing (in litt. with M.A. Jäch) the antennae of *A. pasadenae* are indeed more massive and the antennomeres are more transverse than in *A. laticollis*. Therefore it is legitimate to believe that Brinck's "*Atheta* sp. prope *laticollis*" is identical with *A. pasadenae*.

species had risen by four alien imports. Two of these discoveries were a by-product of a brief ornithological project limited to the settlement plains over a four day period in October 1977 (VOISIN 1981), while the other two emanated from an 18 day consultative survey collection made in September 2000, that focused purely on the agricultural pests within the Tristan settlement (ANONYMOUS 2001; and unpublished report by G. Key 2000: "Integrated pest management on Tristan da Cunha"). At Nightingale the total had been raised by one endemic species found during a days sampling by the members of the Inaccessible Island 1989 survey team (specimens in AMGS; BARBER-JAMES 2007). The Coleoptera species represented at each of the islands thus amounted to the following makeup:

2003	Total	Endemics		Aliens	
Tristan:	24	5	(21 %)	19	(79 %)
Nightingale:	13	9	(69 %)	4	(31 %)
Inaccessible:	17	12	(71 %)	5	(29 %)
Gough:	20	6	(30 %)	14	(70 %)

That the status quo reflected by the 2003 totals represented a skewed under-reflection for the archipelago was clear. No comprehensive entomological investigation had been carried out at any of the three northern islands since the NSET in 1937/38, which in itself had its limitations, especially with respect to the field work on Nightingale and in particular that at Inaccessible. Of the few collecting efforts that had since been made, all suffered the disadvantage of being restricted to a period within the three to four week pre-summer season when the annual relief voyage to Gough provided the means of transport. In view of this and the revelation that the number of species in the Coleoptera alone had within 45 years doubled on Gough despite the strict regulations that prohibit visits and the import of fresh and propagatable goods to the island, there were strong reasons to suspect that an even larger contingent of new species were bound to have become established at the northern islands during the 65 years since the NSET, while natives that may have been missed still awaited discovery (or undiscovered extinction). In terms of the alien scenario, the evidence lay not only within the scientific fraternity's data sets and modelling predictions, but among the locals on Tristan, in whose community no one was entomologically trained, but whose members were experiencing the effects through increasing pestilence problems that were damaging their farm produce.

In an attempt to redress the situation and fill some of the gaps in knowledge, a small invertebrate project was slotted into the much larger program "Empowering the people of Tristan da Cunha to implement the CBD" (Convention on Biological Diversity), and the principal author contracted in as the entomologist (HÄNEL 2005). An insect collection was made in the process, which included members of the order Coleoptera. Within the limited timeframe and budget constraints allocated, there was though no scope for getting all specimens identified. Despite the imperative need, and the funding body's wish to be showcased with the results, the latter declined supporting a follow-up project, and thus the material was left to be pursued in a voluntary capacity. Notwithstanding the odds (including the paucity of researched material from the territory, marred by lack of access to undisclosed comparative collections, and the fact that several genera await revision, thus precluding the definite determinations of several species), significant findings have come to the fore.

Originally, *A. pasadenae* was described from California. It is a cosmopolitan species, closely related to the Palearctic *A. laticollis* (V. Assing and J. Klimaszewski in litt. with M.A. Jäch).

In this paper we report on the results from the 2005 Coleoptera collection that represent species not recorded from the Tristan da Cunha Archipelago before and incorporate these into a tabled list of all the beetles known from these islands to date. As such we present the current status quo of the order, and compare this to the only previous complete summary for the archipelago made by HOLDGATE (1965) as well as the in between situations logged. In so doing, we reveal the changes in composition at the individual islands and the archipelago as a whole.

Methods

The field work was conducted in 2005 between 7th February and 16th March on Tristan, and between 26th March and 5th April on Nightingale. Sampling was random and opportunistic, but focused on trying to access the major habitat types represented.

On Tristan, 23 sites were sampled. Most of these (62.5 %) were in the lowlands [sea level to 47 m]; a few (12.5 %) were on the slopes above [ranging to 180 m], and a couple (2.5 %) were on the plateau ["The Base" as it is referred to on Tristan, at 840 m]. No higher altitudes were sampled. The habitats entailed principally agricultural crop and pasture lands, some 'intruded' fern-bush communities, boggy wetlands and water-bodies. A cave and some coastal wrack, as well as a few building facilities, gardens and some imported goods in the settlement area were also checked. The sites yielding new discoveries on Tristan in 2005 are shown in Fig. 2.

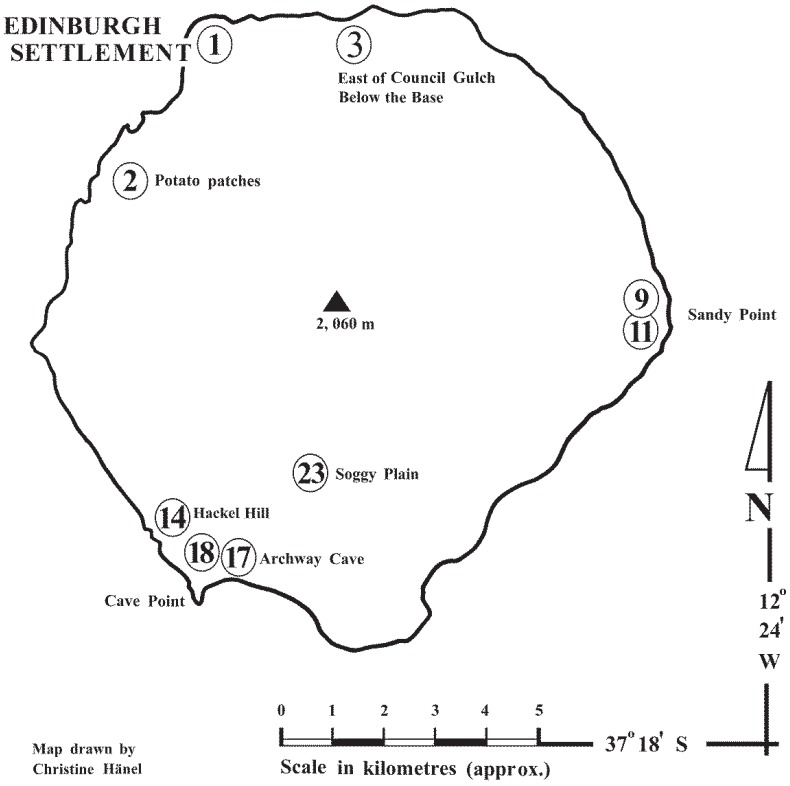

Fig. 2: Map of Tristan Island, showing sampling sites of new records.

On Nightingale sampling was limited to 10 sites in the lowland area (dominated by dense stands of the tussock grass *Spartina arundinacea*) and in the higher central bog areas (variously colonised by ferns, sedges and bryophytous cryptogams). Sample sites in the lower reaches were restricted to the northern tip of the island utilised by shearwaters and penguins (that make their burrows in the fibrous bases of the 2–3 m high tussock clumps when breeding), and humans (during landings and temporary residence occupations). Sample sites in the uplands involved the three main bog areas in different stages of plant colonisation and composition. Viz. the largest entirely vegetated 3rd Pond, dominated by *Blechnum palmiforme* treeferns; the furthest to access and wettest 1st Pond, dominated by the sedge *Scirpus sulcatus* and a still open water-body; and the dryer more firmly sedged 2nd Pond used by nesting Atlantic Yellow-nosed Albatross (*Thalassarche chlororhynchos* GMELIN, 1789). The sites yielding new discoveries on Nightingale in 2005 are shown in Fig. 3.

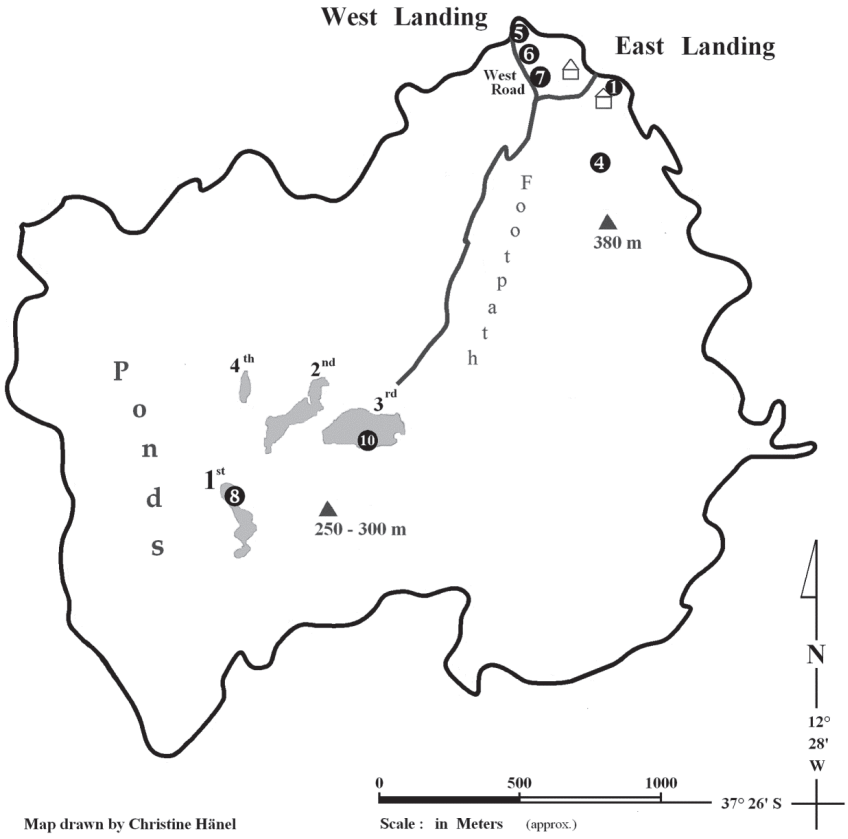

Fig. 3: Map of Nightingale Island, showing sampling sites of new records. No officially surveyed map is known to exist of the island. Sketches have however been produced showing the names and localities of the footpath, High Ridge, huts and The Ponds.

Due to the confusion caused by the reference to the pond numbers in reverse sequence, this map follows the published terminology as used by WACE & HOLDGATE (1976). The names for the landings, West Road and 4th Pond are those used locally by Tristanians. The island's general shape follows a GPS tracing made available by Paul Tyler.

Collecting methods involved the use of Berlese (Tulgren) funnels to extract animals from vegetation, soil with litter and other representative biotic material gathered; sweep-netting; beating or shaking; hand collecting; pootering; Malaise traps; and random "light-trap" checks (e.g. of extant ultra violet traps in the fish factory or outside lights at house entrances switched on at night in the settlement, or candle-light in the shack occupied on Nightingale). Most specimens were dry mounted, and a few preserved in 70 % ethanol. The identification process involved several coleopteran taxonomists as indicated in the acknowledgements.

Abbreviations:

Important expeditions to Tristan da Cunha Islands prior to 2005:

GISS	Gough Island Scientific Survey (1955/56)
GITIS	Gough Island Terrestrial Invertebrate Survey (1999–2001)
NSET	Norwegian Scientific Expedition to Tristan da Cunha (1937/38)
RSET	Royal Society Expedition to Tristan da Cunha (1962)

Other museum collections housing Coleoptera collected from Tristan da Cunha Islands before 2005:

AMGS	Albany Museum, Department of Freshwater Invertebrates, Grahamstown, South Africa
NHML	Natural History Museum, London, United Kingdom

Depository of material collected from Tristan and Nightingale in 2005:

CDTC	Conservation Department, Tristan da Cunha, Atlantic Ocean
IZIKO	The South African Museum, Cape Town, South Africa
NHML	Natural History Museum, London, United Kingdom
NMW	Naturhistorisches Museum Wien, Austria
ZMUN	Natural History Museum, Department of Zoology, University of Oslo, Norway

Results

The identifications of the material collected in 2005 have revealed a total of 16 new records involving 14 species. These are, in alphabetical order of their respective families with the Island(s) at which they were newly found in square brackets [T= Tristan and N= Nightigale], as follows:

- *Homoeodera pumilio* WOLLASTON, 1877 (Anthribidae) – [T, N]
- *Harpalus* sp. (Carabidae) – [N]
- *Hylotrupes bajulus* (LINNAEUS, 1758) (Cerambycidae) – [T]
- *Sericoderus* sp. (Corylophidae) – [T]
- *Micrambe gracilipes* WOLLASTON, 1871 (Cryptophagidae) – [T]
- *Liodessus involucer* (BRINCK, 1948) (Dytiscidae) – [T]
- *Cryptolestes ferrugineus* (STEPHENS, 1831) (Laemophloeidae) – [T]
- *Cryptolestes pusillus* (SCHÖNHERR, 1817) (Laemophloeidae) – [T]
- *Cartodere* (s.str.) ? *constricta* (GYLLENHAL, 1827) (Latridiidae) – [T]
- *Corticaria serrata* (PAYKULL, 1829) (Latridiidae) – [N]
- *Bisnius sordidus* (GRAVENHORST, 1802) (Staphylinidae) – [T]
- *Bledius* sp. (Staphylinidae) – [T]
- *Leptacinus* sp. (Staphylinidae) – [N]
- *Sepedophilus* sp. (Staphylinidae) – [T, N]

Amongst the 14 species are seven species new entirely to the archipelago of which the genera of five and in turn the families of two have not previously been found represented on any of the islands. The majority (11 species from eight families) are new records for Tristan, while about a third (five species from four families) are new records for Nightingale.

Details relating to these species are provided below. The data pertaining to the specimens collected and their sites (e.g. locality, habitat and vegetation types as well as date, collector and method used) are provided in HÄNEL (2005) and other publications reporting on the 2005 invertebrate collection (HÄNEL & HAENNI 2007, HÄNEL & HEYNE 2008, HÄNEL & IRISH 2009, HÄNEL & PALMA 2007, HÄNEL & PONT 2008, REYNOLDS & HÄNEL 2005, SCHMELZ & HÄNEL

2007), in addition to being housed in various institutions (e.g. with the respective specimens in the repositories cited, and the projects database). The details pertaining to the site numbers provided in Figs. 2–3 and as cited in the text (site = st.) apply equally throughout.

With these findings the total number of Coleoptera known from the archipelago up until the most recent study of 2005 is 61 species belonging to 21 families, of which the endemics comprise 21 species (34 %) and the aliens/doubtfulls 40 species (66 %). This total is a conservative score, given that we have not included the unidentified *Leptacinus* sp. and *Sepedophilus* sp. of 2005, to it (see explanations under the respective species descriptions below). Never the less, it represents an increase of seven species since 2003, all of which are aliens represented at Tristan, with one at Nightingale. Using the 1965 figures as a benchmark for the archipelago, it represents an increase in 40 years of 18 species (42 %), all of which are alien to the territory. A list of all the 61 species is provided in Table 1, which still represents the currently known status quo for the Tristan da Cunha Archipelago, given that no significant studies having since taken place at any of the islands or further information come to the fore. Accordingly, the composition at the individual islands can be summarised as follows:

2005	Total	Endemics		Aliens	
Tristan:	**35**	6	(17 %)	29	(83 %)
Nightingale:	**18**	9	(50 %)	9	(50 %)
Inaccessible:	**17**	12	(71 %)	5	(29 %)
Gough:	**20**	6	(30 %)	14	(70 %)

Comparing these figures to those of HOLDGATE (1965), all the islands can be seen to have an increased number of species, with most at Tristan (15 spp.), followed by Gough (10 spp.), Nightingale (6 spp.) and Inaccessible (1 sp. – in lieu of comparative 2005 data). This appears to correlate with the amount of human use the islands were exposed to during that time (viz. the number of people per island area inhabiting or visiting the islands and or its inshore waters; the frequency of visits to the island, both from outside and within; the type of goods imported and control levels; and the nature or level of conservation efforts implemented).

With the earlier figures from the 1938 survey providing a benchmark for the northern islands, a comparison at individual island level can be drawn for Tristan and Nightingale. This shows that over the period of 67 years (viz. 1938–2005) the total number of species at Tristan increased by 20 (133 %), being in main introduced species. This represents almost a tripling of aliens by 19 species, and increase in endemics by one, which figures however can only be regarded as "near correct". At Nightingale the total number of species increased by six (50 %), of which one is an endemic and five are aliens. Inaccessible's figures cannot be considered representative of the status quo at 2005 and thus not comparable, as no significant survey results have come to light from that island since 1938[2].

[2] Between October 1982 and February 1983, a shore based survey was carried out on Inaccessible by the Denstone Expedition. According to SWALES et al. (1985), this included an "invertebrate zoology" component whereby "all major habitat types were systematically sampled" and special collections made that involved curculionid beetles. However, despite an extensive literature search, we could not find any literature pertaining to that invertebrate survey or the results for the coleopteran component.

According to the register of the NHML, it would appear that samples from five orders (Coleoptera, Diptera, Hemiptera, Hymenoptera, Rhopalocera) collected by the Denstone Expedition, were accessioned into the NHML repository. However none of the coleopteran specimens could be located. It would thus appear that the material has not been worked up.

Over and above the 14 species involved in the new findings determined, the 2005 collection contained a number of specimens whose identity could not for reasons already alluded to, be identified sufficiently to assess their status (e.g. whether or not they could be new species to the archipelago or island in question, or be a re-finding and thus confirmation of a particular species continued presence). This applies in main to the specimens belonging to the Curculionidae, the family that contains 16 of the 21 endemic Coleoptera species, of which 13 have only ever been recorded from one island.

The collection also contained specimens from other families, whose identities verified previous recordings of the species from the respective islands. At Tristan these included: the chrysomelid *Stegnaspea trimeni* BALY, 1877, from Sandy Point (st. 10), Cave Point (st. 14) and Gypsy's Gulch (st. 15); the coccinellid *Lioadalia flavomaculata* (DEGEER, 1778), from Bill Hill at the potato patches (st. 2a) and Cave Point (st. 13), the curculionids *Naupactus cervinus*, from Edinburgh Settlement (st. 1) and east of Hackel Hill (st. 14), and *Phlyctinus callosus* from east of Council Gulch (st. 3); the dytiscid *Lancetes dacunhae* BRINCK, 1948, from up Molly Gulch below Dailies Hill (st. 7), Down-by-the-Pot (st. 22), and Soggy Plain (st. 23); the hydrophilid *Cercyon depressus* STEPHENS, 1829 from Cave Point (st. 17); the staphylinids *Anotylus* sp. from a garden in Edinburgh Settlement (st. 1), on a dead Rockhopper Penguin on the coastal rocks below the Sandy Point rookery (st. 11), from the woodland shrub behind the hut at Sandy Point (st. 9), the grassland in front of a hut (st. 18), and at Cave Point from the wall of Archway Cave (st. 17), *Atheta (Mycetota) pasadenae* (BERNHAUER, 1906) from the potato patches (st. 2) and Sandy Point (st. 9) and *Quedius mesomelinus* (MARSHAM, 1802) from Soggy Plain (st. 23). At Nightingale the dytiscids *Liodessus involucer* (BRINCK, 1948) and *Rhantus tristanicola* (BRINCK, 1948) were collected at the 1st Pond furthest from the path (st. 8), and the staphylinid *Atheta* (*Mycetota*) *pasadenae* from the West Landing area (st. 6) and near the East Landing (st. 1).

Anthribidae

Homoeodera pumilio WOLLASTON, 1877

New family record for the Tristan da Cunha Archipelago [from Tristan and Nightingale].

The genus *Homoeodera* WOLLASTON is endemic to St. Helena. It includes 14 species (BASILEWSKY 1972), none of which are known to have been recorded outside of St. Helena before. *Homoeodera pumilio* is the smallest representative and was first described in 1877 at which time it was found in "absolute swarms" (WOLLASTON 1877), and almost a century later, still "very abundant" in many areas (BASILEWSKY 1972, 1985). It occupies a variety of habitats in the mid altitudinal zone, ranging from tree-fern-thicket type vegetation to semi-desert areas. It typically lives on dead twigs and cones of various trees and shrubs, including the indigenous Gumwood *Commidendrum robustum* and the halophytic Samphire *Suaeda fruticosa*, as well as introduced species of *Ulex* and cones of Fir-trees. Measuring between 1.2–2.2 mm in length and being bronze in colour, *H. pumilio* blends in with the brown tones of the surfaces it usually attaches to, making it hard to notice.

The minute coppery-brown coloured specimens collected from Tristan (see Fig. 4) and Nightingale in 2005 are both deemed to be the same species. They have been identified as *H. pumilio*, using the key published by BASILEWSKY (1972). In total, nine specimens were collected: eight from Tristan, and one from Nightingale.

On Tristan they were found only at Sandy Point (west of the hut, amongst herbaceous vegetation at st. 9, where a large pine and eucalypt forest and apple orchard have been in existence for over a century). Several specimens were found in a short space of time. They are considered an introduction from St. Helena, which most likely occurred after 1937, possibly at Sandy Point.

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Figs. 4–6: 4) Habitus of *Homoeodera pumilio* (length: 2.1 mm), collected 2005 on Tristan Island, 5–6) habitus of *Liodessus involucer*, from 5) Tristan (length: 1.9 mm), and 6) Nightingale (length: 2.0 mm).

The single specimen from Nightingale was found at the 1st Pond (amongst *Scirpus sulcatus* growing at the watery fringe of the open pool at st. 8). Its import is likely to have occurred well after that at Tristan, and probably from the Tristan established stock, although a more recent re-introduction from St. Helena cannot be ruled out.

Carabidae

***Harpalus* sp.**

New genus record for Nightingale.

The final identification of the specimens collected in 2005 was not possible, as this group of species is in need of taxonomic revision. However, the Nightingale and Tristan specimens are deemed to be the same species. Their habitus appears to fit that of the South African *Harpalus cursorius* PÉRINGUEY, 1896 (= *H. agilis* PÉRINGUEY), of which specimens were first recorded at Tristan in 1962 from between the settlement area east to the southern coastal regions (BAIRD 1965), and again in 1977 (VOISIN 1981).

In 2005 specimens were found in exactly the same locations on Tristan as those previously reported, namely one at Sandy Point (st. 9); two east of Hackel Hill (from under stones where they were easily located by collector Jeremy Green at st. 14); one in the potato patches (amongst weeds at st. 2) and one from Edinburgh Village (in the garden of collector Vera Glass, at st. 1). The single specimen found at Nightingale was collected from the 3rd Pond (amongst *Scirpus bicolor*, at st. 10).

The genus *Harpalus* LATREILLE is foreign to the Tristan da Cunha Archipelago. Its introduction to Nightingale was likely through inter-island import from the Tristan stock.

Cerambycidae

***Hylotrupes bajulus* (LINNAEUS, 1758)**

First record for Tristan.

The introduction of this species to Tristan appears to have occurred more than 15 years ago (unconfirmed dataset given to C. Hänel 1998). In 2005 it was evidently well established in the settlement and residents aware of it (C. Hänel in litt. with collector of the 2005 specimen, Marie Repetto, who had located it [on curtains?] in her house). That it had also been found on Gough was noted by JONES et al. (2003b) in a list of accidentally introduced alien pest species only recorded from inside of the meteorological station, but without further details about its finding provided.

Commonly known as the Old House Borer, larvae tunnel into timber and dead wood of trees. Originally a European forest insect, it has become a cosmopolitan domestic pest, infesting rafters and commercially important lumber.

The species is an alien introduction to Tristan, from whose established colony it cannot be ruled out, a straggler may have been the source of import to Gough.

Corylophidae

***Sericoderus* sp.**

New family record for the Tristan da Cunha Archipelago [from Tristan].

This family contains very small species and thus commonly called Minute Hooded Beetles or Minute Fungus Beetles, which are typically associated with decaying plant material. The genus is cosmopolitan (ŚLIPIŃSKI et al. 2009). Species include *Sericoderus lateralis* (GYLLENHAL,

1827), an adventive Palearctic species, which, through its extreme liability to accidental dissemination has acquired a wide geographical range, occurring in Europe, United Kingdom, Russia, United States of America, Canada, South Africa, Madeira, Canary Islands, Cape Verde Islands, the Azores (JIMÉNEZ-VALVERDE et al. 2009) and bountifully at St. Helena (WOLLASTON 1877), from where it was originally recorded.

The single *Sericoderus* sp. collected at Tristan in 2005 was from Cave Point (amongst psocids on the damp fungal clad wall of Archway Cave at st. 17). It was sent to NMW, but could not be fully identified due to lack of taxonomic revision. Its arrival is however deemed unlikely to have been by natural means, but probably through human mediated pathways.

Cryptophagidae

***Micrambe gracilipes* WOLLASTON, 1871**

New genus record for the Tristan da Cunha Archipelago [from Tristan].

Members belonging to this family are small (± 2 mm) and of an oblong shape with a usually red or brown colouring. They typically feed on moulds and therefore commonly referred to as Silken Fungus Beetles. A photograph of *Micrambe gracilipes* was published by BRUCE (1972), and a redescription of this species was provided by OTERO (1999).

The finding in 2005 of two *Micrambe gracilipes* specimens in the potato patches at Tristan (st. 2) represents a new genus record for the archipelago. Two other members of the same family in the form of *Cryptophagus pseudodentatus* BRUCE, 1934 and *Henoticus californicus* (MANNERHEIM, 1843) have previously been recorded from Gough Island. All are alien to the Tristan da Cunha Archipelago.

Micrambe gracilipes is likely to have been recently imported via agricultural products, possibly from South Africa to which country the species may, unbeknown to science, have been introduced from St. Helena where it was originally endemic.

Dytiscidae

***Liodessus involucer* (BRINCK, 1948)**

First record for Tristan.

This little water beetle first became known from Inaccessible where seven males had been collected on the February 28th 1938 by the NSET. Four were from "among plants in a rivulet" on the plateau above Blendon Hall [± 450 m], and three from an unknown locality (BRINCK 1948).

Although BRINCK (1948: 4–5) states that specimens were only collected and known from Inaccessible, he indicated in a table of the species distribution (p. 82), that it also occurs on Nightingale. The authors presume the latter to be a mistake, as no evidence for such a find could be traced. HOLDGATE (1965: 395), who presumably may have checked on this, only indicated its presence for Inaccessible.

Eighteen years later *Liodessus involucer* was found on Gough. Adults were collected between November 1955 and May 1956 from a weed-fringed pool of a lowland stream draining The Glen (HOLDGATE 1961). More findings on Gough were made between September 1999 and September 2001, including from several sites that had been sampled by GISS 44 years earlier without revealing specimens. On the basis of the subsequent wide-spread finds the species was described as being "a common inhabitant of fresh water streams and pools – recorded from 5–750 m and in detritus-filled pools at the base of caves found in fern-bush habitat" (JONES et al. 2003b).

Fig. 7: 1st Pond on Nightingale Island. View from the northern end. A group of Atlantic Yellow-nosed Albatross fledglings can be seen utilizing exclusively the area vegetated by the sedge *Scirpus sulcatus*. In 2005 *Liodessus involucer* was collected in the sedge at the fringe of the open water body in the area indicated by an arrow on the photo. Photo taken by C. Hänel, 1st April 2005.

Some 52 years after the NSET had sampled at Nightingale and its Pond's without finding any specimens, the beetle was for the first time found on this island in a small pool near the 1st Pond in October 1989 (specimens in AMGS; BARBER-JAMES 2007). The subsequent numerous findings (16 specimens) in March 2005 were from *Scirpus sulcatus* sedges fringing the open water-body of the 1st Pond (st. 8) (Fig. 7), which is deemed to correspond with the locality of the 1989 collection (see note on Pond naming confusion, Fig. 3).

Sixty-seven years after the NSET had sampled various fresh water habitat types on Tristan, including at Soggy Plain, without evidence of the species having come to the fore, the eight specimens collected in March 2005 from the same Soggy Plain wetland drainage area (amongst Cyperacea and *Scirpus* sp. fringing one of the little ponds at st. 23) represent the first record from this island.

Wings are present under the elytra, but are reduced such that the beetle is not considered capable of flight. Being a predacious scavenger, its food may consist of tiny freshwater invertebrates and speculatively, carrion from birds (BRINCK 1948, JONES et al. 2003b).

The species is regarded as endemic to the archipelago.

We examined a few specimens from the three northern islands (Inaccessible, Nightingale, Tristan) and observed some slight intrapopulational variability with regard to body length (1.8–

2.1 mm), density of punctation and colour pattern (see Figs. 5–6) but we found no apparent evidence of genetic isolation between the populations of these three islands.

More than 20 species of *Liodessus* GUIGNOT, 1939 are known from the Neotropical Region, eight from North America, eight from the Afrotropical Region, two from New Zealand and one from Fiji.

Laemophloeidae

***Cryptolestes ferrugineus* (STEPHENS, 1831)**

First species record for the Tristan da Cunha Archipelago [from Tristan].

This cosmopolitan species is a pest of all types of grains; the larvae attacking in particular stored products. Adults are very small (1.8–2.2 mm), slender, flattened, shiny yellow-red-brown that are very similar in appearance to *Cryptolestes pusillus (*SCHÖNHERR, 1817) (see below). Their life cycle is 5–9 weeks. The adults lay 100–400 eggs in produce, the hatched larvae of which are very mobile. Once matured, they pupate in gelatinous cocoons to which particles of the produce may adhere. The adults, being able to fly, are very mobile, living up to 6–9 months (TONDER & PRINSLOO 2000).

The specimen found on Tristan in 2005 was located at Edinburgh Village (st. 1) amongst hay bales imported from South Africa at the time, together with *Cryptolestes pusillus*, after a Tristan resident reported becoming very itchy while working with the straw.

***Cryptolestes pusillus* (SCHÖNHERR, 1817)**

First record for Tristan.

This species has previously been collected on Gough inside the meteorological station, where it is regarded to have been an accidentally introduced alien (JONES et al. 2003b). It is a cosmopolitan pest species of stored products. It has a flat body of rusty-brown colour, 1.4–1.7 mm in length and is commonly called Flat Grain Beetle on account of its traits.

The specimen found on Tristan in 2005 was located at Edinburgh Village (st. 1) amongst hay bales imported from South Africa at the time, together with *Cryptolestes ferrugineus*, after a Tristan resident reported becoming very itchy while working with the straw.

Latridiidae

***Cartodere* (s.str.) ? *constricta* (GYLLENHAL, 1827)**

First record for the Tristan da Cunha Archipelago [from Tristan].

This single female of *Cartodere* s.str. THOMSON, 1859 was collected on Tristan from epiphytes on the tree-fern *Blechnum palmiforme* located below 200 m east of Council Gulch at st. 3, in modified fernbush-grass-intruded habitat (viz. a vegetation type whose species composition may originally have been similar to the fernbush complex on Gough in which another species of the genus *Cartodere* was recorded by HOLDGATE (1961, 1965) and by JONES et al. (2003b) under the name "*Aridius* sp.", but was altered as cutting of *Phylica arborea* trees for firewood and clearing through burning and grazing by ungulates commenced with the occupation of Tristan in 1810 (HOLDGATE & WACE 1961)). The specimen, which was sent to NMW, very probably belongs to *C. constricta*, which is cosmopolitan. However, in the absence of male specimens this identification cannot be confirmed now.

Another scenario may be enshrined by the curious finding with the Tristan *Cartodere*, of a subtropical free-living predatory mite, *Cheyletus fortis* OUDEMANS, 1904 (Cheyletidae), that itself

had not previously been recorded from the Tristan da Cunha Archipelago and was the only specimen amongst a mass of mites collected in 2005. Virtually nothing is known about its biology, but specimens have been intercepted on various animal and plant species and products (viz. on skins of a parakeet from New Guinea, rats from Formosa, squirrels from Burma, tulips, rice, beans and furniture from Japan, delphiniums from Australia, garlic from the Philippines, wheat, split black gram and opium poppy-seeds from Oman). Originally described from Europe (?), it is now considered cosmopolitan (BANERJEE et al. 2013). Whether the mite has an association with the *Cartodere* sp. and or its micro-habitat and thus account for its singular finding, and in turn be telling of its introduction to Tristan and the origin of the *Cartodere* sp., or whether it just happened to get "stuck" on it after falling off larger animals in the area, is bound to remain an indelible mystery. As an alien to the Tristan da Cunha Archipelago, the mites' arrival could date back to some of the earliest shipwrecks, including that in 1882 which brought the first rats ashore at Sandy Point.

***Corticaria serrata* (PAYKULL, 1829)**

First record for Nightingale.

BRINCK (1948) recorded a single male *Corticaria serrata* collected from Inaccessible (beach hut) on the 5th March 1938. This is a cosmopolitan species, found mainly inside dwellings and in association with stacked straw.

The single brown, ± 2 mm long specimen found on the rock platform of Nightingale's West Landing at st. 5 in 2005 is deemed to be the same species.

Staphylinidae

***Bisnius sordidus* (GRAVENHORST, 1802)**

New genus record for the Tristan da Cunha Archipelago [from Tristan].

In 2005 *Bisnius sordidus* was found in two localities on Tristan: One specimen from the Sandy Point Rockhopper Penguin colony (then in moult) at st. 11, and another from inside a hut at Cave Point (st. 18). Black with a slender body (± 6–7 mm long) they were active and easily visible to the naked eye.

Originally a European or Transpalearctic species, it is a foreign element to the Tristan da Cunha Archipelago that is likely to have been introduced in relatively recent times through human mediation.

***Bledius* sp.**

New genus record for the Tristan da Cunha Archipelago [from Tristan].

In 2005 one *Bledius* sp., ca. 3.5 mm long, was found in the potato patches at Tristan (st. 2). The specimen was sent to ZMUN, but due to the lack of a taxonomic revision for this group, it was not possible to identify it to species level (C. Hänel in litt. with V. Gusarov).

At the Tristan Archipelago the genus represents a foreign element, whose introduction was likely to have been mediated through human activities.

***Leptacinus* sp.**

First record for Nightingale.

BAIRD (1965) reported the finding in 1962 of the first *Leptacinus* ERICHSON, 1839 specimens from the vicinity of Down-by-the-Pot on Tristan. HOLDGATE (1965) listed *Leptacinus* sp. as an alien species.

In 2005, one female member of the genus was collected from the same coastal area Down-by-the-Pot on Tristan (amongst the Farm Grass *Holcus lanatus*, growing on the slope near the moulting Rockhopper Penguin colony at st. 22), and another one from Nightingale along the path inland from the West Landing (st. 7). The specimens were sent to ZMUN, but neither could be identified to species level due to lack of revision of the African xantholinines. It was also not possible to establish if the specimens from Tristan and Nightingale could be the same or different species.

Provisionally the 2005 findings have been grouped with the same as those collected in 1962, as no other species of the genus has been recorded from the archipelago, or from different areas on Tristan. As such, the source of the Nightingale species could have been from the Tristan stock.

***Sepedophilus* sp.**

First record for Tristan and Nightingale.

One member of this genus has previously been recorded from Gough Island, being *Sepedophilus filicornis* (SCHEERPELTZ, 1974) which was commonly found in fernbush-tussock type vegetation from the coast up to 500 m and rarely in wet heath, between 1999 and 2001 (JONES et al. 2003b).

In 2005, members of the genus were found in both high and low altitude habitats at Tristan and Nightingale. On Tristan two brown-coloured, torpedo-shaped specimens (± 3.2 mm long) were collected at Sandy Point (st. 9), and another similar but larger specimen of ± 5 mm length from Soggy Plain (amongst the grass [*Agrostis stollonifera* ?] at st. 23). At Nightingale five light and dark brown specimens measuring ± 4–5 mm in length were collected from the 1st Pond at st. 8, and another two up from the East Landing area toward High Ridge, in *Scirpus bicolor* growing amongst the tussock, at st. 4.

Representative specimens were sent to IZIKO, NMW and ZMUN, but could not be identified to species level due to the lack of taxonomic revision, and it was not possible to establish if they could belong to the same species as those from Gough, due to the undisclosed whereabouts of the only comparative material from the GITIS collection. In lieu of this, speculations about the status of the 2005 specimens and their possible avenue of arrival (if an inter-island import from Gough – should they be the same species or an outside import), are futile. Until such time that the species identity can be established, we have reflected it separately from *S. filicornis* in Table 1, but not scored it as an additional species for the archipelago.

The genus is alien to the Tristan da Cunha Archipelago, therefore the 2005 specimens are foreign elements introduced to Tristan and Nightingale, probably in relatively recent times.

Discussion

The fact that the new findings brought to the fore involve principally alien components is surely testimony to the thorough nature of the NSET survey. This etches out the more grave scenario that it may also be a silent reflection of species that they had never-the-less missed discovering, which could not be found in 2005 due to their having become scarce and displaced (into areas not sampled) or extinct. In this context the noticeable scarcity in sightings on Tristan of the endemic flightless moths (C. Hänel in litt. with Tristanian residents), echoes like an ominous "prediction" the worrying observations described by BRINCK (1948) in connection with the faunal elements found by the NSET at the crater on Tristan's peak, that pertain specifically to the staphylinid findings: "caught here was the imported *Quedius mesomelinus*, widely spread on the

islands (but not living in the vicinity of man!)[3]; apparently it lived on the Lepidoptera larvae occurring abundantly in the soil and moss".

It is most likely that rarity and extinction of the islands species has been in progress and is set to continue at an accelerated pace. There can be no doubt, that the reason for that and the exponential increase in aliens imported to the archipelago is due to the human activities on the islands and in their territorial waters. In particular those involving traffic to and between the islands, whereby the increase in frequency and the origin of vessels as well as the nature of their operations (including the island hopping type of tourist ventures) that provide bridges to species that under natural circumstance would not be able to reach the island, are paramount (GASTON et al. 2003). The finding of *Homoeodera pumilio* provides a most poignant example in this regard, as the genus is not known anywhere else in the world except St. Helena, which lies in the subtropics, 16 degrees below the equator and far removed from the influence of the westerly wind belt that has linked the Tristan da Cunha fauna to that of South America. The same may also apply to *Micrambe gracilipes*, which was previously also known only from St. Helena.

That species imported to Tristan da Cunha through human activities have their origin in St. Helena – even if they may not be native to that province – appears not limited to these two species. The import of the wood borer *Stenoscelis hylastoides* WOLLASTON, 1861 could well be another such case in point. Originally the species was described from only one finding in South Africa. On account of this, it was thought to have been imported from that country to St. Helena, where in the 19th century it was already found "most abundantly within pieces of dry rotten wood, completely dusty and pulverized, as well as in old decayed posts" (WOLLASTON 1877). On Christmas day 1937 one specimen was discovered in a piece of rotten *Phylica* wood on the north-east side of Tristan at 100 m on the mountain slope (BRINCK 1948). In those years, Britain sent the likes of its war ships to obtain reports on the condition of the island's people, and other vessels played a facilitatory role in the supply of goods and transfer of visitors, amongst others, the Bishop from St. Helena to whose diocese Tristan da Cunha belonged. Describing such a visit and the supplies that were landed with the H.M.S. Dublin in 1923, ROGERS (1927) writes: "amongst the stores sent were liberal supplies of timber (&) roofing...". Interestingly on a map of Tristan provided by ROGERS (1927), being from the Admiralty Chart No. 1769, the eastern point is labelled "landing place", being the locality subsequently called "Sandy Point".

The indigenous beetle faunas of St. Helena and Tristan da Cunha do not have much in common. In fact, their compositions are remarkably different, apart from the fact that Curculionidae dominate in both areas. In the Tristan da Cunha island group there are four beetle families with 21 endemic representatives (Curculionidae: 16 spp., Dytiscidae: 3 spp., Latridiidae: 1 sp., Ptiliidae: 1 sp.). St. Helena has 13 families with 157 endemic species, but Dytiscidae and Latridiidae are not represented at all. Remarkably, there seems to be no water beetle in St. Helena[4]. On the other

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[3] This behaviour BRINCK (1948) goes on to explain, is unlike the species normal association with humans and their dwellings. On Tristan instead, *Q. mesomelinus* had already adapted to living in *Sphagnum* bogs, a habitat type in which it has never been encountered in Europe. Indeed, BRINCK (1948) pointed out that it, along with one of the other alien staphylinids, *Atheta* cf. *laticollis*, which, like *Q. mesomelinus*, also has well developed hind wings, were the two most ubiquitous of the human introduced species. By 1938 both had already colonised all the three northern islands, and *Q. mesomelinus* evidently also Gough, where by 1956 it was likewise found in all reaches up to the peak (HOLDGATE 1965). In contrast, BRINCK (1960) noted that *Q. mesomelinus* had not by 1950 been able to penetrate the more complex natural communities of South African habitats after its introduction from Europe.

[4] *Aulonogyrus insularis* BRINCK, 1943 (Gyrinidae) was erroneously described from St. Helena. The type specimens were in fact collected in South Africa (BASILEWSKY & DECELLE 1972: 4).

Peloriolus brunneus (WATERHOUSE, 1879) (Elmidae) was collected by Charles Darwin in 1836. But this species has never been found on St. Helena again and the genus *Peloriolus* DELÈVE, 1964 is otherwise endemic to southern Africa, where Darwin had been just prior to his arrival at St. Helena.

hand, there is not a single endemic carabid in the Tristan da Cunha island group, while there are 19 endemic species on St. Helena!

The deleterious effects of the coleopteran introductions on the indigenous insect species has, beyond casual and deducted observation, such as those relayed by BRINCK (1948) not been investigated on any of the islands of the Tristan da Cunha Archipelago, nor what the impact of any other biotic or foreign element has on the invertebrates, except in one aspect on Gough, where the diet of the introduced house mouse (*Mus musculus* LINNAEUS, 1758) was examined. It revealed that the mice in the higher reaches fed in significant quantities on the larvae of the endemic flightless moth, the latter being by size and mass the largest of all the indigenous insects in the archipelago. In the lower reaches avian carrion made up the bulk of their diet (JONES et al. 2003a). This insectivorous rodent has also been amongst the islands insect assassins and environment destroyers introduced to Tristan.

Strikingly remarkable is the finding of *Liodessus involucer* on Tristan Island, begging the question why it has never been recorded from there before. Could reasons have to do with inadequate collecting? Or that this population gets wiped out periodically due to environmental or other factors? Is this flightless species able to recolonize Tristan and Nightingale repeatedly?

In the Tristan da Cunha Archipelago flightlessness is most prominent amongst the invertebrates, whereby 58 % of the pterygote insects display this feature, which condition is most prevalent amongst the Coleoptera, affecting 19 of the 21 native species, being especially prominent in Curculionidae. The feature in the Dytiscidae is rare, yet of the three species known for the archipelago, *L. involucer* and the much larger *Rhantus tristanicola* display it, the latter species occurring on two and the former on all the islands. In considering the possible ways in which flightless invertebrates could be dispersed naturally, birds have been considered as favoured vehicles, especially young ones that still have downy patches, as these are prone to becoming contaminated with debris. HOLDGATE (1965) also regarded birds as possible vehicles for transporting freshwater and marine organisms. In the case of *L. involucer*, its finding on Tristan and Nightingale point to it having arrived recently on those islands via an intermediary agent, given the unlikelihood that it could have been overlooked by the NSET, and the fact that it cannot fly. The transfer between locations would in that case need to have occurred speedily in order to avoid the beetle from drying out in transit. In this case humans cannot be reasonably considered as the vehicles, alone when taking into account the localities in which *L. involucer* was found on Tristan and Nightingale; both being in high lying areas far from human habitation and their traffic. This leaves the rich birdlife as the most plausible courier, specifically the Atlantic Yellow-nosed Albatross, locally known as "Molly". The latter is singled out on the basis of the observations made regarding their use of The Ponds, including the area inhabited by *L. involucer* during the 2005 sampling period. The time of month having been at the stage when the Molly chicks started to fledge, the nature and sequence by which this occurred within The Ponds area – their clearly preferred nursery ground[5] – was palpable to witness. It was quite evident that the four Ponds were sequentially utilised by the Mollies to serve different developmental stages, whereby the presence and growthform of the sedge *Scirpus sulcatus* seemed to play a determining role. The 2nd Pond, which had a dense luxurious covering of the sedge but no open water, was predominantly the preferred breeding area (with some 100 nests whose building material incorporated the sedge, occupied, as similarly portrayed by a photo of the same Pond in

[5] That this observation is a long standing one is exemplified by several noted incidences. In 1924, at the beginning of February, ROGERS (1927) for instance noted: "I saw one rookery [of Mollies] in a beautiful but swampy valley containing over five hundred of these handsome, spirited birds". In 1938, 14 years later to the day, HAGEN (1952, 1982) banded 544 Yellow-nosed Albatross in The Ponds. Indeed, in various scripts and sketch maps of the island authors used the then locally referred to term "Molly Ponds" (e.g. OLLIER 1984), although the "Molly" part seems to have fallen by the way-side.

WACE & DICKSON (1965: 312, pl. 41, Fig. 28) that appears to testify of the same type of utilisation in 1962). The 3rd Pond, the driest, where the sedge was growing in reduced form around the periphery of the *Blechnum palmiforme* dominated central area, was also but far less obviously in use. As the fledglings started leaving their nests, the higher lying dry area of the 4th Pond began to get populated by a number of the young birds. There the sedge grows densely in firm roundish clumps like a knobbed carpet laced with a network of corridors. These were used by what resembled a crèche of unsure pre-schoolers navigating the world beyond their cradle, each adopting a bushel like a surrogate nest used for weaning, on which to test his or her balance while clumsily flapping still floppy gangly large wings, and resting when soon tired. The next stage in Pond utilisation was the lower wet 1st Pond area in which the waterlogged sedge growth is large and evenly spread around the still open water body, being the habitat in which *L. involucer* was found (see Fig 7). Here the evidently more confident and curious Mollies expanded their navigating range and performance antics, while getting familiar – by allegory – with the watery medium. With no other Pond area (or need for another ?) it seemed likely that the un-obstructed 'waterbed' area of the 1st Pond could have served as a runway for the graduates take-off on their maiden voyage from home ground. A direction into which a number of Nightingales' first time leavers, ringed in 1938 were found to have headed was to the north-east where in the same year they were found in the waters off the coast of West Africa between Walvis Bay to Angola (HAGEN 1952, 1982). For those birds, Tristan lying to the north east provides a convenient stop-over en route. Indeed Mollies on Tristan have also been found to occur most abundantly in the south-eastern sector between Sandy Point and Stony Beach (RYAN 2007), into which sector Soggy Plain fits. These observations all point to the very high probability that flights from Nightingale's 1st Pond to Tristan's Soggy Plain by Mollies that would have unwittingly picked up *L. involucer* passengers during their various pre-embarkation exercises in the water beetles sedged habitat, have been a scheduled route followed through generations, as if mapped into the birds instinctive behaviour pattern. Furthermore, that birds would choose to follow a direct route with no stop-overs (on the ocean), minimising the flight time between locations and the chances of losing their passengers. And once landed at Soggy Plain, they would engage in grooming themselves before departing on their next leg, during which process their passengers disembarkation would be greatly assisted into the boggy environment below which, through the extant community now found to exist there, clearly provides a suitable new home for such deportees.

Conclusion

From the results that have come out of the 2005 collection it is clear that they have contributed significantly to increasing knowledge about the faunal situation at Tristan and Nightingale Islands and thus towards a more accurate picture for the archipelago as a whole. However, while the information presented here is the most up-to-date synthesis for Coleoptera as currently known from the Tristan da Cunha Archipelago, it cannot be considered to represent the true situation on these islands. The status quo as portrayed in this work needs to be treated with circumspection, in particular the total figure and composition for the archipelago, which remains a skewed underrepresentation on account of Inaccessible Island's fauna still being the most incompletely mapped. And while the Tristan and Nightingale components are not nearly as disadvantaged, they too are bound to be underrepresented. This is because of the incomplete sampling regime of the 2005 invertebrate project, including amongst other fundamentals (HÄNEL 2005), the omission entirely of certain representative areas and habitats (e.g. the montane and entire peak region above the plateau on Tristan) and the limited collecting period (that also missed the main summer months of November, December and January). Over and above these factors, it is important to take cognisance of the fact that no quantitative survey has ever been

undertaken with regards to the invertebrates at any of the islands, so that it is not possible to determine the level of rarity or habitat specificity of species.

The lack in recent times of an adequate invertebrate survey at Inaccessible is an unsatisfactory situation, particularly as the island has become a prime tourist attraction and is thus potentially subjected to the same import of alien species as demonstrated here for the Coleoptera, and previously for other orders such as in the Diptera (HÄNEL & HAENNI 2007, HÄNEL & PONT 2008) and the Thysanura (HÄNEL & IRISH 2009). The introduction of a species that may thrive on the endemic fauna, such as might account for the success of *Quedius mesomelinus*, could add substantially to threatening the existence of the indigenous components it preys on or detrimentally competes with, while altering the fragile ecosystem of the islands. It is paramount that this gap in baseline information should be filled soon. Effective management policies and practices are heavily dependent on knowing what species are on the islands and, when aliens are involved, what implications these may hold.

Table 1: Checklist of the Coleoptera recorded from the islands of the Tristan da Cunha group.
Islands: G = Gough, **I** = Inaccessible, **N** = Nightingale, **T** = Tristan
Species status: A = alien introduction, **GE** = island group endemic (recorded from at least two islands), **IE** = island endemic (recorded from a single island)
Significance of 2005 findings: ■ = family new to island, ♦ = genus new to island, ● = species new to island, double underlining = taxa new for the archipelago

FAMILY	SPECIES	ISLANDS				Status
		T	**N**	**I**	**G**	
Anobiidae **Woodworms**	*Ptinus tectus* BOIELDIEU, 1856 Australian Spider Beetle				✓	A
	Stegobium paniceum L., 1758 Drugstore Beetle	✓			✓	A
Anthribidae **Fungus Weevils**	*Homoeodera pumilio* WOLLASTON, 1877	✓●	✓●			A
Carabidae **Ground Beetles**	*Harpalus* sp.	✓	✓♦			A
Cerambycidae **Longhorn Beetles**	*Hylotrupes bajulus* L., 1758 Old House Borer	✓■			✓	A
Chrysomelidae **Leaf Beetles**	*Stegnaspea trimeni* BALY, 1877	✓				A
Coccinellidae **Ladybird Beetles**	*Lioadalia flavomaculata* (DEGEER, 1778)	✓				A
Corylophidae **Minute Hooded Beetles**	*Sericoderus* sp.	✓♦				A
Cryptophagidae **Silken Fungus Beetles**	*Cryptophagus pseudodentatus* BRUCE, 1934				✓	A
	Henoticus californicus (MANNERHEIM, 1843)				✓	A
	Micrambe gracilipes WOLLASTON, 1871	✓●				A
Curculionidae **Weevils / Snout Beetles**	*Naupactus cervinus* (BOHEMAN, 1849) Fuller Rose Beetle	✓				A
	Gunodes major BRINCK, 1948		✓			IE
	Inaccodes oblongus BRINCK, 1948			✓		IE
	Palaechtodes cossonoides (WATERHOUSE, 1884)		✓	✓		GE

	Palaechtus glabratus WATERHOUSE, 1884		✓			IE
	Pentarthrum carmichaeli WATERHOUSE, 1884	✓	✓	✓	✓	GE
	Phlyctinus callosus SCHÖNHERR, 1826 Garden Weevil / Vine Snout Beetle	✓				A
	Sitophilus oryzae (L., 1758) Maize Weevil, Rice Weevil	✓			✓	A
	Stenoscelis hylastoides WOLLASTON, 1861	✓				A
	Tristanodes attai BRINCK, 1948	✓				IE
	Tristanodes conicus BRINCK, 1948			✓		IE
	Tristanodes craterophilus BRINCK, 1948	✓				IE
	Tristanodes echinatus BRINCK, 1948			✓		IE
	Tristanodes insolidus BRINCK, 1948		✓			IE
	Tristanodes integer BRINCK, 1948			✓		IE
	Tristanodes medius BRINCK, 1948			✓		IE
	Tristanodes minor BRINCK, 1948		✓			IE
	Tristanodes reppetonis BRINCK, 1948			✓		IE
	Tristanodes scirpophilus BRINCK, 1948	✓			✓	GE
	Tristanodes sivertseni BRINCK, 1948		✓			IE
Dytiscidae Diving Beetles	*Lancetes dacunhae* BRINCK, 1948	✓		✓	✓	GE
	Liodessus involucer (BRINCK, 1948)	✓♦	✓	✓	✓	GE
	Rhantus tristanicola (BRINCK, 1948) [1]		✓	✓		GE
Endomychidae Handsome Fungus Beetles	? *Mycetaea* sp.	✓				A
Hydrophilidae Water Scavenger Beetles	*Cercyon depressus* STEPHENS, 1829	✓	✓		✓	A
	Cercyon littoralis (GYLLENHAL, 1808)[2]			✓		A
Laemophloeidae Lined Flat Bark Beetles	*Cryptolestes ferrugineus* (STEPHENS, 1831) Rusty Grain Beetle	✓●				A
	Cryptolestes pusillus (SCHÖNHERR, 1817) Flat Grain Beetle	✓●			✓	A
Latridiidae Minute Brown Scavenger Beetles / Mould Beetles	*Cartodere* (*Aridius*) sp.				✓	IE (or A)
	Cartodere (s.str.) *? constricta* (GYLLENHAL, 1827)	✓♦				A
	Corticaria serrata (PAYKULL, 1829)		✓♦	✓		A
	Dienerella filum (AUBÉ, 1850)	✓				A
Oedemeridae False Blister Beetles	*Nacerda melanura* (L., 1758) Wharf Borer	✓				A
Ptiliidae Featherwing Beetles	*Ptinella natvigi* BRINCK, 1948			✓	✓	GE
Salpingidae Narrow-waisted Bark Beetles	*Sphaeriestes sculptilis* FAIRMAIRE, 1868				✓	A

Scolytidae **Bark Beetles**	*Hylurgus ligniperda* (FABRICIUS, 1792) Goldenhaired Bark Beetle				✓	A
Silvanidae **Flat Bark Beetles**	*Ahasverus advena* (WALTL, 1832) Foreign Grain Beetle	✓				A
	Oryzaephilus surinamensis (L., 1758) Saw-toothed Grain Beetle				✓	A
Staphylinidae **Rove Beetles**	*Anotylus caffer* (ERICHSON, 1840)	✓				A
	Atheta (*Mycetota*) *pasadenae* BERNHAUER, 1906	✓	✓	✓		A
	Bisnius sordidus (GRAVENHORST, 1802)	✓♦				A
	Bledius sp.	✓♦				A?
	Halobrecta flavipes THOMSON, 1861			✓		A
	Leptacinus sp.	✓	✓♦			A?
	Notolinus hottentottus (SACHSE, 1852)				✓	A
	Quedius fulgidus (FABRICIUS, 1793)[3]		✓			A
	Quedius mesomelinus (MARSHAM, 1802)	✓	✓	✓	✓	A
	Sepedophilus filicornis (SCHEERPELTZ, 1974)				✓	A
	Sepedophilus sp.[4]	✓♦	✓♦			A
Tenebrionidae **Darkling Beetles**	*Gonocephalum affine* (BILLBERG, 1815) Hide or Skin Beetle	✓				A
	Tribolium castaneum (HERBST, 1797) Rust-red Flour Beetle	✓				A
TOTAL 21	**61**	**35**	**18**	**17**	**20**	

[1] This species was originally described as *Senilites tristanicola* by BRINCK (1948). The genus *Senilites* BRINCK, 1948 was recently synonymized with *Rhantus* DEJEAN, 1833 (see MORINIÈRE et al., submitted).

[2] Two specimens were initially collected in 1873. No specimens were amongst the NSET collection (1937/38), nor have any been found since. BRINCK (1948) stated that the 1873 material, lodged in the NHML, was re-examined and confirmed to be correctly identified. On the basis of the stenotopic wrack dwelling and feeding habits of the North European species, and taking into account the unstable occurrence and disappearance of wrack at the island, its apparent rareness – if still present – could be understood, when considering that it possibly lives on the numerous fly larvae in the shore region.

[3] This species has not been collected since its original "numerous" finding in 1873. BRINCK (1948) tried unsuccessfully to locate the material, in lieu of which he considered if the species could have been a misidentification of *Q. mesomelinus* or that specimens were missed being found or had disappeared.

[4] This unidentified *Sepedophilus* species is not included in the total of 61 species and 40 aliens scored for the Tristan Island group, as explained under the relevant species description and other parts of the text.

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Ms. Christine HÄNEL
Cape, South Africa (chrishanel@yahoo.com)

Dr. Manfred A. JÄCH
Naturhistorisches Museum Wien, Burgring 7, A – 1010 Wien, Austria (manfred.jaech@nhm-wien.ac.at)