



# AIPC

## SPECIAL ISSUE 1



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*Special Edition*

## **The *Drosera petiolaris* complex** by *Maurizio Saroldi*





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## Editorial

Graziano Fiocca

Dear readers,

every year, the AIPC offers to its members 4 issues of its magazine, dedicated to several topics on the wonderful world of carnivorous plants.

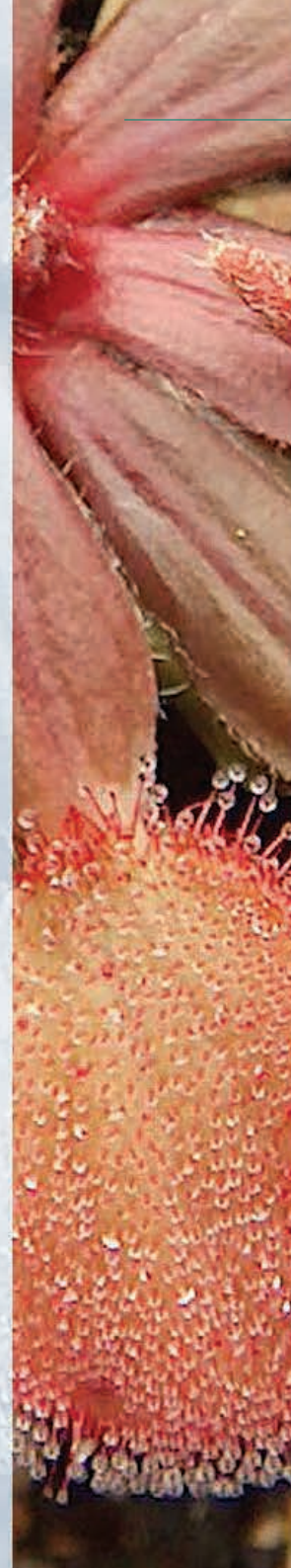
In 2007 we begun an experiment: to devote an entire issue to one single topic. We asked Maurizio Saroldi, the winner of the 2006 Italian Carnivorous Olympics, for a personal account of his experiences with growing the fascinating petiolaris-complex sundews. As a result, in November 2007, the first monograph came to light: AIPCMagazine 7, a double issue comprising 64 pages of incredible beauty. The foreign growers who received this work voiced their appreciation, but also their regret at not being able to read the text, which of course, was in Italian.

For this reason we have now decided to prepare an English version of the monograph. This will surely please many English-speaking readers and we are confident that this will enable us to improve the quality of our magazine, bringing it up to the same level of quality of some of the better-known bulletins of other CP Associations around the world.

It was our original intention to propose a monographic issue every year but, unfortunately, in 2008 this was not possible. The wait, however, has certainly been worth it, as can be seen in the extraordinary monograph by Gabriele Basso, published in June 2009, and dedicated entirely to Mexican *Pinguicula*: our next project will be to translate and publish this in English, as soon as possible.

We would like to thank all those who collaborated, back in 2007, in the preparation of the monograph (Aldo Cappella, Simona Castelli, Rita Corino, Graziano Fiocca, Lucilla Tizzani, Andrea Scaccabarozzi) and also to those who today have prepared the translation of the text and the adaptation of this issue (Alessandro Delfrate and the whole Translators Group, Giovanni Mendini, Andy Smith and Stephen Davis), plus all those who have participated, both past and present, in the work of the Editorial Group.

The Editorial Group





*Drosera lanata* (photo by Maurizio Saroldi).

MAURIZIO SAROLDI

# THE *DROSERA* *PETIOLARIS* COMPLEX





# INTRODUCTION

Section *Lasiocephala* - Planchon (Marchant & George 1982), from the Greek *lasios* = hairy and *kephalé* = head (referring to the hairy appearance of the center of the rosette), includes 14 tropical *Drosera* species (also called the Woolly Sundews): 13 perennial (*D. brevicornis*, *D. broomensis*, *D. caduca*, *D. darwinensis*, *D. derbyensis*, *D. dilatato-petiolearis*, *D. falconeri*, *D. fulva*, *D. kenneallyi*, *D. lanata*, *D. ordensis*, *D. paradoxa* and *D. petiolaris*) and only one annual (*D. banksii*). These species grow mainly in the Northern Australian tropical regions, with only two species growing in New Guinea, and together constitute the *Drosera petiolaris* complex. Their main characteristic is a long petiole terminating in a leaf lamina of different width, with an elliptical, reniform or orbicular shape, which constitutes the real trap. The petiole, in most of the species, is covered with white non-glandular hairs, which can be either dendritic (branched with shorter hairs growing from the main hair's stem) or simple. The flower scape is 5 to 45 cm high, bearing a raceme inflorescence with a number of flowers, ranging from a minimum of 10 to over 70, and is more or less hairy depending on the species. The flowers are white to pink, ranging from 0.5 to 2 cm in diameter. A particular feature that can be seen with naked eye is a significant ramification of the stylus.

Until a few years ago also *D. caledonica*, endemic to New Caledonia, was placed in the same group. This species also has petiolated, hairy leaves but it shows different morphological features of the leaf and flowers, as well as a different germination pattern. Recent phylogenetic studies (Rivadavia, Kondo, Kato, Hasabe) exclude *D. caledonica* from section *Lasiocephala*, and include it in the section *Drosera*, in branches close to *D. rotundifolia*.

They are all wonderful plants but not easy to cultivate, in part, due to the limited and recent distribution among grower enthusiasts. Today, a few certainties and many discordant opinions on the growing method are under discussion. Even Allen Lowrie, one of the most important Australian botanists who has described, grows and sells many of these species, reports in his latest notes about cultivation “...we are still experimenting with various methods... if you find new ideas that you feel would help us to grow these plants better, please let me know your experiences”.

In the wild, a hot and wet season, when the species of the *petiolaris*-complex vegetate, is followed by a hot but extremely dry season during which these perennial species go dormant. The best method of cultivation should be to respect the conditions of this life cycle, but it's not easy; Allen Lowrie reports that in cultivation, during the dormancy, he is not able to keep plants alive in totally dry conditions.

With so many uncertainties in cultivation techniques, I will try to provide, as clearly as possible, information about habitat, weather conditions, descriptions of the single species and, even more importantly, all the information on the different cultivation methods, comparing the different opinions of beginners and expert growers. I'm quite sure that at the end of this article you will be even more confused, but with a general overview on today's status of cultivation methodologies, every one of you could take the different suggestions and tips of this article as a starting point to begin the cultivation of these plants.

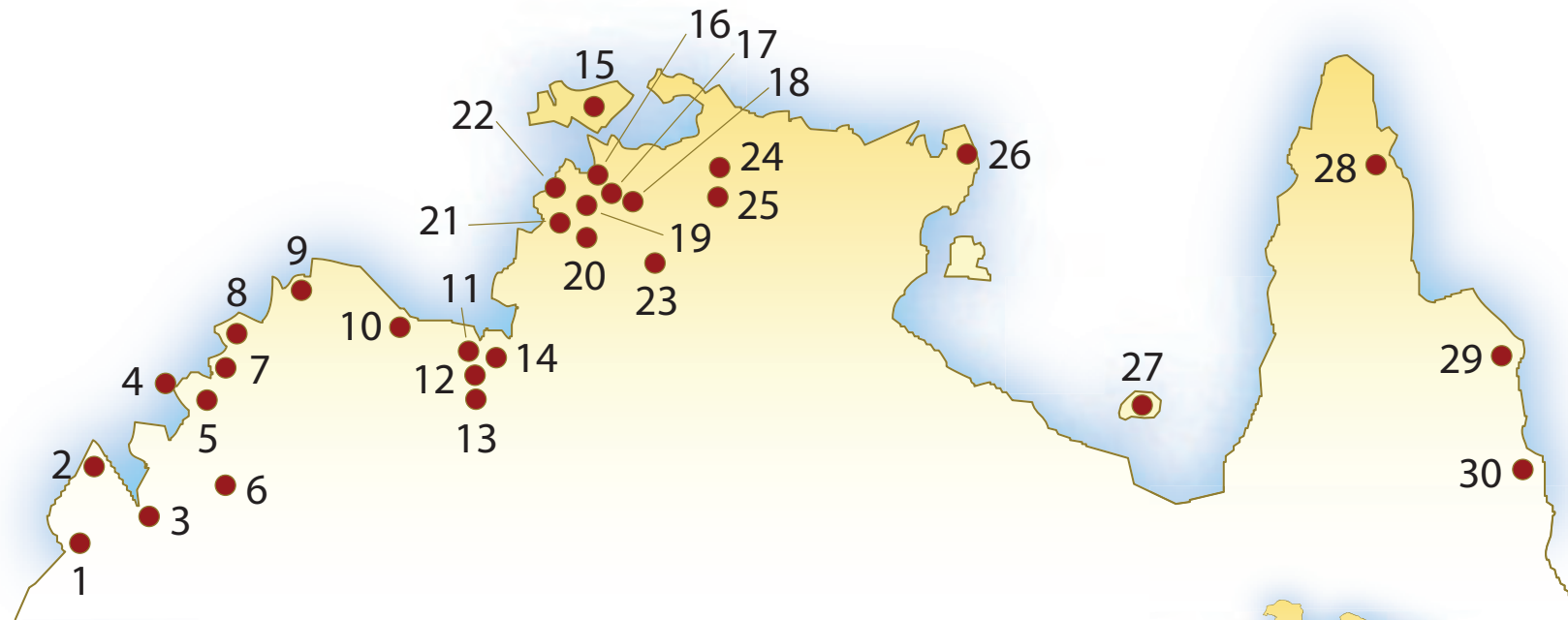


*Drosera ordensis* (photo by Maurizio Saroldi)



# HABITAT AND GROWTH CYCLE

The species of the *Drosera petiolaris* complex can be found growing in an area which includes the northern-most point of Western Australia, the north of the Northern Territory and Northern Queensland. *Drosera petiolaris* and *D. banksii* can even be found in New Guinea.



Some of the Australian locations mentioned in the article where we can find *petiolaris*-complex sundews:

- |                                     |                           |
|-------------------------------------|---------------------------|
| 1. Broome                           | 16. Darwin                |
| 2. Dampier Peninsular, Cape Leveque | 17. Palmerston, Darla     |
| 3. Derby                            | 18. Humpty Doo            |
| 4. Augustus Island                  | 19. Noonamah              |
| 5. Bachsten Creek                   | 20. Batchelor             |
| 6. Windjana                         | 21. Wangi                 |
| 7. Prince Regent River              | 22. Fog Bay, Dundee Beach |
| 8. Mitchell Plateau                 | 23. Edith Falls           |
| 9. King Edward River                | 24. Alligator River       |
| 10. Berkeley River                  | 25. Kakadu National Park  |
| 11. Ord River                       | 26. Nhulunbuy             |
| 12. Kununurra                       | 27. Wellesley Islands     |
| 13. Lake Argyle                     | 28. Lockhart River        |
| 14. Keep River                      | 29. Endeavour River       |
| 15. Melville Island                 | 30. Lotus Glen, Mareeba   |





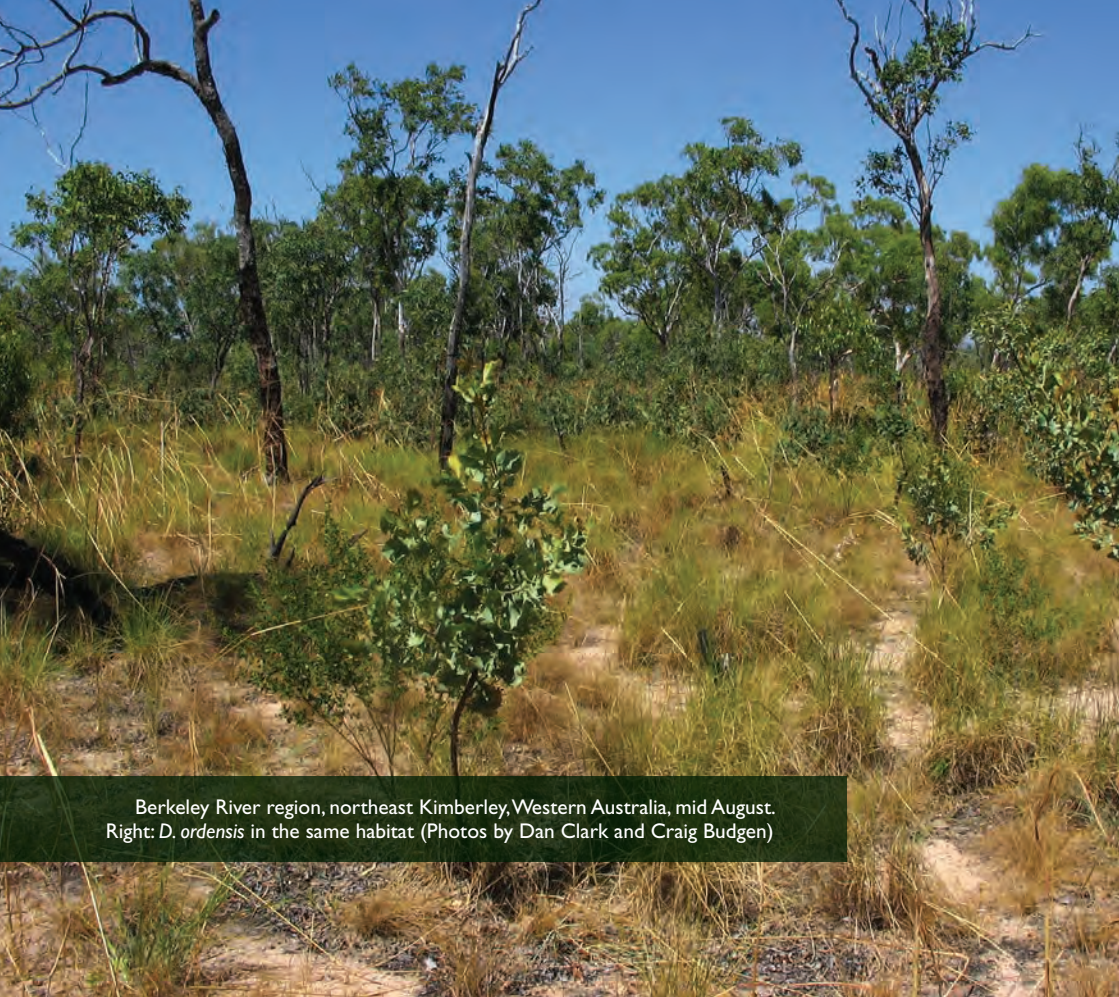


Left: Kakadu National Park, Northern Territory (April).  
Below: *Drosera dilatato-petiolaris*? Kakadu National Park (April).  
(photo by Zackary Severino, both in 20 km range)

Their habitats are grasslands and shallow wet depressions, the banks of lakes, seasonal streams and bogs as well as areas beside springs and rivers. They often grow in sunny areas amongst shrubs and in sparse woods, on sandy-clayey soils (see photo on this page). The main weather characteristic of these areas is to have a hot and very dry season followed by a hot and very wet one.

The summer wet season is from December until April and is characterized by high rainfall, very high humidity and high temperatures (at soil level it can reach 50 °C), with little difference between the minimum and maximum temperatures in a 24 hours period. On the contrary, from May to December is the winter dry season and this is characterized by slightly cooler temperatures (especially the lower ones) and almost no rain. For a couple of months, the only source of humidity comes from the morning fog and from the water collected in soil depressions. (See photos from pages 10 to 15).





Berkeley River region, northeast Kimberley, Western Australia, mid August.  
Right: *D. ordensis* in the same habitat (Photos by Dan Clark and Craig Budgen)

In the following table are examples of some data about temperature, rainfall and humidity levels from April 2006 to March 2007, recorded at the Darwin's weather station in the Northern Territory.

Examples of average values measured during a 62-year period -from 1941 until 2002- are in square brackets (source: website of Bureau of Meteorology, Australian Government <http://www.bom.gov.au> and <http://www.viaggiatori.net/turismoestero/Australia/clima/Darwin>). Of particular note is that from May till November 2006 there were only 12 rainy days, with a total of 74.2 mm of water, while from December to April of the following year there were 113 rainy days, resulting in a total of 1945.26 mm of water!

Month	Average Temperature (°C)		Min. Temp. (°C)	Max. Temp. (°C)	Rain (mm)	Rainy days	Average Relative Humidity (%)	
	Average Minimum	Average Maximum					Time 09.00	Time 15.00
Apr 2006	23,7 [24,0]	32,1 [31,6]	21,2	32,9	396,2 [101,6]	19 [9,3]	80	64
May 2006	20,6 [22,1]	30,8 [32,0]	15,7	32,7	22,4 [20,8]	1 [2,0]	56	35
Jun 2006	18,5 [20,0]	29,9 [30,6]	14,1	32,1	0 [1,2]	0 [0,5]	50	30
Jul 2006	18,0 [19,3]	29,6 [30,4]	13,6	31,7	0 [1,4]	0 [0,5]	56	36
Aug 2006	18,9 [20,5]	31,4 [31,3]	16,2	34,8	0 [5,8]	0 [0,6]	55	30
Sep 2006	21,1 [23,1]	32,8 [32,5]	14,3	37,0	6,4 [15,4]	2 [2,3]	60	37
Oct 2006	23,2 [25,0]	33,6 [33,1]	21,3	35,9	1,8 [72,1]	2 [6,7]	61	41
Nov 2006	25,4 [25,3]	33,9 [33,2]	22,6	36,5	43,6 [140,1]	7 [12,0]	69	54
Dec 2006	25,1 [25,3]	33,9 [32,5]	20,7	35,5	240,0 [248,3]	16 [16,4]	73	59
Jan 2007	25,6 [24,8]	32,4 [31,7]	23,3	34,2	206,8 [425,8]	26 [21,1]	80	72
Feb 2007	24,4 [24,7]	32,1 [31,7]	22,6	33,9	422,26 [354,0]	22 [20,1]	82	71
Mar 2007	24,8 [24,5]	30,9 [31,8]	23,0	33,2	680,0 [321,7]	30 [19,4]	85	76



On this page: *Drosera paradoxa*, Moran River region, Western Kimberley (photo by Dan Clark and Craig Budgen). Inside: *D. caduca* during the resting period (photo by Maurizio Saroldi). *Drosera* sp., Berkeley River region, North of Kimberley, Western Australia, mid August (right)(photo by Dan Clark and Craig Budgen).




As already stated, the *petiolaris*-complex sundews actively grow during the wet season, while remaining dormant during the dry one. Roughly, it's possible to indentify 2 groups:

1. Species which, during the winter, produce progressively smaller leaves with varying amounts of hairs, and in most cases these leaves are not carnivorous, often overlapping each other to form a compact rosette (*D. brevicornis*, *D. broomensis*, *D. darwinensis*, *D. derbyensis*, *D. fulva*, *D. lanata*, *D. ordensis*);
2. Species which, during the winter, completely disappear below ground, creating bulb-like structures, similar to those of *Dionaea*, formed by the build-up of the bases of the old fleshy leaves (*D. caduca*, *D. falconeri*, *D. kenneallyi*).

*D. petiolaris* and *D. dilatato-petiolaris* behaviour is in-between these two groups. The typical form of *D. paradoxa*, even with the reduced size of the leaves and the increase of hair coverage during the dormant period, still has an active vegetative apex. It has to be noted however, that the dormant period is different for each species, and it also depends on the humidity available at the growing site. It is clear that these different adaptations help the plants in protecting themselves from the sun's heat, and to decrease the loss of humidity by transpiration. The plants in the first group, which mostly live in drier habitats, usually have dendritic hairs which have the additional function of increasing the surface of the leaf in order to capture as much air humidity as possible and convey it by gravity to the centre of the rosette. When the first rain comes, dormancy is broken and the plant very quickly produces new leaves and new white, thick and fleshy roots; several species produce flower scapes during this period. The only annual species is *D. banksii* and this starts its growing cycle with the germination of the seed after the first rains, and lives until the end of the wet season and sometimes even longer if it grows in habitats able to retain water and humidity.





*Drosera falconeri* (photo by Maurizio Saroldi).

## THE SPECIES



## *Drosera banksii*

(Etymology: named in honour of the British botanist Sir Joseph Banks, who collected specimens of this species during the expedition of Captain Cook)

Described in 1824 by Robert Brown, this is the only representative of the *petiolaris*-complex with an annual growth cycle. Other features that distinguish it from the other members of the group are its upright habit and the fact of it being the only self-fertile species (but never self-pollinating). All these features, coupled with its general appearance, which is very reminiscent of the tuberous sundews, have confused botanists for a long time. It was initially placed in the section *Ergaleium*, the tuberous *Drosera*, such as *D. subtilis*, with which it has many similarities. *D. banksii* however does not have tubers and grows in the north of Australia, an area where tuberous *Drosera* are not present. Recent studies have led to its insertion into the section *Lasiocephala*, having many common morphological features with other species of the *petiolaris*-complex, such as the leaf lamina, the flower morphology and also the germination pattern.

Usually this species grows up to 10 cm high and occasionally to 20 cm; the leaves are alternate along the central stem and remain attached to it even when they are dry. The petiole is brownish-green, up to 1.2 cm long and covered with short white hairs. The lamina is reniform, up to 1.5 x 2 mm, with its colour ranging from green-orange to red; it is covered with glandular hairs on the upper surface that are longer at the edge and shorter in the central part, the lower surface is scattered with white hairs. It has thin but fleshy underground roots, and occasionally has a few aerial roots just above the base, supporting the plant.

The growth cycle of *D. banksii* begins with the seeds germinating at the arrival of the first seasonal rains. This continues until the end of the wet season, and sometimes even longer if the habitat is very moist.

The inflorescence is located laterally along the central stem, it can reach 3 cm long and carries up to 10 white flowers, each about 0.5 cm in diameter. In the wild, flowering occurs between May and July. The scape and the lower surface of the sepals are covered with white hairs.

*D. banksii* can be found in Western Australia (King Edward River, Packhorse Range, Beverly Springs, Lake Argyle), in the Northern Territory (Howard Lagoon, Finnis River, Bark Hut, Humpty Doo, Berry Springs, Kakadu National Park), in Queensland (Endeavor River) and in New Guinea. It grows on clayey or sandy soils near streams, their banks or near sandstone outcrops.



*Drosera banksii* (photo by Andreas Fleischmann).



## *Drosera brevicornis*

(Etymology: from the Latin brevis = short, and cornu = horn, referring to the stamen that ends with a hooked filament that extends beyond the anthers)

Described in 1996 by Allen Lowrie, this species is a perennial plant with a flat rosette up to 6 cm in diameter, consisting of green petioles and red, orange or purple lamina. The petiole is oblanceolate, up to 2 cm long in the flowering stage and up to a maximum of 3 mm wide; it has a slightly hairy upper surface while underneath it is densely covered with white dendritic hairs. The lamina is orbicular, up to 5 mm in diameter, and covered by glandular hairs, which are longer at the edge and shorter in the central part; the surface of the underside is covered with thick white dendritic hairs.

During the dry season *D. brevicornis* develops a dense rosette of very hairy leaves, which become progressively smaller in size.

The inflorescence reaches 40 cm in height, and the scape and the lower surface of the sepals are covered with thick, white dendritic hairs. The flowers, white or pink, can number more than 25 per scape, and can reach a diameter of almost 2 cm. In nature flowering occurs in March and April.

*D. brevicornis* is only to be found in the Northern Territory (Palmerston, Batchelor, Dundee Beach, Darwin River, Edith Falls, Charlotte River and the Kakadu National Park), where it grows on gritty slopes or in depressions in the ground, in presence of water, on sandy-clayey soils.

A natural hybrid with *D. falconeri* is known [A. Lowrie, pers. comm.].



*Drosera brevicornis* (photo by Maurizio Saroldi).



## *Drosera broomensis*

(Etymology: from the town of Broome, in Western Australia)

Described in 1996 by Allen Lowrie, *D. broomensis* is a perennial plant with a rosette up to 8 cm in diameter, comprising both semi-erect and erect leaves. The petiole is linear, green, up to 4 cm long and covered, during the wet season, by sparse, white, simple hairs; in the dry season the coverage of hairs becomes much more dense. The lamina is suborbicular and coloured from green to pale orange; its size is up to 3.5 x 2.5 mm, with glandular hairs on the upper surface, longer at the edge and shorter in the central part, with the addition of a few simple hairs on the underside.

During the dry season, *D. broomensis* forms a dense rosette of very hairy leaves, each becoming progressively smaller in size. The inflorescence reaches 30 cm in height, and it can consist of more than 50 white to pink flowers, each about 1 cm in diameter. In nature, flowering occurs in February and March, and the scape and the lower surface of the sepals are glabrous.

Geographically speaking, *D. broomensis* is the most westerly of the petiolaris-complex sundews. It can be found from the north and east of the town of Broome, in Western Australia (Coulomb Point, Dampier Peninsula, Cape Leveque, Lake Region, Deep Creek, Lake Champion, Taylor's Lagoon, Barred Creek), where it grows on sandy soils.



*Drosera broomensis* (photo by Andreas Fleischmann).



## *Drosera caduca*

(Etymology: from the Latin *caducus* = temporary, referring to the fact that it produces leaves without lamina in the second part of the growing season)

Described in 1996 by Allen Lowrie, this species is a perennial one that forms one or more rosettes, consisting of both semi-erect and erect leaves. The distinctive peculiarity of *D. caduca*, which separates it from the other species of the petiolaris-complex, is that its carnivorous behaviour only occurs in the first part of its annual growing cycle. Only the juvenile leaves, which grow for approximately the first two months of the wet season, show an orbicular lamina with a diameter up to 4 mm. The lamina possesses glandular hairs on the upper surface, which are longer at the edge and shorter in the central part; the surface of the underside is usually glabrous, but may show a few simple hairs. The colour of the trap is yellowish-green while the petiole, oblanceolate in the juvenile stage and more linear in the mature plant, is pure green and is glabrous on the upper side and has a few simple, white hairs underneath. The leaves can grow up to 3 cm in the juvenile phase and exceed 30 cm in mature plants. The width is up to 6 mm, and this depends on the variety, i.e. 'wide leaf' or 'narrow leaf'.

To protect itself from dry conditions during the dry season, *D. caduca* retires to just below the ground, forming a bulb-like structure from the accumulation of the fleshy bases of old leaves.

The inflorescence may exceed 50 cm in height and carry up to 45 white or pink flowers, each about 1.3 cm in diameter. In the wild flowering occurs from December to July. A few simple hairs are positioned on the scape and on the lower surface of the sepals.

*D. caduca* comes from the Kimberly region of Western Australia (Edkins Range, Mount Elizabeth, Bachsten Creek, Prince Regent River Reserve, Augustus Island). Usually it grows on the margins of streams on silty, sandy soils. Augustus Island's population grows among eucalyptus trees at the edge of soil depressions on the bottom of a sandstone slope.

*Drosera caduca* (photo by Andreas Fleischmann).





## *Drosera darwinensis*

(Etymology: from the city of Darwin, in the Northern Territory)

Described in 1996 by Allen Lowrie, this is a perennial plant with a flat rosette up to 5 cm wide. The leaves, ranging from green to red to purple in colour, and having red or orange, orbicular lamina, are up to 3.5 mm in diameter. The glandular hairs on the upper surface of the lamina are longer at the edge and shorter in the central part, with simple white hairs on the underside. The petiole is oblanceolate, about 1 cm long during the flowering period and covered with short white simple hairs, with just a few that are dendritic.

During the dry season *D. darwinensis* develops a dense rosette of hairy leaves, each becoming progressively smaller in size. The inflorescence reaches 15 cm in height and can carry more than 20 white or pink flowers, each up to about 1 cm in diameter. In nature flowering occurs between December and April. The scape and the lower surface of the sepals are covered with thick, white dendritic hairs.

*D. darwinensis* is found in the Northern Territory (Palmerston, Berrimah, Berry Springs, Litchfield, Tumbling Waters, Daly River, Humpty Doo) where it grows on sandy-clayey soils that are usually covered with a layer of laterite.

Natural hybrids with *D. falconeri*, *D. kenneallyi* and *D. dilatato-petiolaris* are known [A. Lowrie, pers. comm.].





# *Drosera derbyensis*

(Etymology: from the city of Derby, in Western Australia).

Described in 1996 by Allen Lowrie, this species is a perennial plant that forms one or more rosettes, to 6 cm in diameter, composed of both erect and semi-erect leaves. The petiole is oblanceolate, up to 4.5 cm long in the flowering stage and up to 1.7 mm wide, green in colour, it is covered with thick white simple hairs. The lamina is orbicular, up to 3 mm in diameter and coloured green, pale orange or red and it has glandular hairs on the upper side and these are longer at the edge but shorter in the central part, with dense, white, simple hairs on the lower surface. The rosettes of mature plants are raised from the ground on a sort of bulb-like arrangement, formed by the accumulation of the old leaves.

During the dry season *D. derbyensis* develops a dense rosette of very hairy leaves, which become progressively smaller in size.

The inflorescence can reach 35 cm in height and may carry up to 50 flowers, each about 0.8 cm in diameter and coloured white to pink. In nature flowering occurs from March to June and the top of the flower scape and the bottom surface of the sepals are covered with dense, white, simple hairs.

*D. derbyensis* comes from Western Australia and from the Northern Kimberly region, (Derby, Beverly Springs, Windjana, Erskine Range). It grows on white sand near rocky outcrops or on sandy soils in alluvial areas.



*Drosera derbyensis* (photo by Maurizio Saroldi).



## *Drosera dilatato-petiolaris*

(Etymology: from the Latin *dilatare* = to enlarge, and *petiolus* = petiole, with reference to the large petiole)

Described by Kondo in 1984, *D. dilatato-petiolaris* is a perennial plant, with one or more rosettes, each up to 8 cm in diameter and made of erect or semi-erect green or red leaves. The lamina is orbicular, orange or red in colour and about 3 mm in diameter; glandular hairs are present on its upper surface, which are longer at the edge and shorter in the central part and the lower surface is lightly covered with long, white hairs of both simple and dendritic forms. The petiole is oblanceolate to linear in shape, up to 2.5 cm long during the period of bloom and lightly covered with white hairs, the density of which depends on the humidity of the habitat where the plant grows. The rosette of a mature plant often divides to produce multiple rosettes, and these are raised off the ground on a sort of bulb-like arrangement, formed by the accumulation of the old leaves. During the dry season *D. dilatato-petiolaris* greatly reduces the size of the rosette.

The inflorescence reaches 20 cm in height and carries up to 20 white or pink flowers, each about 1.2 cm in diameter. In nature flowering occurs in October. The scape and the lower surface of the sepals are covered with white hairs.

*D. dilatato-petiolaris* comes from Western Australia, (Beverly Springs, King Edward River and Mount Bomford), the Northern Territory (Palmerston, Berrimah, Berry Springs, Channel Island, Darwin River, Humpty Doo, West Alligator River, Arnhemland, Nhulumbuy) and from Queensland (Cape York Peninsula). It grows on sandy soils, in wet depressions near sandstone outcrops, sometimes on laterite in open forests and also on sand in eucalyptus forests. Natural hybrids are known from the Northern Territory, crossing with *D. falconeri*, *D. kenneallyi*, *D. darwinensis* and *D. aff. lanata*. [A. Lowrie, pers. comm.].



*Drosera dilatato-petiolaris* (photo by Andreas Fleischmann).



# *Drosera falconeri*

(Etymology: named in honour of D. Falconer, who originally discovered the species)

Described in 1984 by Kondo and Tsang, this is a perennial plant with a rosette of leaves, flattened to the ground, which is up to 8 cm in diameter and comprising red or reddish-green leaves with a large, reniform lamina up to 1.5 x 2 cm (the largest lamina of the *petiolaris*-complex sundews). The lamina has glandular hairs on the upper surface, longer at the edges and shorter in the centre while its lower surface is covered with sparse, white hairs. The petiole is oblanceolate, about 1 cm wide overall, with a mid-rib up to 3.5 mm wide, it is glabrous on the upper surface but is sparsely covered with white hairs, only at the margins, on the lower surface. During the dry season, to protect from dry conditions, *D. falconeri* retreats just below the ground, forming a bulb-like structure built from the accumulation of the fleshy bases of old leaves. The inflorescence reaches 8 cm in height and carries a dozen white

or pink flowers, each up to 1.4 cm in diameter. In nature flowering occurs at the beginning of the wet season (November-December). The scape and the lower surface of the sepals are covered with short, white hairs. *D. falconeri* comes from a rather limited, narrow area surrounding the city of Darwin, in the Northern Territory (Palmerston, Darla, Berry Springs, Melville Island, Charlotte River, Wangi). It grows on silty clay which may have different proportions of sand and laterite. This becomes very compact during the dry season. The plant usually grows among short grasses and small shrubs, which provide a light, dappled shade, but can be found withstanding full exposure to the sun. The chosen soil on which *D. falconeri* grows has a slightly alkaline disposition, up to pH=8 while all the other *petiolaris*-complex sundews usually grow on acidic soils [Tsang, 1980]. Unfortunately the species has almost disappeared from the site of Palmerston because of expanding urbanization, and the population at Darla station is now endangered.

Natural hybrids with *D. dilatato-petiolaris*, *D. darwinensis* and *D. brevicornis* have been discovered [A. Lowrie, pers. comm.].



*Drosera falconeri*: in full vegetation (left), during the resting period (top right) and at the beginning of the growing cycle (bottom right). (photos by Maurizio Saroldi).





## *Drosera fulva*

(Etymology: from the Latin *fulvus* = yellow-reddish, referring to the colour of its leaves)

Described in 1848 by Planchon, *D. fulva* is a perennial plant consisting of one or more rosettes, each up to 6 cm in diameter and possessing semi-erect leaves. The petiole is oblanceolate, green-reddish-brownish and up to 3 cm long, with an entirely glabrous upper surface while underneath are scattered white, dendritic hairs. The coverage of hairs increases and extends to the upper side of the petiole during the dry season. The lamina is orbicular, up to 3 mm wide and coloured yellowish-orange to red; its upper surface is covered with glandular hairs, longer at the edge than in the central part, while the lower surface is sparsely scattered with a few white, dendritic hairs, which thicken during the dry season. Mature plants have rosettes that are raised off the ground on a sort of bulb-like arrangement, formed by the accumulation of the old leaves.

During the dry season *D. fulva* develops a dense rosette of very hairy leaves, each one getting smaller and smaller in size.

The inflorescence reaches 45 cm in height and carries 50 or more white or pink flowers, each up to 1.8 cm in diameter. In nature flowering occurs between February and May. The scape and the lower surface of the sepals are densely covered with short, white, dendritic hairs.

*D. fulva* is found in the Northern Territory (from Koolpinyah to Noonamah, Howard River, Finnis River, Girraween, Port Essington, Humpty Doo) and also Queensland, where it is found on Wellesley Island. It grows on sandy soils in the humid lowlands or just above the water level in areas that are periodically flooded.

A natural hybrid with *D. petiolaris* has been discovered [A. Lowrie, pers. comm.].



*Drosera fulva* (photo by Andreas Fleischmann).





*Drosera kenneallyi* (photo by Maurizio Saroldi).

## *Drosera kenneallyi*

(Etymology: in honour of Kevin F. Kenneally, who discovered the species in 1982)

Described in 1996 by Allen Lowrie, this is a perennial plant with a single rosette, flattened to the ground and up to 6 cm in diameter. The leaves can range in colour from bronze-green to red-bronze to orange. The lamina is transversely elliptical, up to 6 x 7 mm and has glandular hairs on the upper surface, longer at the edges than in the central part; the lower surface is scattered with simple, white hairs. The petiole is oblanceolate with a length up to 3 cm during the period of flowering and it is glabrous on the upper surface and covered with a few simple hairs on the lower surface.

During the dry season, to protect from dry conditions, *D. kenneallyi* retires just below the ground as a bulb-like structure, formed from the accumulation of the fleshy bases of old leaves.

The inflorescence can reach 20 cm in height and carries up to 20 white or pink flowers, each up to 1.2 cm in diameter. In the wild flowering occurs between November and December. The scapes and the lower surface of the sepals have a few white hairs.

*D. kenneallyi* comes from both Western Australia (Airfield Swamp, Mitchell Plateau, Theda Station) and the Northern Territory (Fog Bay). It grows on sandy-clayey soils containing laterite in grasslands and in open woods of eucalyptus and malaleuca. The population found at Airfield Swamp shows a remarkable adaptation to high water levels: during the months of January and February, the plants are submerged under a few inches of very hot water but the petioles are flexible and follow the rise and fall of the water level, allowing the traps to float on the surface, continuing to catch insects.

Natural hybrids involving *D. dilatato-petiolaris* and *D. darwinensis* have been discovered in the Northern Territory and hybrids with *D. aff. brevicornis* are to be found in the Kimberly (Western Australia) [A. Lowrie, pers. comm.].



## *Drosera lanata*

(Etymology: from the Latin *lanatus* = hairy, referring to the dense covering of hairs on its leaves)

Described in 1984 by Kondo, this is a perennial plant with a rosette up to 6 cm in diameter. The petiole is lanceolate, up to 3 cm long, green and densely covered with white, dendritic hairs. The suborbicular lamina is up to 2 x 2.5 mm and can be green, pale orange or red, with glandular hairs on the upper surface that are longer at the edge than in the central part; its lower surface is densely covered with white, dendritic hairs.

During the dry season *D. lanata* develops a dense rosette of very hairy leaves, each progressively smaller in size.

The inflorescence reaches 25 cm in height and can carry up to 30 white or pink flowers, each up to 1 cm in diameter. In nature flowering occurs between January and March. The scape and the lower surface of the sepals are also densely covered with white, dendritic hairs.

*D. lanata* can be found in Northern Queensland (Lotus Glen, Atherton Tableland, Mareeba) and in the Northern Territory, at the West Alligator River, where it grows among small bushes and in open forests on very sandy and well-drained soils.





## *Drosera ordensis*

(Etymology: from the alluvial valley of the Ord River)

Described in 1994 by Allen Lowrie, *D. ordensis* is a perennial plant that forms one or more semi-erect rosettes with diameters up to 10 cm (A. Lowrie reported that he has found a giant form near Kununurra with a diameter up to 20 cm [A. Lowrie, "Carnivorous plants of Australia" Vol. 3, p. 208]). During the flowering period the rosette consists of long petioles that are oblanceolate in shape, up to 4 mm wide and to 5 cm long; both the lower and upper surfaces are covered with long, white, dendritic hairs. The lamina, up to 4 x 5 mm, is suborbicular in shape and has glandular hairs on the upper surface that are longer at the edges than in the central part; its lower surface is also densely covered with long, white, dendritic hairs. The traps can be red, orange or yellow, and sometimes almost pure green, while the petiole, which is green at the beginning of the wet season, then becomes covered with a dense pelt of white hairs as the season progresses.





During the dry season *D. ordensis* develops a dense rosette of hairy leaves, each becoming progressively smaller in size and which overlap one-another, like tiles on a roof.

The inflorescence can reach 45 cm in height and bears many flowers, from white to pink in colour and with a diameter of up to 1.5 cm. In the wild flowering occurs between December and April. The scape is covered with long, white, dendritic hairs, as are the lower surfaces of the sepals. Occasionally, at the apex of the flower scape, it is possible to find clusters of juvenile plants.

*D. ordensis* originates from the far northeast of Western Australia (Kununurra, Pago, Berkeley River, Ord River, Stonewall Creek, Cave Springs, Beverly Springs, Boab Springs, Mulligan Lagoon, Wyndham, Lake Argyle, Mirama) and from the nearby regions of the Northern Territory (Keep River National Park). It grows on sandy soils, near sandstone outcrops, where the soil remains moist for the first part of the dry season. *D. ordensis* often grows in association with sorghum, which, even if not so dense, can provide some shade from the excessive sunlight.



*Drosera ordensis* during the resting period with plantlets at the apex of the flower scape, Berkeley River region, north-east Kimberley, Western Australia (photo by Dan Clark and Craig Budgen).



# *Drosera paradoxa*

(Etymology: from the Greek παράδοξος = extraordinary, for its once mysterious life cycle that was only explained after prolonged visits to its inhospitable habitat)

Although it is now the most common petiolaris-complex sundew in cultivation (probably because it is one of the easiest to grow), *D. paradoxa* was chronologically the last of the complex to be described, again by Allen Lowrie, in 1997.

It is a perennial plant, with a rosette at the apex of a very short, woody stem, hardly visible in young plants but, after some years, can reach more than 30 cm high. The long petiole is linear, from red-green to red to purple in colour, lightly covered with white, dendritic hairs. The lamina is suborbicular, usually red when exposed to full sun and about 2.5-3 x 2-3 mm, with glandular hairs on the upper surface, longer at the edge and shorter in the centre, with few, white hairs on the lower surface.

During the dry season, *D. paradoxa* produces shorter and more hairy leaves, but retains an active vegetative apex.

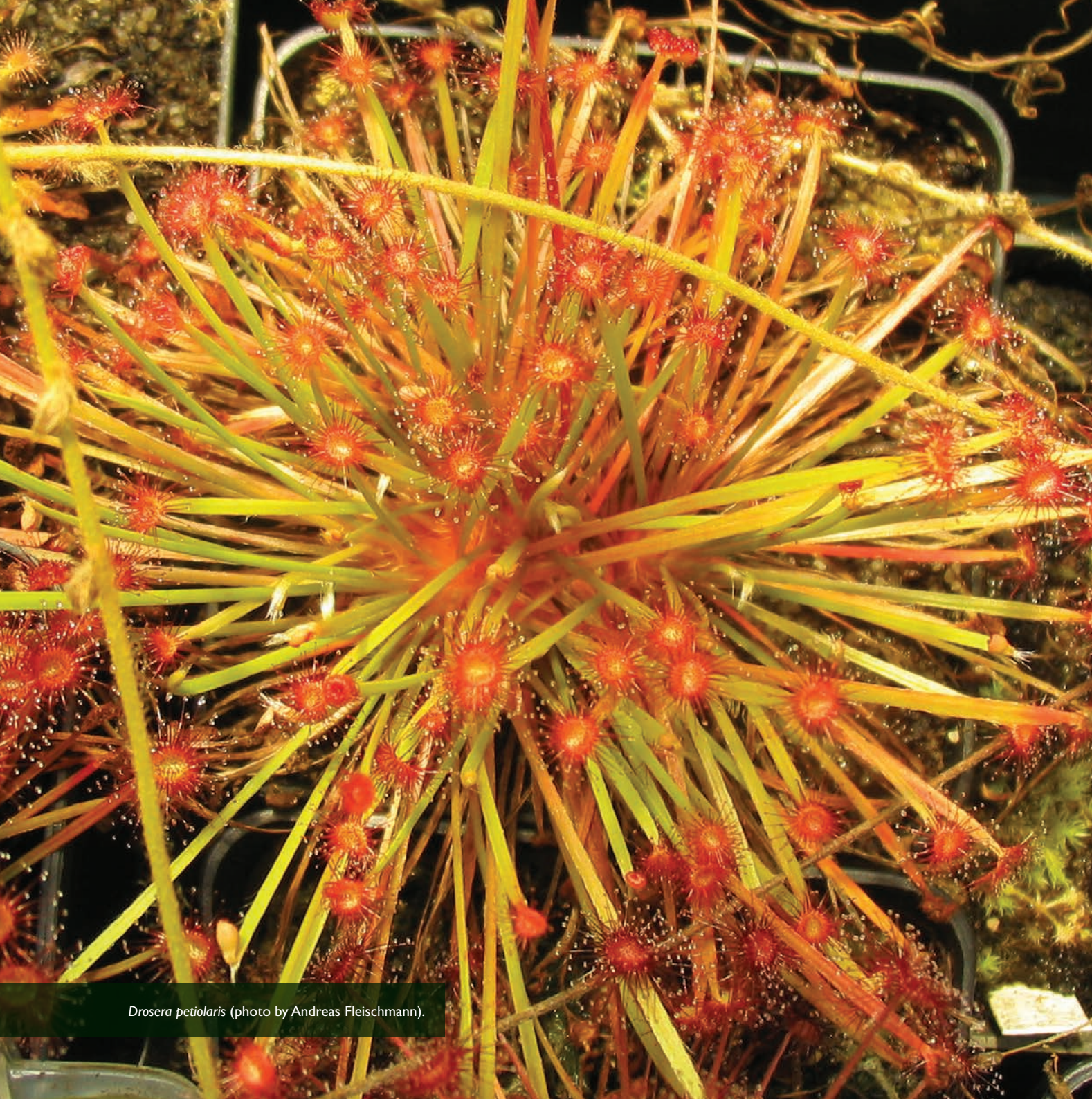
The inflorescence can reach 40 cm in height and have more than 70 flowers up to 2 cm in diameter. These are white or pink in colour and sometimes have a red spot in the centre. The scape and the lower surface of the sepals are covered with white hairs. In nature flowering occurs during the dry season, between July and September.

*D. paradoxa* is widely distributed in Western Australia (from the north to the west of the coast of Kimberley and inland to Beverly Springs, Mount Bomford, Mount Fife, King Edward River, Drysdale River) and in the Northern Territory (Arnhem Land, Lady Dreaming Creek, Kakadu National Park). Most of the habitats colonized by *D. paradoxa* are usually submerged in March and April. This seasonal flooding, especially during particularly rainy years, can be so severe that entire populations of plants can be washed away. Fresh seeds, scattered on the newly exposed ground, is the only way these populations can be renewed. *D. paradoxa* can be found on sandy soils, on sandstone and on the banks of rivers, and between pebbles in the beds of streams that dry up in the dry season.



*Drosera paradoxa* (photo by Maurizio Saroldi).





## *Drosera petiolaris*

(Etymology: from the Latin *petiolus* = *petiole*, referring to the long petiole)

Having been collected as long ago as 1770 by Banks and Solander, who were part of the famous expedition of James Cook, it was finally described in 1824 by Robert Brown. A perennial plant, it consists of a rosette made from erect and semi-erect leaves, with a colour ranging from green to red. The lamina is suborbicular, red or orange, with sizes up to 2.5 x 3.5 mm; the glandular hairs on its upper surface are longer along the margins than in the central part, the lower surface is lightly covered with white hairs, of both simple and sometimes dendritic form. The petiole is linear, up to 6 cm long and usually covered with white hairs in the juvenile stage, but becomes almost hairless as it matures. During the dry season the rosette of *D. petiolaris* reduces dramatically in size, often leaving only a few leaves visible on the surface.

Flowering takes place between October and April and the inflorescence can reach 20 cm in height. It carries many pink or white flowers, each about 1 cm in diameter. The scape and the lower surface of the sepals are covered with white hairs. Occasionally it is possible to find clusters of juvenile plants at the apex of the flower scape.

*D. petiolaris* is widely distributed from Western Australia to the Northern Territory (Darwin, Howard Springs, Noonamah), and also in the northeast of the northern tip of Queensland (Endeavor, Lockhart Rivers). It is also to be found in New Guinea. It grows on sandy soils, often over basalt formations near streams or ponds, and its habitat is often covered by shallow water during the wet season.

A natural hybrid with *D. fulva* is known [A. Lowrie, pers. comm.].

*Drosera petiolaris* (photo by Andreas Fleischmann).

Special Edition The *Drosera petiolaris* complex



## More *petiolaris*-complex sundews...

As well as the 14 species described above, there are several plants currently identified with the prefix “*aff.*” This prefix is the abbreviation from the Latin “*affinis*”, meaning similar, and it is used for plants that have many similarities with the species to which it relates: *D. aff. ordensis*, *D. aff. petiolaris*, *D. aff. dilatato-petiolaris*, *D. aff. fulva*, *D. aff. lanata*, *D. aff.*

*brevicornis*, *D. aff. Paradoxa*, *D. aff. kenneallyi*. Some of these plants may be natural hybrids, yet to be properly identified, or possibly new species, waiting for a botanical description. In nature, hybridization among the *petiolaris*-complex sundews is very common, helped by the fact that all the perennial species are not self-fertile and need cross-pollination.



*Drosera aff. ordensis* (photo by Maurizio Saroldi).



## THE CULTIVATION



*Drosera brevicornis* flower (photo by Maurizio Saroldi).





As previously stated, there is not a standard cultivation method for the petiolaris-complex sundews. Most have been introduced to cultivation in just the last few years, and the relevant cultivation methods are still under development. I have grown these beautiful plants for about three years, and during this time I have had a lot of satisfaction but some inevitable and unavoidable disappointments. My adventurous journey into the cultivation of these plants began with a small *D. paradoxa* (which passed away two years ago) and *D. ordensis* (which is, to my great satisfaction, still thriving). My first suggestion is to learn as much as possible about the species in question, read-up as much as possible and talk to other growers and try to adapt their various cultivation techniques. My first source of information was to start reading old back-copies of AIPC bulletins. I then interrogated two of my friends, Andrea Amici and Gabriele Basso, who have always kindly provided me with a lot of tips from their long experience. Of course, the Internet is a great source of information, particularly through dedicated web sites and forums. Everyone's conditions will be different and really, at this early stage in their cultivation, direct and careful observations of your plants, in the conditions you are providing, will give you the best insight into their preferences. Only trial and error will lead us to understand their requirements, and so when something goes wrong we can quickly correct any mistakes.

#### **Substrate and pots**

I use a standard substrate mix for all species (although some experimentation would be beneficial to try and differentiate the soil composition according to the different plants' needs and habitats). My mix is usually made from 60% sphagnum peat, 30% silica sand, with medium grain size, and 10% perlite and lava. I am just starting to experiment in the additional usage of acidic clay. Allen Lowrie suggests using a 50/50 mix of Lithuanian peat moss/silica sand for the cultivation of *D. falconeri* and *D. kenneallyi* and a mix in the ratio of 60/40 of peat/perlite to cultivate the other species. Pots must be of reasonable depth to accommodate the roots and I use pots measuring 10x10x12 cm. Allen Lowrie suggests using pots with a diameter of 15 cm and a depth of 15 cm.

#### **The annual growing cycle**

The annual life cycle of *petiolaris*-complex sundews can be divided into four different phases, during which the plants should be treated in completely different ways: the growing season, the onset of dormancy, dormancy and the start of the new period of growth.

**The growing season:** this is the period during which the plants can be managed in the easiest way. They do not need our continuous care and under our Mediterranean climate will grow from mid-spring to mid-autumn. As already mentioned, during this period the petiolaris-complex sundews love heat and high humidity. Many growers, including myself, place the plants outside, in a terrarium that is almost completely sealed, positioned to receive direct sun for a few hours in the early morning or late afternoon. These conditions provide the necessary humidity that would otherwise be too low in our dry summers and the temperatures inside the terrarium, when exposed to direct sun, can approach values similar to that of hell... sometimes I record more than 50 °C! Anyway, when plants are in full growth, they seem to appreciate these extreme conditions. Some growers keep the "hairy" species, as well as the easiest ones (such as *D. paradoxa* and *D. petiolaris*), outdoors, without the protection of the terrarium. Another possibility is to use a greenhouse or an indoor terrarium.

Watering: there are two different approaches to watering during this phase of growth, you can either keep the plant standing in a permanently filled water tray (the method I use) or water from above without the use of a water tray.

**The onset of dormancy:** in autumn, as the day-length (photoperiod) shortens, coupled with the gradual decrease in temperature, you will notice that the plants start producing leaves of an increasingly smaller size... this is the first sign of the approaching winter rest. At this point it is necessary to allow the water tray to dry out and gradually reduce the amount of watering from above.

**The dormancy:** this is the most difficult period in the plants annual growth cycle to sustain. Around mid-autumn the plants should be placed in a warm and not too moist but well-lit position, with night temperatures not below 15 °C. The best way is to place the plants in a not-completely sealed terrarium, about 10 cm from fluorescent tubes that have a broad spectrum of light (cool white), for at least 12 hours a day. In my terrarium I have also installed a small computer-cooling fan, which with the use of a timer during the day, turns on for 15 minutes every hour. This ensures good air circulation and prevents possible infections of mould. Perhaps this use of a fan is not necessary, since only a few growers I know use this approach. I gradually increase the time between two watering sessions, until



by mid-January I will be adding just a small amount of water every 10 days. This continues until the beginning of March when I further decrease the amount of water given and only add a small amount every three weeks. This simulates the driest period experienced by the plants in the wild. A second method is to further reduce the watering, but spraying some water a couple of times every week on to the dormant plant itself. This system probably simulates more realistic natural conditions; as for several months the plants receive water only from the air humidity, especially during the mornings. I have tried this second method, but after losing a couple of species from a mould attack, I decided to revert back to the first method. Experienced growers, like Andrea Amici for example, are using the second technique quite successfully.

Many growers, including Allen Lowrie, keep the soil slightly moist during the dormancy. *D. falconeri*, *D. caduca* and *D. kenneallyi* will tolerate somewhat drier conditions, however. The duration of the resting period may vary depending on the species: it has been observed, for example, that in cultivation *D. caduca* and *D. falconeri* can experience a very long dormancy, up to 5-6 months, while *D. paradoxa*, *D. petiolaris*, *D. broomensis*, *D. lanata*, *D. fulva* have shorter resting periods (1-2 months).

I try to keep my plants in a state of dormancy from October-November through to March-April. The appearance of the plants during this period varies greatly depending on the growing conditions: a dormancy with slightly moist soil will allow the plants to maintain a small active vegetative apex, whereas a dormancy with completely dry soil will lead to those “hairy” species forming compact rosettes. Under these dry conditions *D. falconeri*, *D. kenneallyi* and *D. caduca* completely lose all their old leaves and, as in the wild, endure their dormancy below ground.

**Start of the growing season:** this is a critical and not so easy phase to determine, the main question being: must the end of dormancy be artificially induced, or must we wait for the first indications of vegetative activity? If, during dormancy, the plants are kept in stable conditions of light, humidity and temperature, they will not resume their activities so easily. This means that those conditions have to be changed, to kick-start the plants into growth. The photoperiod must be increased and soil and air humidity must be progressively raised, as well as an increase in temperature. The key word here is graduality: too much water at this time could result in the plant rotting, and direct exposure to the sun for too many hours or during the hottest hours of the day, after a winter spent under artificial lights, can be very harmful. At the beginning of spring I move my terrarium in front of a window, where the plants can bask in a few hours of direct sunlight. At this time I begin to slightly increase the frequency of watering. In any case, particular care must be taken to look for their specific needs: A plant showing signs of the emergence of new growth must be given suitable conditions to continue this vegetative activity.

Note that some growers successfully cultivate their *petiolaris*-complex sundews without any resting period, maintaining continuous growth all year long, under stable conditions of light, temperature and humidity. In my opinion, however, the original, seasonal growing conditions that plants experience in the wild should be respected.



### Reproduction and multiplication

Two genetically different plants are necessary to obtain viable seeds from the perennial species, since none of these are self-fertile. *D. banksii* is the only self-fertile species, but this species is not self-pollinating, so a manual pollination is necessary. Once you get the seeds, they have to be sown (preferably at the end of winter) in a hot and very humid place, on the surface of sieved peat. Andreas Fleischmann, the famous German botanist, recommends, for both the seedlings and young plants, a mix of sand and long-fibre sphagnum.

Another way of multiplication is by division of the rosette: sometimes, aside from the main crown, new rosettes are formed, and these plants can be separated after approximately one year from their initial appearance.

Finally, taking leaf cuttings to propagate new sundews can be also achieved. The utmost importance here is that the leaf must be removed in its entirety, using a small and pointed tool to get as close as possible to, and include, the base of the petiole. At this point we can proceed in two different ways: the leaf can be laid on a bed of peat or crushed sphagnum moss and kept in a hot, bright and humid place, or we can try the “water method”: here the leaf must be placed in a transparent plastic bag, completely filled with distilled water and placed under strong light. I personally prefer the latter method, which seems to work quite well. If we are lucky, in a few weeks the leaves will develop one or more small plantlets at the base of the petiole (not on the lamina as is the case for many sundews); with the hairless members of the *petiolaris*-complex, the success rate is higher (see photos in the current page: *D. falconeri* leaf cutting). Using the “water method”, a critical moment is the transition from water to the pot. When the plantlets are well formed, and have a dimension of at least 2-3 mm, I transfer the leaf onto the peat, partially burying it in the growing media, placing the pot under very humid and hot conditions. Some growers prefer to move the leaves from the water to the pot as soon as the leaf shows sign of plantlet production.

Instead of growing *D. banksii* from seeds every year, Andreas Fleischmann suggests to cut the plant 1-2 cm from the apex, treat the cut with a rooting hormone powder and place it in a mix of peat and sphagnum, under artificial light for at least 12 hours per day. Both the cutting and the mother plant will begin a new growth cycle (the mother plant from lateral dormant buds).





# GROWERS, A COMPARISON

Below is a schematic table showing the different cultivation methods used by some enthusiasts who have successfully cultivated these plants over several years.

	Andrea Amici Bologna - Italy	Andreas Fleischmann Landsberg - Germany	Homer League Puyallup - USA
<b>Growing Experience</b>	12 years	8 years	4 years
<b>Substrate</b>	3:1 peat/perlite	Peat, sand and clay: for species from drier habitats (the hairy species for example, or <i>D. dilatato-petiolaris</i> ) 1:2 peat/sand; for those from wetter habitats add more peat in the substrate, with a good amount of clay.	1:1 peat/perlite or 1:1 peat/sand.
<b>Cultivation in summer</b>	Outdoors, inside a terrarium, half-light, direct sun in the late afternoon.	Warm greenhouse.	Terrarium.
<b>Cultivation in winter</b>	Inside a terrarium, under fluorescent tubes, in a cool cellar.	Terrarium.	Terrarium.
<b>Artificial light</b>	Winter: 16 hours of light a day, at 5 cm distance from 30 watts tubes.	2 T5 light bulbs 39W, light colours 865HO and 840HO at about 20-25 cm distance from the plants, 12 hrs light a day.	40W fluorescent tubes, the majority of plants at 5 cm of distance; 16 hours in summer, 12 hours in winter.
<b>Watering in summer</b>	Tray system.	Tray system, permanently wet; different levels of water depending on the species.	Tray system, almost daily watering required.
<b>Watering in winter</b>	Light misting twice a week, dry soil substrate, no tray.	<i>D. kenneallyi</i> , <i>D. caduca</i> and <i>D. falconeri</i> bone dry, just like a tuberous <i>Drosera</i> . Other species only slightly damp soil.	Reduce the water inside the tray; wait till complete evaporation and add water within 24 hours.
<b>Summer temperature</b>	Spring and autumn: min. 10 °C. Summer: average 30 °C, max 45-50 °C when the sun directly hits the terrarium.	A terrarium, kept warm from an electric heating mat, placed below the growing tray. This maintains a soil temperature of about 30 °C. Air temperature ranges from 30 to 40 °C during the day, dropping to around 25-15 °C at night.	Day 38 °C, night about 24 °C.
<b>Winter temperature</b>	Never under 10 °C during the night, 23 °C during the day.	30-40 °C during the day, 20-25 °C during the night.	Day up to 30 °C, night about 20 °C.
<b>Summer humidity</b>	98-99%: using evaporation of the water in the tray inside the closed terrarium.	In the greenhouse it ranges from about 30%-90% or even 100%, depending on outdoor humidity. Night humidity is always above 80%.	25-40% day. The glabrous species inside the terrarium are positioned under plastic caps to increase humidity.
<b>Winter humidity</b>	under 60%.	80-100%.	40% day, not measured at night.
<b>Dormancy conditions</b>	Dry soil in a cool and bright place.	Dry dormancy for <i>D. falconeri</i> , <i>D. kenneallyi</i> and <i>D. caduca</i> . Slightly moist dormancy for the other species. No dormancy for <i>D. paradoxa</i> and seedlings.	Photoperiod of 12 hours and reduced water.
<b>Duration of dormancy</b>	From October to April.	From the end of October/November, until the end of February/March, depending on the species: for example <i>D. falconeri</i> up to 6 months; <i>D. paradoxa</i> , <i>D. petiolaris</i> and <i>D. broomensis</i> have a very short dormancy, maybe just one month.	About 6 months.
<b>Suggestion to break the dormancy</b>	When the night temperature is above 10 °C, Andrea moves the plants to the summer location and begins to add water.	Put the plants outdoors in the greenhouse and start adding water into the tray, spraying also water from above.	Increase watering, temperature and photoperiod.

	Peter Lin Diamond Bar - USA	Chuck Lyon Colorado Springs - USA	Ingo Markel Ludwigsburg - Germany
<b>Growing Experience</b>	3 years	5 years	3 years
<b>Substrate</b>	3:6:1 sand/peat/perlite.	1:1 peat/perlite or 7:3 peat/sand or 1:1 peat/long-fibre sphagnum or 7:3 long-fibre sphagnum/sand.	3:2 peat/perlite with just a small % of sand (diameter from 1 to 3 mm).
<b>Cultivation in summer</b>	Terrarium.	Terrarium. Outside for only few days because nights are too cool in Colorado Springs.	"Hairy" species, <i>D. paradoxa</i> and <i>D. petiolaris</i> outdoors in full sun. The other species inside the terrarium in front of a west facing window; the sun hits the terrarium for 2-3 hours a day.
<b>Cultivation in winter</b>	Terrarium.	Terrarium.	Terrarium.
<b>Artificial light</b>	3 compact fluorescent lamps, total 78 watts (daylight-6500 K), about 10 cm distance from the plants, about 16 hours a day.	T5 lights.	3 x 30W tubes at 10 cm from plants for 12-14 hours a day.
<b>Watering in summer</b>	From above every 2 days, no water in the tray.	Tray system.	Outdoors: water in the tray for about 2 days, then 1 or 2 days without water. Terrarium: about 5 mm of water in the tray once a week (the 3rd or 4th day the water will be completely used).
<b>Watering in winter</b>	From above, every 3 days. Less during dormancy.	Tray system.	Some water from above, every 1-2 weeks if the plants are dormant, otherwise just moist.
<b>Summer temperature</b>	Spring and autumn: min. 10 °C. Summer: average 30 °C, max 45-50 °C when the sun directly hits the terrarium.	Day 32 °C; night 20-21 °C.	Outdoors in full sun: till 45 °C. Inside the terrarium: 35-40 °C when sun hits it, otherwise 30-35 °C.
<b>Winter temperature</b>	32-43 °C.	Almost the same as in summer.	25-30 °C air temperature, the pots are warmer because of an electrical heating mat below the tray.
<b>Summer humidity</b>	About 80-90%.	Unknown. The humidity in the terrarium.	Outdoors: 30-60% during the warm days, 60-70% during the night. Terrarium: 60-80% (more during the night).
<b>Winter humidity</b>	About 80-90%.	Unknown. The current humidity inside the terrarium.	70-80% day and night.
<b>Dormancy conditions</b>	Keep soil just moist.	No dormancy.	Photoperiod 12 hours. Quite dry during dormancy, just moist for entering into dormancy. No dormancy for <i>D. petiolaris</i> , <i>D. paradoxa</i> and seedlings.
<b>Duration of dormancy</b>	From November to February, approx.	No dormancy.	It depends on species; e.g.: <i>D. falconeri</i> 4-5 months, <i>D. lanata</i> and <i>D. fulva</i> 2-3 months, <i>D. aff. andersis</i> 3 months, <i>D. caduca</i> 3-5 months.
<b>Suggestion to break the dormancy</b>	Waiting for signs of awakening. Sometimes repotting can stimulate new growth.	No dormancy.	Increase the photoperiod from 12 to 14 hours and water regularly.



	<b>Sonja Schweitzer</b> Scherneck – Germany	<b>Travis Wyman</b> Atlanta - USA
<b>Growing Experience</b>	7 years	6 years
<b>Substrate</b>	1:1 sphagnum peat/perlite.	2:2:1:1 sand/perlite/long-fibre sphagnum/pine bark for most of the species; for each 15 parts of this mix 1 part of clay is added.
<b>Cultivation in summer</b>	Terrarium covered by a pane positioned at 1 cm from walls.	Terrarium.
<b>Cultivation in winter</b>	Same as in summer.	Terrarium.
<b>Artificial light</b>	250W HQI, at about 50 cm from plants for about 14 hours a day.	2 x 40W fluorescent tubes, 120 cm, for 14 hours a day. Distance from plants 15 cm. Some sunlight from a window.
<b>Watering in summer</b>	1-2 cm of water in the tray.	Pots on a grid lifted up at about 6 cm from the bottom of the terrarium. The pots are dipped in 2-3 cm of water; more water is added only when its level has dropped to 1 cm below the grid.
<b>Watering in winter</b>	Soil just moist, just occasional watering.	Water level 1 mm.
<b>Summer temperature</b>	Heat from the artificial lights, from ambient temperature and from a heating mat for reptiles under the terrarium: 20 °C and more, depending on the season.	Heat from a 50W aquarium heater to its highest set point inside the water under the grid. During the day 30 °C, night 25 °C.
<b>Winter temperature</b>	Almost as in summer.	Almost the same as in summer, temperature just about 5 °C lower.
<b>Summer humidity</b>	Humidity given by the water inside the terrarium.	At least 80%: given by the water inside the terrarium.
<b>Winter humidity</b>	Humidity given by the water inside the terrarium.	As in summer.
<b>Dormancy conditions</b>	During the winter, reduced watering and reduced photoperiod.	Dry dormancy.
<b>Duration of dormancy</b>	About October-March.	Average of 3-4 months, (min. 1 month, max 6 months).
<b>Suggestion to break the dormancy</b>	Increase the watering and photoperiod at first signs of awakening.	Begin regular watering at first signs of awakening.


The largest commercial source for *petiolaris*-complex sundews is Allen Lowrie, in Duncraig, Western Australia; Allen sells all the species, and ships plants worldwide, with good-size plants at reasonable prices. You have to contact him to receive his complete catalogue and price-list, and determine which species are available at which time of year. When the plants arrive, the first problem to overcome is the reversal of the seasons between the two hemispheres. Usually Allen sends plants between March and April, just at the end of the wet season in Australia. Upon arrival at their destination, after a minimum of ten days in transit, the plants should be forced to resume their growth cycle and that must be extended until autumn, before they can enjoy a well-deserved rest. Allen Lowrie provides clear guidance on how to treat them in this delicate phase.

Other suppliers are from Europe, and can be easily found after a quick search on the Internet (e.g. Best Carnivorous Plants, CZ Plants, Labflytrap). For the last few years most have offered the majority of the species, sometimes at good prices and sometimes at very high prices. The obvious advantage from European suppliers is the shorter delivery time and the avoidance of the season reversal problem. With a little luck, *D. paradoxa* can be found in nurseries, garden centres or shopping malls.

Another way of obtaining plants is by trading through the various forums on the web... here the biggest problem is to have something of interest to swap in return for these valuable plants.

## WHERE TO BUY



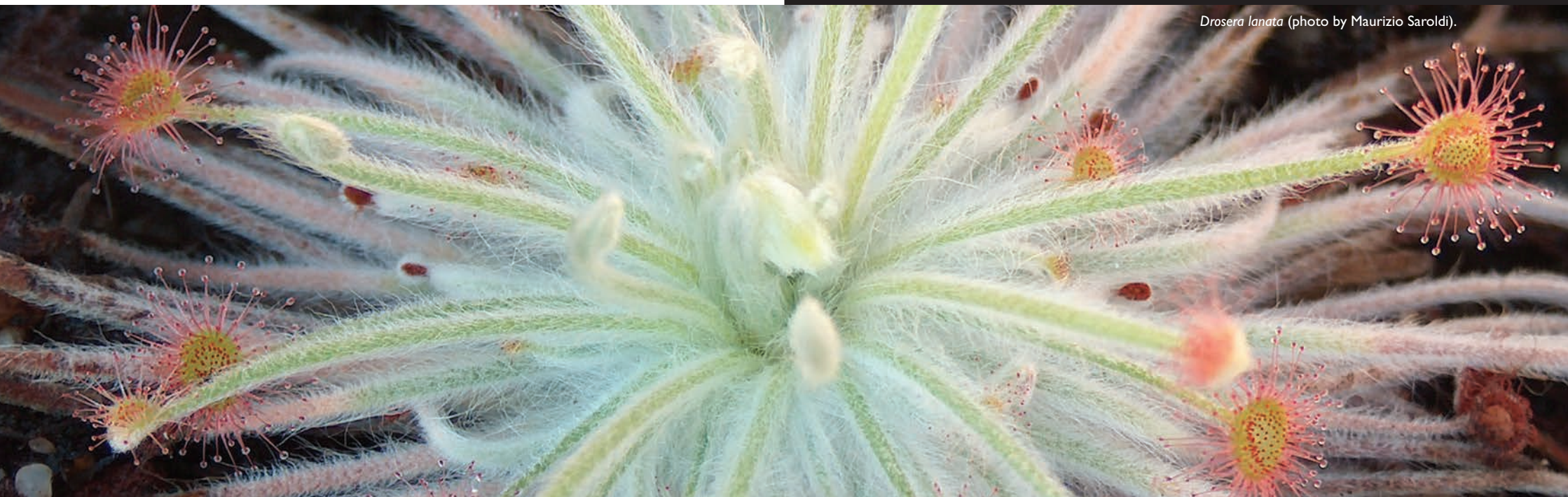


*Drosera paradoxa* flowers (photo by Maurizio Saroldi).

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*Drosera lanata* (photo by Maurizio Saroldi).

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### The author

Maurizio Saroldi was born in 1968 in Castelfiorentino, Italy. He graduated in Mathematics in 1993 and in 1998 acquired his PhD. Since 2001 he teaches mathematics at the Professional Institute "R. Magiotti" of Montevarchi.

He kills his first *Dionaea* at the age of 8 years. Twenty-seven years later he tries again, and this time things go much better. This success has a powerful effect and within a year he fills every square inch of his terrace with more than fifty species of carnivorous plants. One of his first passions was *Drosophyllum lusitanicum*, but he soon dedicated himself to growing sundews, particularly the tuberous species and those of the *petiolaris*-complex. Right now he dreams a CP hunt over Table Mountain in South Africa.