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Time certainly marches on: I started compiling these pages in March 2014 but my editorial attention, spring and summer that year, turned to my volume of 'Further Studies in the Opuntioideae' (Succulent Plant Research Vol. 8). That was followed in December by a ten-weeks trip to Argentina, so March 2014 became March 2015. Then it was the turn of vol. 9 (the Mammillaria volume!), other publications, a month in Peru, and here we are almost in 2016. I hope the book and its counterpart from the University of Bonn (see pp. 76–80) will generate some festive feedback!

Does no one still grow the famous Lau 777?

I asked the question on page 33 but still don't know the answer! I don't have a collection myself these days but would expect it (*M. saboae* ssp. *haudeana*) to be popular and widely grown, especially by *Mammillaria* enthusiasts. The same might be said of many others for which no reports were forthcoming in response to Mark Masterson's survey in 2009. We do now have images of about a hundred (including Bill Weightman's of *Lau 777* taken many years ago) – see the list on page 35 – but I should like to be able to illustrate many more before producing a booklet-catalogue of the kind Alfred Lau himself hoped for.

As a final attempt to obtain more photos, I am going to list all the *Mammillaria* taxa Lau collected that were reportedly in cultivation in the 1984 and/or 2009 surveys of which I do not yet have photos in case someone still has a plant under one or more of the 'missing' numbers:

Lau numbers reported in cultivation 1984 & 2009: Images needed, please!

Lau 6	dioica f.	Lau 761	bambusiphila v.parva
Lau 7	neopalmeri	Lau 775	boolii
Lau 17	estebanensis	Lau 782	wilcoxii
Lau 18	angelensis	Lau 1045	petterssonii f.
Lau 20	fraileana f.	Lau 1074	gasseriana f.
Lau 25	maritima	Lau 1079	wilcoxii
Lau 29	lewisiana	Lau 1093	elegans v. schmollii
Lau 34	albicans	Lau 1107	wuthenauiana
Lau 39	cerralboa	Lau 1109	lanata f. ?
Lau 40	halei	Lau 1114	sphacelata v. tonalensis
Lau 66.1	huitzilopochtli	Lau 1118	sp. obscura?
Lau 81	gueldemanniana	Lau 1219	laui var. dasyacantha
Lau 669	dodsonii	Lau 1234	bellisiana
Lau 671	solisioides	Lau 1281	floresii (canelensis f
Lau 677	dixanthocentron f.	Lau 1296	rubrograndis
Lau 760	vetula	Lau 1443	mystax

Lau numbers reported in cultivation 2009: Images needed, please!

Lau 22	insularis	Lau 1056	martinezii
Lau 62	dixanthocentron f.	Lau 1090	candida
Lau 62.1	dixanthocentron f.	Lau 1091	nana
Lau 82	hertrichiana f.	Lau 1134	lindsayi f.
Lau 85	hertrichiana f.	Lau 1156	sphacelata f.
Lau 619	hertrichiana f.	Lau 1182	bocasana
Lau 621.1	aff. bocensis	Lau 1194	magnifica
Lau 632	orcuttii	Lau 1196	zephyranthoides
Lau 639	theresae	Lau 1245.1	berkiana
Lau 640	guelzowiana	Lau 1259	mundtii
Lau 678	pectinifera	Lau 1339	glassii
Lau 716	painteri	Lau 1346	hertrichiana f.
Lau 763	occidentalis f.	Lau 1357	aff. petterssonii
Lau 1018	conspicua	Lau 1400	lasiacantha
Lau 1020	melanocentra	Lau 1537	aff. glassii
Lau 1037	balsasoides	Lau 1539.1	runyonii (?)
Lau 1055.1	rekei v. aureispina	Lau 1577	duwei

Lau numbers reported in cultivation 1984: Images needed, please!

Lau 5	dioica f.	Lau 778	wilcoxii
Lau 8	pondii	Lau 787	gummifera
Lau 11	setispina	Lau 1005	mystax
Lau 23	brandegeei	Lau 1010	densispina
Lau 28	glareosa	Lau 1021	plumosa
Lau 37	fraileana f.	Lau 1033	pachycylindrica
Lau 38	slevinii	Lau 1038	napina
Lau 46	peninsularis	Lau 1041	carnea
Lau 48	schumannii	Lau 1049	jaliscana f.
Lau 63	dixanthocentron	Lau 1060	sanluisensis
Lau 64	senilis	Lau 1062	gigantea
Lau 65	crucigera	Lau 1078	garessii
Lau 67	dixanthocentron [a]	Lau 1115	sp.
Lau 606	sheldonii	Lau 1119	sp. obscura f. ?
Lau 618.1	tesopacensis v. rubrifora	Lau 1120	sp. gigantea f. ?
Lau 642	sp.	Lau 1121	trichacantha?
Lau 649	barbata	Lau 1154	heidiae
Lau 668	rekei	Lau 1166	trichacantha f.
Lau 670	mitlensis	Lau 1176	gasseriana
Lau 674	pulliamata	Lau 1177	pennispinosa nazasensis
Lau 679	lanata f.	Lau 1211	arida
Lau 680	flavicentra	Lau 1220	rubrograndis
Lau 698	barbata	Lau 1271	supertexta f.
Lau 701	grahamii	Lau 1283	kraehenbuehlii
Lau 707	denudata	Lau 1321	dixanthocentron
Lau 711	herrerae	Lau 1347	campotricha
Lau 753	rhodantha	Lau 1353	pringlei f.
Lau 764	beneckeii	Lau 1364	rubida neoschwarzeana?
Lau 773	mazatlanensis	Lau 1436	leona (pottsii)

From my Mexican notebooks

Previous notes have covered my trip to Mexico in July-August 1969 and the first part of my next visit in 1971 (my so-called 'Peyote' trip — see page 61)

Mexico City to Manzanillo and Guadalajara 1971

28 August – 5 September

When working in the herbarium after returning from the Peyote trip, I met Dr Derek Burch, a specialist on *Chamaesyce* (Euphorbiaceae), originally from England and then (1971) at the University of Florida. He offered me a ride with him and his wife to the Pacific Coast, starting the following day. I accepted gratefully as his itinerary promised to be fruitful for material of *Tradescantia*. All was well as we made it in Derek's hired VW 'beetle' to the coast at Manzanillo, stopping on the way at Morelia and Uruápan.

Unfortunately, during the night of 30/31 August, Manzanillo was caught by the edge of a hurricane that did serious damage further north and we awoke to find our hotel flooded, all power cut off in the town and many trees down. We decided to risk leaving rather than sit in the sodden hotel; after all, the 'Beetle' was supposed to be amphibious! We made it to Santiago without much trouble and got a late breakfast there. But, soon after we drove away, a wall beside the road collapsed and tons of rubble and soil fell as Derek swerved to avoid it. We got off with a dented wing, a bent wheel and a flat tyre. Our plan to go to Autlan had to be dropped in favour of back-tracking to Colima and its VW agent, and thence to Guadalajara.

While we were in Guadalajara, botanists from the University took us to some nearby localities including the Barranca de Colimilla, presumably the type locality of *Mammillaria scrippsiana*, of which we saw a few plants (sorry, no photo) and Derek subsequently collected one for Kew. His wife then returned by air to Florida and I to Mexico City. (He also went to Autlan and collected what proved to be a new species of *Tradescantia*, subsequently described by me as *T. burchii*.)

As Dudley Gold had invited me to stay at his home in Cuernavaca and make some trips from there, Hernando Sánchez-Mejorada kindly met me off my flight and took me to the bus station where I got the midday 'pullman' to Cuernavaca and was met there by Dudley.

Excursions from Cuernavaca (and a day in Hidalgo)

6 – 12 and 16 – 19 September 1971

The next two days with Dudley were devoted to helping me find *Tradescantias* and allied plants in the mountains above the city, where the vegetation of silver fir forest (*Abies religiosa*) and alpine meadows at an elevation of 3000 m (over 10,000 ft) is entirely cactus-free! On the way down and back to Cuernavaca we stopped at a mere 1600 m in the Sierra de Tepoxtlán for the type locality of *Tradescantia tepoxtlana* and I was delighted to find not only that plant but a yellow-spined form of *Mammillaria spinosissima*, probably very similar to the one originally described by A. Dietrich (1846) as *M. auricoma* and mentioned by Schumann (1898/Gesamt. Kakt.

538) from the region of Totolapam and Tleyacapa(n) on the basis of Mathsson's collections. What I take to be the same taxon was named or re-named by Werner Reppenhenagen as *M. crassior*, having collected his nomenclatural type, no. 761, at Tleyacapan (see his monograph, Vol. 2, pp. 432-433).

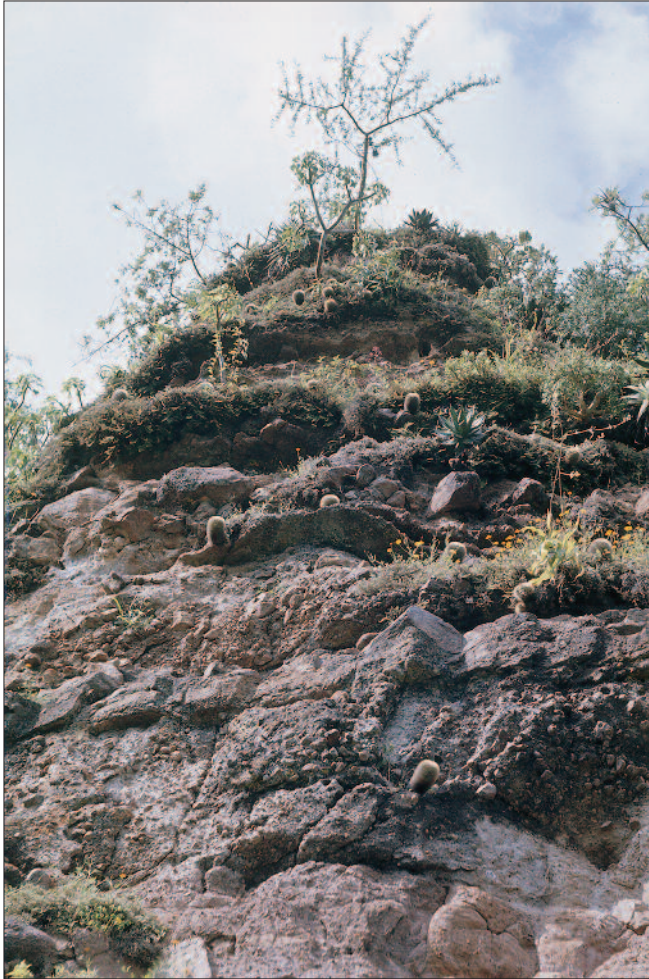
To reach one of the plants at Tepoxtlán involved a rapid scramble up near-vertical rocks – and a more rapid descent, as I was attacked furiously and painfully by a swarm of small bees, though (to my relief) after a few minutes their numerous stings were no longer detectable. Once again, no photograph, but on one of my visits to Reppenhenagen at St Veit he gave me duplicates of many of his, including the accompanying ones which perhaps give a better idea of the rocky habitat of *M. 'crassior'* at Tleyacapan than his black and white on p. 433. There were evidently many more plants there than at Tepoxtlán but the slope at Tepoxtlán was steeper!

The morning of 8 September was spent pottering in Dudley's garden, where he grew a rich variety of native plants he had brought home from his local travels. Then we drove back over the pass to Mexico (with two stops to collect another *Tradescantia*, plentiful above about 2200 m) as I needed to send the live plants I had collected to Kew and Dudley wanted to get new tyres before making the next trip.

Next morning, after packing the plants, visiting the department of agriculture to get the sanitary certificate to cover them at UK customs, and getting the new tyres, we had a quick lunch and left the city via the air freight agents to despatch the parcel and drove to Valle de Bravo, a scenic place popular with tourists, south of the road from Toluca to Tingambato (see map on p. 32 of this series). After enquiring at several expensive hotels (200–300 pesos for B&B) we found beds at the perfectly satisfactory Hotel El Caracol (the snail!) for 20 pesos apiece.

Our main destination on 10 September was the type locality of both *Mammillaria matudae*, described by Helia Bravo (1956) in the old GB journal, and a *Tradescantia* described by her colleague Professor Eizi Matuda himself. The place, off the road to Tingambato, beyond and below Nuevo Santo Tomás, is called La Junta, where two smallish rivers meet at the boundary of the states of Mexico and Michoacán. First we stopped by the reservoir to collect material of a *Tradescantia*-ally called *Thyrsanthemum macrophyllum*, then carried on a few kilometres beyond Santo Tomás to a point where we could look down at La Junta. This proved a very lucky stopping point as I found a quite different and undescribed species of *Thyrsanthemum* growing there, later described by me as *T. goldianum*.

Then we returned to the village and took the side-road down to its dead-end at La Junta. Besides *Mammillaria matudae*, *M. beneckeii* also grows in the deciduous forest there. Our stop was somewhat longer than we intended as Dudley (then 75) tried to climb higher up the steep slope but lost his footing and fell, or rather slid, some 30 ft to where he'd started, losing the plants he'd obtained, his hat and his watch *en route*. The hat and plants were recovered without difficulty but it was some time before I spotted something glinting – a corner of his watch, otherwise buried by the soil and rubble he had dislodged. Dudley said he was 'very tired' after the fall, but it might have been due to the speed with which he had shot up the very steep hillside on a humid tropical day! And he soon recovered when we set off back towards Valle de Bravo and gorged ourselves on excellent home-made ice-cream in



Reppenhagen's photo of the habitat of *M. crassior* Repp. 761 at Tleyacapan, Morelos, dated 16 Sep 1973. His book (page 433) has a photo from higher up the rock, printed as a halftone. For me, the plant is just a local form of *M. spinosissima*.



M. crassior Repp. 761. The same plant as the one in Reppenhagen's book (page 432) taken from a slightly different angle.

Nuevo Santo Tomás. Later, we saw *M. meyranii* [var. *meyranii*] growing on bluffs by a side road below the Valle de Bravo dam, where it was in company with big plants of *Agave attenuata*.

We spent the night at the Hotel America in Zitácuaro and drove the following morning to the grounds of a rather grander hotel, situated half way down an impressive and lush barranca at San José Purua, where I hoped to recollect an alleged but unnamed 'sp. nov.' related to *Tradescantia* and collected there many years ago by George B. Hinton (1882-1943, founder of the Hinton Herbarium and grandfather of the discoverer of *Geohintonia* and *Aztekium hintonii* etc). I eventually found the plant but it looked similar to one from Guatemala, so it remains undescribed. I was more impressed by plants of the Michoacán form of *M. meyranii* growing on the top edge of the barranca. By the somewhat hazardous expedient of crawling under the tight barbed-wire fence that ran along the very edge of the precipice I managed to reach one and survived to photograph it and leave it to Dudley's TLC.

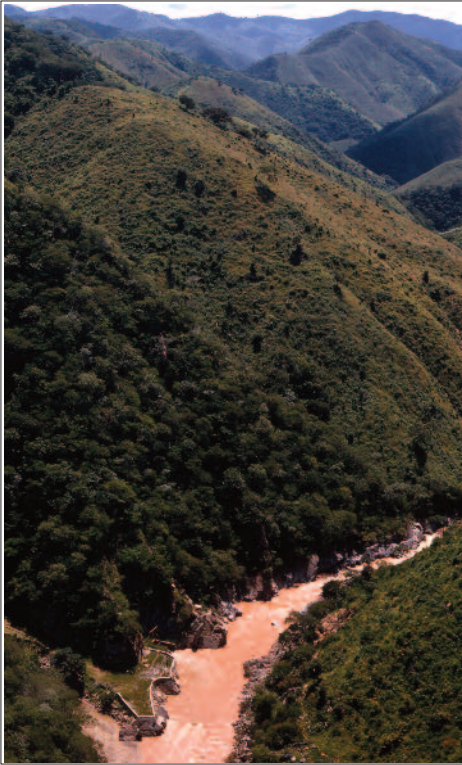
We then continued via Zinacantepec to Temascaltepec, around which George Hinton the elder did much of his collecting, and checked into the primitive hotel there, apparently the only one. I had intended more botanizing on the 12th but (unusually) I developed a severe headache overnight that persisted in the morning (a touch of sunstroke, perhaps) and so decided we should return via Toluca to Mexico City for me to try and sleep it off at the hotel there,

The following morning (13 September) I felt sufficiently better to accept an invitation to lunch with George Hinton's son James (Jaime), who knew of my visit via correspondence with the then Director of Kew. I very much enjoyed meeting him and learning about his life at his ranch in Nuevo Leon where the Hinton Herbarium was and still is housed. Beforehand I had time to go the Instituto de Biología to pack my next consignment of specimens and was happy to add nearly a dozen Commelinaceae kindly collected for me by Derek Burch in Jalisco, including the new species of *Tradescantia* that mentioned earlier that I later described as *T. burchii*. They were duly despatched to Kew the next morning.

A planned day-trip with Hernando Sánchez-Mejorada to the high country beyond Pachuca had to be postponed due to illness in his family but we made it the next day instead. Its purpose was to re-collect material of *Tradescantia* species I had previously collected with him in August 1969 (see Huitz pp. 55–58) that never reached Kew, having mysteriously disappeared from the boot of his car!

Mission accomplished we returned to Mexico City just in time for me to catch the five o'clock bus to Cuernavaca for a final excursion with Dudley Gold. Once again the primary object was to collect living material of Commelinaceae for cytological study at Kew. There were two species related to *Tradescantia* in the state of Oaxaca I wanted and with approximate locality data from herbarium specimens we were lucky enough to find both when crossing the Sierra de Juárez, the first in oak/pine forest above 2400 m and the second in tropical forest near Valle Nacional*.

**Tradescantia nana*, only known from pine/oak forest at 2400–2800 m in the Sierra de Juárez and later moved by me to a new monotypic genus, *Matudanthus*; and *Gibasis oaxacana* D. Hunt, from a lush forested ravine at 680 m in the tropical zone near Valle Nacional.



Looking down on the confluence of the rivers at La Junta; Dudley with his booty; and another good specimen of *M. matudae* partly shaded by a *Begonia*. [DH 710612, 710723 and 710617]



Mammillaria meyranii [var. *michoacana*] from the barranca of San José Purua, near Zitácuaro, 1500 m.
[DH 710732]

It was not until the last day, on the way back to Cuernavaca from Huajuapán, where we'd stayed overnight, that we made a discovery of importance to *Mammillaria* enthusiasts. First, however, we stopped 100 km north of Huajuapán to get better material of a *Tradescantia* I had collected on our way to Oaxaca a few days earlier. It was at this locality that I had also noted a 'green' *Mammillaria* there with rather variable spination (examples are shown below). My own scanty observations suggest this area is where the inland forms of *M. karwinskiana* meet or intergrade with those of *M. mystax* but much further study and mapping is needed (a point to which I will return in the notes on mapping that follow this travelogue).

Back in the state of Morelos, as recounted in the *Mammillaria Society's Journal* vol. 12: 38 (1972), "we stopped to explore a hill a kilometre from the highway which I had christened 'Dudley's Hill', as when passing on two previous occasions he said



Variants of a presumed form of *Mammillaria mystax* (or the scarcely distinct *M. huajuapensis*) near the roadside 100 km north of Huajuapán, 1200 m, 19 Sep 1971 [DH 710832-35]



M. magnifica, Morelos, Peñon de Amayuca, 1400 m, 1973 [DH 731425, 731431]; and Dudley Gold on the track to the Peñon, 1976 [DH 760808]



he had “always meant to botanize there sometime”. With time in hand, and having persuaded Dudley that there is no ‘sometime’ like the present, we had the nice surprise of discovering the true habitat of *Mammillaria magnifica*, previously concealed by its describer, Francisco Buchenau, presumably to prevent its exploitation. Alas, as I also reported in 1972 (l.c.), I omitted to take my camera with me. Happily, Dudley was content to return to ‘his’ hill during a visit two years later.

So ended a very enjoyable interesting series of excursions with Dudley which remain for me a vivid and grateful memory.

20 September

I returned to Mexico City (borrowing Dudley’s car), fixed my flight home for the following day and spent a couple of hours at the Jardín Botánico with Hernando, checking mammillarias. Then in the evening he and his wife Teresa, and Helia Bravo, entertained Jan & Katarina Bruhn (see p. 61) and me to a farewell dinner at Cardini’s restaurant. Jan & Katarina were returning to Europe after a holiday in Yucatan.

Mapping progress (continued from page 60)

And how...! 2015 saw the publication of not one but two attempts to map the distribution of the genus in more or less its entirety. First to appear (31 January) were the ‘balloon’ maps originally drawn by students at the University of Bonn as part of a project to map the range of every cactus species recognized in the New Cactus Lexicon, first mentioned here (with some sample maps) on pp. 45-47 (2010). The 260+ maps averaging 5.34 species per map were all revised and redrawn by members of the NCL editorial team and now form part of a volume in the German Cactus Society’s serial publication ‘Schumannia’ (Vol. 7) entitled ‘Biogeography and Biodiversity of Cacti’ edited by Detlev Metzger.

The second volume in the ‘Mapping the Cacti of Mexico’ series, authored in Mexico by Héctor M. Hernández and Carlos Gómez-Hinostrosa, is devoted to *Mammillaria* only and was also at the ‘data capture’ stage in 2010. It was completed earlier this year and published as Vol. 9 of Succulent Plant Research at the end of July under my nominal editorship. The 54 dot maps cover the 155 species recognized by the authors and draw on data from almost 4400 individual specimens preserved in the University of Mexico’s principal herbarium at the Instituto de Biología (MEXU) and numerous other herbaria.

Though these two publications basically follow my classification, as set out in NCL, and share the same basic purpose (to bring us to a better understanding of the biogeography of the plants and their ecology, conservation biology and so on), the maps are actually based almost entirely on different sources of data, apart from the type localities etc quoted in NCL. The Berlin maps were ultimately based on the combined field-knowledge, published and unpublished, and photographic evidence, available to the members of the NCL team, together with lists of introductions by specialist collectors (in the case of *Mammillaria*, those of Lau and Reppenhagen, for instance). The *Mammillaria* maps were in fact revised by me and redrawn by the

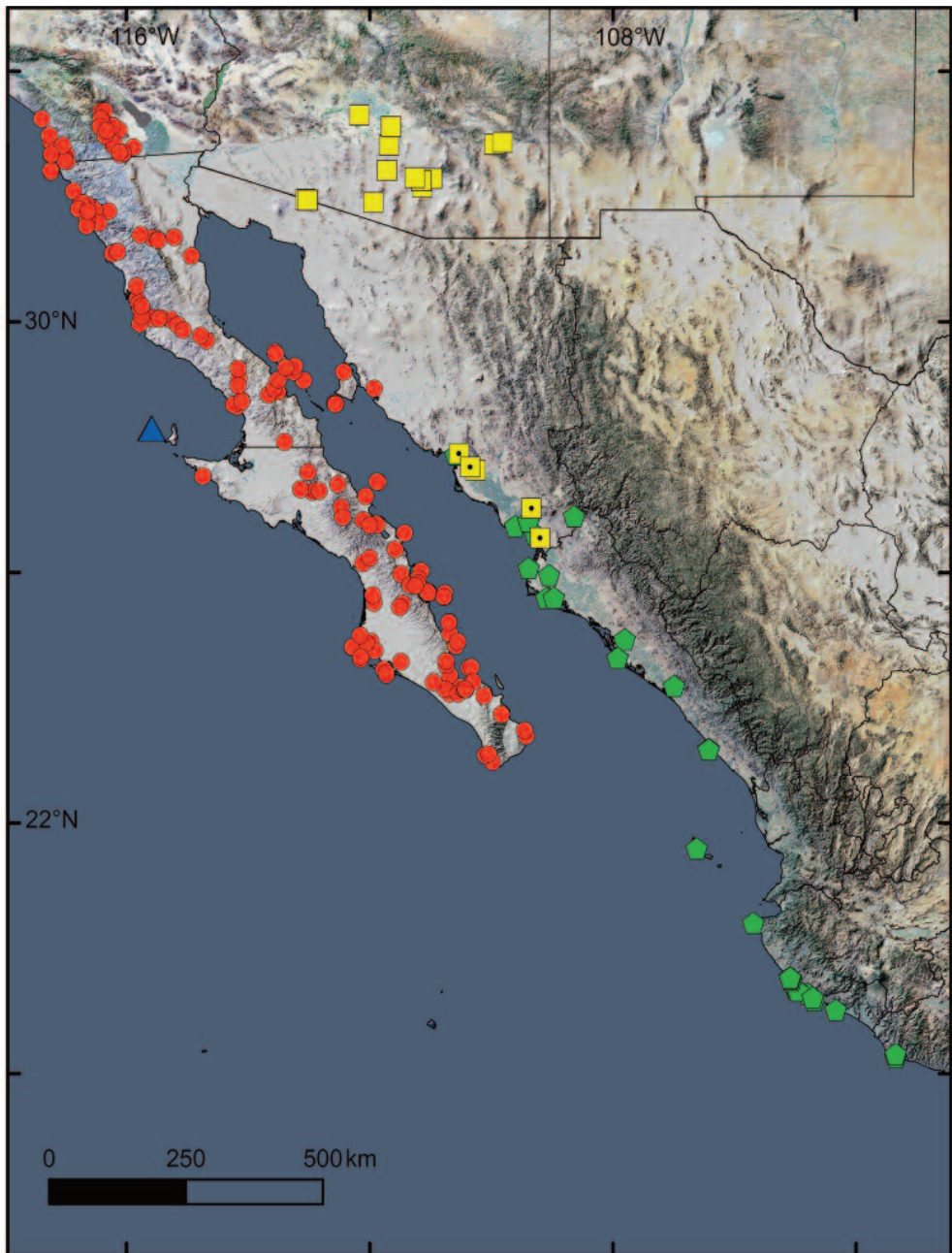
Bonn student Laurens Geffert working with me at Milborne Port. More rigorously, from a purely scientific point-of-view, our Mexican colleagues relied exclusively on the 'geo-referenced' locality data accompanying herbarium specimens, along with the identifications initially provided by the collectors or others who reviewed the material subsequently. This way, data and plant material so identified and preserved are permanently available for verification or discussion etc if required.

I am not sure whether the German Cactus Society's book is available to non-members of that Society but Vol. 9 of Succulent Plant Research is available from me or Keith Larkin and has been kindly reviewed by Al Laius in 'Cactus World' and by Chris Davies in the Journal of the Mammillaria Society. Chris observes that "there are a lot of additional data that haven't been reviewed [by the authors]", referring to the numerous field-lists of enthusiasts in Europe and the US, sometimes including GPS coordinates etc. Just as there is a risk that these lists may include misidentifications, Chris points out that the same risk is inherent in the herbarium specimens that there were the basis of the book. That is very true, and the poor quality of many herbarium specimens of cacti, especially of genera like *Mammillaria* which are so difficult to preserve, except in liquid preservative (see p. 36), is a reason why good locality documentation and photographic evidence may be more reliable, a point I did make to the authors.

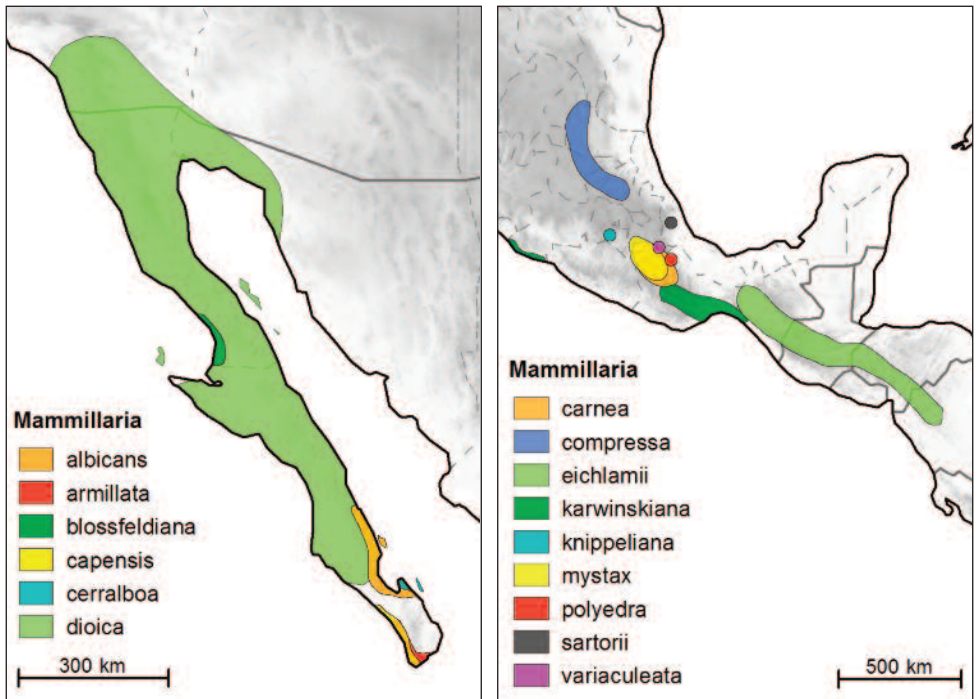
At this point, however, I should make it clear that my personal role in the production of their book did not include reviewing the MEXU specimens (though I examined and made notes on the type specimens there many years ago, and was asked in 2013 to review a large number of specimens deposited there by W.A. Fitz-Maurice sometime previously). My role was largely to lay out the text and illustrations for printing and see the book through the press. I did not comment on the content of any of the maps and suggested very few amendments to the text. The enormous labour of compiling such a massive amount of data and produce the maps was the work of the authors alone, and a considerable achievement.

Now that we have the results of two comprehensive mapping projects, I hope all *aficionados* of the genus will be stimulated to study them and make an effort to expand and/or correct them on the basis of their own knowledge and experience. So I was glad to receive a message from former demon bowler John Pilbeam who had provided (*fide* Chris Davies) the previous "concise and widely accessible source of geographic information" in his *Mammillaria* handbook (1999). John's googly regretted that he was unlikely to make another visit to his beloved Baja California, "especially to check out *M. dioica*'s presence in the south, which I'm already convinced is not there." Well, here on the facing page is the SPR 9 map with the distribution of *M. dioica* shown quite clearly extending right down to the Cape.

The 'balloon' map I drew for this species and others for the Bonn book is shown overleaf. I have only made one trip to Baja (and down to the Cape) and didn't see *M. dioica* further south than sandy plains N of Villa Insurgentes, so I guess John is right and that the numerous herbarium records from further south are misidentified. Some might be *M. hutchisoniana* but those on the east side and nearer the Cape would have to be others of subgenus Chilita that occur down there.



Geographical distribution of subgenus Chilita. *Mammillaria dioica* (red circles), *M. mazatlanensis* (green diamonds), *M. neopalmeri* (blue triangle), *M. thornberi* subsp. *thornberi* (yellow squares) and *M. thornberi* subsp. *yaquensis* (yellow squares with dot). [SPR 9 fig. 16]

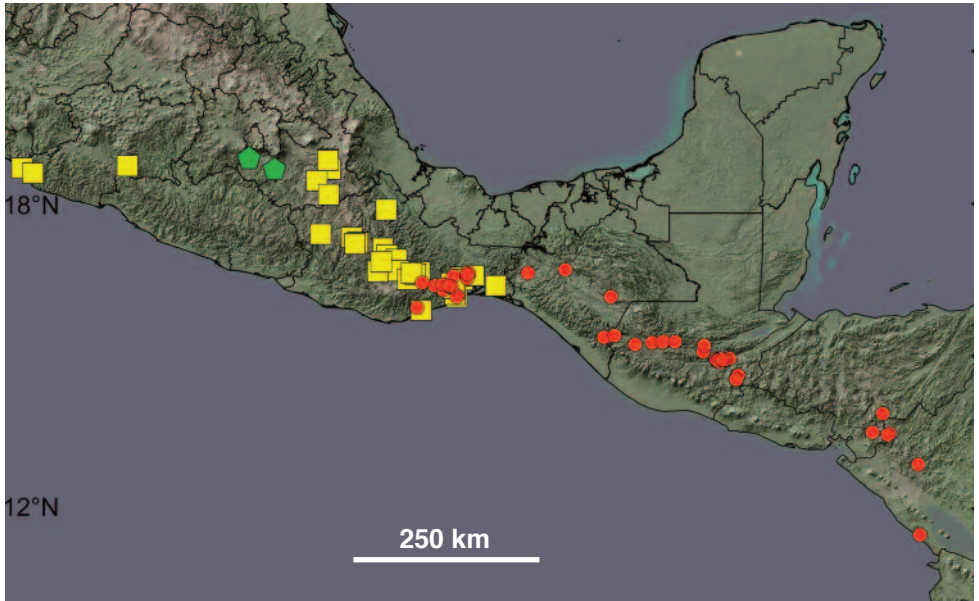


Range maps of *M. dioica* etc (see p. 76) and series Polyedrae (see p. 79) drawn for the Bonn project

The somewhat indeterminate plants I have illustrated on page 73 prompt me to conclude this initial comparison of the two mapping projects with some comments on examples from *Mammillaria* series Polyedrae. First, I should perhaps stress the obvious point that (except where species are only known from the type locality, ‘balloon’ maps do not show the actual *distribution* of a species, merely an approximation of its *range* – the limits of the area in which it has or *might* be found, given suitable environmental conditions. Dot maps also indicate range (if you join up the dots, mentally at least!), but even when the scale is relatively large, like that of the one above compared with its counterparts on the previous page, the individual dots cover a substantial area, perhaps 50 km² or more, within which the species may only be known from a single locality or ‘findspot’.

When the ranges of individual taxa are shown on a map, however, you may not only better understand where and how widespread they are, but where they are in relation to allied taxa, and perhaps begin to wonder how they got there! And when one or more of the dots on a dot map are widely separated from the rest of the records, do you look for an explanation? Could the plant have been misidentified or the dot misplaced, or the GPS incorrectly recorded, etc, etc?

The nine taxa of Polyedrae mapped in the range map above, including four mapped by me as single dots are mapped in SPR on four separate maps, of which I reproduce parts of two here, thereby excluding the one devoted to *M. compressa*

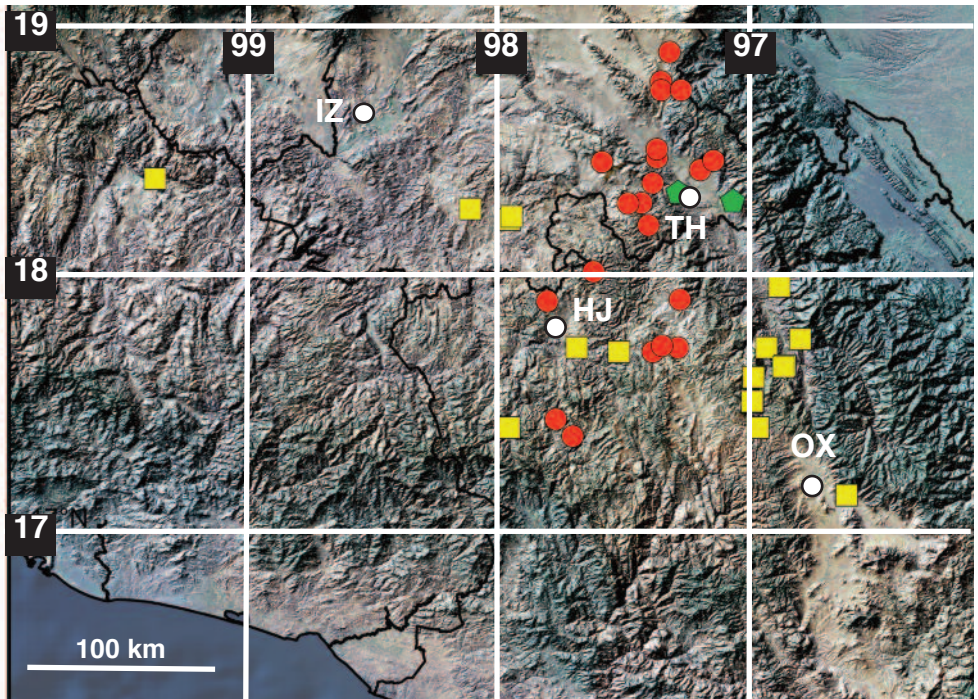


Geographical distribution of series *Polyedrae*. *Mammillaria karwinskiana* (yellow squares), *M. knippeliana* (green diamonds) and *M. voburnensis* (red circles). [Part of SPR 9: fig. 59, scale bar added]

(Fig. 56) and that for *M. carnea* and *M. sartorii* (Fig. 57). The Mexican authors have accepted my treatment of *M. beiselii* as a subspecies of *M. karwinskiana* and this accounts for the two overlapping yellow squares at the coast in 18 deg. N shown in dark green on my map. I cannot at present account for the yellow record further inland and disjunct from the main block of records in Oaxaca. Further east, the symbols on both maps for *M. knippeliana* reflect the usual but questionably correct application of this untypified name to a plant from near Cuernavaca which may be better interpreted as a form of *M. karwinskiana*.

For what I treated in NCL provisionally as *M. eichlamii* (pale green on my map) the Mexican authors prefer the older but untypified name *M. voburnensis*, shown as sympatric with *M. karwinskiana* in southernmost Oaxaca and Chiapas. Having seen three populations of *M. karwinskiana* in Nicaragua as well as Mario Veliz's images of what he calls *M. eichlamii* in Guatemala, I can no longer accept there is more than one species of this group in SW Mexico and Central America (see my note in CSI 26: 23 and fig. 10. 2012). This makes *M. karwinskiana* one of the longest ranging species in the genus (some 2100 km as the crow flies).

Moving on to consider the species mapped by the Mexican authors on their map Fig. 58 (see overleaf) we have *M. mystax*, *M. polyedra* and *M. variaculeata*. Of these, typical red-flowered *M. mystax* is a familiar and uncontroversial plant for those who have seen it in Puebla around Tehuacán or grown a typical specimen from that area. The Mexican authors accept my treatment of the taxa described by Bravo from Oaxaca as being conspecific, along with the form with reduced spination from the border with Veracruz named *M. erythra* by Reppenhagen. The distribution shown



Geographical distribution of series *Polyedrae*. *Mammillaria mystax* (red circles), *M. polyedra* (yellow squares) and *M. variaculeata* (green diamonds). [Part of SPR 9: fig. 58, scale bar, 1 degree grid and white dots for principal cities added: HJ Huajuapán; IZ Izúcar de Matamoros; OX Oaxaca; TH Tehuacán]

in Fig. 58 seems to me plausible, subject to verification of the two records south of Huajuapán. The two localities for *M. variaculeata* are referenced in the book to the type specimen (*Buchenau* s.n.) and to a collection by Ulises Guzmán (*Guzmán* 1091) both at MEXU. It remains my suspicion (NCL text p. 178) that this taxon might be a hybrid of *M. mystax* with one of the *Supertextae*.

The mapped distribution of *M. polyedra* is, for me, more problematic. *Buchenau*'s unlocalized plant (NCL pl. 449.4) has the requisite angled tubercles, as do Reppenhagen's no. 1632 (his book, p. 774) and Linzen's TL 166 (*Pilbeam's* book p. 231) both from Teotitlán [del Camino, close to the border with Puebla, 170 km N of Oaxaca, not to be confused with T. del Valle, SE of Oaxaca city] and I can accept these as the 'genuine article' (hence my red 'dot' on the Bonn map). The other mapped records in the Cuicatlán valley (of the Río Salado) south of Teotitlán may also be correct, though I cannot confirm them from my own observations. The more westerly mapped records, including one from Guerrero, require verification.

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