



Annals and Magazine of Natural History

Series 1

ISSN: 0374-5481 (Print) (Online) Journal homepage: <http://www.tandfonline.com/loi/tnah07>

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To cite this article: Moritz Willkomm (1845) XXI.—Botanical notices from Spain , Annals and Magazine of Natural History, 16:104, 189-192, DOI: [10.1080/037454809495928](https://doi.org/10.1080/037454809495928)

To link to this article: <http://dx.doi.org/10.1080/037454809495928>



Published online: 16 Dec 2009.



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XXI.—*Botanical Notices from Spain.* By MORITZ WILLKOMM*.

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No. VI. GRANADA, November 4th, 1844.

ON the 12th of September I quitted the village of Guejar, and on the following day, after traversing a very difficult and somewhat dangerous path over the Puerto de Vacares, I reached the south side of the Sierra Nevada, where I pitched my quarters in the village of Trevelez, lying at an elevation of about 6000 feet, the first and highest inhabited place of the Alpujarras. This village lies immediately at the base of the Mulhacen, in a very rocky valley, watered by the wild river of the Trevelez, which runs parallel to the principal chain of the Sierra, and divides this from the second, much lower and very sterile chain, the Sierra de Contraviesa. Notwithstanding the great height at which this village lies, it is surrounded with the most luxuriant chestnut- and nut-trees, and rye and barley are even grown in the alpine region; the vine however will no longer flourish here. This very circumstance shows that the position of the region is very different from that of the northern declivity, and moreover its limits are not so sharply marked as on the opposite side.

The southern declivity of the Sierra Nevada presents a perfectly different appearance from that of the northern declivity. Whilst the summits of the principal chain terminate abruptly toward the north, and form immense and frequently inaccessible rocks, these toward the south pass into long, parallel, gradually descending coombes, which on the whole leave but very little undulating country between them. Between these mountain coombes, at a height of from 8000 to 10,000 feet, there lie a number of tarns or small mountain lakes as clear as crystal, from which innumerable rivulets issue into the valleys of Trevelez, the Rio Toqueira and Rio Grande. I have myself seen and visited, between the Cerro Caballo and the Puerto del Lobo,—apparently the two terminations of the mountain range,—fourteen lakes on the south side; but their shores present no remarkable vegetation; indeed, in general the vegetation of the whole southern declivity appears to be much less rich than that of the northern, which may be partly explained by the formation of this side, and partly by its exposure to the south. One of the most characteristic plants of the south side of the Sierra Nevada is the *Arenaria pungens*, Clem., which is found throughout the whole alpine and snow region, growing from the valleys up to the mountain region, and forms the flora of the snow region and the highest summits, together with *A. tetraquetra*, *Artemisia granatensis*, *Ptilotrichum spinosum*, *Eryngium glaciale*, *E. Bourgati*, Gouan., *Sideritis scordoides*, var. *vestita*, Boiss., *Thymus angustifolius*, P., and *Teucrium Polium*, γ. *aureum*. The shores of these lakes are for the most part so thickly covered with *Plantago nivalis*, Boiss., that from a

* Translated from the Botanische Zeitung, May 2, 1845.

distance they appear quite white, and have frequently deceived me. On the margin of the alpine rivulets and on moist alpine meadows grow *Saxifraga stellaris*, L., *Parnassia palustris*, L., *Euphrasia minima*, Schleich., and some liverworts; in bogs of the mountain region *Juncus bufonius*, *J. glaucus* and a *Senecio*, whilst the fissures of the limestone rocks are filled especially by *Linaria origanifolia* and *Antirrhinum molle*. On the fallow fields around Trevelez I found here and there *Jasione montana*, L., a rare plant in Andalusia, and very frequent *Carlina corymbosa*, which grows high up into the alpine region, as well as *Polygonum Persicaria* and *lapathifolium*. On walls and hedges in the environs of the village grow *Senecio linifolius*, L., very frequent and in full blossom, *Artemisia Absinthium*, L., *Mentha rotundifolia*, *sylvestris* and *Pulegium*, *Brassica adpressa*, Boiss., *Crambe filiformis*, Jacq., *Rumex pulcher*, *Helichrysum-serotinum*, Boiss., *Althæa officinalis*, *Rubus hispanicus*, *Pteris aquilina*, *Cystopteris fragilis*, *Asplenium Trichomanes*, *A. Adiantum-nigrum* and *Ceterach officinarum*, all which plants I have for the most part met with on the north side. The Mulahacen yielded a somewhat richer booty; I began its ascent on the 15th of September, after having in vain attempted to ascend it three weeks before from the north side, when, instead of the Mulahacen, I came upon the Cerro Alcasava, and found my way back only with great danger over the frightful rocks of the northern declivity. The ascent to the highest summit of the Sierra Nevada (according to the measurement of D. Simon de Roxas Clemente equal to 4259½ varas castellanas, or 12,779 feet, which appears to be somewhat exaggerated) is not at all dangerous starting from Trevelez, at least in fine weather, which I was so fortunate as to have. After ascending for six hours, I came at noon to a pretty steep and pathless acclivity, on the highest rocks of the summit, and obtained such a magnificent view over a great portion of Spain, bounded by the sea and the coast of Africa, as is seldom presented. With the exception of some lichens, there is only found between the loose masses of rock of the summit, which consist of mica, containing an endless number of garnets, the *Artemisia granatensis*, with the pretty *Erigeron frigidum*, Boiss., which is distributed over the whole of the upper snow region, but everywhere only sparingly, in company with *Viola nevadensis*, *Galium pyrenaicum* and *Ptilotrichum purpureum*. On the side opposite to the Picacho de Veleta, about 100 feet below the summit, I found about a dozen specimens of *Papaver pyrenaicum*, Gouan., already in fruit, gathered by M. Boissier on the same spot seven years ago, without doubt the rarest plant of the Sierra Nevada, as hitherto no other habitat is known, and even here it occurs very seldom. On the wet alpine meadows on the southern declivity of the Mulahacen and on the margins of the rivulets I found the dwarf *Gentiana Boryi*, Boiss., immersed among mosses, in company with *G. alpina* and *G. Pneumonanthe*, var. *depressa*, Boiss., *Ranunculus angustifolius*, DeC., and *Plantago nivalis*. On a subsequent excursion of two days, which I made on the 16th and 17th of September toward the Puerto del Lobo lying nearly at the east end of the Sierra, I found that the eastern portion of the

southern declivity is still poorer in plants than the central part of Trevez, and gathered only one new plant, viz. the rare *Erodium trichomanafolium*, L'Hérit., which grows pretty plentifully on boulders of mica on the broad and high coombe between the Puerto de Jeres and Puerto del Lobo, but seldom blossoms.

On the 18th of September I quitted Trevez, with the hope of obtaining a richer harvest in other parts of the Alpujarras; but in this hope I was soon deceived; for the further I went towards the south, all was parched under the summer sun. Except *Carlina corymbosa*, *Picnemon Acarna*, *Chamaepeuce hispanica*, *Antirrhinum molle*, *Senecio linifolius*, *Helichrysum serotinum*, *Artemisia campestris*, *Bupleurum spinosum*, *Althæa cannabina*, *Centaurea Calcitrapa* and *salmantica*,—plants which are especially common on the limestone formation and which I had already collected,—I observed in the valleys of the limestone mountains between Trevez, Notaëz, and Orgiva only *Scilla maritima*, L., in blossom, and on the perfectly arid limestone in the neighbourhood of Notaëz, some bushes of the beautiful *Lavatera oblongifolia*, Boiss. Even the environs of the charmingly situated baths of Lanjaron presented, with the exception of some salt-plants growing around the mineral springs, little of interest. There were in blossom *Samolus Valerandi*, L., *Erythræa maritima*?, *Statice globulariaefolia*, Desf., and a *Linum*; whilst on the arid limestone rocks in the neighbourhood of the town grow the sweet-smelling *Balsamita multifida*, Clem. (according to Boissier's 'Voyage' *Tanacetum annuum*, L.?), and in some fissures of the rock, but very rarely and not in blossom, the *Lapiedra Martinezii*, Lag. On perpendicular limestone rocks at Orgiva and between Lanjaron and Granada I for the first time met with the rare *Brassica moricandioides*, Boiss., with thick, round, fleshy, bluish green leaves, with ripe fruit, in company with *Bupleurum gibraltaricum*, *Lavandula multifida* and a *Satureja*. In order also to ascertain the nature of the vegetation of the coast at this season, I made an excursion on the 20th of September to the town of Motril, distant four leagues from Lanjaron and half a league from the coast, which is reached by the romantic valley of the Rio Grande, which carries off almost all the water from the southern declivity of the Sierra Nevada to the sea. The valleys of the Alpujarras possess quite a different character from those of the north side, for they are all very wide and the beds of the rivers very broad, even and sandy. Their banks, as especially those of the Rio Grande, are clothed with thick and high bushes of *Arundo Donax*, L., which began to unfold its colossal bunch of blossoms, and the beautiful *Saccharum Ravennæ*, L., clothed with its elegant silver panicles; in company with which plants are found in profusion the *Tamarix gallica* and *Nerium Oleander*. Further toward the sea appear the *Salix alba*, *S. purpurea*, *Populus nigra*, *alba* and *canescens* frequent on the banks; *Passerina hirsuta*, L., which blossoms throughout the year; *Scilla maritima* and *Chamaerops humilis*, which already from Orgiva and Lanjaron indicated the neighbourhood of the coast and the hot region. On the northern declivity of the last chain of hills between the valley of the Rio Grande and the Plain of Motril,

I noticed some gigantic shrubs of *Kentrophyllum arborescens* with stems as thick as an arm, but already completely dried up. It was here that the Andalusian robbers paid me a visit; but fortunately I escaped them by the speed of my horse. The very friendly town of Motril lies at the foot of a limestone chain of hills planted with vines, which surrounds the basis of the Sierra de Lujar, and at the commencement of a wide fruitful plain, quite covered with the most luxuriant fields of cotton, sugar-cane, batates and maize. The coast is quite flat and very sandy; *Pancratium maritimum*, L., blossomed in parts in company with a *Salsola*, *Kakile maritima*, L., and *Euphorbia Paralias*, L. The last had past flowering, whilst on the banks of the ditches of the above-mentioned plains and on grassy places *Panicum arenarium*, Brot., *Xanthium Strumarium*, L., and *Ricinus communis*, L., and in the cotton plantations *Datura Stramonium*, L., are not rare.

At the end of September I returned to Granada, and in the beginning of October I made the last excursion, of four days, in the Sierra Nevada, from whence I brought away little more than seed. The fresh-fallen snow which already covered the mountain down to the lower alpine region, prevented me from visiting the snow region, as I had intended. A subsequent excursion to the neighbouring Sierra of Alcafar yielded little beside a small form of *Merendera Bulbocodium*, *Crocus nudiflorus*, Sm., and *Satureja cuneifolia*, Ten. The summer months are not the most favourable months of the year for botanizing in Andalusia, even in the mountains, as I have found by experience; but much the best time is the spring, from March to May, and June and July for the mountains. On the arid hills around Granada, the *Artemisia Barrelieri*, Boiss., which is here very frequent, begins to flower in the end of October; and about the same time I found on moist shady places in the valley of the Darro the beautiful *Sternbergia lutea*, Ker. (*Amaryllis lutea*, L.), which had not hitherto been found in the kingdom of Granada. In the second half of October it rained almost incessantly, which prevented my making any distant excursions, but favoured the development of the Cryptogamous plants; so that I have obtained a tolerable harvest of lichens and liverworts during the latter part of my stay in Granada: of the last species, besides several forms of the *Pellia epiphylla*, I found especially *Marchantia paleacea*, Bertol., everywhere in moist shady places, common on walls and on stony sites and with spore-bearers; on moist masses of rock I also gathered *Turgionia* and *Lunularia vulgaris*, Mich., both very beautiful and in rich fructification.