Santo

The Natural History of

edited by
Philippe Bouchet, Hervé Le Guyader, Olivier Pascal

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BEETLES IN SARATSI RANGE, SANTO

Alexey K. Tishechkin & Jürgen Schmidl

The task of writing about such diverse group of animals like beetles on a remote, tropical, rather large oceanic island like Santo is analogous to an attempt to describe a black cat in a dark room. You know it is supposed to be there, but have a quite vague idea of its size, age, sex and character, even if you are holding it by the tail. More, you still are not sure if there are any other cats inside, how many, and even if the creature you are holding is a cat at all.

Santo, as a relatively large composite island with its warm and wet climate, lush rainforests, high mountains and limestone plateaus, looks as a good candidate for being a "tropical paradise" for beetles, these champions of diversity and adaptability in animal kingdom. However, there are several important factors of uncertainty in respect to the state of local beetle fauna and our knowledge about it.

First, Santo is a remote oceanic island which has never been connected to a large landmass. This fact brings the issue of colonization, dispersal limitations, survival and diversification of immigrants. Although its major potential colonization sources are represented by such landmasses as Australia and New Guinea which harbor rich and diverse faunas, the water gaps dispersers have to cross are still long several hundreds of kilometers and the nearest lands (Fiji, New Caledonia and Solomon Islands) are remote oceanic islands themselves. These islands are only stepping stones for dispersers from mainland situated more like thousands kilometers away. There is a very limited knowledge available to predict which beetles and how many of them have reached, survived and diversified on an island like Santo.

Second, the remote nature of the island makes it hard to get there not only for animals, but for people who are interested in discovering and studying them. Vanuatu and Santo in particular have never been a popular destination for beetle enthusiasts. Beetle fauna of less remote, larger, more actively used by Europeans islands in the region, such as New Guinea and New Caledonia, had received much more attention from naturalists. So, the available written knowledge and even unsorted museum collections are minimal, especially outside abundant, economically important and appealing to collectors groups, i.e. for "little brown beetles" representing the vast majority of species in this mega-diverse insect order.

And third, there is no way to tell how reliable even this limited knowledge is. The task of obtaining representative picture of local fauna and its natural history for a diverse group of tropical insects at a large and relatively complex site (case of beetles of Santo) is notoriously difficult. In the tropics, most of the beetle species are rare. It could be a true rarity, meaning small populations and small localized ranges, or rarity in collections, when you need a piece sheer luck or very special time window and/or collecting method to detect a specialized species. At a given site, "to get them all" you need to employ a huge effort of mass-collecting methods or apply a multitude of collecting tricks in variety of microhabitats, or better combine two or more approaches. Most of the biotic inventories, even nowadays, fail to do that consistently. That means there is almost no way to tell how complete a given inventory is, and which group failed to reach the island and which was just not netted or trapped. Given all the above, we would not even mention the task of learning the natural history of the beetle fauna as a whole. So, here we are after five weeks of traversing a single range in island's mountains, holding the tail of our black cat in the dark and writing about beetles of Santo.

The background. What do we actually know about them

Anyway, a big picture gets started with a few first touches by a brush. A natural way to begin is to review the available knowledge. In an attempt to get around at least some of above uncertainties, the most promising way is to consult the up-to-date, complete regional or global systematic treatments dealing with particular groups of beetles. This kind of sources would provide the best possible picture. The table 12 lists known beetle species counts for Vanuatu, its three major neighboring island groups, and New Guinea as the major source for Melanesian island faunas. Although these data are sketchy, some patterns are evident. Known New Guinean beetle faunas are approximately three times richer the New Caledonian ones, the latter emerging as the most diverse among Melanesian archipelagoes analyzed. There is no clear picture in relative richness regarding Vanuatu, Fiji and Solomons. The relatively lower diversity for the

Table 12: Catalogued diversity of selected Melanesian beetle taxa by islands/archipelagoes. Dash means no representatives of corresponding taxon are listed, n. a. stands for "not available". Espiritu Santo expedition 2006 data not included.

Taxon	Number of Species					Source
	New Guinea	New Caledonia	Solomon Islands	Vanuatu	Fiji	
Anthribidae	177	58	20	9	29	Rheinheimer 2004
Apionidae: Myrmacicelinae and Rhadinocybinae	245	71	-	1	1	Wanat 2001
Chrysomelidae: Alticini	n. a.	22	4	16	41	Samuelson 1973
Chrysomelidae: Cassidini	29	2	7	-	-	Borowiec 1999
Histeridae	160	50	16	9	14	Caterino 2006, 2007; Caterino & Dégallier 2007; Gomy 2007; Gomy & Aberlenc 2006; Kanaar 2003; Mazur 1997, 1999
Hybosoridae (including Ceratocanthidae)	23	2	-	1	-	Ocampo & Ballerio 2006
Hydrophiloidea: Hydrochidae and Hydrophilidae	75	22	8	13	8	Hansen 1999

latter archipelago, evident for every taxon but Anthribidae and Histeridae, apparently is due to less collecting and less material available, given the fact that their proximity to New Guinea and large size and complex nature makes the Solomons a logical candidate to be the richest among these three island groups. The case of Histeridae is illustrative in that respect, since the species count is based on a very recent work of Gomy and Aberlenc which reviews several collections done in the 1990-2000s.

Not all the sources consulted to get these data discriminate between island records within Vanuatu, but Santo does not emerge as a popular collecting destination within the archipelago. The highest proportion of Vanuatuan fauna recorded from Santo is just above the half (Anthribidae, five species out of nine). It is worth of noting that two leaf beetle datasets provide an odd picture in comparison with the rest of data, with New Caledonian fauna being relatively poor for both tribes and the fauna of Solomons being uncharacteristically rich for cassidines and Fijian fauna —for alticines (and also anthribiids).

The first impressions from the field

Armed with the results of homework reading, you reach the camp in Santo forests and begin your part in the task of local beetle exploration. With the past experience in tropical rainforests on major landmasses, you are somewhat cautious in your expectations about an oceanic island beetle fauna. But local forest looks lush and tall and diverse, and… beetles are out there. You can observe them easily, catches by standard trapping techniques do not look poor in terms of specimen numbers, and all major groups are present. Phytophages, weevils (Curculionidae in a broad sense) and leaf beetles (Chrysomelidae) are abundant and diverse on vegetation. Cut and damaged trees at campsite attract armies of wood-boring weevils and powderpost beetles (Bostrichidae), and many longhorns (Cerambycidae, Fig. 173) and few buprestids (Buprestidae) are prominent (although not so abundant) on this freshly dead wood. Closer look at that substrate reveals plentiful selection of fungus weevils (Anthribidae, Fig. 174), darkling beetles (Tenebrionidae), fancy-looking brentids (Brenthidae, Fig. 174) and representatives of several smaller families of Cucujoidea and Tenebrionoidea on and under tree bark and on dead wood-infesting fungi. At nights, camplights attract numerous ground beetles (Carabidae), scarabs (Scarabaeoidea) and longhorns, including some huge, very "exotic"-looking representatives of Dynastinae and Prioninae (Figs 175 & 176), as well as literally swarms of bark and ambrosia beetles (Scolytinae and Platypodinae). Small and not so small rove beetles (Staphylinidae) are everywhere, making up the bulk of flight intercept trap catches, and several rains bring out flushes of flying water (Dytiscidae and Hydrophilidae) and

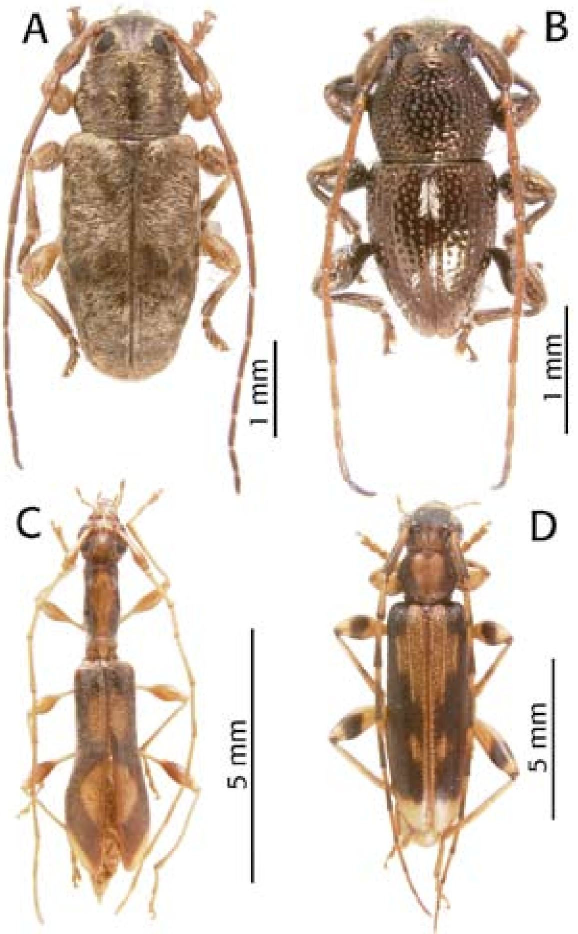


Figure 173: Representatives of longhorn beetles (Cerambycidae). **A**: Unidentified species of *Acanthocinini* (Lamiinae). **B**: *Diastosphya* sp. **C**: unidentified species of a genus near *Tsusuia*. **D**: *Glauscytes* sp. (Photos A. Tishechkin).

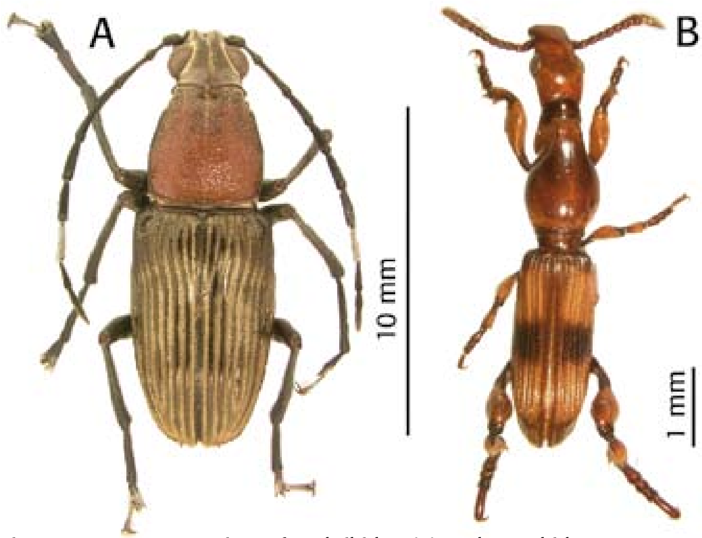


Figure 174: Representatives of Anthribidae (**A**) and Brenthidae (**B**), unidentified species. (Photos A. Tishechkin).

sap (Nitidulidae) beetles. Forest floor leaf litter at different elevations is full of life, with pselaphids (Pselaphinae), scaphidiids (Scaphidiinae), scydmaenids (Scydmaeninae) and other subfamilies of Staphylinidae abundant and diverse, rivaling in numbers ubiquitous ants of various sizes and shapes. And as usually in the tropics, every new day brings multiple discoveries of species not seen before.

Figure 175: *Xylotrupes ulisses* (Scarabaeidae: Dynastinae).

Figure 176: *Olethrius tyrannus* (Cerambycidae: Prioninae).

Initial impression about local beetle fauna does not bring a feeling of an inbalanced or poor fauna, most of its components seem to be in place. However, after closer inspection the picture begins to look different. Leaf beetles are common and rather abundant, but represented by no more than nine species, most of them in Eumolpinae. Dead rotten trunks of fallen trees are beaten by galleries of Passalidae, prominent subtropical and tropical scarabaeoid group in this habitat, but there are only one common large species (*Gonatas hebridalis*) and a rare small one; the latter after a look through the scope turns out to be a stag beetle, *Figulus foveicollis* (Lucanidae, Fig. 177), the only species we found. Another common group, click beetles (Elateridae), is out, but the first days it looks like only three species (small, larger and medium) are represented in catches until one night several large elaterids with spectacular luminescent spots on the pronotum (*Photophorus bakewelli*) show up at the

Figure 177: *Figulus foveicollis* (Lucanidae). **A**: imago (Photo A. Tishechkin). **B**: larva.

Table 13: Beetle species counts per family at Penaoru camp site and Saratsi Range, November 2006. Columns represent results of dead wood hand collecting (**HC**) at study plots from 100-1 200 m (HC deadwood Saratsi range), miscellaneous hand collecting at camp site 100 m (HC Camp 100 m Penaoru) and total species count (sum HC, not necessary additive, since some species are shared between two categories).

	HC deadwood Saratsi range	HC Camp 100 m a.s.l. Penaoru	sum HC
Anobiidae	1	0	1
Anthicidae	0	1	1
Anthribidae	17	5	21
Bostrichidae	0	3	3
Brenthidae	1	5	6
Buprestidae	0	2	2
Byrrhidae	0	1	1
Callirhipidae	1	1	1
Carabidae	2	9	11
Cerambycidae	16	12	27
Cerylonidae	1	0	1
Chrysomelidae	9	1	9
Ciidae	12	0	12
Cleridae	1	0	1
Coccinellidae	0	1	1
Colydiidae	7	5	9
Corylophidae	1	2	3
Cryptophagidae	1	0	1
Curculionidae	35	24	57
Dermestidae	1	1	2
Elateridae	4	5	7
Erotylidae	2	2	3
Eucnemidae	3	2	5
Histeridae	2	4	4
Hybosoridae	0	1	1
Laemophloeidae	2	3	5
Lucanidae	1	0	1
Lyctidae	0	1	1
Melandryidae	1	0	1
Monommatidae	1	1	1
Monotomidae	0	2	2
Mordellidae	3	4	7
Mycetophagidae	3	4	4
Nitidulidae	4	6	9
Oedemeridae	0	2	2
Passandridae	1	0	1
Phloeostichidae	0	1	1
Propalticidae	1	1	2
Ptinidae	1	0	1
Rhysodidae	2	0	2
Scarabaeidae: Aphodiinae	2	2	3
Scarabaeidae: other subfamilies	2	5	7
Scarabaeidae: Scarabaeinae	0	3	3
Scolytidae (without Platypodinae)	3	5	6
Scolytidae: Platypodinae	4	3	5
Silvanidae	0	3	3
Staphylinidae: other subfamilies	9	4	13
Staphylinidae: Scaphidiinae	6	0	6
Tenebrionidae	15	11	25
Thoscidae	1	0	1
Trogossitidae	1	2	2
Sum	**180**	**150**	**304**

expedition dinner table, making themselves (and explaining beetle experts) a center of the expedition crew's attention. Closer inspection reveals later multiple species of click beetles in above-mentioned categories, but total species count stays nevertheless low. We collected only seven species of click beetles from the camp site and from the dead wood collecting along the Saratsi mountain gradient, namely *Abelater* (*Melanoxanthus*) *hebridanus*, *Abelater* sp., *Agrypnus glirinus*, *Calais carinulatus*, *Photophorus bakewelli*, *Simodactylus buxtoni* and *Simodactylus risbeci*.

Good and bad ocean travelers: who's there and who's not

These examples represent a clear pattern: most of the beetle families are present in the Santo's forests, but some only by limited diversity of species (see Tables 13 & 14). Staphylinids, anthribids, bark and ambrosia beetles, weevils and, with some reservations, carabids seem to approach their corresponding dominant diversities in terrestrial mainland communities. The last two families are classical examples of groups prone to successful colonizations and diversifications in remote oceanic islands. But not all habitats may have been colonized successfully by these groups. For example, we could not record one specialized carabid from tree bark, despite thorough sampling efforts, whereas in Australia these are very speciose on bark.

Speaking of beetle groups which were unsuccessful in their dispersion and/or apparently failed to make it to Santo, very few of the major beetle lineages come to mind. Despite bark and ambrosia beetles being abundant and diverse, one of their prominent specialized predators in Australasia, the genus *Trypeticus* (Histeridae: Trypanaeinae), apparently failed to reach Santo. Our collecting efforts and methods employed would most probably detect these beetles if present at the site and behaving in a typical way. Another example includes Endomychidae, a widespread family of fungivorous beetles, with brighly colored and relatively large representatives, prominent in tropical forest both in Old and New Worlds. The

Table 14: Beetle species counts per family at different altitudes along the transect at Saratsi Range, November 2006. Data were collected by tree trunk bark spray method at 100 m, 300 m, 600 m, 900 m and 1 200 m. BS100 = Bark spray plots 100 m, other abbreviations similarly refer to different altitudes.

Family	BS100	BS300	BS600	BS900	BS1200	BS spe sum
Aderidae	0	0	0	0	1	1
Anthribidae	3	1	1	0	0	5
Cantharidae	0	1	0	0	0	1
Carabidae	0	0	1	0	1	2
Chrysomelidae	1	0	3	4	4	7
Ciidae	1	0	0	0	0	1
Coccinellidae	1	1	1	1	1	1
Colydiidae	0	0	0	2	1	3
Corylophidae	1	1	0	2	1	5
Curculionidae	0	1	3	16	1	21
Elateridae	1	0	0	0	1	1
Endomychidae	0	1	0	0	0	1
Lathridiidae	0	0	0	2	0	2
Mordellidae	0	0	0	1	0	1
Nitidulidae	0	1	1	0	3	5
Propalticidae	1	0	0	0	0	1
Ptiliidae	0	0	0	1	1	2
Rhizophagidae	0	0	0	1	0	1
Salpingidae	0	0	0	1	0	1
Staphylinidae: Scaphidiinae	0	0	1	0	1	2
Staphylinidae: Scydmaeninae	0	0	0	1	2	2
Staphylinidae: Pselaphinae	0	0	0	2	6	7
Staphylinidae: other subfamilies	1	1	1	4	4	10
Tenebrionidae	0	0	0	1	1	2
Throscidae	0	0	0	0	1	1
sum	**10**	**8**	**12**	**39**	**30**	**86**

only endomychid record at Saratsi Range was a few specimens of *Holoparamecus*, tiny (2 mm long) brown leaf litter-dwelling beetles, apparently feeding there on some microfungi, found on nearly all elevations. No large, flashy, macrofungi-feeding endomychids were found despite of extensive special searches. Checkered beetles (Cleridae) appeared to be very rare, only one species, *Omadius santo* (already described as new, Fig. 178), was recorded in numbers on dead wood, a very common habitat for the family. One extra species, *Necrobia* sp., most probably introduced, was observed foraging on drying cow bones at our field kitchen dump. Many others families seem to be with low species numbers (Table 13), but final conclusions should await analysis of other habitat types (e.g. canopy, coastal zone, etc.) and sampling methods.

Some help from humans

Another case of naturally missing beetle lineage has been a subject for a manipulation by the humanity. Oceania does not have any native mammals other than bats, so the lack of dung beetles (Scarabaeinae in strict sense) is a regional faunistic feature related to this lack of food source regardless of dung beetles' dispersal ability per se. The only known representatives in Vanuatu are four established exotic species (*Copris incertus*, *Liatongus militaris*, *Euoniticellus intermedius* and *Digitonthophagus gazella*), the latter three (plus *Sisyphus spinipes* which obviously did not establish) intentionally introduced to cope with the dung of brought and abundant now cows, horses etc. At Penaoru camp site, near the sea level and human settlement, we collected (Table 13) three species of coprophagous Scarabaeinae: *L. militaris*, *D. gazella* and, as a

Figure 178: *Omadius santo* (Cleridae), a new checkered beetle species from Santo. (Photo J. Reibnitz).

surprise, *Onthophagus sagittarius*, not recorded from Vanuatu so far, and unclear in its origin.

Mountains matter

One of the important components of Espiritu Santo's beetle diversity might be the island's mountainous topography. Since climatic conditions and habitats are different along the gradient from coastal plain to high montane cloud forests, one expects to find at least some specialization in respect to elevation in animals, beetles in our case. The extent of such specialization in relatively small and not too high oceanic islands (below 2 000 m) is poorly known, and there is some evidence, at least for birds, that on Pacific islands altitudinal specialization could be quite low. However, several examples from the results of our preliminary specimen sorting and identification at Saratsi Range represent the presence of clear altitudinal limits in distribution of some beetle species. Extensive flight intercept trapping has allowed to uncover rather precise upper limit in distribution of *Phaeochrous* sp. (Hybosoridae). This species is one of the dominants at 100-300 m of

Figure 179: Representatives of Pselaphinae (Staphylinidae), including a species of undescribed myrmecophilous genus (right). (Photos A. Tishechkin).

elevation, a few specimens were collected at 500 m and none at 600 m (where collecting effort was the highest along the transect) and above. Out of nine species of Pselaphinae (Fig. 179), small, low vagile staphylinids associated with leaf litter and dead wood, represented by longer series of specimens to allow at least some quantitative assessment, four are restricted to 1 000-1 200 m, two to 100-300 m of elevation and the rest have broader altitudinal niche between 300 and 1 000 m.

An illustrative reflection of altitudinal changes in Saratsi montane forest ecosystem is the correlated altitudinal shift in beetle composition on tree trunks as portrayed by barkspray sample data (Table 14). These data were collected by spraying about a dozen of tree trunks with arthropod-specific insecticide at several plots along the transect between 100-1 100 m. A total of 86 beetle species was identified from this collecting, and there is a clear diversity increase from dryer forests at 100-600 m to moist forest formations within the cloud zone at 900-1 200 m. Increased epiphyte cover (mosses, lichens and algae) on moist tree trunks presumably provides much better trophic basis for a more speciose foodweb (where beetles and mites play the most important role) than mostly bare bark at the lower altitudes. Mite feeding beetle taxa like Scydmaeninae, Pselaphinae and specialized other groups of Staphylinidae clearly prefer the cloud forest tree trunks, but also "classic" phytophagous groups like leaf beetles and weevils (Fig. 180) do, reflecting the higher food supply there for these plant feeders.

Different collecting methods yielded different species and family compositions. Hand collecting (HC) of dead wood along the Saratsi mountain altitudinal gradient (Table 13) yielded 180 beetle species, and four-week occasional collecting at Camp site Penaoru (100 m a.s.l.) another 150 species, summing up to a total of 304 species. Bark spray (Table 14) added another 86 species, almost not recorded by the hand collecting. Abundant records at campsite lights proofed that many beetles species are attracted by lights, so we suspect light and Malaise trap catches yet to be analyzed will reveal a lot of extra diversity, making estimates of total species richness an interesting future task.

Much, much more species then we knew

The mentioned preliminary results of partial specimens sorting and identification from different methods shed some light on the quality of the existing knowledge about the beetles of Vanuatu. The general trend is that the available diversity data for this island fauna in literature are quite incomplete. In fact, the only case when observed diversity was lower than reported represents flea beetles, where only one species was found so far, while five are known from Santo. For the rest of groups with some sorting results available the situation is the opposite. Only two species of Scaphidiinae, small, fast-running, compact-bodied fungivorous staphylinids, are reported from Vanuatu, none of them from Santo. We already sorted out six species. At least 16 pselaphine species were collected at Saratsi Range, more than known so far for the entire archipelago of New Caledonia. This statistics however may be more illustrative in respect to the poor knowledge of New Caledonian Pselaphinae.

Figure 180: *Mecomastyx* sp. (Curculionidae), attracted to freshly dead wood at 600-900 m, male (with long antennae) and female. (Photos A. Tishechkin).

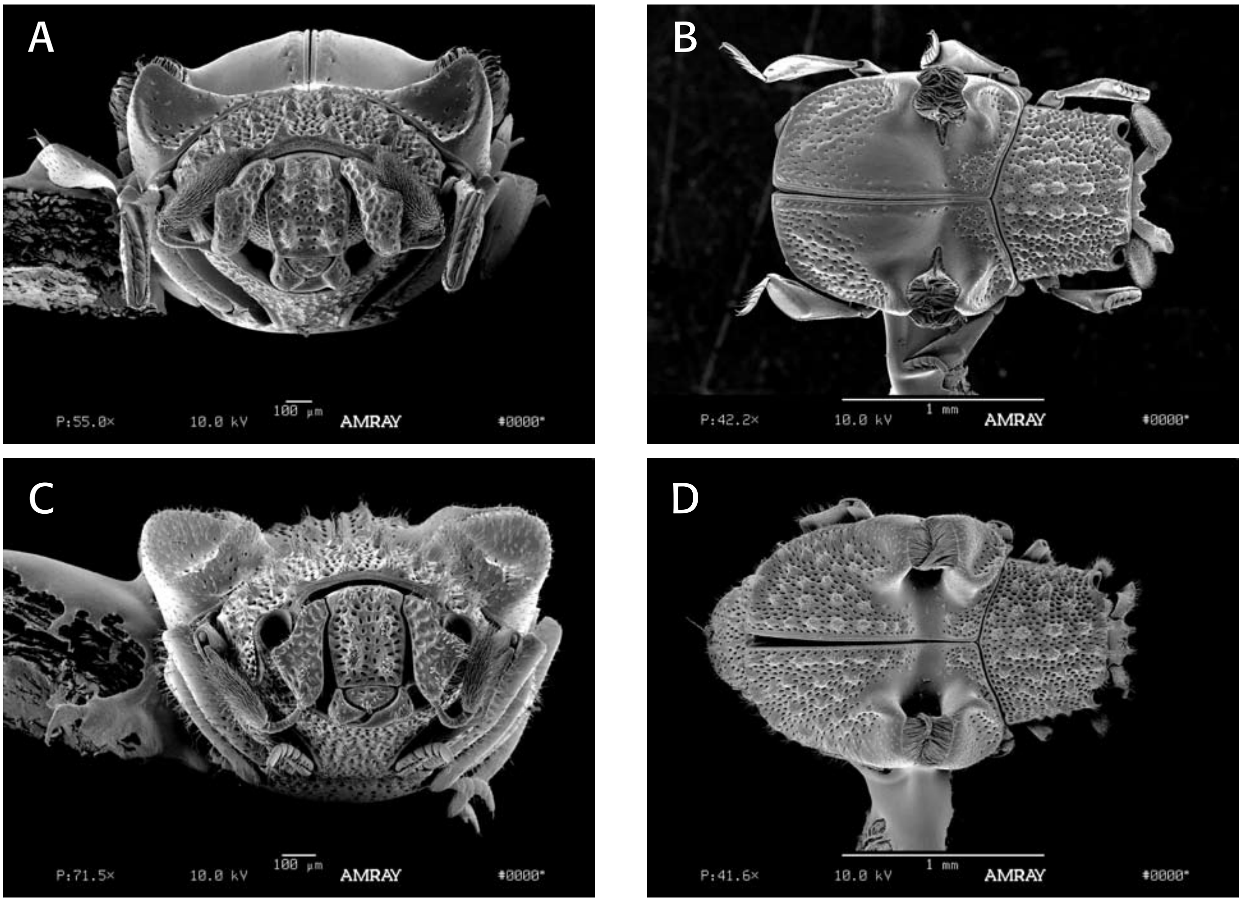


Figure 181: Specialized myrmecophiles. **A-B**: *Eucurtiopsis pascali*. **C-D**: *E. kitchingi*. (Histeridae: Chalmydopsinae). (Photos A. Tishechkin).

Vanuatan ground beetle tribe Platynini has been revised recently by Liebherr as represented by 11 species, five of them recorded on Santo. We identified so far six species, three of which are new island records of decribed species and one —of apparently undescribed one. Twenty one species of anthribids from Saratsi Range and camp site have been sorted so far. The entire Vanuatan fauna is represented by nine species, and only five of them are known from Santo.

The final example includes the Histeridae, a family for which we can provide now the best taxonomic expertise. Histerids are known to be represented in Vanuatu by nine species (Table 12), and at least three are known from Santo (two more is a possibility as island localities for them are not available). We apparently have collected five of these species (although some identification verification is still necessary). One of the undiscovered species belongs to the genus *Bacanius*, tiny dwellers of rotten wood and leaf litter, which are widespread in Oceania and represent a substantial component of otherwise impoverished local faunas. Along with the tribe Acritini, tribe Bacaniini comprise so-called "microhisterids", a group with apparent substantial dispersal and adaptation potential and so an important part of histerid faunas on oceanic islands. The former tribe is also widespread in Oceania, but was not reported in Vanuatu until we found six species at Saratsi Range. One of those species, *Acritus komai*, has almost cosmopolitan range, with known Oceanian records in Mariannas and Hawaii. The total number of histerid species collected in 2006 on Santo is 23 (25 if two extra species collected by different parties of the expedition are included), nearly three times the number known for the entire Vanuatu before the expedition.

Special example: the case of ant "pets"

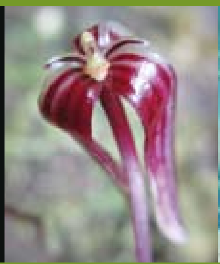
Eight new species from the histerid subfamily Chlamydopsinae represent quite exciting discovery. This Australasian subfamily consists of obligate social insect colonies' associates. These beetles live exclusively in colonies of ants (10 genera in four subfamilies) and termites (one genus) and possess unusual defensive and glandular morphological modifications (Fig. 181) associated with their symbiotic ways of life. Until the early 2000's they were considered to be an almost exclusively Australian group, with no more than seven species (out of about 50 in total) were known outside this continent, from Japan, India, Taiwan, New Guinea and Fiji. The recent surge in systematic research on the group during the last decade has increased the known diversity more than three times and revealed the existence (or potential for existence) of rich local faunas on New Guinea, Borneo, Sulawesi and New Caledonia. The discovery and description of Chlamydopsinae in New Caledonia has doubled the size of local histerid fauna, considered prior to this study well known. Our collecting by flight intercept traps at Saratsi has produced eight species in three genera (*Ceratohister*, *Chlamydopsis* and *Eucurtiopsis*), the number currently known for the entire New Guinea. Biogeographic affinities of the genera suggest both New Caledonian and New Guinean (apparently via Solomon Islands) sources of emigration to Vanuatu. Santovian species of *Chlamydopsis* is closely related to the only two, pretty characteristic New Caledonian species of the genus, while two other genera are known from Greater Sundas, suggesting island hopping through New Guinea and Solomons (where representatives of both these genera however remain to be discovered). This chlamydopsine example is characteristic in several points. The sophisticated symbiotic system of myrmecophilous beetles and their hosts appears to have dispersed to and diversified at a remote Melanesian Island. This discovery also illustrates our poor knowledge not only of the biotas of small remote islands like Santo, but of a major island like New Guinea. Who knows how many big discoveries of poorly known creatures, obscure or not so, await their students in the field or museum storage rooms. Such possibility drives people behind inventories like Santo 2006, united by the goal to add more pieces to the great puzzle of the World's natural history and to preserve the land and its inhabitants for generations to come.

The Natural History of Santo

The islands of the Pacific are renowned for the high levels of endemism of, and threats to, their unique faunas and floras. Espiritu Santo, affectionately known simply as Santo, is an island of superlatives: the largest and highest in Vanuatu, Santo is an extraordinary geographical and cultural microcosm, combining reefs, caves, mountains, satellite islands, and a history of human habitation going back 3 000 years. In the spirit of famous voyages of discovery of the past, the Santo 2006 expedition brought together over 150 scientists, volunteers and students originating from 25 countries. With contributions by more than 100 authors, *The Natural History of Santo* is a lavishly illustrated homage to the biodiversity of this "planet-island". Bridging the gap between scientific knowledge and conservation and education, *The Natural History of Santo* was written with local stakeholders as well as armchair naturalists from all over the world in mind.

Les îles du Pacifique sont célèbres pour le très haut niveau d'endémisme et la grande vulnérabilité de leurs faunes et de leurs flores. L'île d'Espiritu Santo, ou Santo, cumule les superlatifs : la plus grande et la plus haute du Vanuatu, Santo est un extraordinaire microcosme géographique et culturel, avec récifs, grottes, montagnes, îles et îlots satellites, et une occupation humaine qui remonte à 3 000 ans. Renouant avec l'esprit des "Grandes Expéditions Naturalistes", l'expédition Santo 2006 avait mobilisé sur le terrain plus de 150 scientifiques, bénévoles et étudiants de 25 pays. Petit tour de force éditorial avec plus de 100 auteurs, ce *Natural History of Santo* est un éloge de la biodiversité de cette "île-planète". À la fois beau livre richement illustré et bilan des connaissances scientifiques, *The Natural History of Santo* se veut un outil de connaissance pour sa conservation durable. Il s'adresse autant aux acteurs locaux du développement et de l'éducation qu'aux naturalistes du monde entier.



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