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SCARABAEUS

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Editorial: A message to our readers

Dear reader and fellow scarab enthusiast,

A year has gone by since the first issue of "Scarabaeus," and it hasn't been a smooth year for most of us. COVID-19 continues to wreak havoc around the world, and some of the measures to slow its spread are causing psychological and economic problems themselves. However, with the widespread availability of vaccines, there is light at the end of the tunnel, though this is tempered by the hesitance or plain unwillingness of large groups of people to get vaccinated, which may prolong the pandemic into next year.

For us, as scarab collectors and researchers, it has been tough too, with collecting trips being cancelled, museums and universities closed and in-person meetings with colleagues restricted. At the same time, natural disasters such as droughts, floodings, forest fires and ice melts, exacerbated by climate change, have continued unabated, whilst the effects of pollution and invasive species are wreaking havoc on specimens and native ecosystems, further harming them. In spite of the difficulties, we must continue our efforts in the hope that meaningful laws and policies are not just enacted but also effectively enforced so that we may, at long last, reduce the devastating impact that humanity is having on all forms and aspects of life on this planet.

On a much more positive note, we have been able to complete another issue of your Scarabaeus Newsletter. We are happy to present to you:

- The adventures of Brett Ratcliffe behind the Iron Curtain in pursuit of types of *Gymnetis*, in which he visited several collections and could personally notice that equal does not always equal equal;
- Stéphane Le Tirant's account on the cultural significance of those enormous scarabs that form the tribe Dynastini;
- A story on the evolution of the design of Auke Hielkema's baited pitfall traps. It was actually his intention to follow up his previous story on the design of a beating sheet with a tale on a novel way of using such a sheet. However, renovation and pandemic-related accessibility issues at the Naturalis museum in Leiden prevented imaging some specimens he deemed vital to his narrative;
- An addenda and corrigenda by Mario Cupello on his elaboration of how he found type material of Harold in the Dresden museum;
- Steven Barney's short tale on live-trapping *Phanaeus vindex* and getting smoked by a poorly controlled forest fire.

Once again we plead with you, our readers, that you provide any stories related to scarabs that you might have. We know that there are hundreds of scarab workers, each of them with many stories of unexpected discoveries, novel collecting methods, awesome or crazy travel tales and fun meetings with colleagues. All these anecdotes, however small or trivial, are interesting and a valuable source of information about and for our community and we are keen to hear about them. So please, send us your stories; what may seem mundane to you may open a world that we didn't know about to the rest of us.

We wish you happy reading and writing, good health and a speedy return to normal collecting and research activities!

The editors

East Berlin diary, 1980

by

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As I walked towards the inspection shed on the East German side of the Berlin wall at Checkpoint Charlie (near Friedrichstrasse and Zimmerstrasse), past the guard towers and zig-zag concrete barriers, I did so with a blend of trepidation and anticipation. After all, this was East Berlin during the Cold War, the setting of many espionage intrigues like Ian Fleming's *James Bond* and John le Carre's *The Spy Who Came In From The Cold*. With perspiration coursing down my neck, the East German immigration officer demanded "Dokumente bitte," thus snapping me back to reality. But wait! How did I get here?

From 1978 to 1990, the National Academy of Sciences (NAS) conducted a competitive program of scientific exchange with the Academies of Sciences of the USSR and Eastern Europe. The disciplines included in the exchange were natural, mathematical, medical engineering, and specific social and behavioral sciences. Selection criteria for an exchange candidate, aside from prior accomplishments and references, included the special value attached to working at a particular institute, its scientists, and acceptance by the receiving academy. The NAS provided transportation costs for the recipient, and the receiving academy provided housing, transportation costs, and an allowance for food and miscellaneous expenses. I tried my luck (nothing ventured, nothing gained) and applied in October 1979 for an exchange with the Academy of Sciences of the German Democratic Republic (GDR) with the specific goal of working on generic revisions of Neotropical Gymnetini (Coleoptera: Scarabaeidae: Cetoniinae) at one of the finest scarab beetle collections in the world, the Museum für Naturkunde der Humboldt Universität in East Berlin. My prior scientific contact (International Congress of Entomology 1976) at the museum was Dr. Fritz Hieke, the senior research curator of the Coleoptera collection. Much to my shock and delight I was approved in March 1980, and on the the 1st of September 1980 I boarded a flight from Nebraska to Tegel Airport in West Berlin and then took a taxi to Checkpoint Charlie (Fig. 1) on the west side of the Berlin Wall separating East and West Berlin. I was relieved to clear the East German security check quickly with only a cursory inspection of luggage. Dr. Hieke arrived in his car, and we were off to the museum.

Fig. 1. Checkpoint Charlie separating East and West Berlin, 1980. The Berlin wall is in the background.

The museum

The museum's collections date from 1716 when the Academy of Sciences began to obtain natural history specimens. The museum, along with the University of Berlin, was founded in 1810, but the large and ornate building housing the museum on Invalidenstrasse was built between 1883–1889. The heavy bombing during WWII very nearly destroyed all of Berlin, and extensive damage and some ruins were still everywhere in East Berlin in 1980, 35 years after the end of the war. Post-war recovery was clearly a work in progress. The Museum für Naturkunde survived the heavy allied bombings of 1943–1945, but the East (Coleoptera) Wing was totally destroyed by bombs in 1943. Miraculously, the beetle collections and library had been transferred to the basement just a week earlier and were not damaged. The gutted ruins of the Coleoptera wing (Fig. 2) were still standing at the time of my visit, and hundreds of bullet and artillery shell pockmarks on the exterior of the museum building were much in evidence. It was an intensely sobering experience to imagine the street-to-street skirmishes when the Russian army arrived. Nevertheless, the museum was the first museum in Berlin to re-open after the war on 16 September 1945. The museum is internationally famous both for the largest mounted dinosaur skeleton in the world, *Giraffatitan brancai*, and for an excellent specimen of the earliest known bird,

Fig. 2. The bombed-out remains of the East Wing of the Museum für Naturkunde, 1980.

Archaeopteryx lithographica. My first impressions of the public exhibits (most were closed) in 1980 were of dated, run-down, poorly illuminated galleries but with immense possibilities for the future.

The Coleoptera collections increased greatly between 1880–1930, and most of the scarab material dates from this time. There are about 8 million prepared beetle specimens and approximately 2 million unprepared specimens, principally from Africa, China, and Europe with the Neotropical and Oriental regions not far behind. The 1–2 million scarabs (in 1980) occupied an impressive 1,775 drawers in double stacked wooden cabinets (Fig. 3). The collections were expertly curated by Joachim Schulze (chief entomology preparator), research curators Dr. Fritz Hieke (1930–2015, Carabidae) (both Fig. 4) and Manfred Uhlig (1949–present; Staphylinidae), and Dipl.-Biol. Hella Wendt (Bruchidae). I have never met anyone more willing to assist a visitor and expedite research on Coleoptera than these four dedicated entomologists working under the less-than-ideal conditions of the post-war, impoverished GDR, with few supplies and an ageing, war-scarred museum building. Some staff at the Museum ruefully mused, confidentially and in private, that the Museum was only 500 meters on the *wrong side* of the Berlin Wall.

I was housed in a large, high-rise apartment block at Zechliner Strasse just off Leninallee and Ho-Chi-Minh Strasse, the names of which give you an idea of the political climate. The flat was “spartan-modern” and came with a small kitchen and bathroom. A food store (Kaufhalle) was close by for groceries, but it in no way resembled a “supermarket” since it had little fresh produce (but always cabbage and potatoes), a few dry goods, and often unrecognizable meat offerings (except for the ever-present sausages). There was good public transport via tram once you ascertained the correct tram number from the flat to near the Museum. During those grey autumn days, the odor of coal smoke was everywhere.

My first working day at the museum began with Herr Schulze personally showing me the entire scarab collection, *drawer by drawer*, until noon. He was rightly proud of the holdings and organization, but it was a challenge to not get zoned out viewing tiny aphodiines this way (apologies to any aphodiine people). Lunch was customarily taken away from the museum, and on that first day I took it at the Charité–Universitätsmedizin Berlin café with Hella Wendt, whose museum office space I shared. Seating at all restaurants in the GDR was shared with total strangers in true socialist equality. That afternoon I met Bernhard Klausnitzer (1939–present, visiting from the University of Leipzig, a specialist on Coccinellidae and Scirtidae) who was the chief organizer for amateur coleopterists in the GDR, and I was able to arrange with him a seminar presentation later in the stay.

I brought small gifts for colleagues: coffee, chocolates, western magazines, and correction fluid (a big hit!). The small pocket calculators I gave nearly overwhelmed the recipients, since these were uncommon and expensive. I had to

Fig. 3. BCR in the scarab range of the Museum für Naturkunde, 1980.

Fig. 4. Dr. Fritz Hieke (left) and Joachim Schulze, Museum für Naturkunde, 1980.

register at the GDR Reisebüro that arranged all travel for foreigners and also the American embassy where I could send and receive mail. While walking, I was approached by someone wanting to exchange currency but was wary of possible entrapment by the Stasi, the state security service and one of the most effective and repressive intelligence and secret police agencies ever to have existed.

The research

My research with the collections over the next month consisted of examining thousands of *Gymnetis* specimens to establish morphological and geographical species limits. Gymnetine adults are mostly diurnal visitors to flowers, ripe fruits, and sap flows. Their larvae develop in rotting wood or compost where they feed on decaying plant matter. The extensive data from this collection would eventually help to provide specimen-based foundations for my gymnetine revisions that were finally published years later (Deloya and Ratcliffe 1988; Ratcliffe 2004, 2005 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2017, 2018, 2019; Ratcliffe and Deloya 1992; Ratcliffe and Mico 2001; Ratcliffe and Warner 2011; Shaughney and Ratcliffe 2015). Over the past two centuries, many new species had been described, often from single specimens, without any reference to, or comparison with, previously described species, thus leading to a proliferation of species, subspecies, and varietal-level names. The unknown deposition and scattered nature of any remaining type specimens was a major impediment to providing a definitive treatment of the genera. There had never been a reliable way to identify species because most of the descriptions and few illustrations were too general to be of diagnostic value, and no identification key to all the species had been published previously. What might appear to be a single species of these beautiful beetles could easily be several, and what appears to be several different species may be only one. The *Gymnetis* revision in particular was similar to trying to assemble a 1,000-piece jigsaw puzzle, where some pieces are lost and others have been chewed up by the family dog. Wallbank et al. (2016) conducted molecular research on the diversity of colors and patterns on the wings of certain Amazonian butterflies and found that this kind of diversity arose through novel switches in the genome that turn genes on in new contexts during wing development, thereby producing new patterns. Although the switches evolved only once, they were then repeatedly shared between species by hybridization and introgression. In addition, recombination among these switches produced new combinations of patterns within species, much like what we see in *Gymnetis* species (Fig. 5) today. The complex and often overlapping patterns and colors shared among some *Gymnetis* species may be a result of a similar mechanism.

Fig. 5. *Gymnetis merops* Ratcliffe on cherry tomatoes in Peru. Photo by B. Cevallos Gil.

On the 5th of September, I gave an evening seminar on my two years (1976–1978) of entomological research recently conducted in the Brazilian Amazon to the Kulturbund der DDR Fachgruppe Entomologie (amateur entomology club), in a stiflingly hot room . . . perhaps apropos for an Amazonian talk. On the 12th of that same month, I gave an afternoon seminar in English (but with German language data slides I had prepared in advance) to about 25 museum faculty and staff on my lengthy pitfall trapping studies on Amazonian dung beetles. The presentation was enjoyed with many thanks despite the partial language barrier.

On the 6th of September, Herr Schulze accompanied me to see the museums on Museum Island in the center of East Berlin. The Bode Museum (Byzantine art) was closed, the Neues Museum was still rubble from the war, the Pergamon with its Greek altar and Ishtar Gate from Babylon was fantastic, and the Alte Nationalgalerie (fine art) and the Altes Museum (classical antiquities) were excellent (but with many closed galleries). One Sunday I visited the zoo that was on the former estate of a baron and was also the place of fierce fighting during WWII. The zoo was surprisingly good (landscaping and species diversity), and I saw more Russian soldiers here enjoying a day off than in any other place (Fig. 6).

A few days later (the 10th) I attended the opera *Parsifal* by Richard Wagner (1818–1883) at the Berlin State Opera, a monumental building constructed by Frederick the Great between 1741–1743. The building was heavily damaged during the war and rebuilt in the early 1950s. The opera was excruciatingly long at five hours, made more so by the pretentious and wooden performances. And yet, not having learnt my lesson, on the 20th I attended yet another long Wagner opera, *Tannhäuser*. Yikes. On the 11th, Dr. Uhlig took me to lunch at a fine restaurant in the Palast der Republik, a modern building near the opera that housed the parliament of the German Democratic Republic and various cultural venues. Here I became fond of Russian soljanka (соля́нка) soup, a vegetable and beef concoction that was one of the most popular dishes in East Germany.

Fig. 6. Russian soldiers enjoying a day at the zoo, East Berlin, 1980.

The weekend of the 13th–14th September was cold, grey, and rainy. I took the S-Bahn to Schönefeld and then a train to Potsdam near Berlin where I was met at the station by Dr. Uhlig who had invited me to spend the weekend at his home. Potsdam is the site of the Sanssouci Palace complex that was the summer home of the King of Prussia, Frederick the Great (1740–1786), and the German Kaiser until 1918. We visited many of the Renaissance buildings and formal gardens that were part of the complex, including the Charlottenhof Palace, Orangery, and the New Palace. Most of these grand palaces were in disrepair because the impoverished East German economy lacked resources for renovation due to German post-war reparations given to the USSR. The nicely maintained Cecilienhof Palace, however, with its magnificent and intricate woodwork, was the site of the August 1945 Potsdam Conference where Harry Truman, Winston Churchill, and Joseph Stalin met to decide the future of postwar Europe. After dinner at his home, we shared a bottle of Algerian wine, and I showed slides of the University of Nebraska and Lincoln, and Manfred showed slides of Leningrad and Bulgaria in a continuing cultural exchange.

On the evening of the 16th of September, I was fortunate to get a ticket at the Metropol-theater for a performance by the Berlin Symphony of the GDR of Gustav Mahler's first symphony. It was a stunning performance of one of my favorite classical works, and to hear this quintessential German composer's piece played to perfection, *in Berlin*, was almost mystical.

A few days later (21st) I met Joachim Schulze at the Alexanderplatz clock, and we took the S-Bahn to his flat in Köpenick. We had a grand lunch with his family and then went to explore the rolling hills and forest near the Grosser Müggelsee, the largest of Berlin's lakes. Here I collected my first European scarab beetle, a shiny black *Geotrupes*

stercorosus (Scriba), but released it as an homage to beetle biodiversity. We returned to his flat for lemon fluff cake, cherry juice, and broken conversation since neither of us were fluent in the other's language. Considering the political divide between governments of the east and west at the time, it was gratifying to experience warmer relations at the person-to-person level, a situation I have found to be the case in all of my travels.

On the 22nd of September, and after some negotiations with the Reisebüro, I was *permitted* to travel to Halle, in the present state of Saxony-Anhalt, 149 km southwest of Berlin, to study the incredibly important collection of Hermann Burmeister (1807–1892) housed in the Institut für Biologie, Zoologische Sammlungen at Martin-Luther-Universität Halle-Wittenberg. Burmeister described many New World scarabs and established an almost modern classification in his five-volume work, *Handbuch der Entomologie* (1832–1855). I was met at the train in the early afternoon by Dr. Manfred Dorn (1931–2005), head of the entomology collections, who worked on pollination dynamics. After walking to the institute, I was set up with research space and oriented to the collection, and later to the Hotel Stadt Halle with a lodging voucher arranged by the Reisebüro. Work the following morning with the Burmeister collection, especially the type specimens, was exhilarating. These were the specimens actually handled and described by one of my entomological heroes. The requisite midafternoon coffee and pastries with Dr. Dorn followed the same enlightened pattern I experienced on all of the previous occasions in Berlin at the Museum.

On the 24th of September, Prof. Dr. Josef Schuh (Chief of the Zoology Section at the university, similar to a university dean, retired in 1992) invited me to lunch at the equivalent of a faculty club. Imagine my surprise when we went in a chauffeured car to a private dining room with very attentive wait staff and no shared table with total strangers as in all the other restaurants I had been to. It demonstrated that when all are equal, some are often more equal. After a superb lunch, I worked with the collection until late into the afternoon, after which I presented another seminar to about 50 people in a large amphitheater. I had a magnanimous introduction by Dr. Schuh, and the Amazonian dung beetle presentation was well received by the audience with some notable murmurings in response to some "oh my" slides.

After some lively questions, I thought we were finished and prepared to leave, but Dr. Schuh ushered me and ten faculty members into his large, boardroom-like office. Awaiting us was a veritable feast of hors d'oeuvres with delicacies I had never seen in any Kaufhalle. I was quite taken aback but recovered quickly so that we all had a great discussion with lots of questions about entomology and the tropics for another hour.

The following day dawned grey, cold, and rainy, and after lunch and farewells, I caught the fast train (2 hours) to Berlin but had to stand the entire way as no seats were available. My last day in the GDR, Friday the 26th of September, I worked in the museum and was treated to lunch by Dr. Uhlig at the Palast der Republik again. The next morning, Saturday, I took a cab to Checkpoint Charlie where there were no complications for exiting, perhaps because the formal export forms for the beetle loan had a plethora of official looking stamps that may have been distracting. I was most grateful for all of those forms and stamps. I experienced genuine culture shock when returning to the west because of the overt materialism apparent everywhere (cars, clothing, things), fantastic fresh produce in overwhelming abundance, and glittering night life, none of which were present in the GDR. I spent the next four days in West Berlin before going to Paris for nine days of research at the Muséum national d'Histoire naturelle and then on to London for ten days of research at the British Museum of Natural History. But that is another story.

A few years later I returned to the Museum für Naturkunde (still in the GDR) to conduct research after attending the 1984 International Congress of Entomology in Hamburg. My wife and I had a pleasant dinner with Dr. Uhlig and his wife, Barbara, at their flat (now in Berlin), and after dinner he drove us back to *near* Checkpoint Charlie (he did not want to be seen at the border). Once again, it revealed the political climate and apprehension of being seen with anyone from the west. On 9 November 1989, a GDR official mistakenly suggested travel restrictions to the west might be eased, and the confused East German border guards opened the barriers at Checkpoint Charlie and other crossing points allowing thousands of people to move between East and West Berlin for the first time in almost 30 years, thus leading to the eventual collapse of the

of the GDR and reunification of Germany. Further research visits with my students occurred in 1994 and 2001. The bombed-out East (Coleoptera) Wing was still present during both of those trips and a reminder of war's terrible destruction (I have two bricks from the rubble as tokens, Fig. 7). A new, modern replacement building was begun in 2006 and completed in 2010.

Dr. Hieke was always enveloped in a dense cloud of cigarette smoke but was able to peer through it to become the world's leading authority on the Holarctic carabid genus *Amara* Bonelli, and in 51 papers he described more than 200 new species (Uhlig and Wendt 2016). He retired in 1995 at which time Dr. Uhlig became Senior Research Curator for Coleoptera. Dr. Uhlig retired in 2014 (then mandatory at age 65) but remains a leading specialist on the Old-World members of the staphylinid genus *Erichsonius* Fauvel (e.g., Uhlig 2016). Collection Manager Joachim Schulze retired in 2002.

In 2009 the Museum separated from Humboldt University and became the Museum für Naturkunde–Leibniz Institute for Evolutionary and Biodiversity Research. The Museum was administratively divided into Collections, Research, and Exhibitions, and all have prospered tremendously. The scarab collections are among the world's top three (along with Paris and London) based on size of holdings and historical importance. The Museum für Naturkunde is now one of the preeminent natural history museums in the world, and its collections are a treasure trove documenting Earth's biodiversity.

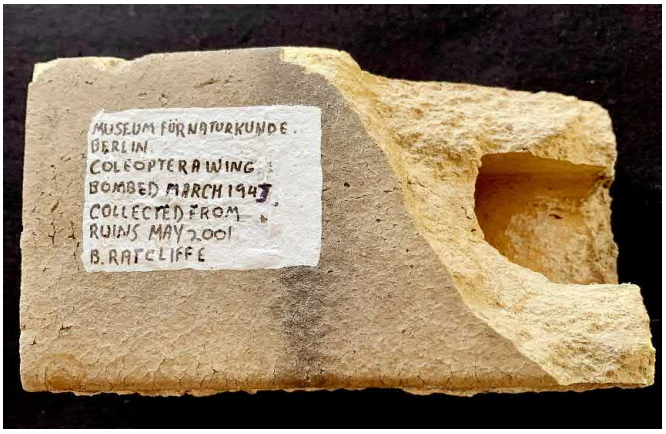

Fig. 7. A brick from the ruins of the East Wing of the Museum für Naturkunde, collected in 2001.

Brett C. Ratcliffe (PhD., University of Nebraska, 1975) is a professor in the Department of Entomology at the University of Nebraska-Lincoln and Curator of the Systematics Research Collections in Entomology at the University of Nebraska State Museum. He is the author of ten books and over 200 journal publications devoted to scarab beetles and has described more than 200 new species of scarabs. He has received several outstanding paper-of-the-year awards, described one of the top ten new species in 2008 recognized by the International Institute for Species Exploration, and is a co-recipient (with R. D. Cave) of the 2020 J. O. Westwood Medal awarded by the Royal Entomological Society for excellence in insect taxonomy.

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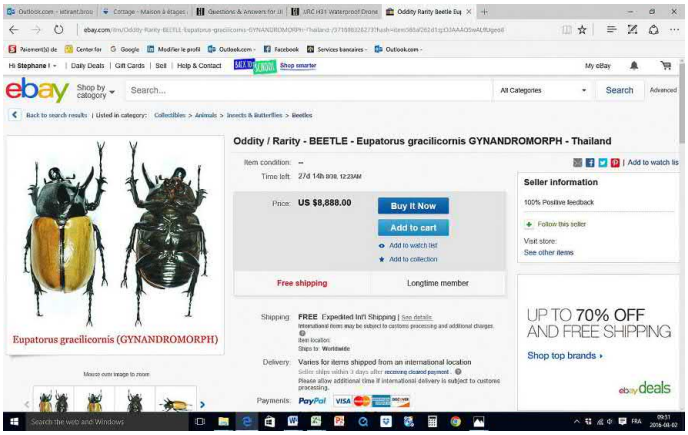

Fig. 1. Gynandromorph of *Eupatoria gracilicornis* offered for sale online with an asking price of thousands of dollars.

The Dynastini scarab beetles in human culture

(Coleoptera: Scarabaeidae: Dynastinae)

by

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"From the small size of insects, we are apt to undervalue their appearance. If you could imagine a male *Chalcosoma* with its polished, bronzed coat of mail, and vast complex of horns, magnified to the size of a horse or even of a dog, it would be one of the most imposing animals in the world."

-Charles Darwin, 1871

Introduction: the fascination with rhinoceros beetles

150 years ago, Charles Darwin wrote that if *Chalcosoma* were a little larger, they would be one of the most imposing animals in the world. Would this great naturalist be astonished at the passion and infatuation that rhinoceros beetles elicit today? Most likely. Extraordinary scientific reviews are devoted to them, and numerous books, films, and everyday objects are created in their likeness. They have been used for a long time in luxury ornamentation, but also as simple everyday toys. They are exhibited and reared in museums, insectariums, and zoos due to their high entertainment value for visitors, and they are passionately collected and sometimes, collectors are willing to pay fortunes for specimens that are but a few millimeters larger than normal or for rare forms or unusual gynandromorphs (Fig. 1). Furthermore, both larvae and adults are used in traditional medicine or entomophagy (Fig. 2) in many cultures. In summary, these large horned beetles are so sought out by humans that several species now have to be protected by local, national, or international laws and regulations.

Fig. 2. Package with dried adult *Xylotrupes gideon* for human consumption.

Ancient en modern mythology

Myths and legends about rhinoceros beetles come from the distant past and are enduring. The Kayapos of Amazonia consider the giant beetle *Dynastes hercules* (Fig. 3) as the leader of all insects, probably due to its phenomenal physical strength. In fact, thanks to its muscles and horns, it has been noted as being able to lift up to 2 kilograms. This characteristic of dynastine beetles has made them a symbol of strength and virility, and as a result, necklaces with elytra or heads of rhinoceros beetles (Fig. 4, 5) are worn in many cultures as protective amulets. Because of their special significance, necklaces with heads can only be worn by important men of the village, whilst necklaces made only with elytra are of less

Fig. 3. Male of *Dynastes hercules*. Photo by René Limoges, Insectarium de Montréal.

Fig. 4. Peruvian necklace with elytra of *Dynastes* sp. Photo by René Limoges, Insectarium de Montréal.

Fig. 5. Peruvian necklace with elytra, thorax and head of *Megasoma* sp. Photo by René Limoges, Insectarium de Montréal.

significance and can be worn by others. In South America and particularly in the south of Venezuela, it is still possible to buy jewelry made with a horn of *Megasoma actaeon* partially covered with gold and tied to a chain, as the horns are a symbol of virility and machismo.

Dr. Fortuné Chalumeau reports in his great work (Chalumeau 1983) that "the legend, corroborated by Lherminier (1837) and propagated by several authors (according to which the male of *Dynastes hercules* 'seizes the young shoots of trees between its thoracic and cephalic horn and [then] flies around [it] at full speed'), is completely erroneous." [translated from French].We nowadays know that the horns of *Dynastes hercules* cannot perform such feats of strength and cannot cut branches of this thickness. Chalumeau also mentions the famous entomologist Cartwright who, in a personal communication, informs him that the same legend exists in South Carolina about *Dynastes tityus*.

During a collecting trip to Venezuela, the first author together with Georges Brossard† (founder of the Montreal Insectarium), were told the same legend by inhabitants of a small village near Maripa (Bolívar) where they were staying! The persistence of such legends surviving through the decades and across borders highlights the significance of these beetles and the human fascination with their strength.

These beetles are not only symbolically important but hold equal fascination with children throughout the world. Among the children of the native tribes of the Amazonian forest, local wildlife like toucans, monkeys, butterflies, and beetles (such as rhinoceros beetles; Fig. 6) are widely used as toys. The rhinoceros beetles are tied around their body with a liana fiber or rope (Fig. 7) and are played with as a "living toy" or a kite. This has also been observed in other cultures, such as some in Africa where children will make “living kites” with Goliath beetles.

Fig. 6. Minor male of *Megasoma actaeon* used as a living toy in Brazil. Photo by Dr. Aldo Lo Curto.

Fig. 7. Indigenous child in Brazil with a living male *Megasoma actaeon* on a string. Photo by Dr. Aldo Lo Curto.

Replicas of rhinoceros beetles are also widely found in many countries nowadays, either as sculptures or toys. For example, *Dynastes hercules* has been depicted in small wooden sculptures in Costa Rica (Fig. 8), and in Ecuador historically significant native art sculptures have also been found (Fig. 9). In Peru, we have seen

Fig. 8. Primitive wooden figurine of a male *Dynastes hercules* from Costa Rica. Photo by René Limoges, Insectarium de Montréal.

Fig. 9. Painted sculpture of a male *Dynastes* sp. from Ecuador. Photo by René Limoges, Insectarium de Montréal.

Fig. 10. A male *Megasoma actaeon* from Peru carved in wood. Photo by René Limoges, Insectarium de Montréal.

Fig. 11. Pewter cast of a male *Chalcosoma* sp. from Malaysia. Photo by René Limoges, Insectarium de Montréal.

magnificent wooden carvings of *Megasoma actaeon* (Fig. 10) and in Malaysia *Chalcosoma* have been cast in pewter, adorned with jeweled eyes (Fig. 11).

In several regions in Asia such as Malaysia, Laos, and particularly in Chiang Mai in northern Thailand, fights of rhinoceros beetles (*Xylotrupes* sp.) are regularly organized (Fig. 12).

The fervor for the "kabutomushi" (a Japanese term for rhinoceros beetles and fighters; "Kabuto-" meaning samurai helmet and "-mushi" insect) is characteristically Japanese. Traditionally the Japanese have used, respected, and venerated certain insects such as mantises, crickets, locusts, grasshoppers, etc. throughout many aspects of their culture. It is widely accepted that for many years the magazines and entomological books they publish are of very high quality with remarkable iconography. However, it is in the Akihabara area of Tokyo, Japan (a well-known area of Japanese pop-culture) that the country´s passion for these beetles is epitomized. This

Fig. 12. Organized fight of male *Xylotrupes* specimens in Thailand. Photo by Dr. Nicolas César.

Fig. 13. Japanese kabutomushi figurine with a helmet inspired by the cephalic horns of *Trypoxylus dichotomus* males. Photo by Hidoto Hoshina.

culture, which includes comic books, video games, animated films, miniature, models and plastic reproductions, is rich with examples of the influence beetles have had in the Japanese pop-culture (Fig. 13, 14). The variably-sized plastic beetle reproductions are immensely popular across the country and it is estimated that their sale in Japan generates an annual revenue of several hundred million dollars. The Japanese rhinoceros beetle (*Trypoxylus dichotomus*) reigns king in popularity as this large beetle is strong and is much loved by children and adults alike. It represents power, strength, and endurance and is found in many popular cartoons and dozens of different models and figurines.

Many other examples exist of the significance and popularity of these large beetles within human culture and this article only scratches the surface. This popularity has even extended to the design of a piece of furniture in modern art (Fig. 15). What does the imagination of naturalists, artists, and designers inspired by these beautiful and intriguing beetles hold in store for us in the future?

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Fig. 14. Kabutomushi drawing of a fantasy creature with rider inspired on dynastine beetles. Photo by Hidoto Hoshina.

Fig. 15. Concept art for a *Chalcosoma*-inspired sofa.

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Evolution of a design for semi-permanent baited pitfall traps

by

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I visited the (Neo)tropics for the first time back in 1998, when I went to Suriname to do a six-month internship on tropical forestry with Stinasu (the Foundation for Nature Preservation in Suriname). During this period, I spent a total of about three months in a resort within a large and nearly pristine nature reserve. Fortunately, I was given a permit to collect scarabs for my father's collection.

At my father's request, I made some traps according to a design he often used in Europe during the summer holidays. The basis of the design was a round plastic margarine cup, about 9 cm in diameter and just as deep. This cup was buried with its edge flush with the surface, and then filled with a layer of about 2 cm sand, on which the bait (excrement or carrion) was placed. The idea was that the specimens would tumble in, and then bury themselves in the sand rather than fly away after some time. As I found out, this presented several problems:

1) I had to go through the sand and bait to find the specimens;

2) small specimens often walked along the perimeter of the bottom of the cup, from where they were difficult to pick up;

3) when pulling the cup from the soil for easier collecting of the beetles, the sides of the hole would frequently cave in;

4) tropical forests are not an ideal place to sit still for a prolonged time to carefully collect individual specimens from a trap, given that there are often multiple insect species trying to collect samples of human blood;

5) large leaves falling into the trap would enable the beetles to just walk out, and

6) rain showers would either fill the cup to somewhere under the brim, making for an interesting mixture of sand, water, bait and specimens, or overflow the cup, simply washing away many specimens.

Because of these issues and the work I had to do for my actual internship, I only used these traps a couple of times. It had become clear to me, however, that for my next trip I had to come up with something better.

Fast forward one year, and I am in the Philippines, doing my thesis on the islands of Cebu (main office) and Bohol (field office) with the SWCF (Soil and Water Conservation Foundation). This time I am working in a much more disturbed forest, but again with the option to collect scarabs. In the kitchenware department of a large warehouse in Cebu City, I was lucky to find a number of items that fitted together, enabling me to create the improved trap that I had been thinking about since Suriname. These items were plastic lemonade jugs with removable lids, plastic cups neatly fitting in those jugs, plastic funnels fitting on the jugs, and green plastic serving trays. I bought four sets and then just had to saw off the bottoms of the funnels (an easy job with my Swiss Army knife) to complete the main hardware for four workable traps (Fig. 1).

Fig. 1. The main hardware of my first self-designed pitfall trap, created in the Philippines.

Back in the forest I proceeded to test my traps. Using my hands and a sturdy blunt knife, I dug four holes in the ground (one for each trap), deep enough to bury the rather narrow and high jugs, taking care that the opening of each jug was a little above ground level. I then placed the cup in the jug, put the funnel on top of the jug, and shoved the dug-up gravelly earth back into the hole around the jug. I used the available finer, more loamy soil to compact the surface around the jug and make a solid small ramp all around and towards the slightly too big funnel. I then carefully removed the funnel, and took out the cup to clean it of whatever had fallen in while filling the

hole around the jug. The cup was then filled for about a third of its height with water and some liquid soap to break the surface tension, and lowered back into the jug. The funnel was placed back on top, and a sachet with bait was fastened to a small straight stick laid across two forked sticks standing on either side, so the bait would be above the trap. Four slightly larger sticks stuck in the ground around the trap held the upside-down rectangular tray above the trap. I put some large leaves on top of the tray so as to camouflage it for human eyes, keeping them in place with stones or pieces of wood. The tray prevented rain and leaves from falling into my trap, while runoff water would go around the loamy ramp, not into the jug. The funnel made sure the beetles fell into the cup, rather than possibly next to it. After removing the tray, the bait and the funnel, I could simply pull the cup with specimens out of the jug, using a sieve to pour the soapy water into another cup to get the specimens out. Even though it took quite some effort to initially put the jug into the stony ground, it saved me lots of time afterwards as I could use the same trap over and over again in that location, doing just a little maintenance. When not using the traps for some time, I just had to put the lids on to keep the jugs from filling with debris and wandering bugs. These traps yielded, among various other species, three of the four specimens of the type series of *Onthophagus hielkemai* Krikken and Huijbregts, 2011 (I collected the fourth one in rotting fruit). Suffice to say I was quite pleased with my trap design.

Fast forward another six years, and I am back in Suriname. I have my traps from the Philippines with me (except for the large serving trays), but I feel that there are still improvements to be made. After all, the largest scarabaeine species I collected in my traps during my stay in the Philippines were less than 2 cm in length, whereas Suriname is home to some much larger species such as *Coprophanaeus* (*Megaphanaeus*) *lancifer*, which may reach a length of well over 4 cm. The high but narrow cups and jugs from the Philippines would not be ideal to collect that species, nor would they accommodate the large quantities of other neotropical species I expected/hoped to attract. The not-so-great-fitting funnels also annoyed me, and I wanted to increase the number of pitfall traps I had. At this time, I was still largely unaware of the designs other people used for baited pitfall traps. Not being aided or hindered by the experiences of other collectors, I had to come up with my own solutions. After looking around in all kinds of stores, I realized that I could use short pieces of PVC pipe with a diameter of 10 cm. I had a pipe cut into 17 cm long sections, and then glued lids on one end of each as bottoms. I had the fortune to find neatly-fitting bright-yellow and bright-pink plastic drinking cups with a height of 10 cm, of which I just had to saw off the handles (cue the Swiss Army knife again). I also found tightly fitting plastic kitchen funnels. Unfortunately, those funnels were very fragile, and although I managed to cut off enough to ensure that species like *C. lancifer* would easily fall through, they quickly became brittle and unusable. That is when I had the idea to ask for options in a plumbing shop. There, they assured me they were able to custom-make funnels of tin-plated steel. I thus gave them a piece of PVC pipe for size, told them the diameter of the bottom side of the funnels (6 cm) and the angle (a simple 45 degrees) and picked up my funnels a couple of days later. Although they advised me to prime the funnels to protect them against rust, they have lasted perfectly fine so far without any primer, despite months of deployment in the warm and humid Surinamese forests (Fig. 2).

Fig. 2. The latter much-improved design, with white pipe and metal funnel. This is the version I still use.

Around each trap, I clear an area of about 50–60 cm diameter by removing all the leaflitter. I also clear a small path towards each trap. I do this to create a working space and to make sure I won't accidentally kneel down on some hidden spines or a venomous critter upon my return to the trap the next day. As trap covers, I now use disposable plastic plates

placed bottom up, which can be used for weeks or months before they start cracking. I use three sticks per trap to keep the lid aloft, and place a small stone or a piece of wood on top to prevent it from falling off due to wind, rain or falling debris (Fig. 3). Near paths, I still put some large leaves on the white plates to make them less visible for passersby.

Fig. 3. A trap baited with human excrements wrapped in tulle. A toad in the genus *Rhinella* is waiting for an easy meal. Keeping out such competition would require a radically different design. On several occasions, I've found small frogs and lizards (but no toads, as far as I can remember) drowned in the traps, suggesting that more insectivores may use these traps as a food source.

Over time, I have made some further adjustments. For example, instead of using the more common gray PVC pipes (commonly used for runoff water), I now use the slightly thicker white variety (used for pressurized water). I don't do this because of the increased strength, but because the lighter insides allow for better visibility in the dark forest undergrowth. I have noticed that some small scarabs may, despite the soapy water, climb out of the cup and fall into the narrow gap between the cup and the pipe. The lighter insides of the trap make it easier to see them and take them out. The bottoms are still dark as I have not yet found white lids, and though I could paint them, the current set-up works fine as it is.
Although I used to use biodegradable tea bags to hang up the bait, I now use squares of tulle of about 20 x 20 cm to tie the bait into. This is because the moisture and weight of the bait may cause a tea bag to rip, while maggots, beetles and stingless bees (Apidae: Meliponini) may dig or bite through it, causing (parts of) the bait to fall into the trap. Stingless bees will even bite through tulle (they seem to be especially fond of fish!), but this will still hold the bait much longer.
I now also use a metal wire with two bends to hold up the bait (Fig. 7). When replacing the bait, I put a large leaf on the soil on which I then place the the square of tulle, after which I put the bait in the middle of the tulle. The leaf prevents dirt from the soil to stick to the moisture of the bait. I then tie the opposite corners of the square together, so that the bait is secured. Then, I put the bent part of the wire on the knots, and tie the four corners of the square again over the wire. The wire is then stuck diagonally into the soil so that the bait hangs over the middle of the funnel, with sufficient space beneath so that large beetles cannot touch it.

Fig. 4. Using a perforated sample cup rather than tulle to hold the bait. I use these mostly for very moist baits, as the unperforated bottom prevents excessive dripping, as well as for fish, as meliponine bees will cut through the tulle and either steal bits of the fish or cause it to drop into the trap. Even though I have used the smallest drill bits available to me (1 mm), tiny rove beetles (Staphylinidae) will still freely walk in and out, which may be relevant to collectors interested in that family.

As an alternative bait-holder, I have several plastic cups with screw caps (urine sample cups), in which I have drilled many tiny holes to ensure air flow. A ringbolt in the cap serves to hang them on the wire (Fig. 4).To prevent ants (which like meat and fish) and termites (which like human excrements) from accessing the bait, I make sure there is no contact between the bait-holder and the lid. Then, I take some petroleum jelly and smear it over several centimeters of the wire, so that the last access to the bait is blocked too (Fig. 5).
Any insect interested in the bait now has to walk towards it and fall into the trap, or has to fly under the lid and land on the bait (which several smaller scarabaeine species are capable of).
When servicing a trap, I turn the cover (the plate) over in its normal position, and work above it when sieving out the specimens, so that I can easily find them back if they somehow fall out (which happens mostly when emptying the sieve in a collecting jar).

I check the traps every day, as I do not use preservatives and specimens will quickly rot in tropical temperatures (Fig. 6). Excrements are usually changed every two days (yield is already much less the second day), while fish, carrion etc. may be left longer, depending on the yield. When I discard old bait, I dig a small hole and untie the tulle square. The bait goes into the hole which I close again so that the smell does not distract approaching beetles. The tulle and the plastic sandwich bags I use to carry the bait go into another plastic sandwich bag which I take with me to dispose later on (Fig. 7). After all, it is everybody's responsibility to keep nature and their working area clean of litter. My main regrets are the instances in which some larger animal (feline, opossum, tegu, ...?) took off with the bait so that I could not retrieve the tulle. The cups I use to hold some baits are washed (with a bit of chlorine at the end of an expedition) and reused on the next trip as they take a lot of effort to make (drilling all those tiny holes).

Fig. 5. Opening up a trap. The petroleum jelly on the bait-wire is clearly visible. Part of the small ramp leading up to the trap is flushed away by the rain. It is important to repair this ramp, as small species won't be able to walk in without it. I've also noticed that small openings between the trap and the ramp may trigger small specimens to tunnel down and thus stay out of the trap.

Although the pitfall trap design described above works great for me, it still has some issues:

1) it is labour intensive to set up and may not be worth the effort for short collecting trips;

2) the pipes do not fit into each other, which means they take a considerable amount of space during transport;

3) because the lids/bottoms of the pipes fit over the pipes and are thus wider, stones and freshly grown roots may make it difficult to pull them out of the soil again, and

Fig. 6. A pretty good haul with at least a large *Deltochilum*, many *Dichotomius* and several *Eurysternus* and *Scybalocanthon*. The caught quantity indicates that this is the first daily check after changing the bait. The yield on the second day is always much less when using excrements, as the bait starts to dry out and give of less odor.

4) unlike the jugs I used in the Philippines, there are no lids available that tightly fit inside the outer pipes to close the traps, meaning that I have to remove the traps after every field trip (and put them back in when returning) to prevent small wildlife getting trapped and die without reason (in fact, dead wildlife in a trap may attract scavengers that will subsequently die there too and lure even more scavengers, thus causing a vicious circle of accumulation of dead specimen of many species in an unused trap).

As I use soapy water without preservatives to kill specimens, the traps need daily servicing. Other mixtures can be used, but these come with their own issues:

1) adding sufficient chloral hydrate to the water may be expensive;

2) adding either salt or vinegar to the water might corrode the pins of specimens killed in it, and

3) using alcohols (ethanol, methanol etc.) instead of water will denature proteins in the specimens and thus stiffen their muscles, making proper spreading difficult.

I believe it could be worthwhile to make some molds to create a complete reusable pitfall trap set, composed of lightweight and stackable outer tubes, cups, funnels and covers from PVC or some other durable plastic, and maybe even some washable bait holders. However, I am not a businessman and I have no idea how large the market for such traps would be. If you think this might be a viable business opportunity, feel free to contact me to further discuss the idea.

Fig. 7. All the components of the latest version of the trap, except for the bait and water, that are not shown in Fig. 2. The lid, the twice-bent wire, a piece of tulle, a bait cup, petroleum jelly, dishwashing soap, and a small sieve. Plastic sandwich bags are used to transport the bait and later to hold the discarded tulle and bait-cups-in-need-of-a-wash. The size of my hands prevents me from using disposable gloves (which are thus not pictured), although these are recommended when handling certain baits.

Addenda and corrigenda to "The discovery of Edgar von Harold type material in the Museum of Zoology, Dresden"

by

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Since the publication of my paper in the first number of this newsletter (Cupello 2020), I found some minor errors and omissions that I would like to address here. Though they do not alter any of my previous main conclusions, the importance of clarifying these issues is twofold. Firstly, to avoid misleading colleagues into the perpetuation of errors. Secondly, to honor previous authors who have primacy over some of the findings that I had erroneously said to have first reported myself.

1) On page 16, the name of the journal founded by Edgar von Harold is misspelled as *Coleopterische* [sic] *Hefte*. The correct name is *Coleopterologische Hefte*. The same misspelling is also present in Fairmaire's (1887: 47) obituary of Harold, one of the sources that I used for my own biographical sketch of the German coleopterist. It is likely that my mistake derives from my uncritical reading of that sentence in Fairmaire's text. In any case, the correct spelling *Coleopterologische Hefte* was used on page 23 of my article, where I list Harold's many works published in that journal.

2) On page 17, I say that the first work to report the existence of a Harold type in the Brussels museum was my revision of *Sylvicanthon* with Fernando Vaz-de-Mello (Cupello and Vaz-de-Mello 2018). While this may be correct for Scarabaeinae, it is incorrect for Harold types as a whole. Scholtz (1979, 1980, 1990) had already recorded several Harold trogid types in Brussels, and the identity of some of those specimens as true Harold types has more recently been confirmed by Costa-Silva et al. (2021). After

discovering that information in Scholtz's works, I re-examined Harold's revision of the trogids (Harold 1872), and there he indeed says that he examined material from the Brussels museum and from Ernest Candèze (1827–1898), whose private collection of Scarabaeoidea is now housed in that museum (Horn et al. 1990a). Taking into consideration also that labels in Harold's handwriting are attached to the specimens recorded in Brussels by Scholtz and Costa-Silva et al., and that these labels bear Harold's typical "type" notation (see Cupello 2020), there is no reason to doubt that they are indeed part of the type series established by Harold (1872).

3) On page 24, footnote 4, it is implied (and it was indeed my intention to convey this) that I was the first to record in the literature the existence of a Harold type in the Museum of Comparative Zoology, Harvard University, a fact already known to the curators and the people who digitized the museum's insect type material. However, Blake (1955) had discovered 65 years earlier ten Harold types of a Chrysomelidae species-group name in the MCZ, and their identity as true Harold types was later confirmed by Furth et al. (1994). Working extensively in the MCZ Chrysomelidae collection, these latter authors added several other specimens housed in the museum to this list of Harold types. My record may be at best the first for Scarabaeoidea.

4) My paper concluded that Harold types exist in six museums: the MCZ, Paris, Brussels, Munich, Berlin, and Dresden. I overlooked, nevertheless, the existence of Harold types in six other museums: London (The Natural History Museum), Bonn (Zoologisches Forschungsinstitut Alexander Koenig), Vienna (Naturhistorisches Museum Wien), Stockholm (Naturhistoriska Riksmuseet), Genoa (Museo Civico di Storia Naturale "Giacomo Doria"), and Müncheberg (Senckenberg Deutsches Entomologisches Institut). The London specimens are part of the type series established in Harold's 1869 study of the Mexican dung beetles then housed in the collection of the French insect dealer and explorer Auguste Sallé (1820–1896) (Harold 1869a). That at least some of those types remained in Sallé's collection after Harold's study, instead of being incorporated to the latter's personal collection as he used to do, is confirmed by Deyrolle (1875). In an inventory of the contents of Salle´s collection, Deyrolle listed several papers in which new species were described based on material from it, and stated that many of the types remained housed there, including those of Harold´s names. In the year following its owner's death, Sallé's collection was auctioned by Émile Deyrolle and scattered (Horn et al. 1990b; Cambefort 2006; Constantin 2012), though most of the Mexican and Central American material seems to have been bought by Frederick DuCane Godman (1834–1919) and Osbert Salvin (1835–1915) for their monumental *Biologia Centrali-Americana* project (Godman 1915; Selander and Vaurie 1962; Papavero 1971; Horn et al. 1990a, b). Eventually, the *Biologia* collection was gifted and gradually transferred by Godman to the London museum (Godman 1915; Elwes 1920; Selander and Vaurie 1962; Papavero 1973; Horn et al. 1990a, b), where, with the exception of more numerous duplicates donated to other museums around the world (Howden 1966; Horn et al. 1990a, b; my personal observation), it has remained ever since.

Type specimens of Harold's (1869a) species-group names were found in London by Jessop (1985: *Eurysternus*), Zunino and Halffter (1988: *Onthophagus*), Génier (1996: *Ontherus*; 2009: *Eurysternus*) and Montoya-Molina and Vaz-de-Mello (2021: *Dichotomius*), all of them coming from the Sallé collection. In October 2019, I had the chance to re-examine and photograph three of the *Onthophagus* types (those of *O. semiopacus*, *O. retusus* and *O. chevrolati*) and I can confirm without doubt that these specimens are indeed part of the type series described by Harold (1869a). Not only do they bear labels identifying them with the name of the new species in Harold's handwriting, but they also have labels in Sallé's handwriting indicating them as types. My photographs of the *O. retusus* and *O. chevrolati* types, including their labels, can be seen in Moctezuma and Halffter (2020). It is worth noting, though, that not all types described in Harold (1869a) remained in Sallé's collection. Some were apparently incorporated into Harold's own collection (and others into Henry Walter Bates's) and ended up in Paris (see in the paragraph below how). Matthews (1961: *Copris*), Jessop (1985: *Eurysternus*), Zunino and Halffter (1988: *Onthophagus*), Génier (2009: *Eurysternus*), and Montoya-Molina and Vaz-de-Mello (2021: *Dichotomius*) found some of these Harold/Sallé and Harold/Sallé/Bates types there. Furthermore, the Mexican Phanaeini of the Sallé collection were studied by Harold six years before the rest

of the dung beetles (Harold 1863), and the types described in that paper seem to have all been deposited in Harold's own collection and are now also in Paris (Arnaud 1982; Edmonds 1994, 2000; Edmonds and Zídek 2010). A few other scarabs were described in that same 1863 paper, but I do not know the whereabouts of their type series. Apart from the types of the 1869 paper mentioned above, other Harold types said to be in London are the syntypes of *Trox acanthinus* Harold, 1872 (Zídek 2013). Harold (1872) informed that his description of *T. acanthinus* was based on material from the Stockholm museum as well as from the personal collections of Auguste Sallé and a certain "C. Baden" from Altona, a name that I presume refers to the German entomologist Johann André Ferdinand Baden (1828–1914). As apparently only the dung beetles and part of the Cetoniinae of Baden´s collection are in London (Horn et al. 1990a), the syntypes mentioned by Zídek (2013) must be the ones originally belonging to the Sallé collection. The ones from the Baden collection can now be in a number of other museums (Horn et al. do not specify the whereabouts of his trogids, but list several museums where parts of the Baden collections are now housed), whereas the ones from Stockholm are possibly still there (see comments below).

Unlike London's, the Bonn specimens are originally from Harold's own personal collection of scarabs. As explained in my previous paper, after Harold's death, the greater part of his collection was bought by the French millionaire and beetle collector René Oberthür (1852–1944), whose own immense collection, including Harold's in it, was almost entirely transferred to the Paris museum in 1952 (Horn et al. 1990b; Cambefort 2006). What I forgot to mention in my paper is that a smaller, but significant portion of the Oberthür collection was deposited in the Bonn museum in April 1956 (Schmidt 1959; Horn et al. 1990b; Ahrens and Klug 2010). According to Ahrens and Klug (2010), the Bonn museum purchased in that year about 911,500 beetles housed in 3,000 boxes of the Oberthür collection from a certain J. du Corsil, apparently one of the heirs to René Oberthür, for seven thousand German marks. Since the portion acquired four years earlier by the Paris museum consisted of around 5 million specimens in 20,000 boxes (Cambefort 2006), Bonn now houses approximately 15% of the material originally owned by Oberthür. But under which exact circumstances the transfer of ownership to Bonn happened is unknown to me. For instance, why would the Oberthür family keep a small portion of the collection for themselves in 1952 only to sell it four years later to the Bonn museum? As far as I know, this and other related questions, all interesting from a historical perspective, are currently unanswered, and the presence of material in Bonn was not addressed by previous authors who discussed the history of the Oberthür collection (Cambefort 2006; Constantin 2012). Mostly ignored has also been the presence of material from the Oberthür collection in the Genoa and Basel museums (Schmidt 1962; Poggi and Conci 1996; Schubert 2020) (see comments below). Be that as it may, Harold types were among the Oberthür specimens acquired by Bonn. Ulmen et al. (2010) list the type specimens of *Scarabaeus westwoodi* Harold, 1869 and *Aphodius sinuatus* Harold, 1860 as present in that museum, and I myself saw a number of other Scarabaeinae types there as well during my 2019 visit, including a syntype of *Canthon corvinus* Harold, 1868.

The Vienna specimens include at least some trogid types described by Harold (1872). As usual for his always meticulous revisions, Harold indicated the Vienna museum as the depository collection of these types. Haaf (1954a) and Scholtz (1980, 1986) confirmed that several of them are still there, though some seem to have been incorporated into Harold's collection and are currently in Paris (Scholtz 1980). It is possible (or even likely) that Vienna also houses some of the Hybosoridae described by Harold (1874), who indicated that museum as the collection of origin of some of his types. Unfortunately, I am unaware of more recent works that have studied these hybosorid types.

At least two Harold types are housed in the Stockholm museum. These, as reported by Scholtz (1980), are the paralectotypes of *Trox asperulatus* Harold, 1872, a species-group name whose type material indeed partly originated from that museum according to Harold (1872). The lectotype, however, is in Paris (Scholtz 1980). Other species-group names established in that same paper were also said to have been based at least partly on Stockholm material: *T. haagi* Harold, 1872 (syntype localities in India), *T. desertorum* Harold, 1872 (Egypt and the Arabian Peninsula), *T. niloticus* Harold, 1872 (northern

Africa), *T. omacanthus* Harold, 1872 (India), *T. procerus* Harold, 1872 (Northern Africa and the Arabian Peninsula), *T. acanthinus* Harold, 1872 (Mexico) and *T. fenestratus* Harold, 1872 (Australia). The types of *haagi* were said by Harold (1872) to have originated from three private collections plus the Stockholm museum. At least some of these specimens seem to have been incorporated into Harold's own collection, as Haaf (1954b) claimed to have seen *haagi* types in Paris; later, Zídek (2013) erroneously referred to the Paris material as the "holotype". Whether any specimen remains in Stockholm is unknown to me. The type series of *desertorum*, though originally from five different museums including Stockholm (Harold 1872), was found only in Paris (likely ex Harold collection) and Brussels by Scholtz (1980), whilst that of *niloticus*, also from five collections, is currently known from only the Paris museum lectotype (also likely ex Harold collection) (Scholtz 1980). The types of *omacanthus*, on the other hand, which were originally said to be numerous and from several different collections besides Stockholm (Harold 1872), were deemed by Zídek (2013) to be possibly lost, while those of *procerus*, equally numerous and from several collections, are now, according to Scholtz (1980), at least in Paris (lectotype) and Brussels (paralectotypes). Concerning *acanthinus*, Zídek (2013) stated that its syntypes are in London, but this must be true only for those that, according to Harold, originated from Sallé's collection; the ones from the Stockholm museum are possibly still there or were incorporated into Harold's collection and are in Paris. Finally, the types of *fenestratus*, originally housed in four different collections, are currently known only from a Paris museum syntype that probably originates from the Harold collection (Haaf 1954b).

The types housed in the Genoa museum are at least some of those established in Harold (1871c, 1877). These articles present the results of Harold's study of the scarab collections made by Italian naturalists – namely, Giacomo Doria (1840–1913), Odoardo Beccari (1843–1920), and Luigi Maria d'Albertis (1841–1901) – in Australia, the Malay Archipelago, and the Horn of Africa in the 1860s and 1870s. That material was sent for Harold to identify and describe apparently by Doria himself (at least for Harold 1871), who, besides being a collector and explorer, was also the founder and first director of the Genoa museum (Conci and Poggi 1996; Poggi 2017). Reid (2000) listed the lectotype male and four paralectotypes of *Coptodactyla subaenea* Harold, 1877, all collected in January 1875 by Luigi Maria d'Albertis at Somerset, Australia, as present in Genoa. Curiously enough, Matthews (1976) had stated decades earlier that the "holotype" male of *C. subaenea* was housed instead in Paris, presumably from the former Harold collection. This information was later repeated in Cassis and Weir's (1992) catalogue of the Australian dung beetles. Reid (2000), however, denied that the Paris specimen was a type, but did not provide any argument in support of that. Since, according to the information provided by Matthews, the Paris museum specimen bears exactly the same collecting information as the ones in Genoa, I think that the answer is simple: the Paris specimen was a syntype that Harold retained for his personal collection, whereas the Genoa material represents the rest of the type series that he returned to the museum after completing his study. It is curious to note, though, that although Harold (1877) mentioned that he knew only females of the species, not males, the Genoa lectotype and three of its paralectotypes as well as the Paris paralectotype are actually males, only the remaining Genoa paralectotype being a female (Matthews 1976; Reid 2000). Harold must have missed some sexually dimorphic characters, and since males of *C. subaenea*, unlike those of the other *Coptodactyla* species known to him, *C. glabricollis* (Hope, 1842), are hornless (Matthews 1976, Reid 2000), he must have assumed that his specimens were all females. But because Harold said he knew "females" ("femelles"), in plural, it is clear that he examined more than one specimen. This prevents Matthews's citation of the Paris specimen as the holotype from being considered a lectotype fixation under Article 74.6 of the ICZN (1999). Reid's is the valid lectotype fixation for *C. subaenea*. With Reid's designation of a Genoa syntype as the lectotype, the Paris specimen has become a paralectotype.

I did not do an exhaustive review of the literature to confirm whether the type specimens of the other species names established by Harold (1871c, 1877) are also present in Genoa, but I assume that this must be the case for at least the majority of them. Besides these 1871 and 1877 types, there is a chance that some others originating from Harold's own collection (and described in other papers) are also in Genoa. As

explained by Poggi and Conci (1996), René Oberthür donated and sent in exchange several specimens over the years to the Genoa museum, and they may have included Harold specimens, even types. A yet further possibility of Harold types in Genoa are specimens from the collection of Carl August Dohrn (1806–1892), which was studied by Harold (e.g., 1870, 1871b, 1872, 1875a, b, 1880a, 1883) and some of whose parts are now in Genoa (Poggi and Conci 1996).

Lastly, the only Harold types known to me to be housed in the Müncheberg museum are the lectotype and paralectotype of *Trox nodulosus* Harold, 1872 (Pittino 1991). These two specimens originate from the collection of the German entomologist Lucas von Heyden (1838–1915), whose Coleoptera have been in the current Müncheberg museum for more than a century (Horn et al. 1990a; see Gaedike (1995) for more details on the convoluted history of the Müncheberg museum). Harold (1872: 20) listed Heyden as one of the people who sent him material for his trogid study, so there is little doubt that Pittino is correct in considering those two specimens as types of *T. nodulosus*. Note that although Harold (1872) did not use *nodulosus* as a valid name, listing it only as a *nomen in litteris* referring to his variety b of *Trox hispidus* (Pontoppidan 1763), the authorship of this name still belongs to him. Under Article 11.6.1 of the ICZN (1999), because Schmidt (1936) used *nodulosus* as a valid name and credited it to Harold, and because Harold (1872) was the first available work in which the name appeared, it is to be considered that *nodulosus* is available from Harold (1872), meaning that the Müncheberg specimens are indeed types (if the name were not available from Harold, but from Schmidt, then they would not be types). Harold mentioned in other works the examination of Heyden's specimens (e.g., Harold 1868, 1869b, 1871a), so it is possible that other specimens studied and labelled by him, including types, may be housed in Müncheberg.

In conclusion, as far as my knowledge goes, Harold types are housed in at least twelve museums: the MCZ, Paris, London, Brussels, Stockholm, Vienna, Berlin, Munich, Bonn, Müncheberg, Dresden, and Genoa. The most likely candidate for a thirteenth museum in this list is Leiden (Naturalis Biodiversity Center). I say this because Harold's short series of papers published in the *Notes from the Leyden Museum* dealing with scarabs from the Sunda Islands seems to have been mostly based on material housed there (Harold 1880b, c, d, e). And there are other candidates. Ślipiński (apud Furth et al., 1994) added that three Harold Chrysomelidae types had been recorded as present in the Stettin (= Szczecin) museum in a list made by its curator in 1944. Unfortunately, most of the museum's Chrysomelidae were either destroyed or lost by the end of the Second World War, and no traces of these three Harold types exist anymore (Furth et al., 1994). Furth et al. (1994) also report the presence of two Harold Chrysomelidae paralectotypes in the Budapest museum (Magyar Természettudományi Múzeum) and another in London. My opinion is that the evidence that these specimens are true Harold types is very weak. The style of their labels says that they are certainly part of the same series of specimens used by Harold (1875a) to describe those chrysomelids, but whether Harold examined the entire series or only a portion of it is less certain. For this reason, I am skeptical that those three specimens should indeed be considered Harold paralectotypes as claimed by Furth et al. (1994). I will wait for stronger evidence before accepting that Harold types are present in Budapest.

Less likely candidates can also be listed. As mentioned above, aside from the parts currently housed in Paris, Bonn, and Genoa, another, smaller portion of the Oberthür collection is present in Basel (Naturhistorisches Museum Basel). This material originates from the Georg Frey (1902–1976) museum, a collection originally built in Bavaria and whose largest part was moved to the Basel museum in 1997 (Anonymous 2021). In the late 1950s or the early 1960s, Frey apparently bought around 15,000 Oberthür collection specimens, mostly Indo-Malayan and Papuan ones, and they included types (Schmidt 1962). From whom he acquired that material (from the same person who sold another part of the Oberthür collection to Bonn?) and in which exact circumstances that happened is unknown to me. But I believe it is conceivable that a few Harold specimens, perhaps even some types, may have been among those 15,000 specimens bought by Frey and are now in Basel. Further possibilities are Florence (Museo di Storia Naturale Sezione di Zoologia La Specola) and Warsaw (Muzeum i Instytut Zoologii Polskiej Akademii Nauk). Along with Genoa, each of these two museums seems to own parts of the collection of Carl August Dohrn (Horn et al.

1990a; Furth et al. 1994; Poggi and Conci 1996; Anonymous 2018), which, as stated above, Harold studied and from which he described new species (e.g., Harold 1870, 1871b, 1872, 1875a, b, 1880a, 1883). It is, therefore, possible that some Harold types may have ended up in either of these museums as well.

Though I hope that I am not missing any further records in the literature, the very existence of the present addenda and corrigenda shows that this is a possibility, especially in relation to beetles other than scarabs. Another potential source of overlooked types concerns specimens that Harold borrowed from private collectors whose collections were ultimately transferred to institutional museums not included in the list above (e.g., see the material from Baden's collection discussed above; also, e.g., material from Ernst Witte [collection now in Frankfurt], Friedrich Riehl [apparently in Marburg], Carl Gustav de Mannerheim [Helsinki], Simon Martynovitsch Solsky [Saint Petersburg], and Victor Ivanovitsch von Motschulsky [mostly in Moscow] [Horn et al. 1990b]). Their eventual discovery would show that my list of museums housing Harold types is still incomplete. I apologize in advance if this proves to be the case.

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Phanaeus vindex outing in Louisiana

by

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I was recently requested to provide live *Phanaeus vindex* (MacLeay, 1819) for an upcoming documentary, so a collecting trip was in order. I have had similar requests pop up from time to time.

We generally don't venture into the field this early in the year (April) since most of the more interesting beetles (*Dynastes*, *Lucanus*, *Strategus*, *Cotinis*) are not around yet. Although these metallic dung beetles can be found here in Cajun Country (southwestern Louisiana) where I live, they are more readily collected in the central parts of the state. In addition to *P. vindex* we have *P. triangularis* near bodies of water, *Phanaeus difformis* near the coast and several *Canthon* species near east central Louisiana. The giants *Deltochilum gibbosum* and *Dichotomius carolinus* can also be found throughout the state, but the ranges of many of these overlap in the specific areas that we like to collect in. Southwestern Louisiana is generally wetter and more prone to flooding, so we do see many of these species here but not in the larger numbers that we find in drier, more sandy areas. Incidentally, "Cajun" first refers to a people before a style of food, but this discussion will have to be left for another article.

While venturing to my collecting area of choice for this species, I brought along my brother Michael, who had been hoping for a long time to visit some of our collecting locations at this time of year. He wanted to photograph some carnivorous plants which are apparently easier to spot while they are flowering. The sundews and butterworts he was interested in seeing are tiny and low to the ground; without the addition of their spindly and tall flower stems, they would be difficult to locate.

Along the way we drove through part of Kisatchie National Forest which we often visit for hiking and scenery. Throughout these piney woods the forestry service has practiced controlled burns (Fig. 1) which replicate naturally occurring fires that help this longleaf pine ecosystem. The thick smoke

Fig. 1. Driving through smoke in Kisatchie National Forest.

gave this part of our trip an eerie feeling; the smoke-filtered sunlight cast strange colors on everything. We later discovered that the controlled burn got out of control and parts of the forest had to be temporarily closed until the fire was contained (Fig. 2). We encountered more box turtles than we had ever seen before; perhaps they were crossing the roads to avoid the fires (Fig. 3).

We arrived at one of our collecting locations and proceeded to set up traps for dung beetles. We used a trap design that my brother invented that we call a "subsurface trap". Although not a trap in the truest sense, it works quite well for paracoprids (which excavate below piles of dung) like *Phanaeus*, and was used with great success while I was writing my dung beetle book (Barney and McMonigle 2012).

Fig. 2. Controlled burns got a little out of hand!

Fig. 3. One of the box turtles found crossing the road.

Fig. 5. The author setting the traps.

Basically, a hole is dug to fit a somewhat shallow, rectangular container and the dirt that was removed is placed into this container. The container is set into the hole so that the edges of the container are flush with the ground. Bait, in this case pig dung, is placed on the dirt in the container, and any *Phanaeus* that arrive and dig tunnels into the soil can easily be found by sifting the dirt from the trap. We have recently learned to still use a stick but instead of suspending dung from it we leave some dung on the end of it to broadcast our stinky message in the wind (Fig. 4–6).

Fig. 6. The completed trap without the bait.

This method has advantages and disadvantages over other trap systems: it is a very simple design and no elaborate suspension techniques are needed to hang bags of bait over the traps with sticks. On the other hand, the beetles are free to leave at any time so these traps must be checked regularly; this is not the sort of trap that could be left overnight. Other discovered advantages are that the trap and its entire contents can be moved and sifted at a later time and by being placed on the surface this style could even be used in areas that are too difficult to dig in.

Fig. 4. The container is set in the ground at the same level as the surface of the surrounding soil.

We set a total of four traps in two different locations and after a few hours we had collected what we came for: 15 females, 7 major males and 7 minor males. The various Aphodiinae (apologies to some of our readers) were discarded.

Michael (Fig. 7) also spotted one of the plants he was interested in, the sundew *Drosera brevifolia* (Fig. 8). In all, it was an eventful and worthwhile trip that may need repeating in the near future since there never seems to be a shortage of people looking for live *Phanaeus* (Fig. 9–10).

Fig. 7. The author's brother, Michael, in search of sundews.

Fig. 8. One of the sundews in bloom, *Drosera brevifolia*.

Fig. 9. Minor male of *P. vindex*.

Fig. 10. Major and minor males and two females.

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