Flower Power at La Silla

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Periodically a rainy winter hits the "Norte Chico" of Chile. Winter 1991 was one of them and generated some unhappiness among the La Silla observers.

For tourism and botany however the interest was greatly enhanced. Down in the valley near the airstrip the *Palo Santo* (Fig. 1) opened the exhibition in August. The shrubs, frustrated by consecutive years of drought, dressed up in tiny green leaves and delicate yellow flowers. Above the Pelícano quebrada the evergreen *Carbonillo* (Fig. 2) began a long sequence of white flowering which will last till summer. Its branches are often chopped down for charcoal and it is now in danger of extinction. Fortunately the La Silla territory remains a preservation area. The carbonillo produces a small almond-flavoured nut highly appreciated by the Vizcacha rabbits. In the same area we find the *Algarrobilla* (Fig. 5), another bush exposed to intensive exploitation. Its thick bean-shaped fruit has a very high content of tanin and is exported to the leather tanneries abroad.

The really spectacular sceneries however appeared in September when the

Figure 1: Palo Santo *(Porliera chilensis)*

Figure 2: Carbonillo *(Cordia decandra)*

Figure 3: Chañar (Geoffroea decorticans)

Figure 4: Espino *(Acacia caven)*

Figure 5: Algarrobilla *(Balsamocarpon brevifolium)*

Figure 6: Algarrobo *(Prosopis chilensis)*

Figure 7: Soldadillo *(Tropaeolum looserii)*

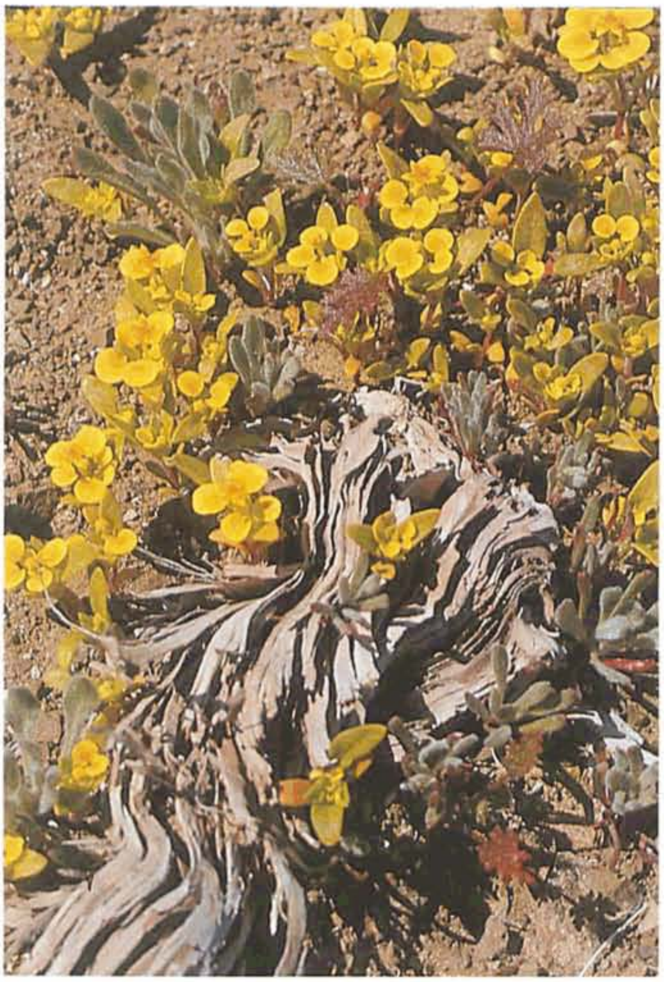

Figure 8: Rosita *(Cruckshanksia)*

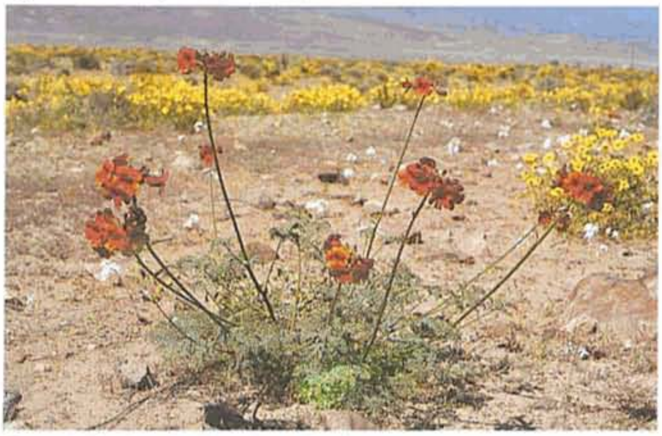

Figure 9: Terciopelo *(Argylia radiata)*

Figure 10: Mariposa blanca *(Schizanthus candidus)*

Figure 11: Pata de Guanaco *(Calandrinia longiscapa)*

Figure 12: Viola del Campo *(Viola asterias)*

purple *Pata de Guanaco* (Fig. 11), covered large extensions of fields alternating with the yellow *Violas del Campo* (Fig. 12) and the *Rositas* (Fig. 8). This is the time when photographic cameras get inspired and the telescopes emerge from unusual green surroundings. The curious visitor will spot the *Terciopelos* (Fig. 9) whose colours range from yellow-orange to dark brown. The velvet flowers make a point of growing on bare ground where other plants cannot compete.

Of the two native trees which grow in our region the *Chañar* (Fig. 3) is the most spectacular one during the flowering season. It shrouds itself in orange blossoms and attracts thousands of bees. The tree has lent its name to hundreds of places in Chile where the villages of Chañar and Chañarcillo compete in numbers with the Algarrobos and Algarrobillos. The elegant and thorny *Algarrobo* tree (Fig. 6) populates the quebradas and has invaded Mr. Schumann's garden located five hundred metres below the mountain top. It is moderate in water consumption and will eventually outnumber the ever thirsty poplars and eucalipti, thriving on our waste waters.

On the road to La Silla the flower festival is led by the *Encelias* which Chileans identify with the lovely name of the *Coronilla del fraile* (the friar's crown).

On the mountain itself the *Soldadillos* (little soldiers – Fig. 7) line up. They are the mountain cousins of the garden Capucins. Several of those wild species *(tropaeolums)* exist in Chile and the coastal slopes harbour a magnificent three-colour version.

The white crosspetal *Schizopetalon* deserves a special mention as it is adapted to our activities. It opens up at sunset and sends its honey smell through the night before closing in the morning.

Many more wild flowers grow on our slopes: the candid *Mariposas blancas* (Fig 10), *Adesmias, Senecios, Malvillas* and magnificent *Alstromerias.*

Dr. Grenon, our walking encyclopedia, has identified over 150 endemic species in our surroundings. Who said La Silla is a desert . . .?

New Aspects of the Binary Planet Pluto-Charon

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Introduction

Never since the discovery of Pluto in 1930 has our knowledge about this tiny far-out planet improved so rapidly as during the past five years. The coincidence of two rare opportunities that occur together only once every 250 years kept astronomers around the world busy to solve the puzzle of Pluto and its satellite Charon.

In 1987/88, the plane of Charon's highly inclined orbit around Pluto swept over the inner solar system. This gave rise to a series of mutual occultations and transits of the planetary disks that were observable from Earth between 1985 and 1990 (cf. Fig. 1). Nearly at the same time, on September 5, 1989, Pluto reached the perihelion of its eccentric orbit around the Sun which placed the binary system within range for photometry with medium-sized telescopes.

The shapes and the timings of the mutual eclipse light curves not only reflect the geometry of the system (which had been scarcely known before) but also provide information about the gross albedo distribution on Pluto and Charon.

In an earlier issue of the *Messenger* (Pakull and Reinsch, 1986), we reported the analysis of the first eclipse light curves observed in 1985 and 1986 which revealed that the diameter of Pluto was much smaller than previously believed.

Thanks to generous allocation of ESO time we were able to continue our study of the mutual eclipse light curves.

Eclipse Observations

As the aspect of Charon's orbit around Pluto as seen from Earth varies with time, different areas on Pluto are occulted during the eclipses (Fig. 2). The eclipse series started in early 1985 with occultations of the north polar region on Pluto. While in 1986 and 1987 large fractions of the northern hemisphere were covered as Charon crossed in front of Pluto, Pluto's southern hemisphere was involved in the eclipses throughout the rest of the series until 1990.

To exploit the full information provided by the mutual eclipses it was therefore necessary to spread observations over the whole period of eclipse phenomena. Due to the fact that the binary system is in a bound rotation it is, however, only possible to derive the gross albedo distribution on one hemisphere of Pluto and Charon, respectively.

From 1985 to 1990 we successfully observed six transits of Charon in front of Pluto (inferior events) and eight occultations of Charon by Pluto (superior events). The photometry was obtained with the ESO/MPI 2.2-m and the Danish 1.5-m telescope, respectively, using CCD direct imaging techniques which allow high-precision differential photometry even if sky conditions are not strictly photometric. Our data base was supplemented by published light curves of eleven further events (Binzel et al., 1985; Tholen et al., 1987 b; Binzel, 1988, Tholen and Buie, 1988; Tholen and Hubbard, 1988).

While the first grazing eclipse light curves could be analysed using models for eclipsing binary stars, more sophisticated algorithms were required as the eclipse series continued. The light curves were then complicated by shadow transits which occurred displaced in time relative to the eclipse events (Fig. 3).

The analytical model developed by Dunbar and Tedesco (1986) to derive the physical parameters of a binary

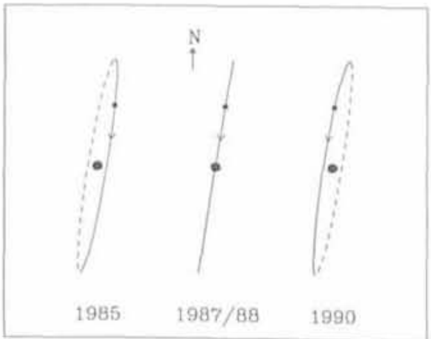

Figure 1: *Apparent view of Charon's 6.4-day orbit around Pluto between 1985 and 1990.*