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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 8.]

[1913.

XLVII.—A BOTANICAL EXPEDITION TO THE
CANARY ISLANDS, 1913.

(With Plates.)

T. A. SPRAGUE and J. HUTCHINSON.

Our ship left Liverpool on May 17th and called at Madeira on May 22nd, when we took the opportunity of ascending the mountain railway at Funchal to its present terminus, which is situated about 2600 ft. above sea level. The ascent occupied about half-an-hour, the lower part of the track traversing much-terraced hillsides, on which were grown small patches of sugar-cane and vines, numerous fruit-trees such as peaches and loquats, and a great variety of tropical and subtropical trees and shrubs, amongst which the most conspicuous were *Jacaranda acutifolia* (commonly known as *J. mimosaeifolia*) and *Wigandia caracasana*.

The subtropical zone of cultivation was succeeded by plantations of *Pinus Pinaster*, which extended upwards to an altitude of about 3400 ft. The cobble-paved mountain road led upwards past the terminus through the pine plantations, and after a time followed the side of a steep ravine. Occasional glimpses were obtained through the trees of the opposite hillside, which in places was yellow with broom.

The undergrowth in the pine plantations consisted chiefly of small bushes of heath (*Erica scoparia*). The white-flowered *Eupatorium adenophorum* was very common by the side of the track in fairly damp places under the shade of the trees, and a singular-looking little herb (*Sibthorpia peregrina*) with long trailing stems, leaves like those of ground-ivy, and pretty yellow flowers, occurred in some abundance on the grassy banks at the side. Specimens of these and a few other plants were collected, and photographs were taken of the head of the ravine, and of the vegetation in the zone above the pine plantations. This consisted principally of a single

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species of tree* which grew gregariously on the ridges and upper slopes of the ravine, and of rounded bright green bushes of *Erica scoparia*, which covered much of the lower slopes (see Plate 1). At a bridge across the ravine known as the Ponte da Ribeira Calles, 3500 ft., we had to turn back in order to get down to the town by nightfall.

On our arrival at Santa Cruz, Tenerife, on the morning of May 24th, we found a letter awaiting us from Dr. G. V. Perez suggesting that we should push on to Puerto Orotava. We left Santa Cruz in the afternoon by the electric tram. The country as far as Laguna was much cultivated and had a very burnt-up appearance, and our first impression of Tenerife was rather disappointing, but between Laguna and our immediate destination, Tacoronte, the vegetation was much fresher. The journey occupied about two hours. In the evening we examined the vegetation of a small deep and narrow gully.

Next morning we started off at 6 a.m. to the celebrated wood of Agua Garcia, which we reached about 6.45. Near the bottom of a small ravine were fine trees of the Viñático (*Phoebe indica*) with very stout trunks, and good examples of the large-leaved Canarian holly (*Ilex platyphylla*). Several beautiful herbaceous plants were in full flower, including *Ranunculus cortusaeifolius*, *Geranium anemonifolium* and a pink-flowered Labiate (*Cedronella canariensis*). On the ridges and the higher parts of the slopes were fine specimens of the tree-heath (*Erica arborea*) and the small-leaved holly (*Ilex canariensis*). *Viburnum rugosum* was seen both in flower and fruit; it is a shrub 5 ft. high or more, and forms a large part of the undergrowth in both the damper and drier parts of the wood. Among the climbers were a *Rubus* which ascended the trees of the Viñático to a height of about 40 ft., and a *Smilax* which occurred among the tree-heaths and small-leaved hollies in the upper and drier parts.† After breakfast, we took the first motor-bus to Orotava, where we arrived about 10.30.

There we were met by Dr. Perez, who was accompanied by Domingo Hernandez, seed-collector for Messrs. Wildpret Bros. The remainder of the morning was spent under their guidance, seeing the grounds of the Grand Hotel Taoro (formerly Hotel Humboldt), and an interesting garden belonging to Mrs. Wethered, where many endemic Canarian plants are cultivated. On a lava stream alongside there were fine examples of *Sonchus leptcephalus*, which is remarkable for its extremely dissected leaves. The habit is shown in Schröter, Nach den Canarischen Inseln, plate 10, fig. 2.

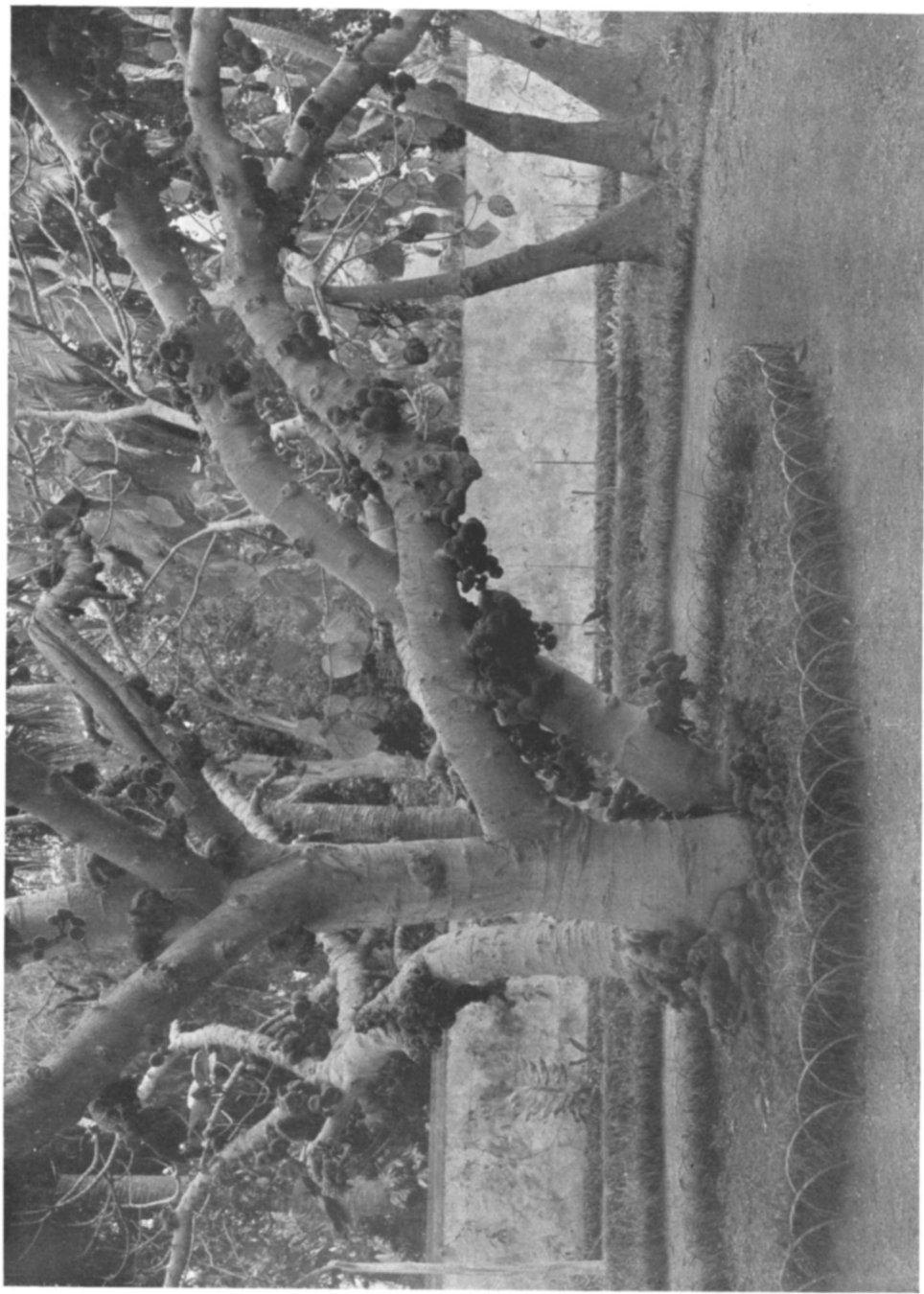
In the afternoon a visit was paid to Dr. Perez's garden at Puerto Orotava. Among the more noteworthy plants seen were various species and hybrids of *Statice*, *Echium simplex*, *E. Bourgaeaunum*, *E. Pininana*, *E. fastuosum* and *E. candicans*, young Dragon-trees, various critical forms of *Cytisus*, *Retama monosperma* and *R. rhodorrhizoides*, *Convolvulus floridus* and an arborescent *Sonchus*.

* Not identified, as owing to lack of time we were unable to climb up the hillside to where the trees grew.

† An interesting account of the wood at Agua Garcia is given by M. Emile Jahandiez in the Bulletin du Chêne, 1913; and it is also dealt with by Schenck, Veg. Canar. Ins. p. 316.



ERICA SCOPARIA.



FICUS ROXBURGHII.

Afterwards we went to Los Frailes, a tract of lava country belonging to Dr. Perez. Among the more interesting plants collected were a boraginaceous plant with small white flowers (*Messerschmidia fruticosa*), *Withania aristata* and *Periploca laevigata*. *Rubia fruticosa* was abundant everywhere. Tangled masses of dodder were found on ivy-leaved *Pelargonium*, growing so thickly that it could be gathered in handfuls. There is a fine avenue of the Canarian date-palm (*Phoenix canariensis*) on the estate.

An early start was made next day (May 26th) in company with Domingo Hernandez for the lava stream below the Montaña de la Horca. *Davallia canariensis* was very abundant among the blocks of lava, and another fern, *Gymnogramme leptophylla*, was fairly frequent. Schimper's 'tufted-leaved plants' (Federbusch Gewächse)* were represented by *Kleinia nerifolia* and *Euphorbia Regis-Jubae*. Among other characteristic plants were *Rhamnus crenulata*, *Gonospermum fruticosum*, *Artemisia argentea*, *Lavandula abrotanoides* and a fine white-flowered *Sempervivum*. Flowering and fruiting specimens were obtained of the rare *Ruta pinnata*.

A visit was next paid to the Botanic Garden,† where we were cordially received by the Curator, Señor Juan Bolinaga, by whose exertions many additional plants have been introduced to the Garden in recent years. A special article would be required to do justice to the Botanic Garden: many tropical and subtropical ornamental and economic trees are now in cultivation, and some of the more interesting endemic plants are represented. Fine examples were seen of *Pandanus utilis*, numerous palms, several species of *Araucaria*, *Hibiscus elatus*, 45 ft. high, *Hibiscus rosa-sinensis*, 15 ft., covered with scarlet flowers, *Ficus nitida* and *F. Roxburghii*. The latter is remarkable for producing figs on the trunk right down to the level of the soil, as well as on the large branches (see Plate 2). Perhaps the most beautiful thing seen was a tree of *Albizia Julibrissin* with a wealth of delicate flesh-coloured flowers.

On leaving the Botanic Garden we met Dr. Perez, who drove us up to his garden at Villa Orotava, stopping at the Plaza de Frankei on the way. Here we got specimens of the rare *Rhamnus glandulosus*, which was stated to have been brought from Las Mercedes. The frequent use of native trees is a praiseworthy feature of the public gardens in the Canaries.

There are two interesting groups of *Laurus canariensis* in the garden at Villa Orotava which illustrate the vegetative mode of reproduction of the species: one consists of the base of a large trunk surrounded by a circle of five smaller trees which evidently arose as suckers from the central one; the other has several relatively small trees in a circle, the middle one having completely disappeared. Among other trees seen were *Juniperus Cedrus* ♂ and ♀, *Heberdenia excelsa* and *Arbutus canariensis*. There was a fine bush of *Cytisus Spachianus* 15 ft. high, said by the late

* Schenck, Veg. Canar. Ins., p. 271.

† An interesting account of this Garden was given by Sir D. (then Dr.) Morris in Journ. Roy. Hort. Soc., 1896, vol. xix., p. 78, with a select list (p. 107) of the plants observed there in 1893.

Mr. Hermann Wildpret to have come from the wood at Agua Garcia and distributed by him as *C. Hillebrandii*.

In the afternoon we inspected the "Hijuela" garden, the full name of which is 'Servicio Agronomico Nacional, Hijuela del Botanico.' This contains a great variety of subtropical trees and shrubs maintained in a very healthy condition, including *Corynocarpus laevigata*, *Maclura aurantiaca*, *Sterculia platanifolia*, *Cocculus laurifolius*, *Fabiana imbricata* and a fine example of *Quillaja saponaria*. There was a beautiful specimen of *Fuchsia arborescens* in full flower looking almost exactly like a lilac at a distance, hence its other name *Fuchsia syringaeiflora*. Two varieties of the bushy *Fuchsia corymbiflora* were cultivated, one with crimson flowers, the other crimson and white.

In the evening Dr. Perez drove us down to Puerto Orotava and pointed out some features of interest such as an old wine-press with a massive beam of the téa wood (heart-wood of *Pinus canariensis*), which is almost imperishable; large logs are no longer obtainable locally in Tenerife. In a garden beside the road were some plants of *Lotus peliorhynchus* (Bot. Mag. t. 6733), which had apparently disappeared as a wild plant and was for a long time known only in a garden at Orotava; it was subsequently rediscovered in the south of the island. The low volcanic hill of the Montaña de la Horca (Gallows Mountain) was covered with a striking association of the Vinagrera, *Rumex Lunaria*, a large shrubby dock.

The well-known fodder plant, Tagasaste (*Cytisus proliferus*) was extensively cultivated on the lower slopes (see *K. B.* 1891, 239; 1893 115). It should be treated like an osier, *i.e.*, cut back regularly so as to produce plenty of young shoots and at the same time prevent its growing into a tree. The low growth is the result of pruning and not a varietal character as supposed by Schröter (Nach den Canarischen Inseln, p. 65). The comparative failure of Tagasaste as a fodder-plant in the colonies is attributed by Dr. Perez to improper treatment, the bushes being allowed to become arborescent. Horses generally refuse it at first, but can easily be taught to like it. The Algarrobo, *Ceratonia Siliqua*, is much cultivated, and is seen here and there along the roadside.

On May 27th a banana plantation in the neighbourhood was visited. The species grown in the Canaries is the dwarf *Musa Cavendishii*. The area under cultivation has increased enormously in recent years, and very high rents are paid for suitable land. Irrigation is essential, and is the largest item in the cost of production. In the plantation visited the bunches of fruit were propped away from the stem by small pieces of bamboo to prevent the bananas being deformed by pressure and to ensure freer circulation of air, thus reducing the danger of attack by mould. Each bunch (*racimo*) bore from 12 to 14 hands (*manos*). There were as many as 40 bananas in a lower hand, the number per hand decreasing gradually towards the end of the bunch. An average bunch contained about 400 fruits. One bunch was observed immersed in a pool of water, and on enquiry it appeared that the fruits had shrivelled somewhat, and were being freshened up before delivery to the exporters.

We were delighted to see the island of La Palma* in the evening, outlined against the setting sun. It is only visible from Orotava at sunset during very clear weather.

The unusually clear weather continued on the following day (May 28th), the Peak† being visible at intervals during the morning. As a rule it becomes shrouded by mists about 8 o'clock in the morning, and these usually do not disappear until dusk. They are caused by the rise of moisture-laden sea-breezes which, at an altitude of about 3000 ft., become cooled down sufficiently to cause condensation.

A small steamer lay off the pier awaiting a shipment of bananas, which were being brought down in large wagons drawn by two oxen. The bananas are packed in single and double crates holding one and two bunches respectively. The wood is sent in ready-shaped pieces from Scandinavia, and the crates are made up on the spot. One wagon contained 36 single and 12 double crates, *i.e.*, 60 bunches of bananas altogether.

In the afternoon specimens of a few Canarian trees and shrubs were obtained in Mrs. Wethered's garden by kind permission of the owner. Several of these were afterwards met with in a wild state in La Palma and Tenerife. A few plants were gathered in the Barranco Martianes, the flora of which seemed to be very poor.

On May 29th we left Orotava by the 7 a.m. motor bus for Tacoronte, and thence proceeded by tram to Santa Cruz. Between Tacoronte and Laguna there is a fine view towards Tejina, with some good rock scenery. Shortly afterwards, the wooded hills of Las Mercedes came into view, with a table-topped hill in the foreground. These were visited on our return from La Palma, and are described later on. The journey by electric tram from Laguna to Santa Cruz is very bumpy and dusty, at least in the summer, but in the descent to the capital there are fine views of the sharp black peaks and serrated ridges of the Anaga Mountains.

In the afternoon we were courteously received by Don Arturo Ballester, Chief of the Forest Department of the Canaries, to whom we had a letter of introduction. He gave us a letter to the Assistant Conservator of Forests at Santa Cruz de La Palma, and some valuable advice as to places worth visiting in that island.

Our steamer, the "La Palma," was due to leave Tenerife at 8 p.m., but did not depart till after midnight, as there was still a good deal of cargo to be unloaded, including many crates of onions from Lanzarote. On approaching the island of La Palma next morning (May 30th), we could see that the upper and middle slopes of the mountains were still covered with extensive pine-forests. Deforestation has taken place to a much less extent than in Tenerife. The numerous immensely deep ravines (*barrancos*) which furrowed the sides of the mountains were very conspicuous from the sea.

The island is roughly pear-shaped, with the rounded end towards the north. It is 29 miles long and $17\frac{1}{4}$ miles broad. The centre of the northern half is occupied by an immense crater, the Gran

* Not to be confused with the town of Las Palmas, the capital of Grand Canary.

† Pico de Teyde, Tenerife.

Caldera, which is over 4 miles in diameter and 5000–6000 ft. deep. This is drained by a deep ravine, the Barranco de las Angustias, which runs in a south-westerly direction to the sea. From the rim of the crater, the highest point of which is about 7700 ft., the surface slopes steeply to the sea on the west, north and east. A high mountain ridge runs from the south-east of the crater to the south of the island.

The capital, Santa Cruz, almost always called “La Ciudad” (the city) by the inhabitants, lies at the side of a coast crater, the Caldereta, 1000 ft. deep, half of which has been washed away by the sea. As we came near to land a gentle drizzle started which continued all day. We were told that rain usually ceases in La Palma before the end of May, and not a drop fell during the remainder of our visit.

In the afternoon we called on Dr. Elias Santos y Abreu, the Director of the Museum, and one of the principal doctors of the island, to whom we had a letter of introduction from Dr. Perez.

The town-hall of Santa Cruz is very interesting. It contains the standard of the Spanish Conquest, and the ancient official manuscript records, which are much worm-eaten, and date from 1554, in which year the previous town-hall was destroyed by fire. The remains of the latter are to be seen behind the present building. A curious oven used for baking bread was noticed high up on the outside wall of a neighbouring house.

A visit was also paid to the museum, where we were cordially received by the officials, and the members of the Cosmological Society. There is a fine collection of articles used by the Guanches, the ancient inhabitants of the Canaries. Among them are numerous earthenware cooking pots elaborately ornamented outside, each vessel having a different pattern; drinking cups, milk-bowls, bone needles, a stone knife, curious hats made of rushes, and necklaces of earthenware beads and of seeds. A collection of dried specimens of La Palma plants is being formed under the direction of Dr. Santos, who devotes to scientific pursuits the leisure of a busy professional life.

A huge crab which was fished up off the island from a depth of 160 fathoms measured 3 ft. across as mounted, and 4½ ft. when fully extended.

On May 31st and June 1st a thorough exploration was made of the lower and middle parts of the Barranco del Carmen, a large ravine to the north of the town.

Nearly 60 numbers of plants were gathered, and five photographs were taken illustrating the vegetation. At the mouth of the barranco there was a very characteristic association of tufted-leaved Euphorbias, *Kleinia neriifolia*, *Lavandula abrotanoides*, low rounded greyish bushes something like wormwood (*Schizogyne sericea*) and straggling plants of *Rubia fruticosa*.

On the upper part of the cliffs there was a good deal of the candelabra-like *Euphorbia* (*E. canariensis*), and the Pitera, *Agave americana*, was frequent on the steep hill-sides. Some of the most interesting plants, such as the endemic *Crassulaceae* and *Caryophyllaceae*, grew in the clefts of the perpendicular rock faces.

In the winter there are sudden rushes of water following heavy rains in the mountains, but the barranco is dry for the greater part of the year. In the dry bed of the winter torrent the following plants occur abundantly: tufted-leaved *Euphorbias* and *Kleinias*, the white-flowered *Eupatorium adenophorum*, so common in Madeira, *Rumex Lunaria*, a large-leaved *Hypericum*, a *Micromeria* and the common tropical weed, *Bidens pilosa*. A good deal of the bottom of the barranco had formerly been under cultivation, and was now overrun with a yellow-flowered crucifer, *Hirschfeldia adpressa*.

The first specimens of *Pinus canariensis* were seen in the middle part of the barranco, where they descend much nearer the sea than on the ridges. In former times the pines probably extended in many places down to the coast. A small prickly-fruited umbellifer was very abundant on flat ground above the dry bed of the torrent.

We ascended the steep southern slope of the barranco, and returned to the town by the high ground. A pretty much-branched *Sempervivum* grew on the slope. It had white flowers with pink carpels, and a strong smell of honey.

Two days, June 2nd and 3rd, were spent in exploring the lovely Barranco del Rio, which runs into the mountains to the west of the town. On the way we passed the Alameda, a rectangular promenade surrounded by a wall, and shaded by about 30 trees of *Ficus nitida* in four rows, and a few *Casuarinas* at the far end. Some of the fig trees were blown down in a storm a few years ago and broke down a large part of the wall.

Just past the Alameda is a stone ship, which is rigged in April every fifth year, on the occasion of the festival of the Virgen de las Nieves. The church of that name is situated about one hour's walk up the barranco, and contains an ancient and much venerated image which is carried down to the town in procession during the festival. The altar is overlaid with beaten silver work, among the subjects represented on the panels being a palm, a pine tree, an olive-tree, a banana plant, a tower and a fountain.

The last house passed before entering the Barranco del Rio is situated at about 1000 ft. above sea-level on the ridge to the north, and belongs to Señor Antonio Lopez Anca, who received us very kindly, and made arrangements for a guide to accompany us on the second day.

Señor Anca cultivates a certain amount of coffee for which he obtains 2 pesetas (about 1s. 6d.) per lb., whilst Venezuelan coffee realises only 1½ pesetas in the island.

The path follows a small aqueduct which has been built along the steep and sometimes precipitous side of the ravine, and one has to walk on the small outer wall, which in places is only 1 ft. wide.

The Barranco del Rio is much moister than the Barranco del Carmen, and the vegetation is very luxuriant. The Canary pine is extremely abundant and extends in places from top to bottom of the slopes. The precipitous rock-faces bear a characteristic association composed largely of *Sempervivum*, and including arborescent *Sonchi*, *Cinerarias* and other *Compositae*, *Phyllis Nobla*, *Sisymbrium millefolium* and a small-flowered *Echium*.

In the damper situations there was a great deal of a pale magenta *Cineraria* which had been much eaten by goats. By the side of the

aqueduct were several small species of *Sempervivum*, abundance of the golden-flowered *Sisymbrium millefolium*, *Arabis albida*, maiden-hair fern and a *Myosotis*.

Among the commonest shrubs and small trees are the Faya (*Myrica Faya*), the small-leaved holly (*Ilex canariensis*) and the tree-heath. There are three kinds of laurels, the most frequent being the Viñático (*Phoebe indica*). Among the less common trees are *Visnea mocanera*, *Catha cassinoides* and *Notelaea excelsa*.

We penetrated the ravine to a short distance beyond a hill named Lomo Corto, 2200 ft., and had a fine view of the cliffs known as La Subaquera.

On June 4th we started at 5 a.m. for the Pico del Cedro, 7300 ft. Most of the ascent was done on mule-back, but it was necessary to walk down the greater part of the way. A great extent of low wood was traversed which reached its fullest development between 3000 and 4000 ft., in the cloud belt. The wood was composed mainly of *Myrica Faya*, *Erica arborea* and *Ilex canariensis*, with undergrowth of white-flowered *Cistus* and bracken. The *Ilex* apparently did not occur above 4000 ft., but the *Myrica* was abundant up to 4400 ft., and odd specimens were seen up to 5400 ft. At 8 o'clock we reached the Llano de las Vacas, and had a fine view of the Peak of Tenerife and the wall of cliffs which encircles it above a sea of clouds. About 4700 ft. the vegetation consisted chiefly of pines, tree-heaths and bracken. The upper ridges were clothed with pine woods practically destitute of ground vegetation.

Lunch was taken at the Pozos de la Nieve, 6400 ft., small pits in which snow is stored for summer use. The mules were left here, and the rest of the ascent was done on foot. The last pines occur about 200 ft. below the summit. Above them the chief feature of the vegetation is the Codeso (*Adenocarpus viscosus*), a large papilionaceous shrub with bright yellow flowers.

The Pico del Cedro takes its name from an old cedar (*Juniperus Cedrus*), which formerly grew among the rocks at the summit. This is now dead, but part of the trunk still remains. About 200 ft. below, on the inner slope of the crater, there is a healthy and well-grown example of the same species. It took a quarter-of-an-hour to climb down to it, as much of the surface is composed of dangerous screes, some of which end in small cliffs.

Magnificent views of the crater (Gran Caldera) were obtained. The opposite rim is about four miles away and the bottom is from 5000 to 6000 ft. below. The interior of the crater has been carved by water into an intricate series of steep ravines and bold bluffs, clad with forests of *Pinus canariensis*.

As some difficulty had been experienced in reaching plants on the cliffs, we had a large hook-knife made and mounted on the end of a long pole which proved of considerable service.

On the afternoon of June 6th we examined the vegetation of the sea-cliffs to the south of the town. The beach was composed of black volcanic sand in which nothing grew. At the base of the cliff, among loose boulders and stones which had fallen from it, were a Pellitory (*Parietaria*), *Chrysanthemum frutescens*, a

Micromeria, a much-branched shrubby *Plantago* and a purplish-flowered grass (*Pennisetum cenchroides*).

Nicotiana glauca, a slender shrub with glaucous leaves and greenish-yellow tubular flowers, was abundant amongst the rocks and also in the cuttings of the carriage road which leads round the south of the island. It is a native of South America, which has become completely naturalised in stony places near the sea in the Canaries and the Mediterranean region.

We had hoped to start on the morning of June 7th for Los Llanos, a town on the west of the island, but were prevented from leaving until the 9th. In the meantime a visit was paid to a banana plantation at an altitude of 800 ft. near the village of Las Nieves. It had been neglected, and had fallen into a bad state, but was being improved by the present owners. Two diseases were prevalent, a mould (hongo) and a red scale-insect (mangra). In order to prevent the spread of the mould the perianths were removed after the fruit had set, and the terminal part of the inflorescence, which never produces fruit, was cut off. The large red bracts covering the hands were also removed. To combat the scale-insect, the plants were painted with an emulsion of paraffin and ordinary soap, as soft soap was unobtainable.

Each banana plant in the plantation is irrigated every ten days, alternate days being devoted entirely to this work. After bearing, the stems are cut off about two feet above the ground, and are fed to oxen, the dry leaves being used for packing. Only one sucker is left to replace the old stem, the stump of which remains in the ground for a year, and is then uprooted, broken up and used as manure. The suckers take a year or more to come into bearing, and the bunch of fruit is ready for cutting about five months after the first bracts open. The bunches of bananas are packed first of all in cotton wool, then in newspaper, afterwards in straw, and finally wrapped in dry banana leaves, the whole being rammed tight before the crate is fastened up.

We left Santa Cruz for Los Llanos by the public motor on the afternoon of June 9th. The road zigzags repeatedly up the hillside behind the town until it reaches Buena Vista, 1100 ft., whence it runs straight to the south of the island. The principal crops between 1000 and 2000 ft. appeared to be onions, vines, maize and bearded wheat, and there were numerous mulberry trees and figs.

An interesting plant-association was observed at a place about 1200 ft. above sea-level, where the original vegetation had not been disturbed, bushes of *Myrica Faya* growing amongst such characteristic xerophytes as *Euphorbia obtusifolia* and *Kleinia neriifolia*.

Extensive tracts of lava were passed. These were very bare, and in many places the only plants that could be seen were the Canary pine and the shrubby dock (*Rumex Lunaria*).

Near Fuencaliente at the south of the island we were surprised to see quantities of the yellow Horned-Poppy (*Glaucium luteum*) by the side of the road, at an altitude of 2200 ft., as it is usually regarded as a strictly maritime plant.

We arrived at Los Llanos at 6 o'clock, the journey having occupied three hours. The next day, (June 10th) was occupied

mainly in making arrangements for our journey to the Caldera, but some time was spent in collecting on a lava flow near El Paso.

There are many fields of tobacco in the neighbourhood, and sugar-cane is cultivated close by at Argual. Almond trees are planted everywhere, the produce being sent to Tzacorte for export. Safflower (*Carthamus tinctorius*) is grown in almost all the cottage gardens. The florets, which are used as a dye-stuff, fetch 2 pesetas (1s. 6d.) per lb. in La Palma.

On June 11th we went on to the farm of Tenerra in the Caldera, accompanied by the Forest Guard at El Paso, Francisco Gonzalez Mendez.

The track to the Caldera leads north from Los Llanos along a small gully, and over dry stony ground to the edge of the Barranco de las Angustias, the great ravine which forms the outlet of the crater. A magnificent blue-flowered thistle (*Cynara Cardunculus*, var. *ferocissima*) occurred by the side of the track and amongst the stones cleared from the fields.

At about 1400 ft. there is a fine view of the ravine, and the path turns sharply to the north-east, rising slightly until a cross is reached marking another good view-point, La Cruz de la Viña, 1600 ft. On the opposite side of the ravine there was a great cliff at the top, with a large terrace at its base, much of which was under cultivation. Below this came a steep slope ending in another cliff which extended nearly to the bottom of the gorge.

The path descends rapidly from La Cruz de la Viña to the river-bed, 800 ft. below, and proceeds for a short distance along the dry flood-bed, before crossing the stream and mounting the opposite slope. Here we observed a number of men cutting branches of *Myrica Faya* for decoration during a fiesta. The first 1000 ft. of the ascent was extremely arduous to those on foot, and took nearly an hour under the blazing sun. After passing the farm (1900 ft.) belonging to Señor Domingo Camacho, the track was rather less steep, but we were glad to make a halt under a fig tree about 400 ft. higher up. A little further, 2400 ft., we passed some bushes of a magnificent pinkish-purple *Salvia*, which we had also observed 1500 ft. below.

At 2600 ft. there were some large rounded bushes of a tansy-like composite (*Gonospermum* sp.), covered with golden-yellow flowers. This also occurred in some quantity higher up, on the slopes of a small ravine, where it formed a distinctive feature of the vegetation.

The highest point on the track is Lomo Alto, 3800 ft., from which there is a slight descent to the farm of Tenerra, which was reached at 12 o'clock. There we were most hospitably received by the owner, Señor Odon Gonzalez Morales, and pitched our tent under a fig tree near the house.

Two days (June 12 and 13) were spent in the Caldera. On the first we went to the small farm of Taburiente, 2800 ft., and collected in the pine-woods on the way. The second day was devoted to exploring the base of the fine cliffs of El Capadero, 2600–2650 ft., where we obtained a rich harvest of plants, including the endemic *Senecio palmensis*, and some photographs of the more characteristic species.

There are five farms in the Caldera (including the Barranco de las Angustias), with a total population of 66 men, women and children. The farms are Taburiente, Tenerra, Camacho, Viña and Paredon.

In the evening after sunset at Tenerra the mists creep up from the direction of the sea into the crater, where they remain all night, retreating down the Barranco de las Angustias before daybreak. The upper level of the mists is apparently about 1000 ft. below Tenerra. The meteorological conditions inside the crater form an interesting contrast with those of the Peak of Tenerife, which is shrouded by mists during the daytime and clear at night.

Our muleteers returned for us on June 14th, and we had a pleasant ride to Los Llanos with occasional stops for collecting and photographing.

The next day one of us returned to Santa Cruz by the Cumbre Vieja, whilst the other went with the luggage by the public motor.

The journey across the Cumbre Vieja, one of the passes over the ridge which forms the backbone of the southern half of the island, was made by mule, starting at 5.30 a.m.

At about 2800 ft. there were numerous pines with an undergrowth of Tagasaste, tree-heath and bracken, and low pine-woods commenced a little below 3000 ft. Where the pines had been cut down on the Loma de Andrique, about 3800 ft., the hillside was yellow with bushes of Codeso (*Adenocarpus viscosus*).

At 3850 ft. a desert of black volcanic sand and gravel was entered, parts of which were destitute of vegetation, whilst others had only a sprinkling of burnt-up annuals a few inches high. These included a sorrel, a *Silene*, a rock-rose (*Helianthemum guttatum*), a Composite, two trefoils and two or three grasses. A continuous carpet of vegetation was absent except in a few depressions into which some brown sandy soil had been washed. Towards the top of the pass the black sand was replaced by brown soil, which was covered with a scrub of tree-heath and pink *Cistus* (*C. Berthelotianus*), amongst which were a few pines.

The summit of the pass is about 4700 ft. above sea-level. On the eastern slope there is a good deal of bracken near the top, and at about 4500 ft. the first bush of Faya (*Myrica Faya*) was seen. This rapidly became more plentiful, and at 4400 ft. the track entered a low wood of Faya and tree-heath, which gradually passed into typical laurel-wood. Among the more interesting herbs seen were *Geranium anemonifolium* and *Cedronella canariensis*, the latter not in flower. Two yellow-flowered species of *Sempervivum* were very common on a wall by the side of the track. One of these is known as 'Crespinel' and its juice is used to cure sores. The track joins the road at Breña Alta, 1200 ft., and the remainder of the journey to Santa Cruz calls for no remark.

We left La Palma on the evening of June 16th, and arrived at Santa Cruz, Tenerife, the next morning. In the afternoon a small ravine behind the Hotel Pino de Oro was explored. This contained an interesting association of xerophilous plants including *Plocama pendula*, *Euphorbia canariensis*, *Kleinia nerifolia* (leafless), *Lavandula abrotanoides*, a *Micromeria* and the wide-spread *Nicotiana*

glauca. The *Plocama* is a small rubiaceous bush with long slender weeping whip-like branches and small white fruits like mistletoe berries.

Next day we started by the first tram (7 a.m.) for Laguna, and walked from there to the woods of Las Mercedes. There was a good deal of the fragrant yellow-flowered *Spartium junceum* on the way.

The track to the wood leaves the road at the village of Las Mercedes, and ascends the side of a dry hill, passing some rock dwellings on the way. These are hewn out with pick-axes, and are lime-washed inside. The Guanches, who inhabited the Canaries before the Spanish Conquest, lived mostly in caves, and the custom has persisted to the present day. The best known cave-dwellings are those of Atalaya in Grand Canary.

A fine *Sempervivum* with greenish-white flowers was fairly common on the dry stony hill-side, and there was a good deal of a shrubby plantain (*Plantago arborescens*), which formed much-branched bushes 1½ ft. high. *Daphne Gnidium* occurred both on the dry hill-side and in outlying parts of the wood.

The wood commenced at an altitude of about 2600 ft., and extended to the tops of the hills, which were about 3000 ft. high. *Prunus lusitanica* occurred in great abundance, and was in flower at the time of our visit. It has an interesting geographical distribution, being known only from Portugal, the Azores, Madeira and Tenerife. A lovely gentianaceous plant, *Ixanthus viscosus*, grew in rich soil on the shady slopes. It is a slender little-branched herb, 4–5 ft. high, with a large terminal pyramidal panicle of bright yellow flowers, and has somewhat the appearance of a *Lysimachia*. Among the climbers was the beautiful mauve-flowered *Convolvulus canariensis*, which ascends to the top of the trees, where it produces dense masses of flowers. The stems of old plants become very corky, and one that we measured was 12 inches in circumference at the base. A pretty *Senecio* (*S. appendiculatus*) with white ray and buff-coloured centre was very common in the wood. Forty-five numbers of plants were collected during the day, and photographs were taken of some of the more characteristic species.

We left for England on the evening of the following day (June 19th), and arrived at Southampton on June 27th.

Over six hundred numbers of plants were collected during the expedition, and about fifty photographs were taken. The scientific results will be published elsewhere as soon as the collection has been worked out.

In the meantime we desire to express our hearty thanks to Dr. Thomas Bond Sprague, for generous financial support, without which the expedition could not have been undertaken; to the Director, Royal Botanic Gardens, Kew, for extended leave during our stay in the Canaries; to Dr. George Victor Perez, whose admirable arrangements for our stay in Tenerife and kind assistance in many other ways conduced largely to the success of the expedition; to Messrs. Wildpret Bros., for kindly permitting their seed-collector to act as guide during our visit to Orotava; and to Don

Arturo Ballester, Chief of the Forest Department in the Canaries, and Don Jose Ruiz y Albaya, Assistant Conservator in La Palma, for their courtesy in affording us all facilities in their power during our stay in La Palma.

XLVIII.—DIAGNOSES AFRICANAE.—LV.

1451. *Pelargonium luteolum*, *N. E. Brown* [Geraniaceae-Pelargonieae]; affinis *P. rapaceo*, Jacq., sed foliis biternatim divisis et petalis 3 inferioribus porrectis subimbricatis nec conniventibus facile distinguitur.

Herba bulbosa. *Folia* 4–5, omnia radicalia; petiolus 4–6 cm. longus, glaber vel minute puberulus; lamina biternatim divisa, 1.5–3 cm. longa et lata, segmentibus ultimis 3–13 mm. longis linearibus acutis. *Pedunculi* erecti, 3–5 cm. longi, inferne 1–2-nodosi, aphylli, minutissime glanduloso-puberuli. *Umbelli* 3–5-flori, basi bracteis 1 mm. longis linearibus apice barbatis involucrati. *Calyx* glanduloso-puberulus; tubus sessilis, 1.3–1.4 cm. longus; lobi 5 mm. longi, lineari-oblongi, acuti, 4 inferiores reflexi, pallide virides. *Petala* 1 cm. longa, spatulata, obtusa, 2 superiora 3 mm. lata, erecto-reflexa, 3 inferiora 4.5 mm. lata, porrecta, subimbricata, omnia pallide flava, basi lineis duobus rubris ornata. *Stamina* perfecta 5; antherae purpureae, polline aurantiaco.

SOUTH AFRICA. Prince Albert Div.; near Prince Albert, Pearson.

Described from a living plant sent in 1912 by Prof. Pearson to Kew, where it flowered in June, 1913.

The three lower petals of the flower are horizontally directed forward and the two lateral partly overlap the central one, but stand slightly above it on another plane.

1452. *Bersama transvaalensis*, *Turrill* [Melianthaceae-Meliantheeae]; *B. Tysonianae*, Oliver, affinis, sed foliolis paucioribus majoribus, racemis longioribus, fructibus dense et obtuse echinatis facile distinguenda.

Arbor 12-metralis (ex *Thorncroft*), ramis teretibus juventute leviter puberulis, foliorum cicatricibus prominentibus triangularibus. *Folia* imparipinnata, usque ad 20 cm. longa, petiolo 2–4 cm. longo cum rhachi leviter puberulo plus minusve sulcato haud alato; foliola 7–9, ovato- vel elliptico-lanceolata, apice obtusa vel acutiuscula, basi lateralibus oblique acuta, terminalia cuneata, margine integra vel leviter et irregulariter dentata, glabra vel costa infra leviter puberula, nervis reticulatis, lateralibus utrinque usque ad 13 cm. costa in pagina superiore subprominulis in inferiore prominentibus; foliolorum lateralium petioli 2 mm. longi, terminalium 5 mm. longi, leviter puberuli; stipulae parvae, intrapetiolaes, amplexicaules. *Racemi* multiflori, terminales, 2–3-aggregati, cum pedunculo usque ad 18 cm. longi, dense puberuli; pedunculus usque ad 4 cm. longus; bractae lineari-lanceolatae, acutae, 4 mm. longae, dense puberulae; pedicelli 4–5 mm. longi. *Calyx* extra dense puberulus, intus fere glaber, coriaceus, lobis 5, postico anguste ovato 5 mm. longo 3 mm. lato, lateralibus linearibus 5 mm. longis