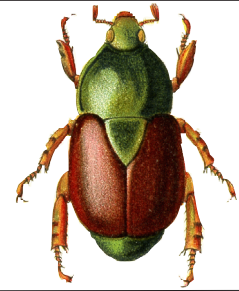


SCARABS



Va's avey chey, tey avey chey

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Nicaragua Collecting Report

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Paul Lusting After *Aphodius* in Gopher Burrows

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I had the pleasure of visiting Pablo Yoder, a missionary friend of mine in Nicaragua, from May 30 to June 13, 2005. The stated goal of the trip was to take photographs for my employer, for a nature book that Pablo is writing. The unstated goal was to collect beetles! Brett Ratcliffe got me in touch with Jean-Michel Maas who was able to line up a collecting permit for me to bring back 450 specimens. I collected Cerambycids and Buprestids along with a few other unusual looking beetles in various families, as well as scarabs.

I prepared for the trip by gathering up all the empty film canisters and peanut butter jars I could find. I borrowed an extra AC/DC ultraviolet collecting light and I made some of those neat 250' extension cords out of 18 gauge zip cord. I had previously shipped Pablo a quart of ethyl acetate and gave him instructions on making a portable mercury vapor light. He was also responsible for obtaining buckets and molasses.

Nicaragua has malaria throughout the country, so I took the anti-

malaria drug chloroquine for one week before, during, and for four weeks after my trip. I had been to Nicaragua a little over a year earlier, so I didn't need any shots. A passport is required, but no advance visa.

On the way to Selva Negra I changed some money and got some Nicaraguan rubber boots (the best footwear for the kind of hiking we always do – up and down streams and muddy trails) and other supplies including

The Chapel at Selva Negra



When I landed in Managua, my friend Pablo was waiting for me. Before we left the airport, we got to meet Jean-Michel who was waiting for some other friends of his to arrive on a later flight. The hotel receptionist told us to look for a man with a big *bigote* (mustache) and this proved to be a reliable field mark.

Pablo and I looked for beetles around the area where we spent the night, just outside Managua, at lights and by searching tree trunks and fallen logs. We picked up many interesting specimens on the grounds and also some in the freezer. Pablo's friends had been preparing for my arrival and were keeping their eyes out for beetles for me. We didn't stay out late, as we were to leave very early in the morning for Selva Negra.

rotting bananas that we planned to hang in trees along the trail. The drive was fairly short, but it took all too long for me – I was anxious to get my traps out.

Selva Negra is a beautiful place with comfortable accommodations, good food, terrific trails through the forest, and great collecting. The birding was also fantastic and I often had a hard time concentrating on what I was doing. Both Pablo and Jean-Michel had worked with the owner to get permission for me to collect on the property. For this I was most thankful, as our collecting there was wonderful and we thoroughly enjoyed ourselves! As soon as we checked in, we hit the trails to set out our traps. We put fermenting molasses traps and rotting bananas in the trees, and dung-baited pitfall traps in the ground. I use old peanut butter



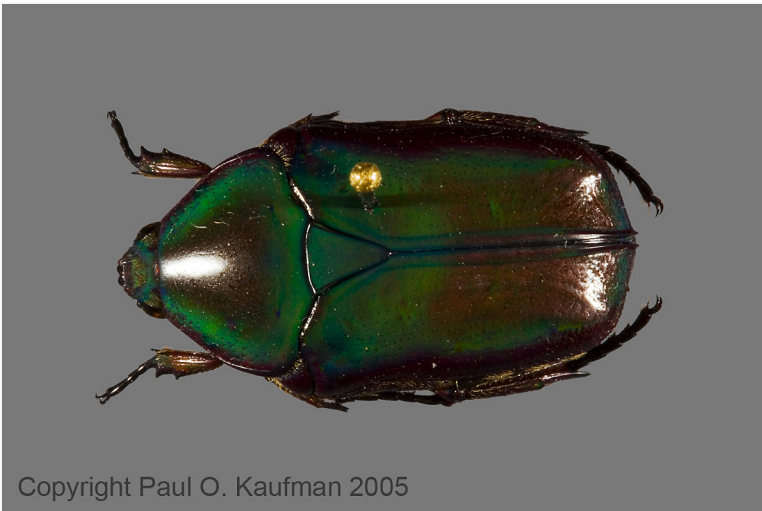
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Megaceras septentrionis



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Pelidnota costaricensis



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Euphoria candezi

jars to transport the dung and have always removed the labels first – we were later in some areas of Nicaragua with robber groups operating, and at that time I wondered if I should have left the labels on... We set the traps along one of the loop trails and checked them several times during the day and night.

Near the beautiful Chapel, just before dark, we got our mercury vapor and two UV lights set up with sheets under and beside them. At dark, the fun began! We tried

up again after that until 4:00 AM. Unfortunately for us, a hurricane brought rains to Nicaragua about 2 weeks earlier than normal. The plantation workers at Selva Negra told us that the *D. hercules* come out with the first rains, and we did not get a chance to collect any. We later met an engineer working at Selva Negra who recently started collecting beetles. He was willing to trade me a small male *D. hercules* for one of the *Megasoma elephas* that Pablo had picked up for me before my arrival. We pulled all our traps the next morning. The dung-

Macroductylus



to take just a few of each species but soon became confused about what we had and how many. Pablo and I, along with Pablo's 6-year old son Kenny, were running from light to light grabbing new arrivals. We took everything back to the Chapel and sorted things into killing jars. Brett had told me that the *Dynastes hercules* fly late (or early, depending on your perspective), so we kept at the lights until 4:00 AM the first night. The second night, light rain gave us a chance to sleep a while, but it quit around midnight, so we were

baited pitfalls worked well, but our molasses traps and rotting bananas did poorly.

From Selva Negra we went to Jinotega and set up rotting fish-baited pitfalls around Lake Apinas. The traps did not end up collecting any scarabs, but along the shores of Lake Apinas we found some of the beautiful *Euphoria candezei* Janss. on *Croton*, probably *Croton xalapensis* Kunth (in Spanish, Colpalchi' or Sangregado). At our lights that night which we set up at Santa Elena (part way down the

mountain toward Jinotega from Selva Negra) we collected some nice scarabs.

The next day we traveled to Pablo's home in Waslala. This part of the country has been heavily cut over and burned regularly for years. Still, we found some interesting scarabs in spathes of *Diffenbachia* (sp) and checked the mercury vapor lights in Pablo's yard as well as at the nearby hospital.

Our next adventure was several days later at Penas Blancas del Cua. There is a wildlife preserve there and a beautiful 50-meter waterfall. We were not able to get AC power at the base of the mountain where we camped, but we carried Pablo's truck battery in and ran one UV light both nights we were there. Some day I'd really like to get power up on top of the mountain and try running lights up there. We collected some interesting scarabs at the lights but rain on one of the nights stopped our efforts early.

After a brief return to Waslala, I took a bus back to Managua. I again checked the lights for a few last specimens and packed for my trip home. During my trip, every night after collecting, I re-packed my specimens (with collection tickets) from glass vials into film canisters. My collection tickets included the date, location, GPS coordinates, and any other information such as host plants, etc., which are filled out at the time of collection. The collection tickets stay with groups of specimens until I can get labels put on their pins. I layered squares of toilet paper in between



Forest at Peñas Blancas de Cua



Falls at Peñas Blancas de Cua

specimens associated with different collection tickets. Specimens too large to fit in film canisters were stored in Tupperware-type containers.

On arrival back in the States, I showed my Nicaraguan permits to the officials and was given a bit of a hard time about having insects with me. The customs official seemed to want to see something from the US government that indicated that I could bring my specimens into the country. Finally I was allowed through (with great

relief) and was soon on my way home. I understand that there is nothing required by the US government to bring specimens into the country (as long as they are dead) but I may try to get something to document that before my next trip!

This was my first real collecting trip out of the country and it was a great experience. I am looking forward to more trips to more places in the future!

Coprophanaeus Revision

By W. D. (Dave) Edmonds

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Dave in his study. We hope you all appreciate that Dave thoroughly cleaned up his desk just for this photo!



I am progressing well, if somewhat slowly (a function of older age?) on my on-going revision of *Coprophanaeus*. This will be the fourth in the series of revisions of phanaeine genera and sequel to *Phanaeus* (1994), *Sulcophanaeus* (2000) and *Oxysternon* (2004). I would very much welcome hearing from readers who have *Coprophanaeus* material they would be willing to loan for this study. My contact information is above.

Collecting Necrophiliacs

By **Barney D. Streit**

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Editor Barney taste-testing Mexican hot hogs: a welcome break from the tedium of entomological pursuits. With him are Anne and Tammy, the full-time trap researchers at Scarabs headquarters.

From extreme southern Texas south to South America, scarabaeologists have before them a rich palette of scarab fauna that are only occasionally attracted to dung. This includes the genus *Coprophanaeus* and the seldom-collected *Phanaeus bispinus*, which are the pearls of the carrion crowd, as well as several other groups such as *Deltochilum*, *Dichotomius*, etc.

To collect these species, carrion must be utilized as an attractant. Anyone who has tried to use carrion knows why these beetles seem scarce in most collections: using carrion presents a few problems, which can be illustrated by my experiences.

My initial attempts utilized the brilliant idea of placing rotting chicken inside a plastic 48-ounce

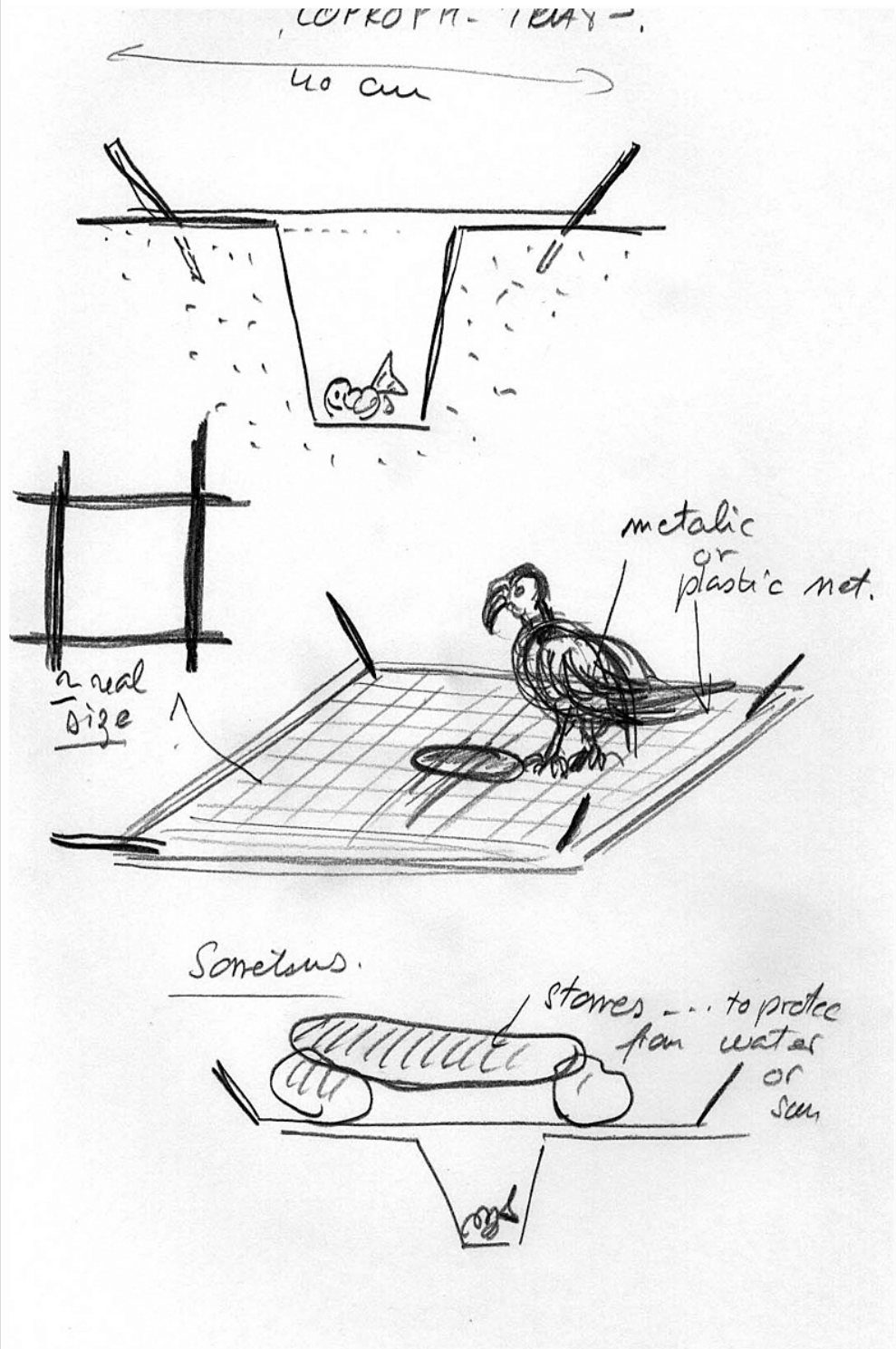
cottage cheese container. I cut a 1.5-inch hole in the snap-on lid, and taped it on the container with wide plastic wrapping tape. These traps were buried flush to the ground in semi-tropical thorn forest, then checked a few days later. Upon my return, I found the traps undisturbed, except that the carrion was gone. Flying overhead, I descried the culprit: the long beak and neck of the vulture was surely to blame.

Small paint buckets, such as the 2.5-quart size sold at Home Depot fared a little better. After removing the handle, holes were drilled in the bottom for drainage. The bait was protected by a chicken-wire mesh (1" poultry netting) wrapped over the mouth of the bucket and held tightly by a circumferential wire. These buckets are deeper, so that vultures cannot reach the bait.

The problem with these traps is that sometimes the entire trap had been unearthed and carried away by some unfriendly mammalian predator.

In desperation, I contacted Patrick Arnaud of Saintry-Seine, France, to find out his strategy for trapping with carrion. I received a nice explanation, complete with a drawing. Patrick uses a plastic

Patrick's musings on how to do it right. That is one frustrated vulture!



can of about one liter in size and cuts a hole in the cap about four centimeters wide. He simply buries his carrion container and covers it with a strong wire mesh about 40-50 centimeters wide which is held tightly over the trap by wooden stakes driven into the ground. Depending on the locality, Patrick will place a “tent” of stones or leaves over the trap to protect it from sun, rain, and of course, hungry critters.

Various stakes have been tried with varying degrees of success. Anne’s research showed that a long metal stake (on the left, below) is best for sandy areas. Otherwise, animals will be able to tear the trap apart.

Tammy ascertained that short, plastic stakes (such as the yellow one she is holding) are too-easily

pulled out of the ground, and are not recommended.

The best all-around stake is the round metal stake (middle, below). It is not too short, so it is difficult for animals to pull out. Nor is it too long, so it can be driven into hard, rocky ground.

Another problem is that carrion stinks. Like dung, the stinkier the better. I have used chicken parts with great success. In Latin America, a bag of “menudo chicken” can be purchased inexpensively in most any market. It came as no surprise that Patrick likes to use fish, as the French are well-known for their culinary flair and wizardry. It is best to transport your bait in an insulated cooler with ice until you utilize it. Another source is of course road kill. If you are fortunate enough to



Dracula...beware!

have a roof rack on your vehicle, I suggest placing the road kill in a plastic bag and tying it to the roof rack. If there is no roof rack, then use a small, plastic garbage can.

Editor Billy Bob Warner suggested the use of dried fish. It is expensive, to be sure, but is light, compact and does not smell bad. Therefore,

you can purchase it ahead of time and bring it along with you on your trips. You only need to hydrate it well and rinse all the saltiness away. In the tropics, it should “ripen” within a day. If you have any designer baits or favorite techniques, please let us know.

A trap crawling with Coprophanaeus!



We love this quote, but think it could be improved by substituting “scarab beetles” for “the universe.”

“The effort to understand the universe is one of the very few things that lifts human life a little above the level of farce, and gives it some of the grace of tragedy.”

Steven Weinberg, from *The First Three Minutes*

Side By Side

Postulations on Some Rare *Diplotaxis*

Dispatches from the Diplo Desk—Part 2

By Scott McCleve
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There is one quality of certain *Diplotaxis* species that excites some interest in scarab collectors: **rarity**. Below, handily enumerated 1 to 4, is a report of sorts on some of our rare and curious diplo pairs.

There is a curious and striking pattern that—after long study—appears with certain pairs of diplo species that have parapatric (side by side) ranges. One half of each pair (the more recently derived species) tends to be very rare and reluctant or unable to fly to lights. There are other candidate pairs not explored in this paper.

We may discover something here in the way of a new wrinkle in the time-tested paradigm of allopatric speciation. If this wrinkle is indeed new, then I hope it will be tested by some of you as it applies to the genera of your expertise.

Take a sheet of paper. Put a pencil dot in the middle of one edge. Any edge—your choice. Keep it handy for later

Pair # One—*sordida* (Fig. 1, left) and *vandykei* (Fig 1, right). Take your piece of paper and hold it so that the dot is at the bottom. The dot represents the rare species *D. vandykei* Vaurie, and the rest of



Scott is also a culinary wizard!

the paper represents the range of its common sister species, *D. sordida* (Say). You could say, in a special way, that they are side by side.

Thanks to the magnanimous Bob Woodruff at the Florida State Collection of Arthropods, I have a fine male paratype of the very rare *vandykei* to study—one of the type series of 16: AL: [Mobile Co.] Mobile, 18 December 1939. Pat Vaurie also had a single specimen from AL: [Pike Co.?] Spring Hill [=Springhill?], 30 October 1910. Below we will do a little ranting about bad labels—which have complicated several important matters in the genus, and which



Figure 1.
Diplotaxis
sordida (left) and
vandykei (right)

sent the usually placid H.C. Fall repeatedly but quietly ballistic. This slightly uncertain Alabama locality is most of the way across the state, in the southeast corner. Mobile is in the southwest corner.

Some of you out there might be thinking, “Is *vandykei* extinct?” I want to quash this foolishness right now. I have another much more recent specimen. This specimen is labeled GA: Lowndes County., 31 V 1963, E.I. Hazard. This is a NEW STATE RECORD. Lowndes County is on the south central border of Georgia—a state and a half away from Mobile.

Too bad that E.I. Hazard did not give us any more geographic detail than the state and county. There is also a Lowndes County in Alabama itself, and if that does not sufficiently astound you, there is also a Lowndes County in the adjacent state to the west, to wit—Mississippi. These three Lowndes Counties in contiguous states are the only Lowndes Counties in the entire world!

The Lowndes County in Alabama is about a third of the way up the middle of the state. Was E.I. confused or lost?

The third Lowndes County, in Mississippi, is on the eastern border about two-thirds of the way up the state, on the Tombigbee River—which drains into Mobile Bay. Does *vandykei* follow the Tombigbee upstream to Lowndes County, Mississippi?

Note to all the young collectors out there: **It Is Really Important To Get Unambiguous Data Onto Your Labels—And More Data Is Better Than Less.** Do you want to be singled out and ridiculed in your old age? Part of your **Legacy** is your **Labels!**

I think it is safe to infer that, unlike *sordida*, its common sister species, *vandykei* does not readily fly to lights. This reluctance may become recognized as a common behavioral characteristic of some of the less-commonly collected diplos, including several not mentioned here. I propose that this alleged reluctance to fly may be a feature of the new wrinkle of our speciation paradigm.

After hurricane Katrina hit in 2005, I was wondering if *vandykei* might have succumbed to the cumulative insults of the pollution of the Mobile Bay area plus urban sprawl, plus Katrina. But the perspicacious Paul Lago reassured me with this (personal communication, 30 Jan 2006).—“I doubt that Katrina had much effect on insect populations. I suspect bad hurricanes were

happening long before people arrived and insects probably deal with the situation better than humans.”

The rarity of *vandykei*, relative to the commonness of *sordida*, is doubtless partly a factor of the small range of *vandykei*. *Sordida* has a huge range: your whole sheet of paper, from southeastern Canada and down to the Gulf Coast, and from Michigan to the east coast. *Vandykei*, on the other hand, is confined to a dot of territory in southwest Alabama, or to a strip along the Gulf Coast if the single other Alabama and the single Georgia records are good. While *sordida* flies to lights in good numbers, *vandykei* has yet to be discovered with any kind of “UV” or other such bit of data on an accompanying label, which leads to the suspicion that *vandykei* does not fly to lights. It is even possible that it does not fly at all. Also, *vandykei* seems to prefer the fall months, except for the single Georgia specimen which bears a May date.

The most salient fact of the *sordida-vandykei* phenomenon is that *vandykei* seems clearly to be a descendant or sister species of *sordida*. I suspect their relationship offers clues to the speciation process in diplos—and maybe even in “real” scarabs. *Sordida* is a very strange species from a taxonomic point of view. The first time you see it under a scope, your reaction is, “Can this be a diplo? It looks so very ... um ... interesting!”

Sordida had the huge territory it occupied all to itself. Then, some events, likely during the Pleistocene in a glacial phase when the sea level was much lower, occurred to isolate a small population on the southern edge of the range of *sordida* in such a way as to prevent re-contact with *sordida* proper until an indeterminate number of millennia later. An event such as the 2005 Katrina disaster leaps to mind, or perhaps a series of Katrinas in close succession. It would seem to me that a widespread catastrophe such as a series of monster hurricanes plus a tsunami or two plus regional mega fires consuming thousands of square miles of forests would be required to prevent re-contact in a region with so little elevational relief. Such events are becoming familiar and credible to us.

Perhaps the isolated population was limited to an island refuge and selective pressure resulted in a species with a reluctance to fly. A tendency to walk (not fly) around and feed and mate in the fall might also have been somehow selected for in some small island habitat where the founder effect and/or genetic drift could produce unusual behavioral features that would further its reproductive isolation from *sordida*.

Think of all the scarab species (*sensu lato*) that we know are flightless. The sheer numbers of them, in many genera, tell us that there is something lurking in the basic scarab genome that is ready to resort to flightlessness when something drastic changes in the beetles’ environment. This

“something” could be a very small part of the genome, perhaps a single recessive (-r) gene that deactivates the whatchamacallit that allows the firing of the neurons that say “WINGS DON’T FAIL ME NOW!” We will call this the **wdfmn-r** gene, and I invoke it repeatedly below. This notion may be useful as we examine the several pairs of apparent sister species selected for discussion here—not just *sordida* and *vandykei*. Please keep in mind this possibility: when disaster strikes, perhaps this quirk in the genome—this capacity for flightlessness—is waiting there ready to make umpteen million new copies of itself when the time is right. If the disaster has been rather recent—say, in the latter part of the Pleistocene—then the rest of the genome of the beetles in question may have lagged behind in producing the outward morphological changes that usually allow us to recognize flightless species with a little practice. Part of the conundrum of these species pairs is that the rare species in each pair has seldom or never been recorded as flying—but these rare parapatric partner species show none of the outward morphological signs of flightlessness (see below).

So far as I know, no specimens of the common *sordida* have been shown to be sympatric with *vandykei*, but *vandykei* seems abundantly separate from *sordida* on the characters Mrs. Vaurie gives, and even the molar lobes of the right mandibles seem to differ slightly between the two species in the limited number of specimens I have compared.

I hope some of our southern scarabaeologists will collect more *vandykei*. Also do not just toss any specimens of *sordida* that you get. Mapping the ranges of the two species in fine detail where they occur, or nearly occur, or don’t occur, together, should be very interesting.

To help with field identification with a hand lens, *sordida* has very sharp and acute front pronotal angles, while *vandykei* has no such points on the angles, but rather obtuse angles. Feeding records of the two would be very interesting.

Pair #Two—*sierrae* (Fig. 2, left) and *dahli* (Fig 2, right). Take your piece of paper and hold it so the dot is on the far left side. The dot represents the rare species *D. dahli* Cazier.

Thanks to the persistence of the indefatigable and accommodating Ron McPeak, the very rare *D. dahli* Cazier has been rediscovered 63 years after the first and only time it had been reported (2005: McPeak, *Coleopterists Bulletin*: 59:4, p. 449-450).

This is a strange species. In all particulars but one it seems to be identical to the much more common *D. sierrae* Fall. The only apparent difference is that *sierrae* has no elytral hairs, while *dahli* has short sparse hairs on the elytra. I doubt that anyone would note the hairs on the elytra of *dahli* until the specimens were mounted and the elytra examined very closely under the ‘scope. I

doubt that I could distinguish *dahli* from *sierrae* in the field even with a hand lens. In his description Cazier unfortunately and repeatedly used the terms “pile” and “pilose,” but you will find no “pile” in the common sense of abundant short soft closely-packed hairs, as in a pile carpet, clothing *dahli*. Rather, you will find very sparse, shortish bristly-looking hairs on the elytra, not “long brown hair” as stated in the second line of the actual description.

(1940: Cazier, *Entomological News*: 51:p. 251.) However, this was his first diplo description, and maybe I ought to cut him a little slack.

Ron generously sent me the two males he collected, and he gave me one! I soaked them up in an ammonia solution, spread mandibles, subjected them to my ultrasonic cleaner plus other indignities, and looked at them very closely, and compared them with a full “A” tray of *D. sierrae*. I even looked at 8th sternites and internal sacs and came up with no discernible differences suggesting any taxonomic significance except those hairs on *dahli*.

Ron reported his two specimens from essentially the 1940 type locality (within 0.2 miles, if not the exact spot). I doubt these specimens differ in any important particular from the norm of the species back in 1940.

Your whole piece of paper (with the *dahli* dot at the left) represents the range of *sierrae*, with California covering most of the sheet, some of Oregon at the



top, the western edge of Nevada along the right edge, and the northern edge of Baja California at the bottom, with Laguna Hanson on the lower margin. I have before me a *sierrae* specimen labeled as collected at Laguna Hanson, Baja Cal., 27 VIII 1958 by E.L. Sleeper. Now, it is my pleasure to announce, for the glory of this heretofore rag, that this is a NEW COUNTRY and STATE RECORD.)

But poor *dahli* is stuck over in Fresno Co., apparently in one patch of *Juniperus californicus*. Now, five specimens is hardly enough to warrant making bold pronouncements. But the similarity of this pair of species, common *sierrae* and rare *dahli*, to the similar pattern of the common *sordida* and the rare *vandykei*, is striking. I think this emerging pattern is cool!

Like the rare *vandykei*, the rare *dahli* exists on a virtual postage stamp of land. Also, while *dahli* is not apparently pushed right up against the beach, it is only a few miles from the Pacific coast—but there is so much elevational relief here that *dahli* could have done

Figure 2.
Diplotaxis sierrae (left)
and *dahli* (right)

a lot of wandering during the perturbations and vicissitudes of the climate and sea level changes during the Pleistocene and ended up here 7 miles west of Coalinga, on the west side of the San Joaquin Valley in the foothills of the Diablo Range in this one patch of juniper.

I find it inviting to invoke another Pleistocene offshore island for the birthplace of the incipient *dahli*. An isolated population there, after most individuals taking flight were blown out to sea over multiple generations, could have switched on the old wdfmn-r gene and just waited out the millennia until things warmed up and the island rejoined the coast.

While the common *sordida* and *sierrae* both readily fly to lights, the rare *vandykei* and *dahli* both appear reluctant to fly. The type series of three *dahli* specimens was collected on juniper, while McPeak got his two at light among junipers. Ron also reports that he got 14 *D. insignis* LeConte with the two *dahli* specimens, which could suggest a reluctance of *dahli* to fly to lights, or perhaps a reluctance to fly at all. Certainly, a disinclination to fly is a good way to become abundant on the ground and on the bushes, but scarce in museum trays.

While the eastern pair of *sordida-vandykei* apparently have not been collected together, likewise *sierrae* and *dahli* have apparently not occurred together—just ... um ... side by side. I have seen *sierrae* from many localities north and south and east of the apparent tiny range of *dahli*, but I have seen no *sierrae* from Fresno County except a single

specimen from Cedar Grove, which I have not located on a map, nor from Monterey County between the type locality and the Pacific.

We have a good clue of where to look for *dahli*—at a certain elevation in the Diablo Range, on juniper in March and May. We have some feeding records (on *J. californicus*) for the common *sierrae* (2006: *Coleopterists Bulletin*: 60[1]: 43-48: McPeak, McCleve & Lago). Maybe in the next 63 years we ... um ... you youngsters will discover if they can be found together. If they cannot be found together, then the distinctness of *dahli* becomes suspect. Hopefully, some of you California collectors will get out there and find more. The largest, most flamboyant and grandiose of the three *Scarabs* editors madly covets Ron's and my specimens.

Is there a pattern emerging? How often do we get good clues of which of two or more species came first? Why is one common and the other rare? Why is the map of a genus partitioned by the member species in just such a fashion? Good scenarios are scarce. Most of the time I just sit at my desk and puzzle over maps—with a big balloon over my head that says, "Duh?"

Pair # Three—*rudis* (Fig. 3) and *rex* (no photo available). Now things get complicated. Our commoner species, *rudis*, is short and chunky and looks flightless—while the rare one is long and slender and looks like it could

fly. But appearances are probably deceiving for both. Turn your piece of paper over to use the blank side. Now put your dot in any corner, and rotate the paper so that corner is at the bottom. This dot represents the known range of *D. rex* Vaurie down in the southern tip of Texas.

Many years ago, through the kindness of the estimable Ed Riley of Texas A & M, I was able to dissect a fine male of the very rare *D. rex*. Then, I had to give it back. This is the only U.S. (or Canadian) species I lack even a borrowed specimen of. Hence, no photo. Ed promised me the next one, and is still looking. This is a small, 8 mm, tawny and hairy species. Ed and his late buddy, Charles Wolfe, reported (2003: *Southwestern Entomologist*, Supplement No. 26, p. 25) that they saw specimens from Brooks and Kenedy counties. Vaurie saw only her type series of four specimens from Kleburg County, which adjoins the other two southern Texas counties.

I always thought *rex* was a flying species—but now I am not sure. I am hoping Ed will keep after this one and tweak out the facts of its way of life. Any food plant records would be wonderful. Finding a population of the commoner *rudis* and looking for them on vegetation at night should be a fairly easily accomplished task worthy of a note by some rising young Midwestern scarabaeologist—and such records may lead to insights regarding the super-rare *rex*.

This just in: Ed sends this locality data for five *rex* specimens at Texas



A & I collection in Kingsville:

- 1 - Kingsville, TX, VI-20-1973
- 1 - Kingsville, TX, VII-21-1977
- 3 - Falfurrias, TX, VI-1-1983

Ed also sends this information, which reflects the thinking of the most likely current worker (himself) to ferret out new data for this species:

“A few years ago a group of us managed to get onto part of the Kenedy Ranch (which occupies much of Kenedy Co.) during mid-April. It’s a great place with active sand dunes and lots of deep sand here and there. I had high hopes of bagging a good series of *rex*, but over two days and nights of active collecting, as well as pit-fall and Malaise traps operated at the site for a two-week period, no *rex* were taken.” (Personal communication, 28 September 2006.)

The few dates available are for May (3rd and 25th) and June (1st and 20th) and July (21st). Perhaps Ed’s mid-April foray onto the Kenedy Ranch was just a little too early.

Figure 3.
Diplotaxis rudis

Continuing with the apparent pattern of the two species-pairs above, none of the *rex* records have any indication of attraction to light. It is possible that it does not even fly. As I recall from my examination of the one long and slender specimen I have seen, it certainly looked like a flying species complete with big eyes and long legs, and Vaurie's description gives no hints of flightlessness. There are other diplo species I suspect do not fly, or fly reluctantly, that exhibit none of the typical characteristics of flightless species: short unfolded "flying" wings, shortened metasterna, reduced elytral umbones, small eyes, and shorter legs, and sometimes the loss of an antennal segment.

Vaurie put *rudis*, which would occupy, in a very spotty way, most of your sheet of paper almost to the Canadian border, and *rex*, occupying just that 3-county dot at the bottom, together in their own little group of two. Much collecting will be necessary to see how closely the range of the more common *rudis* comes to the dot cluster representing *rex*. Vaurie had a single record for simply "Texas." Riley and Wolfe listed Potter Co., which is way up north in the panhandle of Texas, and they stated that most of the specimens came from pitfall traps.

Both are uncommon, weird (LeConte gave *rudis* its own genus), and hairy, and have a more-or-less bilobed labrum. Both are psammophilous, we think. The picture in this pair is cloudy because they are both rare—not just *rex*. I do not postulate that they are sister species; rather, I suspect they

had a common ancestor that flew regularly and was fond of sandy habitats, but perhaps was not an obligate as *rudis* and *rex* seem to be. Would these two be step-sister species? Sister-in-law species? Cousin species?

Vaurie observed that the short and chunky *rudis* has reduced wings in at least some specimens, but it can and does fly in some populations. We see the plasticity referred to above about the capacity for flightlessness in the commoner *rudis*. How ironic would it be for the much rarer *rex* to be flightless even though it is a longish and slender species? Relictual species stuck in the sand do odd things, including, perhaps, switching on that *wdfmn-r* gene. If you must have sand, it might pay to give up your wings. What comes with sand? Wind.

Pair # Four—*conformis* (Fig. 4, left) and n. sp. (Fig. 4, right). Keep your piece of paper turned with the dot at the bottom corner. The whole sheet now roughly represents the range of *conformis* Fall, from eastern Oregon in the north to California in the west to Colorado in the east, south to Arizona, where it is common in the northern and central parts of the state, but rare in southeastern Arizona, showing up regularly only on the lower slope of the east side of the Pinaleno Mts. in Graham County, and again a little further south in Guadalupe Canyon in extreme southeast Cochise County. I have a new county record (and significant range extension) of a single specimen from the mesquite grassland on the western

side of the southeast Arizona sky island ranges: Pima Co., Cienega Creek, 4200', 7 VIII 1997, UV, S.&A. McCleve. Thus, the populations of *conformis* spread down from the north toward southeast Arizona like an amoeba, and the leading part of the blob divides to embrace both sides of the area occupied by the many mountain ranges.

I also have these NEW COUNTRY and STATE RECORDS that represent even further extensions to the south of the eastern arm of my so-called amoeba of *conformis*: MEXICO: Sonora: Sierra San Luis, Cajon Bonito, 1370 m, 21-22 VIII 1982, at light, G.E. Ball & D. Maddison, 1 male; and Sonora: 14 km S Huachinera, 1150 m, 5 VIII 1982, S. McCleve, G.E. & K.E. Ball, 1 male.

However, there seem to be large gaps in available territory and appropriate habitats (mesquite-oak-grassland) where *conformis* ought to occur on the lower slopes of all the isolated southeast Arizona ranges and in all the valleys between them. The reason for these puzzling gaps likely involves a new species, and its range is the dot at the bottom of your piece of paper.

In much of southeast Arizona *conformis* is replaced by a new (undescribed) sister species, which occupies a niche a little higher in elevation than does *conformis*. They could both occur side by side together where the mesquite-oak zone interdigitates with the lower edge of the oak-pine zone, but so far as I know they are mysteriously miles and multiple mountain ranges



apart.

Conformis seems to me to have no close relatives, except for the new species. *Conformis* has a unique mandible, and the new species has the same mandible—with the addition of an extra ridge.

There is no question about the ability of the new species to fly. I have several hundred specimens, almost all collected at light. I also have food plants for it, but I have no food plants for *conformis*.

There is a very strange pattern to the collections of the new species. I have seen a few hundred thousand diplo specimens over the nearly four decades I have been here in Cochise County. I have seen many collections from many years into the past, including some from the 1800s. But none of the older collections, or any collections sent to me for determination, contained any specimens of the new species. The first specimen, a single male Mrs. Vaurie looked at for me, was collected by myself in 1972. The second, also a single male, I got a few years later in a second range.

Figure 4.
Diplotaxis conformis
(left) and new species
(right)

Both were at light. Then in 1979 I got a series of 24 in a third sky island range. Since then I have gotten increasingly larger series of up to a hundred or more specimens, including two squirming handfuls handed to me one night by fearless Fred Skillman (of Longhorn Ranch, Pearce, AZ). Even back in those innocent years before I got hooked on diplos, I would collect in series (if not, indeed, collecting every scarab specimen), and I believe the single specimens in the first two collections were the only ones that appeared on those occasions. There is thus an apparent real increase in the numbers of this new species. Is this global warming? Has the behavior of this species changed in the last 30+ years, such as a new-found readiness to fly? In other words, has the wdfmn-r allele been swamped by the dominant WDFMN allele? Just now in this blink of time while I am here to notice? Or, is the new species just more abundant—and if so, is another species declining? I do not think it is just moving north from Mexico. I have never seen it in northern Mexico, or indeed even in any of the first tier of Arizona mountain ranges adjacent to the border.

I see a simple scenario for the evolution of this new species: At some point in the rising and falling of the Pleistocene vegetational zones in this area, a small population of *conformis* got isolated in one valley or canyon complex. As the climate grew cooler, this warm-valley-loving population got cut off from the retreat to lower elevations of the main part of the populations of *conformis*. Then, the climate changed slowly enough for the

cut-off population to adapt to the cooler and moister conditions, and eventually it became a new species, and apparently it discovered an open niche as both it and its habitat changed over time. Then, in the next warmer period, when *conformis* re-invaded parts of its old territory, the two species partitioned the environment with the new species occupying the somewhat higher oak-pine zone in at least three of the mountain ranges, while *conformis* settled into the lower oak-mesquite zone both east and west of the complex of mountain ranges. But somehow *conformis* seems unable to occupy the sort of abundant habitat that seems appropriate for it in the valleys between the mountain ranges.

This apparent phenomenon of the members of each pair somehow preventing each other from really existing side by side in any particular habitat is easily dismissed with pairs # 1 and 2 above as an “artifact of collecting” because the rarer species are so very rare. In pair # 3 we have so little data as to make speculation there moot at best. But with *conformis* and the new species, the phenomenon cries out for some kind of explanation: How is *conformis* excluded from all that apparently suitable habitat in the valleys between all the southeast Arizona sky island ranges? Is it a pheromone that operates across valleys? Is it some other competing diplo species, or a species of another genus? Is it a disease, or a predator? Since we know so little of the food plants of each member

of each pair, it is possible that they share at least some of their food plants, as do *sierrae* and *dahli*). Are the plants able to resist feeding by the older species, in this little-known arms race, but unable to synthesize an effective deterrent against the newer species, which could have developed an immunity? Think about *sierrae* and *dahli*, both of which feed on juniper. R.G. Dahl, and McPeak and 63 years later, got *dahli* in a patch of junipers, but neither they nor apparently anyone else has gotten *sierrae* within miles of that patch.

Please trust me here. I and many others have made many collections between these mountain ranges in the mesquite-grasslands and mesquite-oak-grasslands would have discovered *conformis* if it does indeed occur in these valleys. I was absolutely astonished when Annie and I got a single *conformis* at Cienega Creek on nearly the west side of the block of ranges. Since you have read this far, and we are near the end, I am going to toss out there one more wild notion: That there is a subtle (to us) but powerful factor involved, which I here suggest as the mysterious “**mutual sister-species exclusion principle.**” Is it really possible to collect both species of any of these pairs together in one habitat, or at one locality on the ecotone between two habitats? I hope this “principle” will be tested for these species and that others will test it by examining their collections for anything similar in their genera of choice.

So there they are, these four pairs of species, each pair doing an evolutionary dance “side by side,” through all the vicissitudes and trials and catastrophes of at least the later Pleistocene. Let us hope they will survive, side by side, in these days of looming global catastrophe. The forests and woodlands, grasslands and deserts are changing before our very eyes here in the Southwest—and probably not for the better.

Note—I had hoped to touch on the investigations being conducted by the puissant Matt Paulson (with nudges from myself) up in Nebraska on the enigmatic and rare species *Diploptaxis basalis* Fall. As this essay developed I had to leave it out—as, 1) I do not know which is its sister species among several candidates (*harperi* Blanchard, *fulva* [LeC.], *blanchardi* Vaurie and *urbana* Vaurie). And 2) Matt has gained by hard and thoughtful work a lot of interesting new information and insights into what is going on with this species, which I think he plans to share with us all. Among others is the fact that *basalis* is reluctant to fly to lights—which I mention here as it suggests that there may be something to my supposition that some derived sister species are reluctant to fly.

Are you now thinking of the genera of your expertise? Do you have a rare and isolated species that is obviously very close to a common and widespread parapatric species? Is there any indication that the rare species flies readily? Can you conjure up a speciation event in the manner on display with these four pairs of

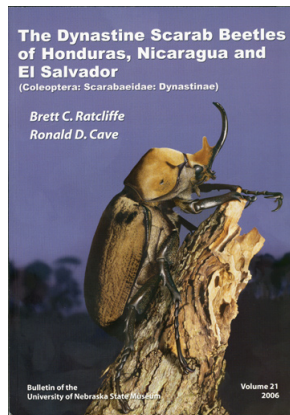
diplo species?

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and/or flightless scarabs. Most of all I owe debts to the celebrated George E. Ball, mentor to me and many more, for introducing me to flightless Arizona beetles and the Pleistocene.

---Nothing in life is assured, except death and *Diplotaxis*. Are you getting your share of diplos?

Two Notable Publications



The Dynastine Scarab Beetles of Honduras, Nicaragua and El Salvador, by Brett C. Ratcliffe & Ronald D. Cave, (\$45) and *Phylogenetic Analysis of the Scarab Family Hybosoridae and Monographic Revision of the New World Subfamily Anaidinae*, by Federico C. Ocampo, (\$28). Order at: www-museum.unl.edu/pubs/bulletins.html.

