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WITHIN THIS ISSUE

Lee Kong Chian Natural History Museum	1
Artist George Foster	5
The Beetle Hobby in Switzerland1	(

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Singapore's Lee Kong Chian Natural History Museum

by Abigail Ashvina

Astute readers of *Scarabs* may remember me from *Scarabs* #80. I am Editor Barney's first assistant, and was elated when Barney asked me to write a short article on the Lee Kong Chian Natural History Museum, located on the campus of the National University of Singapore (NUS). Lee Kong Chian was a wealthy businessman who formed a foundation that donated funds to found the museum in conjunction with the NUS.

The history of the famous Raffles Collection, which is housed here, is detailed in the book *Of Whales and Dinosaurs*. The foyer of the Museum features a small store on one end and a ticket counter on the other. When you enter, you are greeted by a large mural depicting natural history specimens. The first floor is cavernous, and features impressive exhibits of, you guessed: dinosaurs and a whale skeleton.



The street view of the Museum. The entrance is on the left, and the steps lead to botanical exhibits on level two. The architecture is beautiful, and you can see that here, 1° north of the equator, landscape maintenance is a big job!



This is just a small section of the mural in the entrance foyer of the Museum.



Part of the outdoor aquatic plant exhibit on level 2.

Before I delve into the specifics, our friend Stéphane Le Tirant sent a list of some of the scarabs in the collection:

Anoctus laevis (Sharp, 1875) Chalcosoma atlas keyboh (Nagai, 2004)

Clinterocera pilifer (Moser, 1921) Copris agnus (Sharp, 1875) Dichodontus fissicornis (Arrow, 1911)

Dipelicus daedalus (Fabricius, 1792)

Dipelicus lacordairei (Sharp, 1873) Glycyphana binotata (Gory & Percheron, 1833)

Haroldius fairmairei (Boucomont, 1914)

Haroldius rugatulus (Boucomont, 1914)

Ixorida pseudoregia malayensis (Antoine, 1986)

Ixorida regia sumatrana (Miksic, 1972)

Mystroceros macleayi (Gory & Percheron, 1833) Ochicanthon dytiscoides

(Boucomont, 1914)

Onthophagus borneensis (Harold, 1877)

Onthophagus pavidus (Harold, 1877)

Onthophagus pedator (Sharp, 1875)

Onthophagus rutilans ->
Onthophagus borneensis
Oryctes rhinoceros (Linnaeus,
1758), the asiatic rhinoceros beetle
Paragymnopleurus striatus (Sharp,
1875)

Paraphytus doriae (Harold, 1877) Paraphytus ritsemae (Harold, 1880) Sisyphus thoracicus (Sharp, 1875) Tibiodrepanus sinicus (Harold, 1868) Thank you Stéphane; I look forward to meeting you on your next visit to Singapore.

The wet collections and dry collections are stored on separate floors. Here is a look down one of the aisles where the entomology specimens reside:



Dr. Wei Song Hwang, whose interest is Hemiptera, was my host for this visit. Dr. Hwang kindly spent a lot of time touring the facilities and answering many questions.

I was shown the computerized deconvolution camera system, which gets heavy use. I also learned that DNA analysis is used on many incoming specimens, and the results are kept in the Museum's database. The cost of each analysis has dropped to about 20 cents.



This is part of the insect display in the public part of the Museum.



Dr. Wei Song Hwang (or, as we would say in Asia, Dr. Hwang Wei Song) kindly showing me a drawer of dung beetles collected in Singapore.



A closeup of the drawer of dung beetles.



Dr. Yu Chen Ang, a specialist in Diptera.



Dr. Wei Song Hwang on the left and Dr. Martyn E. Y. Low, Secretariat of the ICZN, on the right.

I also met Dr. Yu Chen Ang, a Diptera specialist, who showed us the beautiful computerized specimen database.

Finally, I was introduced to Dr. Martyn E. Y. Low, the Secretariat of the International Commission of Zoological Nomenclature.

Here is contact information:

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In summary, the curators at the Museum are wonderful and friendly people. Specialists are most welcome to visit and hopefully organize the specimens and update the nomenclature.

Insect Bronzes of George Foster

by Stéphane Le Tirant and Brett C. Ratcliffe

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The artist's fabulous bronze insect sculptures, including magnificent scarabs, have been exhibited at the Montréal Insectarium, the Canadian Museum of Nature, the Museum of the University of Nebraska, and many art galleries. Others are in permanent exhibition at the Insectarium of Hong Kong and elsewhere in Asia. George Foster appeared in the episode "Living Art" of the Insectia TV series in 1999. Some sculptures are part of the personal collection of Stéphane Le Tirant, Brett C. Ratcliffe, and the late Henry F. Howden and Roger-Paul Dechambre. We want to acquaint the readers of *Scarabs* about this artist.

Insect Bronzes - by George Foster

For most of my working life I have been casting bronze for sculptors by molding from their originals, and I developed some special casting techniques. I was raised in Ontario and built my first small foundry/studio there. At the age of 30 I moved to rural Quebec (Eastern Townships) and built a much larger foundry. I tried my hand at making



Artist George Foster.



Trypoxylus dichotomus male, bronze, 8cm.



Xylotrupes gideon male, bronze, 7.5cm.



Xylotrupes gideon female, bronze, 4cm.



Xylotrupes gideon female, bronze, 4cm.

Page 6

my own sculptures in addition to the casting I did for others, and that was mostly figurative work, some of which were sold through galleries.

Most foundries use the lost wax method (cire perdue), but one can also "burn out" organic materials such as insects and dead June bugs. Insects were my first candidates to make into bronze or even silver to make pendants and other jewelry. Some of these were shown at a gallery in Montreal along with my other work. It went over well, and the gallery owner decided to wear an aluminum water bug on a leather thong apparently for the rest of his life. One of the visitors said "it's too bad you can't make them much bigger" and that stimulated me into a research project to do just that. Remember this is before computer 3-D printing, and so I was confined to analog processes such as pantography along with many hours of sculpting details in wax models while peering through a stereo microscope focused on complete specimens.

I was impressed by the insect collection at The Canadian Museum of Nature, and I set about buying or borrowing similar exotic specimens to enlarge and cast into bronze. The Insectarium of Montreal at that time was still an unrealized dream of the notary and insect collector Georges Brossard.

Philosophical ideas and questions emerge concerning the bronze sculptures of insects given that they are a kind of "objets trouvés" or "found art" and not really my creations. However, they are framed as "fine art", and they are the most difficult and time consuming bronzes to do. Since the 1980s the passion to do them and to keep seeking out new ones has consumed much of my life. I'm sure there would have been more socially relevant and certainly more lucrative pursuits for me, but there is my collection of big metal insects to see, crazy or not.

As a child, my favorite books were about wildlife and studying the wonderful drawings of vertebrate anatomy in old text books. My father bought me science stuff like a big chemistry set or tools to make things, and the world of physics opened up. I studied science at McMaster University but really wanted to be an engineer making machines and devices.

The local media have called me call me "The Bug Man", but many people are called "bug men", usually entomologists or insect collectors. A well known portrait photographer living near me captioned his print of me (among other portraits displayed) holding a bronze beetle and a welding torch, "George Foster, Mad Scientist". This title grows less worrisome to me with time.



Dynastes granti male, bronze 6cm.



Catharsius molossus male, bronze 6cm.



Catharsius molossus male, bronze 6 cm.



George Foster and a cast of an ant tunnel.



 $George\ Foster\ exhibition\ at\ the\ Montreal\ Insectarium.$

My parents were market gardeners and artists when they had time. I also alternate my art with gardening. I do many experiments growing unusual, even tropical, food plants on my farm and in the large mostly solar powered greenhouse in cool Québec. What a dream it would be to have some leaf or stick insects hanging out in the greenhouse! Maybe one day.

My current project is to finish my last three bronzes and replace some that have been sold to have an intact collection. *Cyclommatus imperator* (Lucanidae) has very long mandibles for its body length while two "tigers", *Amblycheila cylindriformis* and *Manticora latipennis* (Cicindelidae) (suggested by biologist and writer Robert Wrigley), finish what I need to do.

My bronze collection has been shown in Toronto, Montreal, Ottawa, Sherbrooke, Vancouver, Colorado, Nebraska, Washington, and at a national meeting of the Entomological Society of America. The largest show was local for me in Coaticook, Quebec, and a film was made of it and the studio/foundry. The Royal Ontario Museum (ROM) purchased and borrowed some of my larger pieces. My favorite may be one they borrowed but declined to purchase.

It was instead purchased by a political writer and friend. It was collected by a famous Canadian entomologist, Henry Howden. I told Henry and his wife I found the tiny specimen he lent me to be "visually symphonic". The bronze of this (*Glyphoderus centralis* from Argentina) is 17 inches long.

So what am I and what have I done making this collection? If I could speak for these wonderful creatures, I would say "Hey look at me. I'm not just a functional bug. I'm nature's work of art. Look at how I move. Rejoice at my fantastic colors and iridescences and go to the insect sculptors of the world to be in awe of my form."

George Foster

Acknowledgments

We would like to thanks René Limoges for the photos of the bronze sculptures, Marie-Ève Gagnon for the photos of the George Foster exhibition at the Montréal Insectarium, and Ron Graham for the photos of George Foster.



George Foster exhibition at the Montreal Insectarium.



George Foster bronzes in the Team Scarab Lab in Nebraska: *Heliocopris dominus* male and female, bronze, male 15 cm and *Phanaeus lancifer* male, bronze, 9 cm.

The Beetle Hobby in Switzerland

by Benjamin Harink

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Figure: 1. *Lucanus cervus cervus*, small male, typical size for the Walensee, Switzerland, locality.



Figure: 2. *Lucanus cervus cervus*, female, Walensee locality.

This article is part of a series of articles that covers the beetle hobby in different countries of the world. Today, I would like to talk a bit more about Switzerland, a very interesting place that I called home for about three years, during which I met and befriended some outstanding beetle hobbyists.

Development of the beetle hobby in Switzerland

Switzerland has a long tradition of entomology, even though the beetle rearing hobby has been a relatively recent development and is practiced by only a few people. The country is breathtakingly beautiful, and quite small, with about six million people. There are a few entomological societies; the one I spent most time with was the Entomological Society of Zurich (https://www.insektenegz.ch/). This society has existed since 1911 and has 300 active members, most of which seem to be specialized in European insect species. There is also an association of beetle breeders (https://www.hirschkaefer.ch) specifically that I founded together with Daniel AMBUEHL in 2011, with a focus on making the beetle breeding hobby more widespread in Switzerland and also to develop ideas and concepts for the local stag beetle species, *Lucanus* cervus cervus (Fig 1 & 2), which

is considered very rare but can be locally abundant. Because of Daniel, Switzerland quickly showed up on the European map as one of the places where Kinshi (a breeding material that makes rearing of many Lucanidae species very easy) (Fig. 3 & 4) production was pioneered and done on an already somewhat semi-commercial scale. Daniel also developed a non-sterile method of producing Kinshi, which makes it very easy for growers to produce Kinshi at home – without laminar flow and autoclaves. I did a lot of the initial testing of the Kinshi with him, and we were quite impressed with the results. All of a sudden, we could very easily produce large, telodont stag beetles without a lot of effort. Even better, I was able to do the first recorded breeding of *Mesotopus tarandus* (Fig. 5 & 6) on his Kinshi, for which we had used Reishi (Ganoderma lucidum) instead of Trametes versicolor. I was lucky enough to get some time from Daniel to give some more insights into his beetle breeding and other projects that he is working on.

Insect fairs and suppliers in Switzerland

There is a good insect fair in Kloten, which is next to Zurich. It is relatively small compared to big fairs like the ones in Frankfurt (Germany) or Prague (Czech Republic), but it is normally a very good place to find some living insects (Fig. 7, 8 & 9). In the past when I visited, it seemed to be more focused on Lepidoptera and moth species that were sold as livestock. The majority of insects on offer,



Figure: 3. *Ganoderma lucidum* (a mushroom) kinshi bottle, made in Switzerland with a very happy larva of *Mesotopus tarandus*.



Figure: 4. *Pleurotus pulmonarius* (another species of mushroom)kinshi bottle, made by Daniel Ambuehl – Copyright D. Ambuehl.



Figure: 5. F2 *Mesotopus tarandus* male raised on Swissmade kinshi. To my knowledge the first successful breeding of this species in Europe.



Figure: 6. L2 larva of M. tarandus on Reishi kinshi.



Figure: 7. Display of live insects and invertebrates at the insect fair in Kloten.

however are dead stock. Hobbyists seem to order most of their species through the Internet from dealers and exchange with like-minded hobbyists.

Among Europe's Best Beetle Breeders: Daniel AMBUEHL and Etienne GROEPL

Daniel is a good friend of mine and I am happy he volunteered to answer some of my questions.

Benjamin: When and how did you start beetle breeding?

Daniel: It was on Saturday, the 5th November 2011 in the morning at 8.30. I was just about to start my academic workshop about mushroom cultivation at the Zurich University of Applied Sciences in Wädenswil, near Zurich, Switzerland. For this I built up my private little laboratory in a classroom for students. One of the first participants, that appeared this morning was a young man named Benjamin Harink. He had written me several mails asking questions about whether I also can cultivate this and this mushroom on this or that wood. And because he mentioned mushroom species like *Trametes* (Coriolus) versicolor and wood species like "Kunugi" and used a word I never heard before (Kinshi), I was afraid he would probably be in the wrong workshop and asked him, why he wants to use these mushrooms on these logs. Benjamin explained that he needs this white rotten wood for the breeding of beetles. As he sounded pretty serious, I asked

him to bring some items with him, so we can discuss his project in the plenum. There he was, with a bunch of Be-Kuwa editions and some larvae of *Phalacrognathus muelleri*. I was amazed. And of course he stole the show. But I was very glad about that because I knew that I could help him find recipes for the making of his breeding substrates and because I was the proud owner of some grubs of the Australian Rainbow stag beetle. From then on we tested a lot of recipes for Kinshi and Flake soil that all worked very well. In 2012 we founded the Swiss stag beetle association to find other people who are interested in beetle breeding and to conduct research about the life cycle and optimize the breeding and rearing technic for the European beetle flagship species, the stag beetle Lucanus cervus cervus. Benjamin is still President of our association. We hope that with this we can apply a little pressure on him to return to Europe from his mission to California;-)

Benjamin: How did you get into beetle breeding?

Daniel: Originally I studied education and communication sciences at the Zurich University, came into radio journalism, worked as an author and moderator for Swiss television, than left the media to focus on my artistic work, stayed three years in Berlin, married, and became a father of two children. I was always out in nature, taking home fishes and frogs and insects to keep in my terrariums and aquariums so you might wonder why I didn't study biology. The



Figure: 8. Collectors at the Kloten Insect Fair.



Figure 9: Insect specimen for sale.



Figure: 10. *Dorcus hopei binodulosus*. Red Eye Clone carrying male.



Figure: 11. Prosopocoilus giraffa keisukei.

reason is very simple. At high school my biology professor was a conceited braggart and I didn't want to meet someone like him in my career. But also in my artistic work, I always loved to work in and with nature, making installations with living mushrooms, creating a homeopathic pharmacy with the meconium of butterflies and growing chairs with living trees. (http://www.dendrotektura.ch/)

Benjamin: What species have you bred?

Daniel:

Phalacrognathus muelleri
Lamprima adolphinae
Lucanus cervus akbesianus
Dorcus parallelipipedus
Dorcus brevis (Fig. 23)
Dorcus hopei binodulosus (Fig. 10)
Dorcus titanus palawanicus
Aegus chelifer
Prosopocoilus giraffa keisukei (Fig. 11 & 12)
Prosopocoilus hasterti moinieri

Dynastes hercules hercules (Fig. 15)
Dynastes neptunus neptunus
Dynastes satanas
Megasoma elephas
Megasoma gyas porioni
Megasoma actaeon
Megasoma anubis (Fig. 14)

Cheirotonus parryi Cheirotonus jansoni Propomacrus bimucronatus

Goliathus goliatus
Mecynorrhina polyphemus confluens (Fig. 13)
Mecynorrhina torquata ugandensis
Mecynorrhina torquata immaculicollis
Eudicella aethiopica
Cetonia aurata

Benjamin: How did you get into mushroom breeding? How was this beneficial for breeding beetles?

Daniel: Mushroom spawn production was first kind of a by product of my artistic work with fungi. But people started ordering spawn and joined my workshops at the Zurich University of Applied sciences. So I slipped into that. And, of course, my knowledge was pretty useful for the development of beetle-rearing substrates.

Benjamin: You do have several YouTube channels. Can you tell me what you are showing there, and where these can be found? Why did you start these?

Daniel:

Beetle breeding Daniel Ambuehl: This channel with more than 2,500 subscribers features over 200 films mostly like video logbook entries. Some are in German, some in English. There are a lot of subscribers from Asia, especially Japan, and people keep asking me to come to Japan to make some films for my channel.

Skyfood – Edible insects: This channel is only about edible insects. Cultivation of species, reviews of documents, books, interviews, and my presentations about edible insects.

<u>Pilzgarten Daniel Ambühl</u>: This is a channel about my mushroom projects.



Figure: 12. Prosopocoilus giraffa keisukei.



Figure: 13. Mecynorrhina polyphemus confluens.



Figure 14: *Megasoma anubis* male – Copyright D. Ambuehl.

Page 15



Figure 15: Dynastes hercules hercules, male – Copyright D. Ambuehl.



Figure 16: F1 pair of *Goliathus goliatus* – Copyright D. Ambuehl.



Figure 17: Male *Goliathus goliatus* in cocoon – Copyright D. Ambuehl.

Page 16

The main purpose of these channels is spreading information, giving open access to knowledge and insight into breeding and other adventures.

Benjamin: Where do you get the information about beetle breeding?

Daniel: There are some Internet forums about beetle breeding in Europe in German and French. Books from McMonigle, Jonathan Lai, Articles and Internet documentations of Benjamin Harink, scientific literature about entomology.

Benjamin: You have been quite successful in breeding *Goliathus* for successive generation with very good size results as well. Can you give some pointers on how to be successful with this genus (Refer to figures 16, 17, 18, 19, 20, 21 & 22)?

Daniel: Main substrate materials for L1 with leaves and flake soil and white rotten wood finely ground. From L2 only with peat and sand. Small boxes, 1 liter. Don't fill to the top and maintain at 26 degrees Celsius. Feed with cat food pellets. Keep feeding rhythm rigorously. Add 1 gm of water for every 0.5 gm feed pellet. Always remove uneaten feed. Monitor humidity so not too wet. Change substrate regularly every 2 weeks. In late L3 stage monitor behavior. If you see them walking transfer to special box with high sand content (75%) and keep humid but not wet. If they pupate, lower temperature to 22 degrees Celsius. Check pupae exactly 14 weeks later. See my videos.

Benjamin: And how do you obtain breeding/rearing items: cages, substrates/foods, and so on?

Daniel: Mostly DIY, but also from IKEA, special sawmills, etc.

Benjamin: What species do you breed/rear at the moment?

Daniel: Most recently, I invested more time in breeding and cultivation of edible insects:

Samia ricini Bombyx mori Attacus atlas Gonimbrasia zambesina Antheraea pernyi

so I had to reduce my beetle breeding program a little bit.

I keep:

Phalacrognathus muelleri
Lamprima adolphinae
Lucanus cervus akbesianus
Dorcus parallelipipedus
Dorcus hopei binodulosus
Dorcus titanus palawanicus
Aegus chelifer
Prosopocoilus giraffa keisukei
Dynastes hercules hercules
Megasoma elephas
Mecynorrhina polyphemus confluens
Mecynorrhina torquata ugandensis
Mecynorrhina torquata immaculicollis

Benjamin: What substrates do you use?

Daniel: Rotten leaves, white rotten wood (beech, oak), Kinshi with beech and *Pleurotus pulmonarius, Pleurotus djamor, Pleurotus cornucopiae*, Shiitake (*Lentinula edodes*) and others, Flake soil (my Swiss recipe: 8 kg beech wood sawdust, 2 kg wheat bran, 20 liters water, compost starter. I have a cellar that is never over 20 degrees and goes down in winter not under



Figure 18: F1 generation of *G. goliatus* – Copyright D. Ambuehl.



Figure 19: *Goliathus goliatus* egg – Copyright D. Ambuehl.



Figure 20: Female G. goliatus conspersus – Copyright D. Ambuehl. Page 17



Figure 21: *Goliathus goliatus* egg laying box – Copyright D. Ambuehl.



Figure 22: *Goliathus goliatus* pupa – Copyright D. Ambuehl.



Figure 23: *Dorcus brevis* F1 pair – Copyright D. Ambuehl. Page 18

3 degrees (ideal for *Lucanus* and *Dorcus*) I have a tropical room (around 25 degrees), and I have a room that is between these two rooms (10 minimum winter – 25 maximum summer).

I also managed to interview Etienne GROEPL, another expert at beetle breeding. He does make his own breeding products, and I am very thankful he took the time to answer my questions as well. Even more, he is an outstanding photographer that takes breathtaking images of beetles.

Benjamin: When and how did you start beetle breeding?

Etienne: My first Cetoniinae beetles I had when I was a small boy at the age of seven from the local zoo in Zurich. 17 years later I wanted the same species back. At this time I moved to Germany and the bigger breeding scene in Germany and Daniel Ambuehl's Videos influenced me very strongly. Soon, more and more species followed. Three years ago I got my first stag beetles. After a successful breeding of *Dorcus* titanus titanus from Sulawesi. I discovered my passion for stag beetles. So today, I'm specialized on stag beetles. The fascination for stag beetles is their complex biology and the fact, that you need to understand a lot of processes and other organisms like the trees, fungi and bacteria. Through the stag beetles breeding, I got in touch with mushroom farming and I now own a little lab to cultivate my own cultures for Kinshi and edible mushrooms.

Benjamin: What species have you bred?

Etienne: Successful:

Chlorocala africana africana Chlorocala africana oertzeni Eudicella euthalia bertherandi Dorcus rectus Dorcus titanus titanus ex Sulawesi Dorcus titanus titanus ex Sumatra

Tried to breed:

Dorcus montivagus Dorcus titanus daotensis Dorcus schenklingi

Benjamin: Where do you get information about beetle breeding?

Etienne: From Daniel Ambuehl's videos, the Kaeferforum, Japanese videos, *Be-Kuwa* and from various websites including http://www.beetlebreeding.ch/.

Benjamin: How did/do you obtain living beetles?

Etienne: By exchanging species or good white rotten wood with breeding friends and through the Kaeferforum of German and Austrian breeders.

Benjamin: And how do you obtain breeding/rearing items?

Etienne: I make a lot myself. Flake soil, Kinshi, Kutsuki with oak logs and Shiitake. I don't sell anything professionally but I give things to friends if I have something left. (Fig. 25 & 26)



Figure 24: *Lamprima adolphinae* male – Copyright E. Groepl.



Figure 25: Breeding materials, mushroom wood – Copyright E. Groepl.

Benjamin: What species do you breed/rear at the moment?

Etienne:

Mecynorrhina torquata ugandensis Mecynorrhina torquata immaculicollis Dicronorrhina derbyana derbyana Eudicella hornimanni Dorcus titanus palawanicus Dorcus parryi Dorcus antaeus Dorcus nepalensis Dorcus hopei binodulosus Prosopocoilus giraffa keisukei Cyclommatus metallifer metallifer Phalacrognathus muelleri (natura, supergreen, dark green, dark red/black) Lamprima adolphinae (Papua) (Fig. 24) Neolucanus maximus maximus *Dynastes hercules hercules* Dynastes neptunus neptunus Megasoma gyas porioni

Benjamin: What substrates do you use?

Etienne: Flake soil, Kinshi (Ohharitake/Kawaratake).

Figure 26: Breeding room Etienne Groepl – Copyright E. Groepl.

Benjamin: What are the best results of your reared beetles?

Etienne: Male of *Dorcus titanus titanus* from Sulawesi, 81 mm, on pure oak flake soil without any protein additives. Male of *Lamprima adolphinae* (Papua) 39 mm

Benjamin: What is the Swiss beetle hobbyist community like?

Etienne: Sadly, the Swiss community is still very small. Most of the people breed big Cetoniinae species like *Mecynorrhina torquata ugandensis* or *Mecynorrhina polyphemus confluens*. Very few people breed Lucanidae so I guess I am the biggest Lucanidae breeder besides Daniel Ambuehl in Switzerland.

All in all, there is much more to be written about beetle breeding and hobbyists in Switzerland, but I am running out of space. I would like to thank Daniel AMBUEHL and Etienne GROEPL (Switzerland) for their feedback, efforts and support in gathering the latest information for this article.