

Travel Award Report: Collecting Expedition to Bolivian Andes, March-April 2007

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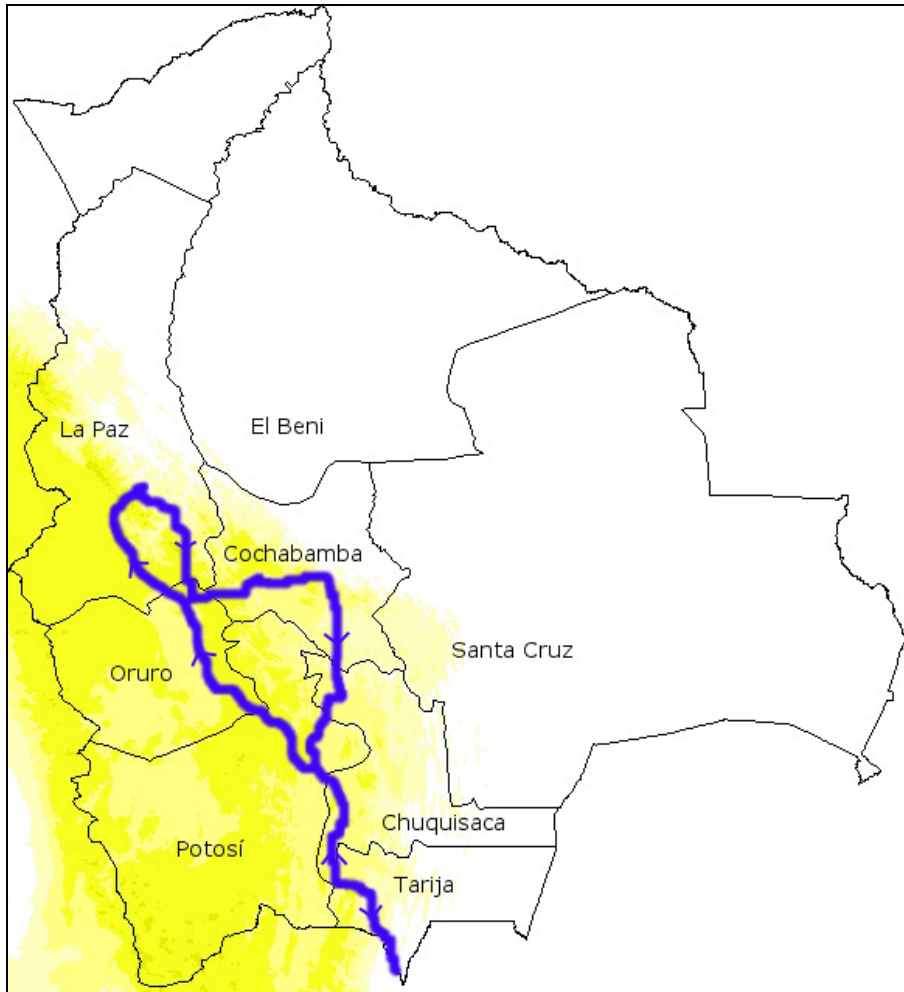
Introduction. Despite its relatively small size (at 1,100,000 km² it is one-eighth the size of neighbouring Brazil and less than half the size of Argentina) Bolivia is, topographically and ecologically, the most biodiverse country in South America. It is a land of extremes, with the western half of the country dominated by the Andes and *Altiplano*, and noted for the world's highest city, highest commercial airport, highest navigable lake and highest ski-run (now threatened due to global climate change), while the east comprises lowland Amazonian rainforests and semi-arid *Chaco*. It is also landlocked, thanks to Chile's annexation of its coastal strip in the 1880s, politically unstable (having had five presidents in as many years between 2000 and 2005) and, despite massive reserves of natural gas, the poorest country in the continent.

In terms of biodiversity, Bolivia ranks among the top ten countries in the world (Atkinson, 2007) for the variety of habitats, number of species and number of endemic species it sustains. This project focused on the flora of the Andes, in the Southwest of the country. The richness of the Andean flora presents a major challenge for conservation, which depends on identifying areas of endemism and understanding evolutionary and biogeographic relationships in order to prioritise protection. To this end, the project aimed to contribute to modelling past and present processes of species diversification in time and space across the Andes, by building dated molecular phylogenies of diverse Andean plant groups, with which to investigate the origin and maintenance of biodiversity. One major limiting factor at present is the number of well-sampled phylogenies available for tropical Andean plant groups, although this is gradually improving. The research expedition described here was designed to increase the amount of material available for building phylogenies of selected Andean taxa. The flora of Bolivia is perhaps the least studied of all the tropical Andean countries, and thus provided the ideal place to start, with the potential to have dramatic impact upon the amount of botanical data available for tackling fundamental questions of diversification in the Neotropics.

Aims. The original aims of this project were to collect botanical specimens of *Calceolaria* (Calceolariaceae) and other species from the Andes of Peru, which would form the basis of a dataset for building a well-resolved phylogeny of the genus. This would be integrated into a larger project aimed at generating densely-sampled, well-resolved, dated phylogenies for many tropical Andean taxa. These phylogenies would in turn be used to document and explore the mechanisms by which evolutionary diversification has taken place, leading to the enormous diversity of species seen today in the tropical Andes.

Due to unforeseeable circumstances, the expedition was delayed by one year from 2006 to 2007. In retrospect, this delay was a bonus as it meant my collaborators in Peru were able to make significant collections there in 2006, and I myself was able then to travel to Bolivia in 2007 to make a complementary set of collections, contributing to a much larger dataset overall.

Activities and observations. This expedition took place from 22 March to 11 April 2007 – a time chosen to coincide with the end of the wet season, when many species of *Calceolaria* tend to flower. It was carried out in collaboration with Dr. Colin Hughes and Ms Tiina Sarkinen (University of Oxford), Mr. Pablo Duchén Bocángel (La Paz herbarium, LPB) and Ms Margoth Atahuachi (Cochabamba herbarium, BOLV), all of whom focus their research on the large family Fabaceae. Starting in La Paz, at 3640 m above sea level (masl), we travelled by four-wheel-drive vehicle to a variety of collecting localities throughout the Bolivia Andes (see map, below), including the departments of La Paz, Cochabamba, Chuquisaca, Tarija, Potosí and Oruro, and covering locations around La Paz, Chulumani, Cochabamba, Quillacollo, Sucre, Potosí, Camargo, Tarija, Bermejo and Oruro. We even made a brief excursion into Argentina, at Toldos de Bermejo. We covered elevations from 1000-4650 masl, and habitats ranging from dry inter-Andean valleys to cloud forest and Alpine tundra. In addition, I visited the herbaria at LPB and BOLV to obtain locality data (prior to the trip) and identify the specimens collected (afterwards).



Map of Bolivia to show departments, approximate altitude and route taken on the expedition.

The collecting part of the trip took place from Saturday 24 March to Sunday 8 April, following a route which went broadly South-by-southeast from La Paz to Tarija and back again (see map, above). The scenery through which we passed can only be described as “dramatic,” encompassing snow-covered, llama-grazed peaks, dry valleys lined with sheer cliffs and vast waterfalls, fields delimited and cleared long ago by the Incas, and the high, dry, windswept *Altiplano* dotted with barley and quinoa fields. In contrast to these remarkable rural landscapes we also visited the bustling metropolis of Quillacollo and Cochabamba, the peaceful, sugar-white city of Sucre, which houses the best chocolate shop in Bolivia, and Aiquile, almost flattened in an earthquake in 1998, which has in just ten years been rebuilt into a beautiful city of wide, tree-lined streets with an enormously impressive, buttressed cathedral. Another highlight of the trip included travelling a short way down the “most dangerous road in the world,” also known as the “death road;” a newer road has now been built alongside, but many mountain-bikers and motorcyclists still choose to use the old one!

My collecting success varied daily depending on the habitats visited. On some days I spent all my time pressing the collections of the others; on other days they spent all their time pressing mine! On my most productive day, in the cloud forests between Inquisivi and Caracollo, I was able to take nine collections of six species of *Calceolaria*. Two days later, in a densely forested, wet valley north of Monte Punco, I found another three species of *Calceolaria* (possibly four subspecies), one not previously recorded from Bolivia, which I had to remove my boots and wade across a stream to collect! Further south towards Tarija we crossed the high, Alpine summit of *Cuesta de Sama*. At the time I was disappointed with this area, collecting only two species (both of them I thought already seen elsewhere) compared to the six that potentially grew there. However, later analysis in the herbarium revealed both to be new species to me (*C. schickendentziana* and *C. teucroides*), and both rather restricted in range.

Our last, and for me the most exciting day was Easter Sunday, when we made an early start and visited the most interesting and broad range of habitats we had yet experienced. We set out northwards through El Alto, known as “the other La Paz,” where half the capital’s population exist in extreme poverty in little more than slum conditions on the cold, high hills surrounding the city, then continued on up between snow-covered peaks, including that of Huayna Potosí at 6100 masl. We crossed the pass into the Zongo valley, surrounded by llama, snow geese and alpine flowers such as *Astragalus* and *Gentiana*, breakfasted by a chilly glacial stream, then dropped rapidly down on a precipitous road through rapidly changing habitats – alpine scrub – cloud forest – valley forest – collecting not one but five species of *Calceolaria*, three of which I had not yet seen on this trip. Retracing our route, we next went south of the city and spent the afternoon in the completely different dry, sun-baked valley habitats of Moon Valley and Mecapaca, where we collected a rare subspecies of *Tecoma fulva*, making it a successful day for everyone. This was a wonderful end to what had been a very rewarding expedition, on both a personal and professional level and I was very sad to return to Edinburgh, knowing that the other members of the team were going on to similar things elsewhere in South America.

Achievements. As a team, we made a total of 178 collections, most comprising 4-5 sheets. For the majority of collections, leaves were also dried in silica gel for future DNA-based study. The groups collected included *Begonia* (Begoniaceae), *Calceolaria*, *Fuchsia* (Onagraceae), *Ruprechtia* (Polygonaceae), *Tecoma* (Bignoniaceae) and many Fabaceae.

I made 37 fertile collections comprising a total of 18 species (20 taxa including subspecies), including 16 species *Calceolaria* (18 taxa including subspecies) and 2 species of *Fuchsia*, another diverse Andean species which will be important in my study (for a list of collections made see Appendix 1). In addition, the collections of *Mimosa* (Fabaceae-Mimosoideae) and *Ruprechtia* made by others in the team will prove useful for my research. Based on the collections held in La Paz herbarium (LPB) and the account in *Flora Neotropica* (Molau, 1988), there are 35 species of *Calceolaria* known from Bolivia. Thus my collections represent 43% of the species known from this area, including the majority of those flowering during my visit (most of the remainder flower early in the rainy season, from October to December). Six species were represented by multiple accessions, taken more than 100 km apart. The most frequently collected species of *Calceolaria* were *C. parvifolia*, which favours very dry habitats, and *C. engleriana* which tends to grow by watercourses, both represented by seven collections and each including two subspecies.

One sheet from each collection has been deposited at LPB, with most also being represented at BOLV. The remaining sheets have been brought to the herbarium at the Royal Botanic Garden Edinburgh (E), where they will be worked upon and later distributed to other herbaria where they will be put to good use. Each of my collections is accompanied by silica-dried leaf material for DNA study. Of the 16 species of *Calceolaria* collected, eight have never been subjected to DNA study (data from GenBank, 2007); thus the trip was hugely beneficial in terms of augmenting the molecular data available for analysis in Calceolariaceae. Each species was also photographed; the images are provided in digital format on the CD accompanying this report¹.

In addition to botanical collections, during this trip I accomplished several other goals, including learning a new technique for collecting (by vehicle rather than on foot) and exploring a new range of habitats and species (I had never worked in the Neotropics before). I learnt a great deal about the flora of the Bolivian Andes, both by first-hand experience and by discussion with my travelling companions. I also built up relationships with the other members of the team, which were hugely rewarding on both a personal and professional level. I believe that everyone on the trip benefited in a similar manner from the knowledge-sharing and friendships developed during our travels. Although it was only short, those of us who had not visited Bolivia before were also able to learn something of its culture and customs and developed a respect and love for this beautiful and varied country and its people.

¹ Calceolariaceae lies within the order Lamiales, a group of plants in which I have a long-standing interest. I therefore also took every opportunity to photograph plants within this group (which includes families Acanthaceae, Bignoniaceae, Gesneriaceae, Lamiaceae, Verbenaceae and Scrophulariaceae *sensu lato*). These photographs are also included on the CD.

Problems. The only problems encountered, as is to be expected, involved travelling by vehicle in a country with a relatively unstable political system and poor road network. A sudden 48-hour blockade of the city of Tarija (which we were visiting at the time) led to a shortage of petrol for a time, which delayed our progress and limited the number of places we were able to visit in the south of the country. We also had an unforeseeable problem with the vehicle's brakes (which mercifully occurred on a relatively level stretch of road and as we entered a town where it could be fixed) and two punctures, which I consider to be a very low number of mechanical problems given the state of the roads and the distance covered during the trip.

Recommendations for similar ventures. The problems outlined above highlight the importance of thorough research and planning in undertaking a trip to a country such as Bolivia, where blockades, in particular, are a preferred form of protest. It is important to assess the current political situation beforehand and to remain abreast of local news during the trip, in order to avoid and pre-empt as much as possible the impact of any local action upon your movements. Travelling with someone from the country helps enormously with this; if this is not possible, the party must certainly include someone with a good knowledge of the local language (in Bolivia's case Spanish and preferably Aymara and Quechua). Research is also crucial in terms of the plants to be collected: determining the flowering or fruiting season, favoured habitats and altitudinal range of target species during the early stages of planning maximises the productivity and minimises disappointment during the collecting expedition.

It is also crucial to rent a vehicle from a reputable company, preferably on a personal recommendation, and to thoroughly check the vehicle prior to use, familiarising yourself with the controls and the locations of tools, gauges, etc. To minimise the effect of any travel problems, it is important not to overestimate how far and how fast it is possible to travel, particularly on rough roads, with unpredictable weather conditions and while stopping frequently to collect plants. I would recommend travelling to the farthest point of your journey *first*, and then travelling slowly back to the departure point. This means that any unforeseen delays (due to vehicle breakdown, blockades, etc.) are likely to happen when there is time to resolve them and still return on schedule, if necessary by changing the route or itinerary during the return journey. On our trip, we travelled by a roundabout route south from La Paz, collecting at many places, and reached the farthest point (Tarija) towards the end of the trip, such that the delays we incurred in Tarija could have been disastrous as we only had a few days left to make the return journey to La Paz. Fortunately in our case the problems were resolved quickly enough that they had minimal effect!

Summary and conclusion. This trip provided a wonderful opportunity for me to appreciate the beauty and diversity of the Andean flora first-hand, and to familiarise myself with the particular habitat and altitudinal preferences of my target genus, *Calceolaria*. I was able to collect many specimens, representing a large number of species, which will be of great use to those, including myself, who hope to study the flora of Bolivia and the evolution and ecology of Andean plants. In addition, I built lasting relationships with my fellow travellers and botanists, and I hope to build upon these through future collaborations.

Future plans. Sadly, I have not yet been able to obtain financial support to conduct my wider study into the mechanisms and tempo of diversification in the tropical Andes, towards which this expedition was intended to contribute. However, my experience in Bolivia has inspired me to continue to work in South America and on *Calceolaria* in particular, and I will continue to seek opportunities for this. The herbarium collections, digital images, slides and silica-dried material will all be secured as part of the collection at the Royal Botanic Garden Edinburgh, where they will be made available to those working on Calceolariaceae and the flora of the Andes, which I hope will soon include myself. Having been inspired by the beautiful landscapes, fascinating plants and friendly people of Bolivia, I certainly intend to return there, and to other parts of South America, during the course of my future research.

Budget summary.

Income (£)	
Alpine Garden Society	980.00
Systematics Association	1000.00
Total income	1980.00
Expenditure (£)	
Accommodation	125.27
Equipment/miscellaneous	342.80
Food	110.65
Travel	1223.91
Total expenditure	1802.62
Returned to Alpine Garden Society	88.69
Returned to Systematics Association	88.69
Total outgoings	1980.00
Balance	0.00

References

Atkinson, D. 2007. *Bolivia*. Chalfont St. Peter, UK: Bradt Travel Guides Ltd.

Genbank. Available online at <http://www.ncbi.nlm.nih.gov/entrez>. Accessed on 17 April 2007.

Molau, U. 1988. Scrophulariaceae Part I. Calceolarieae. *Flora Neotropica Monograph 47*. New York, USA: Organization for Flora Neotropica.

Appendix 1. Collections made by Alexandra Wortley, Bolivia, 24 March – 8 April 2007

Date	Collection	Genus	Species	Authority	Subspecies	Authority
24 March	AW201	<i>Calceolaria</i>	<i>boliviana</i>	(Rusby) Pennell	-	-
24 March	AW202	<i>Calceolaria</i>	<i>atahualpae</i>	Kränzlin	<i>atahualpae</i>	-
27 March	AW203	<i>Calceolaria</i>	<i>conocarpa</i>	Pennell	-	-
27 March	AW204	<i>Fuchsia</i>	<i>sp. 1</i>	-	-	-
27 March	AW205	<i>Calceolaria</i>	<i>atahualpae</i>	Kränzlin	<i>atahualpae</i>	-
27 March	AW206	<i>Calceolaria</i>	<i>parvifolia</i>	Weddell	<i>guentheri</i>	(Kränzlin) Molau
27 March	AW207	<i>Calceolaria</i>	<i>monantha?</i>	Kränzlin	-	-
27 March	AW208	<i>Calceolaria</i>	<i>ferruginea</i>	Cavanilles	-	-
28 March	AW209	<i>Calceolaria</i>	<i>conocarpa</i>	Pennell	-	-
28 March	AW210	<i>Calceolaria</i>	<i>parvifolia</i>	Weddell	<i>guentheri</i>	(Kränzlin) Molau
28 March	AW211	<i>Calceolaria</i>	<i>conocarpa</i>	Pennell	-	-
28 March	AW212	<i>Fuchsia</i>	<i>sp.2</i>	-	-	-
28 March	AW213	<i>Calceolaria</i>	<i>engleriana</i>	Kränzlin	<i>engleriana</i>	-
28 March	AW214	<i>Calceolaria</i>	<i>trilobata</i>	Hemsley	-	-
28 March	AW215	<i>Calceolaria</i>	<i>bartsiiifolia</i>	Weddell	-	-
28 March	AW216	<i>Calceolaria</i>	<i>parvifolia</i>	Weddell	<i>parvifolia</i>	-
28 March	AW217	<i>Calceolaria</i>	<i>engleriana</i>	Kränzlin	<i>engleriana</i>	-
28 March	AW218	<i>Calceolaria</i>	<i>buchtieniana</i>	Pennell	-	-
29 March	AW219	<i>Calceolaria</i>	<i>parvifolia?</i>	Weddell	<i>guentheri?</i>	(Kränzlin) Molau
29 March	AW220	<i>Calceolaria</i>	<i>engleriana</i>	Kränzlin	<i>engleriana</i>	-
30 March	AW221	<i>Calceolaria</i>	<i>parvifolia</i>	Weddell	<i>guentheri</i>	(Kränzlin) Molau
30 March	AW222	<i>Calceolaria</i>	<i>engleriana</i>	Kränzlin	<i>engleriana</i>	-
30 March	AW223	<i>Calceolaria</i>	<i>rivularis</i>	Kränzlin	-	-
30 March	AW224	<i>Calceolaria</i>	<i>engleriana</i>	Kränzlin	<i>lutea?</i>	Molau
31 March	AW225	<i>Calceolaria</i>	<i>parvifolia</i>	Weddell	<i>guentheri</i>	(Kränzlin) Molau
02 April	AW226	<i>Calceolaria</i>	<i>parvifolia</i>	Weddell	<i>parvifolia</i>	-
02 April	AW227	<i>Calceolaria</i>	<i>engleriana</i>	Kränzlin	<i>engleriana</i>	-
03 April	AW228	<i>Calceolaria</i>	<i>teucroides</i>	Grisebach	-	-
03 April	AW229	<i>Calceolaria</i>	<i>schickendantzi</i> <i>ana</i>	Kränzlin	-	-
04 April	AW230	<i>Calceolaria</i>	<i>rivularis</i>	Kränzlin	-	-
07 April	AW231	<i>Calceolaria</i>	<i>engleriana</i>	Kränzlin	<i>engleriana</i>	-
07 April	AW232	<i>Calceolaria</i>	<i>schickendantzi</i> <i>ana</i>	Kränzlin	-	-
08 April	AW233	<i>Calceolaria</i>	<i>lobata</i>	Cavanilles	-	-
08 April	AW234	<i>Calceolaria</i>	<i>mexicana</i>	Bentham	<i>mexicana</i>	-
08 April	AW235	<i>Calceolaria</i>	<i>tripartita?</i>	Ruiz & Pavón	-	-
08 April	AW236	<i>Calceolaria</i>	<i>atahualpae</i>	Kränzlin	<i>atahualpae</i>	-
08 April	AW237	<i>Calceolaria</i>	<i>conocarpa</i>	Pennell	-	-

Appendix 2. Images on accompanying CD

This report is accompanied by a CD containing images of the plant species seen on the trip, of which most comprise species of *Calceolaria* and other Lamiales. Images are presented as jpeg files and are named in the following way: [image number]_[taxon]_[collection number]. Not all images have an associated collection. Not all image numbers are represented because some slides taken were not relevant to this report. Not all images have been determined to species, or even genus, level.

Copyright for all images is retained by the author. The table below shows the images supplied on the CD.

Image number	Family	Genus	Species	Subspecies or variety	Collection
015	Fabaceae	<i>Lupinus</i>	<i>breviscapus</i>	-	-
017	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
018	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
019	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
020	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
021	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
022	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
023	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
024	Orobanchaceae	<i>Castilleja</i>	<i>sp.</i>	-	-
025	Orobanchaceae	<i>Castilleja</i>	<i>sp.</i>	-	-
026	Orobanchaceae	<i>Castilleja</i>	<i>sp.</i>	-	-
027	Gesneriaceae	-	-	-	-
028	Gesneriaceae	-	-	-	-
029	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW202
030	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW202
031	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW202
032	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
033	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
034	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
035	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
036	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
037	Calceolariaceae	<i>Calceolaria</i>	<i>boliviana</i>	-	AW201
039	Scrophulariaceae	<i>Agalinis</i>	<i>sp.</i>	-	-
040	Scrophulariaceae	<i>Agalinis</i>	<i>sp.</i>	-	-
041	Scrophulariaceae	<i>Agalinis</i>	<i>sp.</i>	-	-
042	Scrophulariaceae	<i>Agalinis</i>	<i>sp.</i>	-	-
043	Lamiaceae	-	-	-	-
060	Bignoniaceae	<i>Tecoma</i>	<i>stans</i>	<i>stans</i>	TS2073
061	Bignoniaceae	<i>Tecoma</i>	<i>stans</i>	<i>stans</i>	TS2073
062	Bignoniaceae	<i>Tecoma</i>	<i>stans</i>	<i>stans</i>	TS2073
064	Bignoniaceae	<i>Tecoma</i>	<i>stans</i>	<i>velutina</i>	TS2075
065	Bignoniaceae	<i>Tecoma</i>	<i>stans</i>	<i>velutina</i>	TS2075
066	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
067	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
068	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
069	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
070	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
071	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
072	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
073	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
074	Calceolariaceae	<i>Calceolaria</i>	<i>conocarpa</i>	-	AW203
075	Phrymaceae	<i>Mimulus</i>	<i>sp.</i>	-	-
076	Phrymaceae	<i>Mimulus</i>	<i>sp.</i>	-	-
078	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW205
079	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW205
080	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW205
081	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW205

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083	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW206
084	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW206
085	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW206
086	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW206
087	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW206
088	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW206
089	Calceolariaceae	<i>Calceolaria</i>	<i>monantha</i>	-	AW207
090	Calceolariaceae	<i>Calceolaria</i>	<i>monantha</i>	-	AW207
091	Calceolariaceae	<i>Calceolaria</i>	<i>monantha</i>	-	AW207
092	Calceolariaceae	<i>Calceolaria</i>	<i>monantha</i>	-	AW207
093	Calceolariaceae	<i>Calceolaria</i>	<i>monantha</i>	-	AW207
094	Calceolariaceae	<i>Calceolaria</i>	<i>monantha</i>	-	AW207
095	Calceolariaceae	<i>Calceolaria</i>	<i>monantha</i>	-	AW207
096	Calceolariaceae	<i>Calceolaria</i>	<i>ferruginea</i>	-	AW208
097	Calceolariaceae	<i>Calceolaria</i>	<i>ferruginea</i>	-	AW208
098	Calceolariaceae	<i>Calceolaria</i>	<i>ferruginea</i>	-	AW208
099	Calceolariaceae	<i>Calceolaria</i>	<i>ferruginea</i>	-	AW208
100	Calceolariaceae	<i>Calceolaria</i>	<i>ferruginea</i>	-	AW208
101	Calceolariaceae	<i>Calceolaria</i>	<i>ferruginea</i>	-	AW208
102	Calceolariaceae	<i>Calceolaria</i>	<i>ferruginea</i>	-	AW208
106	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW210
107	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW210
108	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW210
109	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW210
110	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW210
111	Asteraceae	<i>Barnadesia</i>	sp.	-	-
112	Asteraceae	<i>Barnadesia</i>	sp.	-	-
113	Onagraceae	<i>Fuchsia</i>	sp.	-	AW212
114	Onagraceae	<i>Fuchsia</i>	sp.	-	AW212
115	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>engleriana</i>	AW213
116	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW210
117	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
118	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
119	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
120	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
121	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
122	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
123	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
124	Calceolariaceae	<i>Calceolaria</i>	<i>trilobata</i>	-	AW214
125	Calceolariaceae	<i>Calceolaria</i>	<i>bartsifolia</i>	-	AW215
126	Calceolariaceae	<i>Calceolaria</i>	<i>bartsifolia</i>	-	AW215
127	Calceolariaceae	<i>Calceolaria</i>	<i>bartsifolia</i>	-	AW215
128	Calceolariaceae	<i>Calceolaria</i>	<i>bartsifolia</i>	-	AW215
129	Calceolariaceae	<i>Calceolaria</i>	<i>bartsifolia</i>	-	AW215
130	Calceolariaceae	<i>Calceolaria</i>	<i>bartsifolia</i>	-	AW215
134	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
135	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
136	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
137	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
138	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
139	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
140	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
141	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
142	Calceolariaceae	<i>Calceolaria</i>	<i>buchtieniana</i>	-	AW218
143	Bignoniaceae	<i>Tecoma</i>	<i>fulva</i>	<i>garrocha</i>	TS2091
144	Bignoniaceae	<i>Tecoma</i>	<i>fulva</i>	<i>garrocha</i>	TS2091
146	Lamiaceae	<i>Salvia</i>	sp.	-	-
147	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW219

148	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW219
149	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW219
150	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW219
152	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>engleriana</i>	AW220
153	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>engleriana</i>	AW220
154	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>engleriana</i>	AW220
157	Scrophulariaceae	<i>Agalinis</i>	<i>sp.</i>	-	-
158	Scrophulariaceae	<i>Agalinis</i>	<i>sp.</i>	-	-
159	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW221
160	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW221
161	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW221
162	Asteraceae	<i>Mutisia</i>	<i>sp.</i>	-	-
163	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>engleriana</i>	AW222
164	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>engleriana</i>	AW222
165	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
166	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
167	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
168	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
169	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
170	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
171	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
172	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
173	Calceolariaceae	<i>Calceolaria</i>	<i>rivularis</i>	-	AW223
175	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>lutea</i>	AW224
176	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>lutea</i>	AW224
177	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>lutea</i>	AW224
178	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>lutea</i>	AW224
179	Calceolariaceae	<i>Calceolaria</i>	<i>engleriana</i>	<i>lutea</i>	AW224
181	Bignoniaceae	<i>Tecoma</i>	<i>beckii</i>	-	TS2113
182	Bignoniaceae	<i>Tecoma</i>	<i>beckii</i>	-	TS2113
186	Calceolariaceae	<i>Calceolaria</i>	<i>parvifolia</i>	<i>guentheri</i>	AW225
188	[unknown Lamiales]	-	-	-	-
189	[unknown Lamiales]	-	-	-	-
190	[unknown Lamiales]	-	-	-	-
196	Calceolariaceae	<i>Calceolaria</i>	<i>teucroides</i>	-	AW228
197	Calceolariaceae	<i>Calceolaria</i>	<i>teucroides</i>	-	AW228
200	Acanthaceae	-	-	-	-
201	Acanthaceae	-	-	-	-
218	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
219	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
220	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
221	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
222	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
223	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
224	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
225	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
226	Calceolariaceae	<i>Calceolaria</i>	<i>lobata</i>	-	AW233
227	Calceolariaceae	<i>Calceolaria</i>	<i>mexicana</i>	<i>mexicana</i>	AW234
228	Calceolariaceae	<i>Calceolaria</i>	<i>mexicana</i>	<i>mexicana</i>	AW234
229	Calceolariaceae	<i>Calceolaria</i>	<i>mexicana</i>	<i>mexicana</i>	AW234
230	Calceolariaceae	<i>Calceolaria</i>	<i>mexicana</i>	<i>mexicana</i>	AW234
231	Calceolariaceae	<i>Calceolaria</i>	<i>mexicana</i>	<i>mexicana</i>	AW234
232	Calceolariaceae	<i>Calceolaria</i>	<i>tripartita</i>	-	AW235
233	Calceolariaceae	<i>Calceolaria</i>	<i>tripartita</i>	-	AW235
234	Calceolariaceae	<i>Calceolaria</i>	<i>tripartita</i>	-	AW235

235	Calceolariaceae	<i>Calceolaria</i>	<i>tripartita</i>	-	AW235
236	Calceolariaceae	<i>Calceolaria</i>	<i>tripartita</i>	-	AW235
237	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW236
238	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW236
239	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW236
240	Calceolariaceae	<i>Calceolaria</i>	<i>atahualpae</i>	<i>atahualpae</i>	AW236