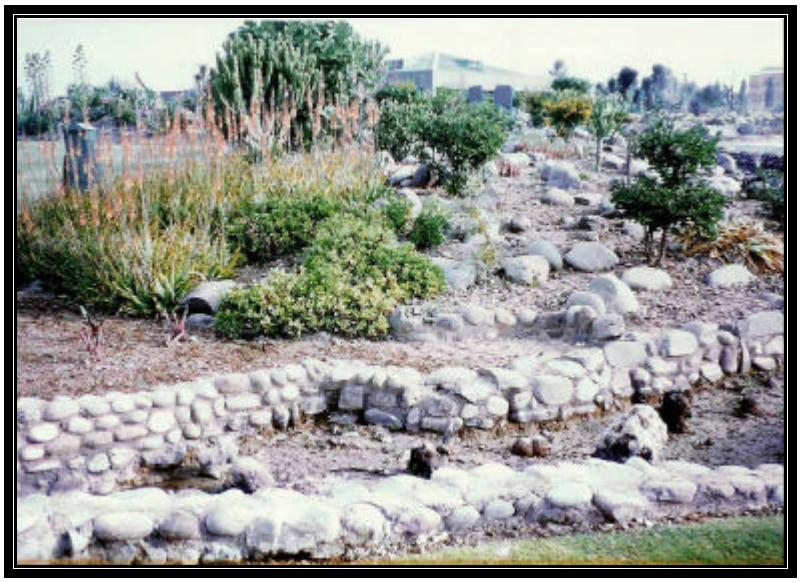
6. ROCKERY II



The next mound, numbered II, is botanically the most valuable landmark and asset of this Botanical Garden. It is a long sprawling landscaped feature about 50 x 10 meter, beginning near a small tank to the left of the gate of the garden and then progressing in an undulating fashion in a North-Easterly direction. Starting as a low sandy rockery, it starts a gradual rise from a path across its middle, till it ends in a three meter high water fall, at its Northern end. Several species of INDIAN SUCCULENTS have been grown on this feature. Due to untiring efforts over many years, a large number have now become naturalized inhabitants. Most of the Indian

Succulents come from the southern warmer regions of the Indian peninsula, and are extremely susceptible to the rigours of weather of this region. During winter there can be heavy casualties amongst some of these species. Over the years, after several trials, we have created conditions congenial to the growth of different species. The tank near the gate acts as the storage reservoir of water, to be pumped to the waterfall at the Northern end and then comes down in an undulating waterway back to the storage tank. Low sprinklers are also installed in the waterway. This has been done to create more humidity in this region during the very hot dry months.

While looking at this feature, one's attention is drawn to a large number of tree-like *Euphorbia* plants, some about three to four meters high.

The following species can be easily identified. A variegated golden coloured *Euphorbia tirucalli* is at the beginning of this rockery. *E. tirucalli,* though a plant from Eastern Africa has extensively naturalised in S. India. In several villages in Tamil Nadu and Kerala I have noticed that the villagers hang branches of this plant on their entrance doors or windows in a firm belief that it wards off insects and mosquitoes. Several plants of *Euphorbia antiquorum* (see last picture) are next; growing up to two and a half to three meter height. *Euphorbia antiquorum* has a very extensive distribution in the southern part of Indian Peninsula. The plants grown here are from various localities extending from around Bangalore to near Kanya Kumari in the South. Note that the winged, three to five angled, at times twisted segments of the branches have a good deal of variation in different plants. These plants come into flower at the end of the rainy season in September, and at that time present a spectacular sight. The flowers attract a very large number of bees as they are laden with nectar. Unfortunately, with the onset of winter, if there is frost or minimum temperature falls below 5 degree C., all the flowers and setting seed pods are scorched by the cold, and hardly any seed setting results. In the background are tall tree-like plants of *Euphorbia royaleana*. This has very extensive range in lower Himalayas, extending from Jehlum in Pakistan to Assam. I have studied this species from the north of this area, Hoshiarpur, Kangra and the Jammu-Katra region.

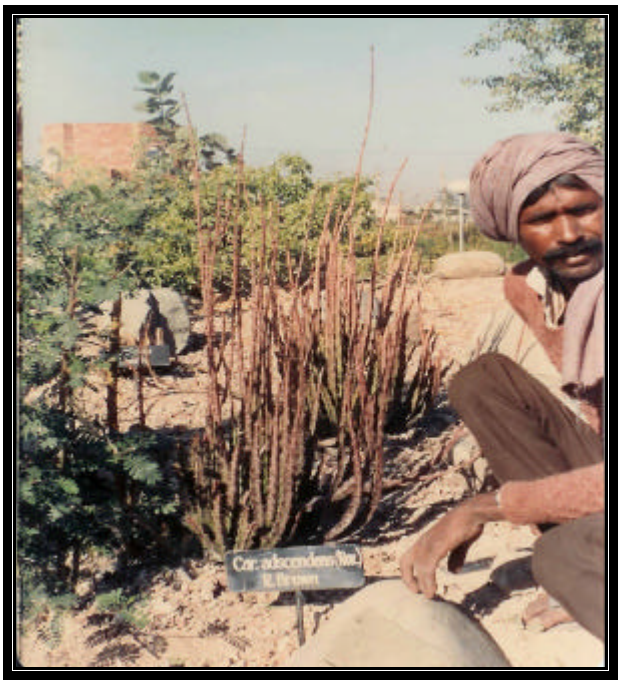
In nature, it can grow up to five to seven meter height. Its branches are winged and their number varies a lot, five to seven usually, or even more. It flowers in spring and sets seeds during summers. Only in Katra, near Vaishno Devi Shrine, have I noticed monstrose formations of stems on some plants. One of these cuttings rooted with us and grew into a large plant. About four years ago, rot set into the crest during monsoons. Unfortunately we could not salvage any branches. Further on, tucked amongst other *Euphorbias*, you see a tall plant of *Euphorbia nivulea*. The plant comes from the lower ranges of Shevroy Hills, North of Salem. When I collected this species, its habitat was being cleared by the Forest Department to plant other tree species. A small plant of *Euphorbia barnhardtii* is also present in this locality. Three large plants of *Euphorbia cauducifolia* monstrose form are also here. A large normal growth *Euphorbia cauducifolia* plant is present near the path which crosses this rockery. *Euphorbia cauducifolia* has an extensive range of distribution in Rajasthan and Saurashtra areas. Monstrous formations have been seen by me around Jodhpur (Mandor Hills) and near Bhuj in Kutch area. In the extremely dry areas it has very small leaves, hardly three to four cm long. Wherever the rainfall is more, the leaves become much longer. Two plants of *Euphorbia nerifolia*, collected from the hills south of Pune are also present near the path. Another *Euphorbia* species collected from the southern most area of Tamil Nadu,

with thinner twisted branches like *Euphorbia antiquorum*, is planted in this locality. Some botanists consider it to be *Euphorbia tortolis*, but I am doubtful about its identity. Further study of this species is essential. Plants of three more tree-like species of Indian *Euphorbias* are being grown in our glasshouses. *Euphorbia vajravellu*, *Euphorbia santapauii*, and *Euphorbia susan-holmeiae*, are being grown indoors. As these species come from very humid areas of Western Ghats, they are difficult to establish outside. After further propagation trials will be made to establish them outdoors. We also have a single plant of *Euphorbia fusiformis*, collected from near Dehradun. During this summer efforts will be made to collect more specimens to grow them outside. This is not an ideal pot plant and for proper growth and propagation several plants will be essential. On this rockery ,beyond the path crossing it, are many more *Euphorbias*. Tree-like plants of *Euphorbia stenoclada* are in the background. This species is of African origin.

CARALLUMAS. The Indian Species of the Genus *Caralluma* (Family *Ascelepiadaceae*) collection is very comprehensive. Practically all the known species of this genus are being grown in this garden and quite a

large number of these have been acclimatised in this section. I had been engaged in the search for members of this genus since Dr. G. BARAD's visit to India in 1975. GRAVELY AND MAYURANATHAN had done wonderful pioneering work on this genus and published their findings in 1931, their publication was used by me to track down different species in their habitats. Indian species of this genus belong to its subgenera *Eucaralluma* or *Caralluma* s. str. (= sensu stricto = 'in a narrower sense' in Latin) and *Boucerosia.* The species of these two subgenera are easily distinguished. In *Eucarallummas* the stem is more or less tapered, and the flowers arise in the axils of rudimentary leaves all along the distal part of the stem. In *Boucerosia,* the stems are approximately of uniform thickness throughout, and the flowers arise either as terminal umbels or in an umbel near the top. Except two, all the other members of this genus are from Peninsular India. *Caralluma tuberculata* originally described from Baluchistan and Jehlum Districts of Pakistan is found in Jammu areas near Pakistan borders. I made collections of this species from a rocky hill about twelve miles North of Jammu. The flowers come in umbels from the sides near the tip of branches. After several trials, we have succeeded in naturalising this species outdoor. We grow them under the protection of stone boulders and it can be seen in two localities in this rockery near the middle. The other species *Caralluma edulis* is from the Western regions of

Rajasthan is found growing under *Capparis aphylla* bushes (KAIR or KARIR is the local name, this bush belongs to the Family Capparaceae) or in grasses. It is becoming very scarce in its habitats in India, as it is generally eaten by local people. It is extremely difficult to keep this species alive in collections for any length of time. It has long tapering stems in summer, and the plants tend to group from the base, when in active growth. During winter the long branches shrivel up and die. In summer caterpillars and crickets also make a bee-line for this plant. In spite of all these difficulties we are managing to keep it alive in this garden. MAJOR M. K. VAID recently tried hard to make field collections from Northern region of Rajasthan. He has reported that now it is extremely scarce in its habitats. He has managed to send us ten stems which are now rooted in our glasshouses. During the summer, these cuttings have been extensively propagated, and now we have 10 pots full of large groups, and there are four groups in the field under *Capparis aphylla* bushes. These field plants have been provided winter protection.



Another interesting member of *Ascelepiadaceae* Family is *Frerea indica* DALZELL. Described as a monotypic species this plant has persistent leaves. It grows on cliffs and steep slopes of hills around Pune. We have several plants from its Type Locality i.e. Shivneri Hill, near Junnar about 50 km North of Pune. This plant has been extensively collected from its habitats on this hill as well as at Purandhar and Mahableshwar. Luckily this plant has now found a permanent home in this garden and has also established itself as an outdoor plant. In its habitat its white branches hang down the cliffs with bunch of terminal leaves. Flowers about three cm. in diameter come in profusion singly near the tips. Unfortunately this plant is very sparsely thrived, as its flowering time is the onset of winter here. Leaves can be up to seven to ten cm. long in its habitats. Here the size of

leaves does not exceed five to six cm. GORDON ROWLEY has described it as a *Caralluma*. But due to its unique leafy character I still consider is as a monotypic species.

Coming to the species from the peninsular region, as mentioned earlier they either belong to sub-genera *Boucerosia* or *Eucarallumma.* Plants of the *Boucerosia* sub-genus belong to two groups. One with square stems, up to three cm in thickness and the others with stems hardly one cm thick. The plants in the first group are (a) *Caralluma umbellata* (b) *Caralluma diffusa* and (c) *Caralluma procumbens.*

Caralluma umbellata has extensive distribution, in eastern and southern parts of Karnataka, throughout Tamilnadu, and the southern part of Kerala. I had made wide-ranging collection from various localities in these states. Very large groups of this species have naturalised on this as well as on another rockery. Flowers come in large umbels during summer, mostly during the monsoons. *Caralluma diffusa* differs from the former in having thinner stems with terminal umbels of flowers. Individual flowers are campanulate (cup-shaped). Though we are growing a large number of clones from the locations where it was reported, unfortunately no plant had flowers fitting into the description of *Caralluma diffusa* flowers. The third member of this group is *Caralluma procumbens.* It has been collected by me from its Type Locality on Maruthuamalai Hill near Nagerkoel and from Aramboli Hill. In its habitat it hangs down from cliffs and its habitats get very strong sea breeze. It has flowered in our glass houses. This species is very much prone to black rot and Mealy bug attacks. Regular spray of pesticides and fungicides are essential. Flowers come in umbels at the tips of the branches. The next branch comes out from the side of this umbel. In Southern part of Kerala on the Eastern watershed hills I had noticed large groups of *Caralluma umbellata* like plants, with long crawling stems. This could be a link between *Caralluma umbellata* and *Caralluma procumbens.*

Caralluma indica

Three species with thinner branches belonging to sub-genus *Boucerosia* are found in the Deccan plateau. The first one is *Caralluma truncato-coronata* with thin, about one cm thick rectangular branches ten to fifteen cm long, forming large groups with subterranean stolons. This species was reported from the Hubli area. My search of this area proved futile. But it was collected extensively east of Bangalore. The flowers come in umbels at the end of monsoons. In glass house grown plants they flower during early winter months. Outdoors it grows well under protection of low bushes or stone boulders. It needs winter protection. The other very interesting member is *Caralluma indica.* It grows near Chennai, and its distribution extends up to about thirty km south of Trichy, on the eastern regions of Tamilnadu. This is a very difficult species to keep alive here due to extremes of weather. Indoors it is susceptible to black rot and mealy bug

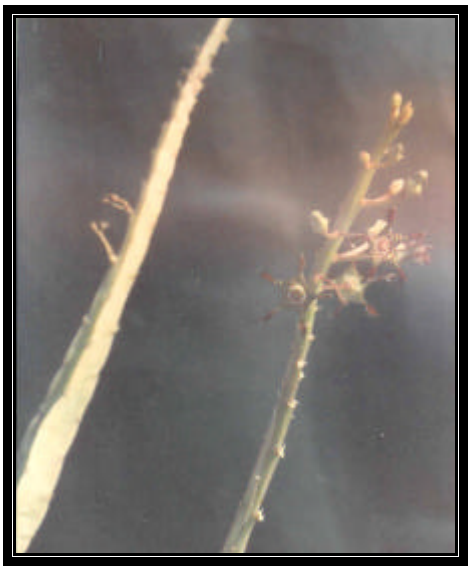
attacks. Still with great difficulty we are able to keep a couple of clones alive. Now we are propagating it extensively. Flowers are extremely attractive. Outdoors it flowers at the end of the rainy season. *Caralluma pauciflora* is another species belonging to this group. I have collected it extensively along the Eastern regions of Tamilnadu, Kalkad Forests and on Maruthuamalai Hill in the South. Like its other cousins it is another difficult species to keep alive here. Indoors it flowers during early winter months. The late DR. KUMARASWAMY of the College of Indigenous Medicine, Trinelvelli, had collected another plant of this group in Kerala on our way to Madnagiri Hill. This plant flowered with me and the flowers were in large umbels of eight to twelve in number and the individual flowers resembled *Caralluma pauciflora* flowers. Search for this plant is essential.

C. pauciflora

Another member of the sub-genus Boucerosia, and belonging to the group of thinner stemmed species is *Caralluma crenulata*. This species was

described from Burma. At one time it was quite common in Indian collections under another name. It had come from nurseries in Kalimpong-Sikkim. Long ago in a personal discussion with PROF. RAO of Jaipur University, I was informed that during his brief spell with Assam University in Gauhati, he had collected this species from a dry hill near the University. This in my opinion is dependable information, and a search in that area is essential. Dr. RAO had earlier directed me to two localities of *Caralluma truncato-coronata* near Kolar.

Sub-genus *Eucaralluma* has several species in Peninsular India. GRAVELY AND MAYURANATHAN, on the assumption that all the Southern species of *Eucarallummas* are descendants of a single ancestor, have described them as varieties of *Caralluma adscendens*. However, field studies of the so-called different species present a different picture. All species reduced to varietals status have well-defined physical characters and flowers. In fact these characters put them in four loose groups. Considering these facts, I consider these as true species, and not varieties of *Caralluma adscendens.*



C. adscendens v. *gracilis*

Caralluma fimbriata WALLICH has a very wide distribution. It was originally described from Burma (Yenengun and Pagamerd). In India, I have collected it from several areas in Western Madhya Pradesh, Maharashtra, and Karnataka. It is also reported from near Suratgarh in Rajasthan (personal communication from MAJ. H. K. VAID). The plants from various localities indicate that it is quite a variable species. From dry habitats near Sitara, Bijapur and Chikhli, the plants have a stunted growth with round stems, only fifteen to twenty cm. high, with characteristic pendant small hairy flowers. Near Chikhli, plants in some small pockets, where the soil had more moisture, their sides were more or less squarish with rudimentary leaf markings. The flowers were like those of *Caralluma fimbriata*. Near Pune Air Force Station, where the soil was sandy with

plenty of moisture, the plants were more robust, up to forty five cm. in height, in lower one third the stems were square with round angles and the rest of the plant had round tapering stems. The flowers were characteristic of *Caralluma fimbriata*. In its Southern distribution, *Caralluma stalagmifera* is found alongside this species, but no hybrids between the two were noticed. This plant is quite tolerant to cold and has formed a large group on our rockeries. Under good cultivation conditions plants from various localities have developed the character noted in Pune Air Force Station locality.

Caralluma adscendens ROXBURGH. This species has been described to be prevalent in Godavri District Vizagapatnm district, along the Eastern coast up to Chennai and further South and as a disjunct population in Tamil Nadu. I have collected it from near Coimbatore, thirty five km West of Madurai; around Salem and about thirty five km North of Mysore. Eleven km North of Coimbatore, on Maruthuamalai Hill base to the East of Temple Road, it grows alongside *Caralluma attenuata* and freely hybridizes with it. The plants in this area are very robust, about seventy to eighty cm high. The young shoots have acute angels in lower half. The terminal round part of the stems attenuated to about three mm. diameter near the top. West of Madurai, beyond Uslampatti, at the foot of the hill, there are robust

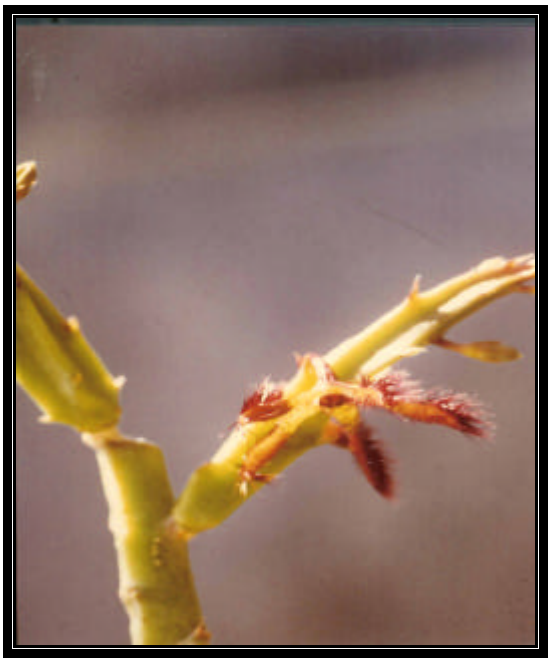
populations with plants over seventy five cm. in height, with stems having acute angles in lower part. Here the plants hybridize with *Caralluma carinata* which grows along them.

Plants of *Caralluma adscendens* ROXBURGH along with *Caralluma attenuata* WHIGHT and *Caralluma gracilis* J.S. SARKARIA Syn. *Caralluma adscendens* v. gracilis GRAVELY ET MAYURANATHAN, form a single cohesive group.

Caralluma attenuta WHIGHT**:** Sixty to seventy five cm in height, more or less square stemmed in lower half with angles more or less rounded and later branching freely into four to five acute attenuated stems, hardly one and a half mm diameter. The flowers are hairy, opening widely about one and a half cm across. They are described as pendulous but during their exhaustive study in the field I have seen them pointed laterally or even upwards. Corolla lobes have been described as deep purple in colour but in field there is wide variation in colour going through different shades of brown, purplish brown to yellowish brown. It has very wide distribution extending from Southern parts of Karnataka, Andhra Pardesh and into Tamilnadu. Several other species of *Carallumas* grow along this species, but I have found it to only hybridize with *Caralluma adscendens* near Coimbatore.

C. adscendens R.BROWN

Caralluma gracilis J. S. SARKARIA Syn. *C. adsecendens* v. *gracilis* GRAVELY ET. MAYURANATHAN: Described as a plant with maximum height of at least two ft., of it the last part is extremely slender, angles of stems acute, stems green, as much as 2 cm square near base, distally strongly attenuated, very slender and much branched. Flowers hairy, widely opened very small (only about 10mm) across erect, borne in pairs on long slender pedicels, and chestnut brown in colour.

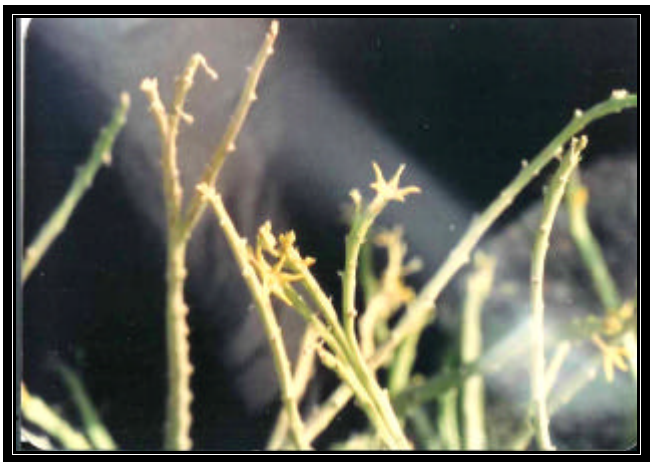


Caralluma adscendens v. *carninia*

I have given this detailed description from the original work of GRAV. ET. MAYUR. Plants fitting this description were collected by me from near Puddukotai and Tirumyum. I also made collections of this species near Salem and from a locality behind a temple at the base of Alagar Kovil Hill, north of Madurai. The plants from these two localities had slightly larger flowers about one to 1.2 cm across. GRAVELY ET. MAYURANATHAN in Fig. 141, page 194 have given diagrams of its presumed hybrids with *Caralluma stalagmifera* and *Caralluma adscendens*. To me these are not very convincing and lead me to the fact that we are dealing with a species with wide ranging variations of flowers. Alagar Kovil plants are a pointer to that effect. Illustration No. six, on this diagram

resembles the terminal stems of large plants, up to seventy five cm in height collected by me from Vellar River bed on Puddukotai-Tirumyum Road. These plants appear to be a new species and ROBIN FRANDSEN has named it *Caralluma bruneonoloba* n.n. I have found this plant on Madurai-Dindigal Road as well. There are several low hills North of Alagar Kovil, and extensions forests West of Puddukotai up to Dindigal. Exploration of that region will decide about the exact status of *Caralluma bruneonoloba* n.n. (= nomen nescio, 'name unknown' in Latin) FRANDSEN.

Caralluma stalagmifera FISCHER**:** This species also has quite an extensive distribution. I have collected it from wide area around Hubli, Dharwar, Bangalore and Mysore, near Chennai, and further South from practically all over Tamilnadu to areas just short of Trinelvelli in the South. In the North it grows along with *Caralluma fimbriata* and further South around Madurai along with *Caralluma sarkariae.* It forms a distinct group along with *Caralluma sarkariae*. The plants have square stems, but the angles are not very acute except in juvenile growth. The stems have prominent purplish brown mottling. The terminal parts of stems are attenuate and curved gently. The flowers open out widely and point upwards and the corolla lobes have the typical bell like hair hanging downwards from their margins. I have found it to hybridize with *Caralluma sarkariae.*



C. sarkariae, yellow-flowered clone

Caralluma sarkariae LAV. ET FRANDSEN: This species described from near Madurai, has quite an extensive distribution. In the South it is found near Trinelvelli. On Madurai-Trichy Road, it grows extensively up to Tirumyum and has been collected from several localities North of Madurai a large number of populations exist up to nearly 50 km distance. Though its Type Locality has already been over-run by sprawling urban growth, it is in no danger of becoming extinct in its habitats. Type plant described had brownish streaks on corolla lobes. Another form with yellow corolla lobes is also found extensively. In the yellow form the lobes are slightly narrower. In this garden both the forms are in cultivation. Like other *Eucarallumas*, *Caralluma sarkariae* also is not winter hardy and needs protection during winter. *Caralluma sarkariae* hybridises with *Caralluma stalagmifera*.

The southernmost three species have sides up to 1.5 cm. broad with acute angles, and form a very distinct group.

Caralluma carinata J. S. SARKARIA Syn. *C. adscendens* var. *carinata* GRAV. ET MYUR.**:** Angles of stems acute; stems green, distantly gradually attenuate in varying degree but never strongly, not branched, unless tip broken. Flowers are purplish, hairy, usually pendulous and campanulate, sometimes semi erect, pedicle not bent at angle, with a maximum height two feet. I have collected this plant from Northern slopes of Nagamalai Hill where it has abundant growth. It is also found in abundance on the hills about five to six km west of Uslampatti. It forms good clumps in this garden in the open during summers. It is not winter hardy and looses its terminal parts during the cold season.

Caralluma geniculata J.S. SARKARIA Syn**.** *C. adscendens* var. *geniculata* GRAV. ET MYUR.**:** This is another attractive species from the extreme South. Angles of stems are acute, stems green and slightly attenuate and curved near the end. Very little branching, if any, offsetting from the base to form groups. Flowers are hairy about twelve to fifteen mm. across, wide open, deep brown in colour and point up ward due to a bend in pedicle just below the flower. I have collected it from Maruthuamalai hill near Nagerkoel, lower slopes of Aramboli hills, Kallakkad Forest, lower

dam site at Papanasam and Vallanadu Hill near Trinelvelli It is a difficult plant to keep alive, but still we are keeping a couple of clones alive.

Caralluma bhupinderana SARKARIA**:** It is the last acute angled *Eucaralluma* from down South. I discovered it while botanising on Vallanadu Hill, almost fifteen km East of Trinelvelli. The first plant of this species was encountered on the roadside along the Northern face of Vallanadu Hill. The erect robust group about forty to fifty cm high with square one and a half cm. thick stems and acute angles pointed it out as distinct from the other two members of this group described above. Strikingly beautiful flowers, about 1.2 cm across confirmed my opinion. Later I found this species for about ten miles along this Trinvellei-Tuticorn Road, and on my last trip in 1996, to the North of this road in over four miles area. In its habitat it grows along with *Caralluma geniculata* and *Caralluma pauciflora*. Two clones of this species have naturalised on one of our rockeries. Further propagation is being done to make it available easily.

Apart from *Carallumas* we are growing some other members of the *Ascelepiadaceae* Family on this feature, which are:

Cereopegia bulbosa and *Cereopegia luschi* are found in the sandy hills near Panchkula and are being grown here. Their vines die during winter, but the underground tubers easily withstand weather vagaries.

Cereopegia juncea is probably the only true Indian succulent species of this genus. It is found extensively in Peninsular India. It is difficult to maintain outdoors here but we are keeping it alive indoors. *Sarcostemma brevifolia* is another member of the *Ascelepiadaceae* Family which has acclimatised here. Its thin trailing branches have made some of the tall *Euphorbia royaleana* plants in the background as its host. It is a very shy bloomer in this climate.

There are two species of *Cissus* here. One is the succulent segmented climber, *Cissus quadrangularis*. This is the most prevalent *Cissus* in the South. Outdoors most of the plant is lost during severe winter, but the surviving segments start growing as soon as the weather warms up. Another *Cissus* species with thick succulent leaves and trailing branches has also naturalised here. There are several species of *Kalanchoe* described from the Indian sub-continent. The following species have established here. *Kalanchoe spathulata* with large spatulate leaves from lower Shivalik Hills grows here easily. *Kalanchoe grandiflora* grows extensively all over the Indian Peninsula and has probably earned several botanical names. The plants of this species grow robustly in the rockery. Two very interesting species with their narrow greenish yellow leaves collected from hills near Mettur Dam flourish in our garden. These are *Kalanchoe lanceolata* and

Kalanchoe lacinata. Both form attractive yellow flowering clumps during summer. In winter some of the vegetative growth dies.

Several species of *Sedum* and a few *Rosularias* have been described from the Himalayas. Only the *Sedum rosulatum* from the lower ranges has naturalised in this garden and forms nice compact groups.

While exploring succulents in the South I was struck with the beauty of *Notonia (Senecio*) *grandiflora* growing in the Hills around Pune and farther South. The large oval leaves in a terminal rosette with white powdery farina, form an attractive sight in nature. Unfortunately I could not keep plants of this species alive here. Another *Senecio* species from near Kanya Kumari (Cape Comarin) with small leaves and pale yellow flowers has found a home on this feature. A large bush of *Synadenium grantii* rubra grows in the background. This plant is grown as a hedge plant in some localities in the South. Its natural habitat is Tanzania. A large bush of a *Pedilanthus* species also grows in the background. This too is extensively naturalised in the South. Two species of *Sansevieria* grow extensively in the South and are in small groups here i.e. *Sansevieria fasciata* and *Sanseveria roxburghiana*. *Aloe barbadensis* Syn. *Aloe vera* grows practically all over India. Several groups of this species find a home here. As already mentioned, parts of the rockery beyond the path crossing it near the middle,

has several large *Euphorbias*. The most outstanding plants on this rockery are five large *Pachypodium geayi* plants. These plants with their white flowers during summer form a pretty sight against the skyline. Unfortunately *Pachypodium geayi* do not set seed here. Next to the *Paachypodiums* there is a very tall branching *Dideria madagascarensis.* Four large plants of *Plumeria* hybrids are also being grown here. Some growers in South India have very large collections of hybrid *Plumerias.* Some thirty odd hybrids are in cultivation. Their bright yellow, red and pink flowers add lot of colour to this feature in summer. For a connoisseur, two large plants of *Aloe marlothi* are a beauty. They come in flower during February, and the flowers last for over two months. Several plants of *Pachypodium lamieri*, about 1 meter high are on the top. Several groups of *Adenium obesum*, including plants of a clone with large deep red flowers make the landscape beautiful during the summer months.

Pachypodium boronni v. *windsori*i

Across this Rockery II, of which some plants were gifted by DR. RAM GANDHI, and in front of the nest of four botanical glass houses 1-4, there are two small, but attractive, raised beds.

BEDS IIa & IIb

These beds have in them some plants which were the earliest gifts---from my brothers DALJIT and GURMUKH, and from my son JASBIR---to this garden from the U.S.A. Bed IIa has a large plant of *Calibanus hookeri*, *Pachypodium saundersii* ssp *saundersii*, *Pachypodium lamieri*, and several small plants of *Euphorbia splendens* group. Bed IIb has one plant of *Alluaudia montagnacii*, *Pachypodium geayi*, two very large plants of *Pachypodium saundersii* ssp *saundersii* and a few smaller *Euphorbia splendens* group plants.

Pachypodium saundersii v. *lealii*