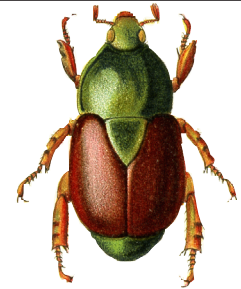


SCARABS



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The *Protaetia cuprea* Complex in France and Surrounding Countries (Coleoptera: Cetoniidae) - Part I

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Protaetia (Potosia) cuprea Fabricius is a complex species and there are many questions about this scarab and its various populations, from Europe to Asia. In this first article, we will examine the taxonomic status of this insect in France, where we have the best knowledge of *P. cuprea*.

We will use the taxa *bourgini* (Ruter), *metallica* (Herbst), *olivacea* (Mulsant), and *cuprea* sensu stricto (see Figure 1). These names were originally used to define the different subspecies of *P. cuprea*. At least for the case of French species, we know that the reality is more complex because some of these populations are sympatric in restricted areas (see map – Figure 2). The term “subspecies” must classically be used for populations that are geographically separated. We think that in the past, this condition was perfectly realized, but the discovery of new populations of *cuprea* presents some localities of mixed taxa, particularly

in the South of France where hybrid specimens can be found. In these areas where different populations are sympatric, there are exchanges of characters between the subspecies of *cuprea*, making some specimens difficult to determine.

But in the majority of regions, the definition of subspecies is well verified. Elsewhere, it is possible to use the term of “mixed populations.” Some authors have discussed the status of *P. cuprea metallica* and think that it is in reality a second species (*Protaetia metallica*). In this hypothesis, *bourgini* would be a subspecies of *metallica*. We think that it would be necessary to breed *metallica* and *cuprea* sensu stricto, cross them and obtain sterile hybrids to prove that hypothesis. This experiment has not been done. Moreover, recent genetic analysis (see bibliography) shows that there are not decisive differences between *metallica* and *cuprea* and we think that these arguments to create two species are unsupported.

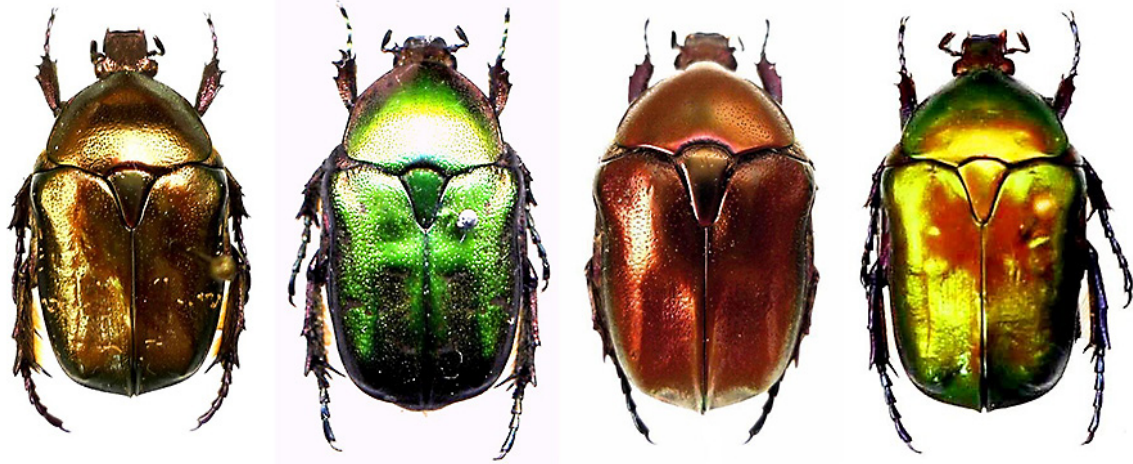


Figure 1:
P.cuprea bourgini *metallica* *olivacea* *cuprea.*

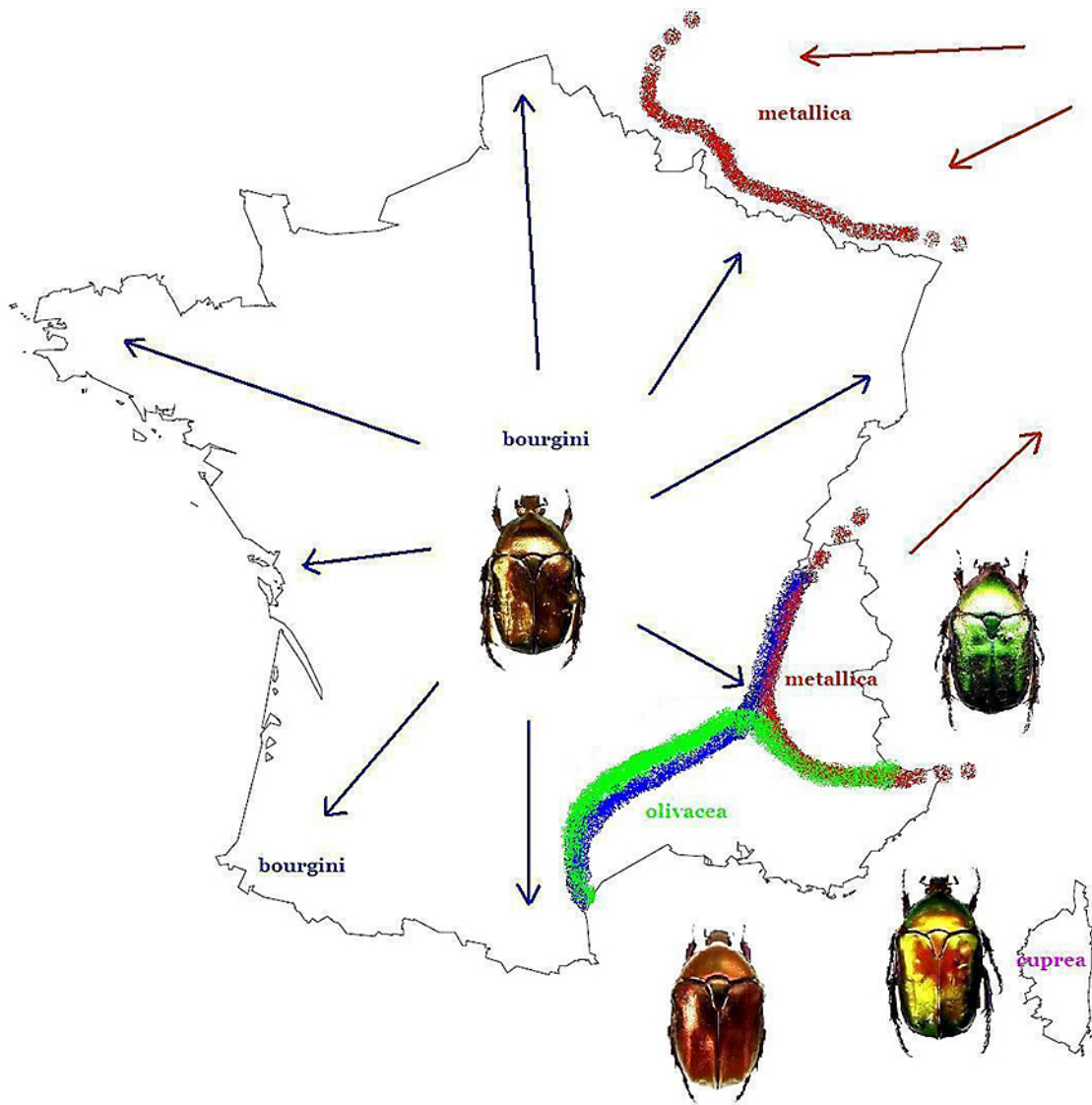


Figure 2: Map of France.

Protaetia cuprea bourgini is the most widely distributed subspecies in France. For a long time, we didn't know the northern limit of this subspecies and thought that this scarab was not present in the North of France where we reside. But recently, our colleague Olivier Boilly confirmed that he found a specimen near the town of Arras, which is the most northern locality that we know for *bourgini*.

In France, *Protaetia cuprea metallica* is the subspecies which is found in the Alps Mountains (Figure 3), from 900 to 2,000 meters in altitude. This insect has adapted to cold conditions (boreo-alpine lineage). As shown on the map, it extends to the east, as far as Russia, was also recorded in Belgium, and approaches the frontier with northern France (red arrows on map). This scarab has a unique biology because it lives in association with the red ant (*Formica rufa* Linnaeus). The larvae grow in the ant-hill, contrarily to the other subspecies which generally live in decaying wood (such as cavities of various trees) or compost of animal manure. At the point of the differentiation of *metallica*, there was possibly an adaptation to a cold climate by utilizing a warmer environment (ant-hill) for the larva to grow. In summer, adults are often seen on thistle flowers, where rare chromatic variations (Figure 4) are sometimes found (see *Scarabs* 37).

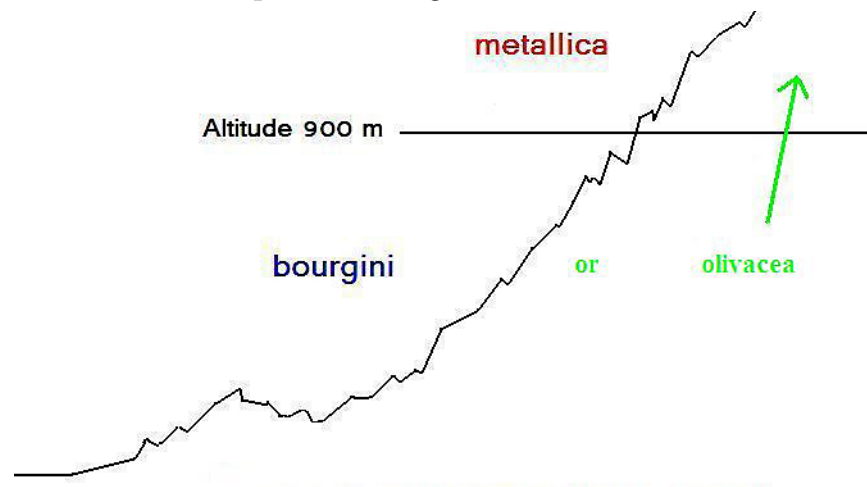


Figure 3: Habitat of *Protaetia cuprea metallica* in the French Alps.



Figure 4: Atypical *P. cuprea metallica*.

Within the boundaries of the French Alps, *P. cuprea bourgini* exists in the valleys but is replaced by *metallica* in the montane habitats above an altitude of about 900 meters. It seems that *bourgini* is not sympatric with *metallica*, staying under 700 or 800 meters in altitude, and no hybrids are known between these two subspecies (see Figure 5).



Protactia cuprea in the boundaries of french Alps

Figure 5: Distribution by altitude.

Protactia cuprea olivacea is a Mediterranean subspecies (see Figures 6, 7, 8 and 9 for some variations), found in the South of France, and is adapted to a warmer and drier climate. Its population extends toward the north, meeting *bourgini* in some places where hybrids are found. This phenomenon can also happen in some areas of the extreme southeast where the higher altitudinal range of *olivacea* meets the lower altitudinal range of *metallica* (see Figures 2 and 5).

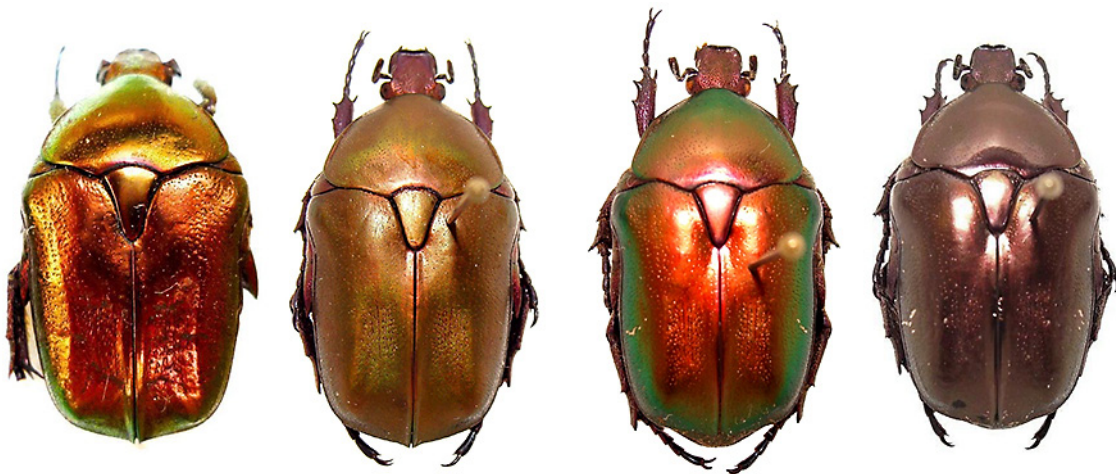


Figure 6.

Figure 7.

Figure 8.

Figure 9.

Variations of *P. cuprea olivacea*:

Figure 6: Region of St Jean-du-Gard (South of France).

Figures 7 and 8: Bouyon (Alpes-Maritimes - South-East of France).

Figure 9: Bois de Païolive in Ardèche (South of France) – Exceptional color (found by Pascal Stéfani in 1998).

Protaetia cuprea cuprea is found on the island of Corsica, in the South of France. It is also found in Italy. This scarab has a vitreous aspect which is not present in the other subspecies of *cuprea*. Beautiful chromatic forms are known (Figures 10 and 11).

In the North and North-East of France, and in the boundaries with Belgium, there is no contact between *bourgini* and *metallica* to our knowledge, but the exact limits of the range of *bourgini* are not really known near France's boundary with Belgium.



Figure 10.



Figure 11.



Figure 12.



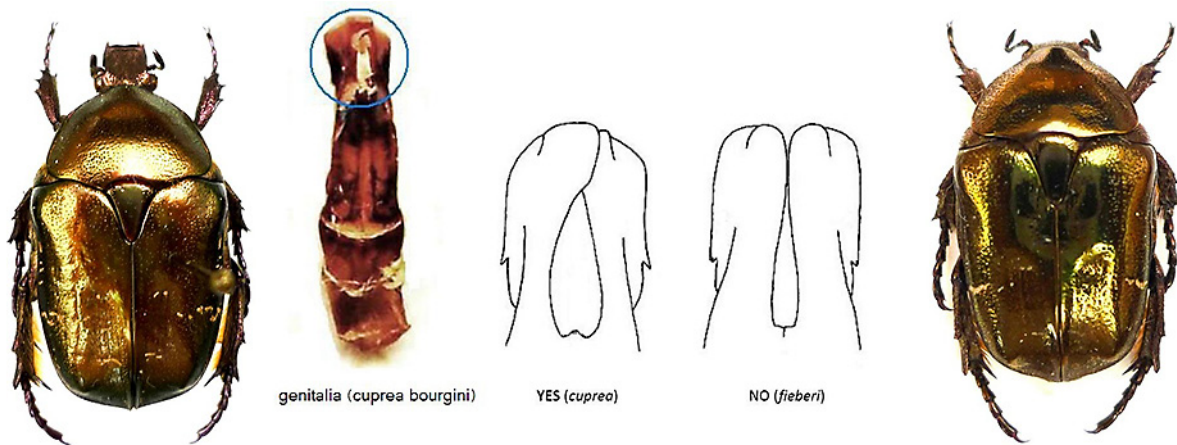
Figure 13.

Figures 10 and 11: Variations of *P. cuprea cuprea* (Italy, Corsica).

Figure 12: *P. cuprea bourgini* (Brive – South-West of France) - This subspecies is not very variable and often bronzed, sometimes with greenish or gold reflexions.

Figure 13: This specimen looks like *bourgini* but was found in a population of *olivacea* (Barles, in the Alpes-de-Haute-Provence, South-East of France), far from populations of *bourgini*. This variation can occur in various populations and is associated with “genetic drift.” The cause could also be the proximity of *metallica* populations and possible interbreeding.

In many parts of France exists a twin species of *Protaetia cuprea* which looks very much like the subspecies *bourgini* with which it often cohabits: it is *Protaetia fieberi* Kraatz (see *Scarabs* 36). With some practice, one can distinguish these two scarabs but to be sure, it is necessary to look carefully at the knees (the joint between the hind tibia and femur) of the beasts: *cuprea bourgini* has a little white spot but not *fieberi*. One can also extract the genitalia for a sure identification (see Figure 14). Genetic analysis recently (2008) confirmed significant differences between these two insects (see bibliography).



P. cuprea bourgini.

Figure14: Comparison of genitalia.

Prottaetia fieberi.

To be continued. The next article shall discuss *P. cuprea* from France to the Orient.

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Bug People XVIII

from the Secret Files of Henry Howden

Do you know these entomologists, shown here with Anne Howden, the Howden children and local children? The answer is at the bottom of this page.



The coleopterist on the left is a well-known Swedish entomologist. At the time was working on a revision of Canadian Carabidae. He not only published on ground beetles, but perhaps was better known for papers on zoogeography. His home base was Lund.

The second man standing lived in Creston, British Columbia. This photo was taken in his backyard. He concentrated on beetles from British Columbia and his collection is now at the University of British Columbia in Vancouver. He was a miner, but also published several books of poetry. Hatch's western beetle books cite his collection records frequently.

Answer: Carl Lindroth (left) and Gordon Stace-Smith.

In Past Years - XLI - 1998

by Henry F. Howden

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Since we had retired in 1995, we were free to travel when we wanted. This time we were invited by Bruce Gill, instead of the other way around, to go for three weeks to Bolivia. He had been invited to return to Bolivia to evaluate the “Noel Kempff Mercado Natural History Museum” in Santa Cruz, Bolivia. His way was paid, but we would be tolerated if we helped curate some of the beetle collection. A four-wheel drive Toyota (or something like it) would be provided for weekends, some evenings and for the last week of our stay. Since we had not been to Bolivia, it took only a few seconds to say yes, we would be happy to go.

The three of us left Ottawa on March 21 - in a snow storm. Flights were delayed in Toronto because of heavy snow and we just made the Miami - Santa Cruz flight which was also delayed. We

landed in Santa Cruz the next morning and were met by the Museum Director, Dr. Mario Suarez Reglos, and by Julieta Ledesma, head of Entomology. We toured the Museum, but not Entomology, which was situated at the Gabriel René Moreno Autonomous University, some distance from the Museum. Later, we were taken to a very nice old motel with lovely treed grounds. There was a light rain in the evening, but we braved the weather and collected several beetles (new to us) at the motel lights.

The next day was spent at the Museum; Bruce was introduced to the various departments and shown some of their collections; we tagged along as tolerated extras. That evening we returned to our motel, but one of the administrative types found out where we were staying. The next morning we were moved to “better” lodging - the new “House Inn” where the Museum received a discount (the price being less than where we had been staying). While the Inn was like a small hotel, it lacked the treed grounds and the diverse beetle fauna (Photo 1).

The three of us went to the University the next day to see the insect collection. Julieta showed us around and explained that the collection was at the University, partly because the Museum did



Photo 1: A view of part of Santa Cruz taken from a window of our ‘new’ lodging at the Inn.

not have much space and partly because they could use student help. The mounted part of the collection was in a great variety of cabinets and boxes, but the specimens were generally in good condition and parts were well-curated. Many groups, including the scarabs and weevils were partly named. Unfortunately, much of the collection was either stored in alcohol or in a large freezer. Entomology had a very small budget and lacked money for pins! We had brought along 5,000 pins, but many more were needed. When we asked about the necessary collecting and export permits, we were told that half of everything collected should be left behind. We then pointed out that not only would that be difficult, but it would all be placed in the freezer. We then asked if they would prefer to get a synoptic collection, mounted and labeled and identified as well as we could? After some thought our offer was accepted, and several years later they received boxes full of mounted specimens. The most difficult part was getting the shipment from Ottawa to Santa Cruz.

For the next few days Bruce worked at the Museum, while Anne and I worked at the University. I quickly learned that taxi rates varied and it was better to negotiate before getting in a taxi. There was a line of taxis at one place at the University and we quickly became known as the “five peso” pair. A few taxis wouldn’t take us, but most argued, then agreed to take us to the Inn for that amount. It was one of only a few times that I believe we paid what a “local” would. During the



Photo 2: Part of a large sandy area just east of Santa Cruz. The sand formation, I think, was mostly formed by wind-blown sand during the Pleistocene. As the sand formation was relatively recent, there seemed to be few, if any, endemic insects.

next two days we worked on the beetle collection. In the late afternoons Bruce managed to liberate a vehicle so we went collecting near the city. The first time we tried to find an area called “Las Dunas”, but at dusk stopped in a sandy area (Photo 2) and put out our lights. Twelve species of scarabs were collected, the largest being a *Cyclocephala*. About nine it started to rain, which it did frequently (we were at the end of the rainy season), so we picked up and went back to the hotel.

While working on the collection, I found an undescribed species of *Athyreus*, collected by Fray (= Friar) Andras Langer. He was a frequent visitor who donated a large number of specimens to the Museum and was generally interested in Natural History. He was a priest in a small town called Pampa Grande situated in a dry valley in the foot hills of the Andes. It was where he had collected four specimens of a new *Athyreus*



Photo 3: Foothills of the eastern side of the Andes on the way to Pampa Grande; not easy collecting.



Photo 4: Fray Langer's church near our lodging in Pampa Grande.

and he invited us to visit him over the weekend. He had a small lodge reserved for visitors and we would be welcome as his guests. His invitation was welcomed, and with several days left before the weekend we could get anything needed for the trip. After working the rest of the day on the collection, Bruce, Anne and I drove to the Rio Pirai, a large river at the eastern edge of Santa Cruz. The river banks were a mixture of small trees and shrubs. Beating yielded numerous weevils and several *Strigoderma*, as well as a mixture of other beetles. A black light set near the river attracted about eight species of scarabs and several tiger beetles. In the brief time we spent, we had good collecting. Later we learned that the river bank at Santa Cruz was the type locality for several species of scarabs named by Antonio Martínez.

On Saturday morning Bruce, Anne and I collected a car and drove (Photo 3) to Pampa Grande (Photo 4). Our lodging was fairly primitive consisting of a rather shaky bunk bed with the top just strong enough to hold Anne, me on the bottom and Bruce on a straw mattress on the floor. One wall had several long shelves, the lower one with twin hot plates and plates and cutlery. The top shelf held our food. In the back wall was a door that opened onto a small walled yard with a curtained toilet and cold water shower. Numerous mosquitos made sure one did not linger there too long. Sometime during the night mice enjoyed our bread, leaving us with food in tins; not very useful for sandwiches.

We had arrived early in the afternoon, so after dropping off some of our sleeping bags etc., and getting directions from Fray Langer, we drove past the town into the adjacent valley. There were a few cleared fields, but much of the area contained a great variety of cacti (Photo 5) and other arid-adapted plants, with perhaps 20% of the cacti endemic. There had been some recent rains, so we were lucky. A few dung traps were set and the few dung piles were excavated, not with anything unusual appearing. Sweeping was useless, as everything had spines, and one normally doesn't sweep cacti. So we all used beating sheets (Photo 6), or looked under anything we could find. Despite the damp soil, no beetle burrows were seen and general collecting produced few scarabs, more weevils and cerambycids, but nothing spectacular. Our lights that night had the same, rather poor results, perhaps influenced by a nearly full moon. I did not manage to collect any of the new *Athyreus*, so everyone had to put up with my complaints.

On our way back to town we shined our head lights on the walls of several houses and saw many *Triatoma infestans* (Photo 7) on the wall; in one place there were 18 in the beam of one head light! As we knew that the bugs transmitted Chagas, a disease that gradually affects the heart, I asked Fray Langer if many in town had the disease. He replied that almost everyone had it, but I did not have to worry, I was too old; Chagas might take 40 years to kill you, and other things would



Photo 5: The valley filled with cacti near Pampa Grande; 20% of the cacti are endemic to the area.



Photo 6: Some of the cacti that withstood Anne's best efforts with the beating sheet!



Photo 7: *Triatoma infestans*, one of the assassin bugs that transmit Chagas disease which was extremely common in Pampa Grande Photo by Jocelyn Gill.



Photo 8: A Harpy eagle, a species we were likely to see only in a cage.

kill you first - a pleasant thought! Still, I didn't like the idea of being bitten.

The next morning we found that the mice had enjoyed our planed breakfast, so we improvised and then left for a morning of collecting. Beating yielded nothing new, but our dung traps contained numerous species, some we had not seen before. We returned to town shortly after noon, and went to a house that the Fray told us was the only place in town that served food. The meal of the day was stew, a large serving in a large bowl. It was adequate, but the meat was difficult to identify and tough. In the late afternoon we started back to Santa Cruz, stopping at a few places to do some roadside collecting. At dusk there was a light rain falling as we reached the last of the foothills before Santa Cruz. There was a pull-off in a small wooded area and I set up our black light for an hour. It was not a very fruitful stop, the total collection for the hour consisting of four *Canthidium* and one *Ataenius*. Dinner that night was at 9:30 in our hotel. Afterwards, we curated the day's catch.

The weekend over, Bruce went back to assessing the main Museum collections, while Anne and I went back to curating the beetles. Night collecting consisted of collecting from the hotel lights; these yielded mostly aquatic and cerambycids. This routine lasted two days, the second day interrupted by a birthday party for an

entomology student. It turned out to be slightly different - the student forgot he had a birthday and came in an hour and a half late! I was sorry that my Spanish wasn't better - the remarks I did understand were either very funny or rude.

By mid-week Anne and I had done as much as we could, so we took a taxi to the Rio Pirai and spent the afternoon collecting. The only scarab that we had not seen before was a *Strigoderma*, but there were many weevils and other beetles to make it great collecting. Another day was spent at the city zoo; some of the local fauna (Photo 8) being of particular interest to us. There was a large monkey cage around a tree that housed a troop of monkeys. One had gotten outside of the cage and had then decided that life was better in the cage. The antics of the monkey trying to get back into the cage kept us amused for some time.

While working on the insect collection we met Paolo Bettella, an immigrant from Italy, who owned a "snake farm" nearby, east of Santa Cruz. He was interested in insects and invited us to stay at his guest house for four or five days if we could "liberate" a vehicle from the Museum. When we did get our four-wheel drive Land Cruiser, the Museum also furnished us with a guide to get us to a "village" called Potrerillo del Guenda (with one small store and a few scattered houses) where he would leave us with directions on how to get to the "farm". It sounded easy, but turned out otherwise! We first had



Photo 9: Another sandy area on the "road" to the "snake" farm.

to cross the Rio Pirai. Fortunately, trucks had made a firm, rocky bed across the river at a shallow point and we were able to cross with no problem. The road beyond the river was no more than a dirt tract, which initially was sandy (Photo 9), then mostly clay. Puddles were numerous after we had passed the sandy section. One puddle turned out to be deeper than the others and we became well and truly stuck (Photo 10)! Our four-wheel drive simply dug us in deeper and stirred up the mud. The Toyota



Photo 10: When the "road" bed turned to clay, one of the puddles was deeper than the others and we had to winch the car out. Photo by Bruce Gill.



Photo 11: Part of the town of Potrerillo del Guenda where our guide left us.



Photo 12: The large river just before the “snake” farm. The crossing was marked by several branches stuck in the bed of the river.



Photo 13: The wide, sandy beach on the “snake” farm side of the river. Several species of beetles were collected only in this habitat.

finally had to be winched out and we were lucky to find a dead stump strong enough to hold the cable. After that, we did manage to do a little collecting on some flowering bushes, before reaching the “village” (Photo 11). There our guide left us and we drove on, to be faced by another river crossing. This crossing had a steep clay bank down to the wide river, which had a few sticks stuck diagonally across the river to mark the way (Photo 12) and a wide, sandy strip on the other side. We tried to measure the water depth, but finally took a chance, and following the line of sticks made it to the other side. The sandy beach (Photo 13) ended at the forest edge and the trail turned to clay again, but fortunately it was not steep nor very wet. A few hundred meters further and we arrived at Paolo’s housing. The housing and rooms for guests were much better than we had expected. Real comfort, with several beds in each room and an attached bathroom the size of a bedroom. There was a similar building on the other side of a dirt courtyard with a screened-in kitchen and eating area on one of the open sides of the courtyard.

All of this came as a real surprise, as it had taken us about six hours to drive the 46 km from Santa Cruz to Paolo’s farm. It must have been a real problem getting all the cement and bricks from Santa Cruz to build the rather elaborate buildings, the dirt yard (Photo 14) between the buildings also answered a question that had long bothered me - do any scarabs utilize bird droppings?

As was often the case, there were a number of free ranging chickens around the buildings, as seen in their droppings in the dirt of the courtyard. Small piles of dirt were seen beside some of the droppings. After noting a number of the dirt piles, some were excavated and, to our surprise yielded two species of *Canthidium*. While chickens are not wild birds, they are birds and there were enough burrows under their droppings to rule out a one-time, chance event. So, bird droppings may be used by some small scarabs as a food source!

It should be mentioned that rent for our stay consisted of bottles of red wine (we had been told this by the museum staff). We took as many bottles as we could easily fit in our vehicle, but between Paolo and his Italian helper, with a little help from us, our supply vanished in three days. Things were not quite as cheerful thereafter, but the supplies did not totally dry up. For our part, beetles kept us busy and happy, except during hard rains. These occurred with some frequency, even though it was supposed to be the end of the wet season; so much for weather forecasts! Our lights were not very productive during our stay, as there was a nearly full moon that influenced the catch at times when it was not raining. Dung traps and our flight intercept traps (FITs) did well and produced *Phanaeus*, *Eurysternus*, *Oxysternon*, *Canthidium*, *Onthophagus* along with a number of other genera. One male *Athyreus* was collected in my FIT, and Bruce also took one in his FIT (Photo 15),



Photo 14: The yard between the farm buildings where we collected two species of *Canthidium* feeding on chicken droppings.

while others could be heard for a short time at dusk buzzing around in the surrounding forest.

Daytime collecting was slower, but a number of different species were collected. There was a yellow flowering tree (that we thought might be a *Cassia*) that had a number of different melolonthids attracted to its flowers along with other beetles. A number of beetles were collected by sweeping in open areas with short vegetation, but no scarabs of interest were taken. Some *Canthon* were taken in forested areas sitting on leaves; the same species were also collected in dung traps. Along the broad, sandy strip along the river were several tiger beetles running around, but finding *Canthonidia rubromaculata* (Photo 16) feeding on old dung and even an old piece of a large, rotting seed was surprising. We found that species only on the sand fringing the river.

We spent part of the day at the snake pits that contained mostly rattlesnakes that were milked for



Photo 15: A male *Athyreus forcipatus* collected by Bruce in his FIT set in the nearby forest. Photo by Jocelyn Gill.



Photo 16: *Canthonidia rubromaculata* collected on dung only on the broad, sandy area fringing the river. Photo by Jocelyn Gill.

their venom (Photo 17), which was then used for the making of anti-venom. We did not ask where the anti-venom was produced; probably in Brazil which had laws about importing snake venom. We do know that Paolo would not allow his picture to be taken, but it was OK to photograph the venom-milking process. One way or another, it must have paid well, as it did not appear to be a very productive farm otherwise.

On our last day black clouds appeared and we thought about leaving, but before we could pack-up, it started to rain heavily. It rained all night but cleared by dawn, allowing us to collect any remaining traps and finish packing our car. As soon as we reached the nearby river we knew there were problems. The river was definitely higher and some of the sticks marking the crossing were gone. Since we had to return to Santa Cruz that day, we took a chance and fortunately made it across the river. The steep, muddy bank beyond our crossing was another matter. There was a sharp turn at the base (Photo 18), so we couldn't get up any speed and our four-wheel drive only allowed us to get up the lower half of the bank. After several tries (Photo 19), we had to resort to the winch again and finally pulled the car up the bank. Bruce, who had done most of the work, was somewhat muddy, to say the least. We managed to avoid the deep mud hole that had caused problems before and drove on.

Just before we reached the large Rio Pirai we came to a small branch of the river that we had crossed on our way to the farm with no problem. It was now a fast-flowing small river (Photo 20); we had no choice but try to cross it. After some contemplation, Bruce drove the truck into the flood. Water came over the hood briefly and the car started to drift sideways for a moment. Then the wheels caught bottom and we made it to the other side with the gasoline engine sputtering. We stopped for a few minutes to let the wet motor dry off, then drove on to the main river to find it only slightly higher and with trucks still crossing . There was no further difficulty and shortly we were back at the hotel.

There was some confusion about our room, not unusual in Latin America, but we finally were settled in a new room, ate and went to bed. The next day we went to Entomology for export permits, packed and in the evening had a farewell party in a swank ice-cream parlor. Almost everyone we had met was there and it was a great send off, ending about 10 PM, thank goodness. Before going to bed, Anne noticed some small lumps in her feet and I found several in mine. They were not painful and using our very sharp forceps, we dug out a brown center in each of the lumps. As it was late, we didn't try to figure out what had caused the lumps, but simply disinfected each excavation and went to sleep.



Photo 17: Milking a rattlesnake. I prefer collecting beetles! Photo by Bruce Gill.



Photo 18: Brush pile caused by high water at the base of the trail we had to take up the river bank.



Photo 19: Stuck again, half way up the river bank. Photo by Bruce Gill.



Photo 20: A small branch of the Rio Pirai, which proved to be deep and fast enough to push our car sideways before we managed to get across.

The next morning we had lots of time as we were returning on the same flight that we had come in on three weeks before. The plane was slightly late, then had to be cleaned and refueled before it left for Miami. It made little difference to us, since we had planned to overnight in Miami anyway. Miami was warm and dry and checking the lights near our motel yielded a tenebrionid. April 8th saw us back in Ottawa, and there was bare ground (no snow)!

Several days after our return, Anne found another lump in her foot. This time we had an audience - Bruce. We dug out another brown mass and this time had a microscope to see what it was. It turned out to be a burrowing flea (chigoes - genus *Tunga*). We had never encountered them before and were very lucky that none had lodged under a toe nail. If they get under a toe nail they are said to be very painful and need to be removed surgically! Our example, even though damaged in its removal, was preserved at Bruce's insistence and now resides in the collections kept at the Canadian National Collection. Anne has the honor (?) of being listed as the host!

Unfortunately, we must end this on a sad note. Six weeks after we returned, we learned that Paolo Bettella had died from malignant malaria. We were glad we had taken our pills!