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Front cover: *Stylidium graminifolium.* Anglesea, Victoria . Photo: Greg Bourke
Back cover: *Stylidium graminifolium* with native bee pollinator. Note the pollen on the bee's thorax. Jervis Bay, NSW. Photo: Greg Bourke

Some Ramblings as We Restart

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Welcome (back) to the ITPS! After an hiatus, we're back! Our history in brief runs as follows: founded in 2002 by Greg Bourke and myself, we had a homemade website. Life became rather hectic, and it seemed like a simpler setup was needed. We were on hiatus from 2004-2008, but now we have a website built at 1and1.com and an all-online system. Registration, as you must know if you're getting this pdf, takes 20 seconds at triggerplants.org, and we're sending out our journal as a pdf so ITPS can be free for anyone.

Please tell your friends and family to join. And please, please do feel free to submit materials for this journal. We'd love to have more material from members.

Right now it's a great time for triggerplants here in the Northern Hemisphere, with all of the Spring bloomers like *Stylidium graminifolium* and *S. adnatum* in bloom or close to it, based on email conversations I've had recently plus examination of my own plants. From what I heard from a friend in WA (Greg Quicke who runs AstroTours of the Kimberley out of Broome; well worth the cost, and he also takes people on bird watching trips and will even get you to sites for carnivorous plants and triggerplants), it's been a good Wet up North and so there should be lots of tropical triggerplants in Oz this year.

Stylidium validum

Stylidium aff. *divaricarpum*

I've been getting more involved in botanical art in the last few years, and one fun and easy technique which might work well with your triggerplants is natureprinting (natureprintingsociety.info). You can either ink up plant materials and make direct impressions or crush the flowers into absorbent paper and let their own color make the image. You start with a piece of harder paper (like printer paper), then lay down the absorbent material like Gampi or Hosho (see dickblick.com or imclains.com), lay flowers face down, then another piece of harder paper. Using a small, rounded object like the rounded end of a drawing pencil, rub and press onto the flower. It takes a little practice to find out just how much pressure to use, but once you get it right, the likeness is amazing. If you want to practice before using your precious triggerplant blossoms, thin-petalled flowers like pansies and poppies are good for practice.

Also, I have started working on some ATC-sized miniature watercolors of various triggerplants, using Allen Lowrie's photos from his 2008 ICPS talk as models (with his permission, of course). I hope to start putting those up on the ITPS website soon.

My introduction to the world of Triggerplants

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Ever since I was a child I have ventured into the bush. I grew up on the edge of the Royal National Park in Sydney's south. I was intrigued by the smaller plants especially those that were never found in gardens. I came across many carnivorous Sundews (*Drosera* spp.) as well as terrestrial Orchids, *Utricularia*, Ferns and Triggerplants (*Stylidium* sp.).

It wasn't till my teenage years that I actually learned what a trigger plant was but by this stage I was more interested in girls and sport. In my late teens however, I became interested once more in the native plants that grew in my area. I began collecting carnivorous plants and native orchids from specialist nurseries across the country.

One seller of carnivorous plants in South Australia by the name of Fred Howell had many species of carnivorous plants and it wasn't long before I had at least one of every species on his list. But he also had *Stylidiums* listed. He'd sent me a free one with one of my orders. *Stylidium debile*. I vaguely recall speaking to him on the phone at length about these amazing plants and how they worked. From there my interest grew. Fred had a few species on his list which I purchased and still maintain to this day.

After tracking down a copy of Rica Erickson's "Triggerplants" in the mid 90s (around the same time as my first field trip to Western Australia) I was hooked. Not so much on cultivating these amazing plants but seeking them out in the wild.

At the start of this century I met Dr Doug Darnowski during one of his trips to Australia to write his book on Triggerplants and the potential they have both as collectors curiosities and in the commercial horticulture trade.

Right: *Stylidium graminifolium* complex showing how the column moves to accomplish pollination.

Doug and I had spoken about forming the International Triggerplant Society and slowly got things moving (well at least Doug did). Both of us had commitments with carnivorous plant societies as well as growing families so things moved very slowly till recently.

Recently I have made trips to all corners of Australia through work where I have been fortunate enough to tack on a few days here and there to seek out Triggerplants including several yet to be described.

It still amazes me that Stylidiums, the fifth largest genus of plants in Australia which contains enormous variation and arguably the fastest moving parts is not more widely cultivated. It is hoped that through this free online journal interest will grow worldwide in this amazing group of plants.

Above: One of the first *Stylidiums* to enter my collection *S. falcatum*.

Below: *Stylidium debile* from moist soils of the central coast of eastern Australia.

Modification of †Rica Erickson's common name sectionalisation of Stylidiaceae and some photographic examples of Triggerplants belonging to these sections.

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Triggerplants come in many life-forms. Related species that share similar characteristics can be placed into common sections more or less similar to that defined by Rica Erickson (1958). It should be noted that Rica's common name sections are not botanical systematic sections as determined by Mildbraed (1908). Mildbraed's sectional categories are still being used today but they are in need of revision to better reflect the diversity found in Stylidiaceae. Rica divided Stylidiaceae into the following categories which straightforwardly reflect the relationships shared between species.

1. Ephemerals
2. Creeping Triggerplants
3. Leafy stemmed Triggerplants
4. Rosetted Triggerplants
5. Tufted Triggerplants
6. Scale leaved Triggerplants
7. Eastern Triggerplants
8. Tropical Triggerplants
9. Styleworts

This list is still relevant today but can be enhanced by the following modifications.

Ephemerals to be split into two sections:

1: Annual Triggerplants.

Annuals passing from one growing season to the next by seed only.

2: Bulbous Triggerplants

Perennial Bulbous plants with ephemeral upper parts.

3: Creeping Triggerplants

Stilt-rooted plants that asexually reproduce additional plants on above ground stolon-like runners, often forming spreading plant mats.

4: Leafy stemmed Triggerplants

Plant stem covered with or bearing leaves.

5: Rosetted Triggerplants

Compact leafy basal rosettes adpressed to the soil surface or positioned above the soil on stilt roots.

6: Tufted Triggerplants

Basal tufts of leaves either compact or open.

7: Scale-leaved Triggerplants

Leaf bases shrouded in a papery sheath-like bract.

0: Eastern Triggerplants

Eastern Triggerplants are better placed in their appropriate categories, e.g. *Stylidium tepperianum* placed in Creeping Triggerplants section and *Stylidium graminifolium* placed in Tufted Triggerplants section etc.

8: Tropical Triggerplants

Perennial and annual Triggerplants from the tropical regions of Australia and south east Asia.

9: Styleworts

All species within the *Levenhookia* complex.

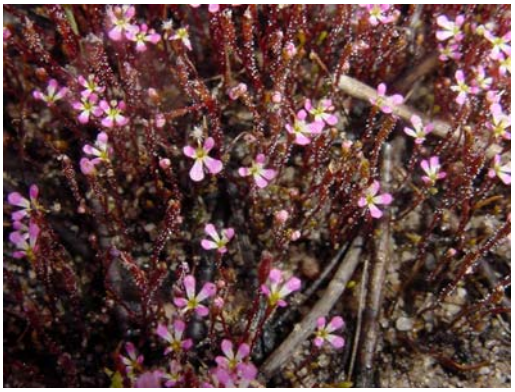
†Rica Erickson (1908-2009) passed away on the 8 Sep. 2009 at the age of 101. She was the author and illustrator of the books "Orchids of the West", "Plants of Prey" a work on the Carnivorous Plants of Australia and "Triggerplants". She also wrote many books on early historical events as well as biographies on prominent members of the early colonisation period of Western Australia.

Ephemerals to be split into two sections.

1: Annual Triggerplants.

Annuals passing from one growing season to the next by seed only.


Stylidium utriculariodes


Stylidium sidjamesii


Stylidium ecorne

2: Bulbous Triggerplants

Perennial Bulbous plants with ephemeral upper parts.


Stylidium petiolare


Stylidium asteroideum


Stylidium emarginatum

3: Creeping Triggerplants

Stilt-rooted plants that asexually reproduce additional plants on above ground stolon-like runners, often forming spreading plant mats.


Stylidium drummondianum


Stylidium bulbiferum


Stylidium neglectum

4: Leafy stemmed Triggerplants

Plant stem covered with or bearing leaves.

Stylidium adnatum

Stylidium fasciculatum

Stylidium scandens

5: Rosetted Triggerplants

Compact leafy basal rosettes adpressed to the soil surface or positioned above the soil on stilt roots.

Stylidium ciliatum

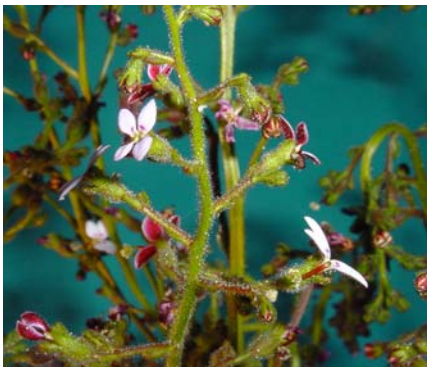
Stylidium ciliatum

Stylidium pulviniforme

6: Tufted Triggerplants

Basal tufts of leaves either compact or open.

Stylidium pycnostachyum



Stylidium turleyae

Stylidium species

7: Scale-leaved Triggerplants

Leaf bases shrouded in a papery sheath-like bract.

Stylidium stenosepalum

Stylidium macranthum

Stylidium caricifolium

8: Tropical Triggerplants

Perennial and annual Triggerplants from the tropical regions of Australia and south east Asia.

Stylidium fimbriata

Stylidium adenophorum

Stylidium lobuliferum

9: Styleworts

All species within the *Levenhookia* complex.

Levenhookia leptantha

Levenhookia pauciflora

Levenhookia stipitata

Initial observations on pollinators of the *Stylidium graminifolium* complex in the Snowy Mountains

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In the summer of 2006 and 2008 I made two short trips to Kosciusko National Park in NSW, Australia to observe members of the *Stylidium graminifolium* complex. This is a group of grass-like Triggerplants that are widespread in south eastern Australia with at least one species extending to New Zealand. There remains some confusion as to the exact identity of the species within this complex. For the purpose of this article I have followed Raulings and Ladiges (2001) on the grounds of best fit.

The focus was on an area near Sawpit creek where both *S. armeria* and *S. montanum* could be easily observed in close proximity. *Stylidium armeria* is locally common in open areas above the snowline and below open Eucalypt canopy where understory vegetation is sparse, generally on steep slopes. *Stylidium montanum* is common in peat based soils in open herb fields near the winter snow line where trees are absent. Grasses are the dominant feature of these areas but *Brachyscome* spp., *Geranium* spp. and *Ranunculus* spp. are also common and found in flower over the summer.

Figure 1: Reed Bee about to feed.

Putative hybrids between the two species mentioned above were observed generally in the margins between the two species' habitats and were visited by three of the four pollinators observed. Reed Bees (*Exoneura* spp.), Euro-

Figure 2: Top to bottom shows how the throat appendages guide the bee into position to ensure the column will strike the thorax of the bee. In this case the flower is in its female phase and the bee has no pollen to donate.

Figure 3: Reed Bee feeding from a flower triggered fifteen minutes earlier possibly by itself.

pean Honey Bees (*Apis mellifera*), unidentified striped bees (possibly of the genus *Lipotriches*) (A. Dollin Pers. Comm.), Bee Flies (Family Bombyliidae) were observed to visit both *S. montanum* and *S. armeria.* The European Honey Bee was not seen to visit *S. armeria*. White flowered plants of *S. armeria* were observed at several locations and were only visited by both native bee species.

Figure 4: European Honey Bee feeding on *S. montanum*. Note that although it is positioned incorrectly to receive pollen it does have some pollen on its thorax.

Reed Bees were considered to be the true pollinators of *Stydlidium* spp. by Erickson (1958). They certainly were the most frequent of visitors to both species of *Stylidium.* The Reed Bees (**Figure 1**) certainly seem to be the ones for whom the flowers of the *Stylidiums* are designed positioning their bodies so as to accept a dab of pollen on the thorax as they feed on the sweet nectar (**Figure 2**) . Flowers can however take a long time to reset, especially in the cool alpine areas where they were witnessed being visited many times before being ready to be triggered again (**Figure 3**).

Figure 5: Unidentified striped Bee.

Whether the nectar has been replenished before the trigger is reset is not known.

European Honey Bees (**Figure 4**) were rarely seen and were not seen triggering any flowers. Pollen was seen on one bees thorax but this may have occurred from the bee rubbing on the anthers of an already triggered flower. This bee with its long tongue was able to feed on the nectar without positioning it's body in the way the *Stylidium* is designed. This relationship is more beneficial to the bee than the *Stylidium*.

The unidentified striped bee (**Figure 5**) also fed on nectar and was seen triggering the flowers to accept a dab of pollen on the thorax. They did however spend more visits collecting pollen directly from the anthers (**Figure 6**) . This probably works out well for the *Stylidium* as the bee ends up covered in pollen so the chance of transfer taking place is high regardless as to whether the column is

Figure 6: Unidentified Striped Bee reaching around to feed directly on the pollen on the anthers of *S. montanum*

ready to be triggered or not. The downside is that when amongst multiple species of *Stylidiums*, the chance of cross pollinating between two species is high increasing the chance of hybrids.

The Bee Fly with its long proboscis (**Figure 7**) is able to feed on the nectar from any angle and although probing deep into the throat of the flower I was not able to witness a single flower triggering. If the fly was positioned with its body over the path column would normally take it would not receive a dose of pollen on it's thorax. I did witness Bee Flies in the correct position to receive a dab of pollen and some Bee Flies had pollen on their thoraxes but it was rare. This relationship is similar to that of the European Honey Bee's and thus not in favor of the Triggerplant.

Figure 7: (Top) Bee Fly with its long proboscis ready to feed. (**Bottom)** Bee Fly probing into the throat of the flower for nectar. Note the pollen on its back

The relationship between *Stylidiums* and their pollinators is complex and although my observations support the notes in Rica Erickson's Triggerplants (1958) there is still much to be learned.

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Carnivorous Plant Attributes of some non-carnivorous plants (Part 3)

(Reprinted from *The New Zealand Carnivorous Plant Society Journal* **12**(3): 16-19)

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Plants with stalked glands which secrete mucilaginous fluid

Rosa hybrids (Rosaceae)

Although Roses are renowned for their thorns, a few cultivated hybrids produce sparsely-spaced, stalked glandular hairs close to the base of each flower. The glands, often red in colour, produce a drop of viscous fluid. I have not seen any insects which have been caught in such fluid.

Some Groundsel plants (*Crepis* species: Asteraceae)

At least one naturalized species of Groundsel produces stalked glands on the pedicels and bracts of the flower heads. As with the Rose hybrids noted above these are relatively widely spaced and do not appear to trap any insects.

Plumbago auriculata (Plumbaginaceae)

This commonly grown garden plant from South Africa produces a moderate density of stalked glands on the pedicels of each inflorescence. These glands secrete a sticky fluid, which is best appreciated by noting how well detached flowers stick to clothing. I am not aware of what, if any insects get caught by this plant, not whether this trait occurs in other species of this genus.

Salvia sp. (Lamiaceae)

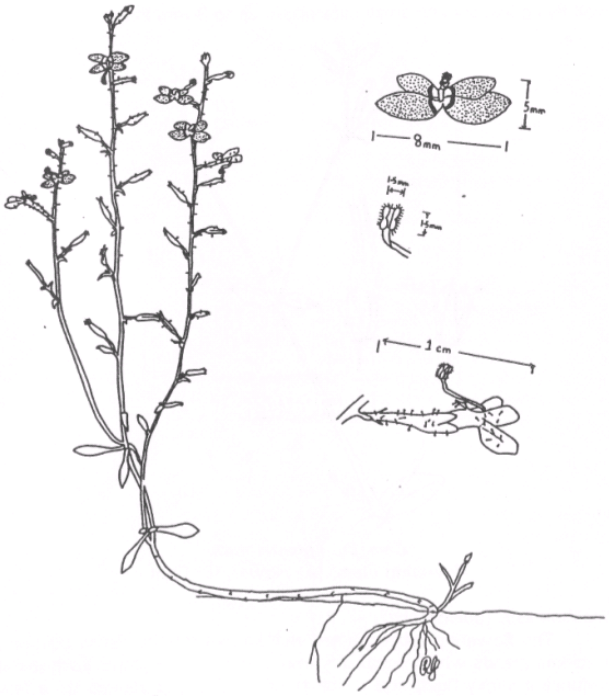
A very attractive perennial species, with deliciously scented leaves and vibrant dark blue flowers has a dense covering of stalked glands on its scapes and pedicels. These secrete a small quantity of sticky fluid that can trap small (up to 2 mm) flying insects.

Grevillea banksii and some of its hybrids (Proteaceae)

The inflorescence of *G. banksii*, *G.* x 'Robyn Gordon', *G.* x 'Ned Kelly', *G.* x 'Coconut Ice' and *G.* x 'Superb' are densely covered in red-stalked glands which secrete a very small drop of sticky liquid. These glands function the entire time that the scape develops and are capable of retaining small flying insects up to 3 mm long. They are notably absent from the rest of the plant. Other *Grevillea* species and hybrids lack these glands but instead often have a dense cover of fine, white, downy hairs, but no glands on the flowering parts.

Stylidium species (Stylidiaceae)

Many species of Trigger Plant produce stalked glands over their scapes, pedicels and bracts,



Stylidium debile var. *debile* - An easily grown *Stylidium* with scattered, stalked glands on the scape, pedicels, bracts and back of petals.

Stylidium debile var. *debile*

the backs of the petals and on their leaves. The actual location of such glands varies according to species. Each gland produces a colourless drop of sticky fluid.

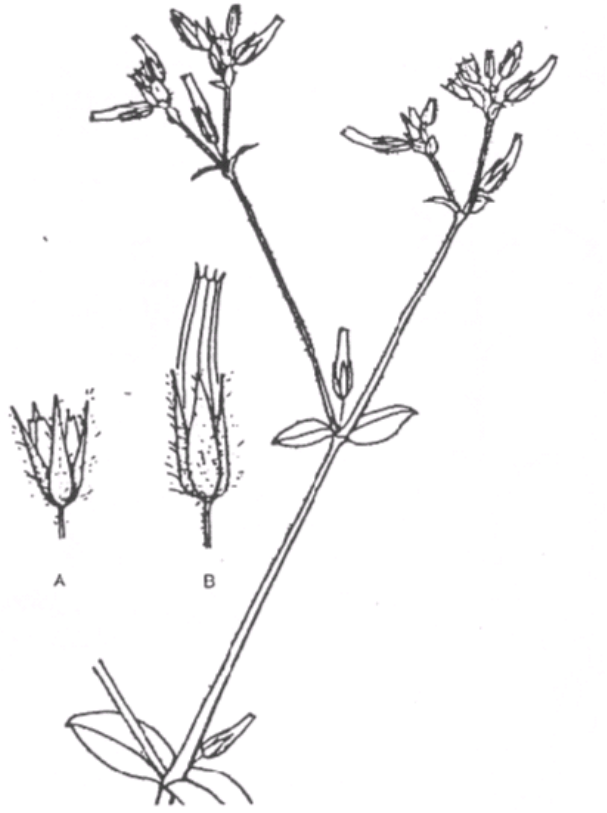
Cerastium glomeratum (Caryophyllaceae) 'Mouse-eared Chickweed'

This is an annual weed of cosmopolitan distribution that is common in the Sydney area. The plant initially forms a rosette with very short internodes between the opposite, sessile, oblong leaves. The internodes lengthen considerably as the place approaches flowering size. The white petalled flowers are arranged in a panicle. The leaves stems and sepals are densely covered in transparent hairs. Those of the upper part of the stem and one the sepals terminates in a small red gland which secretes a small drop of sticky fluid. These are able to trap small flying insects and small caterpillars up to 3 mm long.

Nicotiana spp. (Solanaceae)

The flowering tobaccos are well-known for the dense covering of stalked glands which occur over most parts of the plant. Each gland produces a sticky fluid that traps small flying insects (up to a few mm long). These plants are easy to grow and recommended for the 'normal' garden of carnivorous plant growers.

Other examples undoubtedly exist and show that many aspects of the sophisticated trapping mechanisms employed by carnivorous plants are not so totally different from features found in non-carnivorous plants, and are merely the end of a spectrum. Any of these plants are amenable garden subjects and offer additional appeal for the carnivorous plant enthusiast.



Cerastium glomeratum - Flowering stem, (A) Flower, (B) Fruit

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Contributions to the journal may be submitted on, CD, DVD, USB memory or by email. Use Microsoft Word whenever possible. For instructions on submitting photographs and diagrams please contact the editor (sydneycarnivorous@hotmail.com). Contact details are preferred for publication but may be excluded by the authors request.

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References should be cited as:
Costin *et al*. (2000);Erickson (1958); (Jackson & Wiltshire 2001) in the text;
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The alien like flower of an unidentified *Stylidium* (possibly *S.schizanthm*). This is a remarkable group that have double hinged columns that swing back and forth in the same motion.