



Envirotalk



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PROMOTING APPRECIATION, ENHANCEMENT AND CONSERVATION OF BERMUDA'S ENVIRONMENT

WELCOME

In this issue...

- **Claire Jessey**, Plant Protection Officer, offers advice on how we can help our bee colonies in Bermuda which are under attack from the Varroa mite.
- **Dr. Robbie Smith**, Curator of the Natural History Museum, tells the sad story of the demise of our endemic land snails and what is being done to save and protect those that we have left.
- Check out our two mouth-watering recipes.
- As usual we have our Fall planting calendar.

Please contact:

Caroldey Douglas (Tel: 239-2307 or e-mail: cdouglas@gov.bm) with ideas for future articles.

Alison Green (Tel: 239-2310 or e-mail: agreen@gov.bm) to be added to the subscriber list.

BEES IN CRISIS – HOW TO PLANT A BEE-FRIENDLY GARDEN

The Background

Bees could be one of nature's most under-valued organisms. When you think of bees, you probably think of honey. However honey is a mere by-product of their more important role on our planet – pollination.

Bees are the major pollinator responsible for all flowering trees, shrubs, flowers, fruit and vegetable producing crops. It has been estimated that one-third of the human food supply depends on insect pollination, most of which is pollinated by bees. Other pollinators include moths, flies, butterflies, birds, bats and the wind.

In recent years, much attention has been focused on bees and their mysterious disappearance in areas of Europe and the United States. This phenomenon has been called Colony Collapse Disorder (CCD) and as of yet no conclusive evidence has been found to prove that a single factor is the cause. Scientists believe that several factors combined, including viruses, mites, bacterial and fungal diseases, long-range hauling for pollination services and pesticide exposure may be stressing the bees' immune systems, leading to the demise of bee colonies worldwide.

In Bermuda, we often assume that our proximity from the nearest continent affords a 'barrier' protecting us from international pests and diseases. Our remote location may protect us from many things, however it was not enough to prevent the recent introduction of a serious bee pest that is currently decimating our local bee populations.

In November 2009 an observant beekeeper noticed an unexpected and new bee parasite in a sample of bees and comb they removed from a feral (wild) hive. See *Envirotalk*, Spring 2010, Vol. 78 No. 1, for more information on this find.

The parasite was confirmed to be Varroa mite, (*Varroa destructor*) – arguably the most destructive pest to the beekeeping industry and the one that has also been proposed as one of the several stressors that may be contributing to CCD. Scientists have predicted this mite will nearly eliminate our feral bee populations as well as have a devastating impact on our kept (managed) bees. Indeed, recent surveys of local hives have revealed that hundreds of hives are dying and the Varroa mite is the main suspect. Prior to the mite introduction there were estimated to have been several hundred wild bee colonies scattered around the island and approximately 310 kept hives. Bee specialists have advised us that without any treatment or mite control, the bee population in Bermuda will dwindle down to about one hive every two kilometers (1.2 miles). That would be a total of 18 kept hives left in Bermuda. The effects on our environment especially on our agricultural crops and bee pollinated fruits will be catastrophic.

So what can be done?

Officers from the Ministry of the Environment are researching best practice control methods and working closely with beekeepers in an effort to provide advice, assistance and support in this crisis, however, bees will need every little bit of help in the coming months and years. Homeowners can assist by ensuring that plenty of bee food is readily available island wide by planting flowers and trees that provide nectar and pollen sources that they require.

Preventing stings

Bees are not aggressive by nature and will only sting if they feel threatened or they feel you may be intruding too close to their hive. The best way to avoid bee stings is prevention.

1. Avoid fragrances including hair spray, strongly scented soaps, lotions and oils.
2. Avoid wearing clothing with flowery, colourful patterns. Bees see in the ultraviolet range so if the pattern lights up under 'black' light, it may be interesting to bees.
3. Be careful with food and drinks left outside. Cans and bottles of sweet drinks are particularly attractive to bees and they may climb in unobserved and sting the face of the unassuming drinker.
4. If bees are noticed in the garden area, do not walk barefoot.
5. Wear long trousers and long sleeved clothing if you know you will be in an area that bees will be visiting.
6. If a bee is near or does land on you, do not swat at it.. Rapid movement may startle the bee and encourages stinging. Remain calm and try blowing gently on the bee to encourage it to move off.

Creating a bee friendly garden:

1. Select plants that attract bees. Not all flowers are attractive to bees and some are more attractive than others. Bees have a strong preference for purple, white and blue flowers, and some reds and oranges. Eddie Semos from Brighton Nurseries recommends planting a bee-favourite: cuphea (Mexican heather), but also pentas, lantana and alyssum in your garden. Try also herbs such as rosemary, thyme and mint or vegetables such as pumpkins and squashes. Farmer Carlos Amaral recommends planting sunflowers in your garden. Bees are attracted to all these plants particularly when several of the same are planted together.
2. Let your lawn be diverse. Bees like to feed on clover in the lawn so

don't kill off this 'weed' with chemicals, let the bees feed and it will die off naturally later in the season. The small, common matchstick weed is also a source of food for bees, but its flowers are unavailable if the lawn is continuously mowed short in the summer months. Wild mustard, nasturtium and fennel are other plants that bees enjoy but are sometimes hastily pulled up by over-eager gardeners seeking a manicured lawn or garden.

3. Provide a water source. Bees need to drink water so a clean bird bath filled with water or a small pond will ensure they have moisture.
4. Do not use pesticides in the garden unless it is absolutely necessary. If you do have to use pesticides, choose the least toxic option available. Soap solutions, horticultural oils, diatomaceous earth and home remedies such as hot peppers, garlic and coffee grinds have their place in controlling garden pests.

See your local plant nursery for advice on less-toxic pesticides. Avoid 'systemic' pesticides (those absorbed into the 'system' of the plant) at all costs as the residue from the pesticide can be found in the nectar and pollen that the bees feed on. Choose a 'contact' insecticide (works by 'contacting' and killing the insect directly) which in many cases has a much shorter residual time (time needed to pass before the chemical is degraded and loses effect).

Apply chemicals early in the morning or later in the evening when bee activity is not at its peak thus minimizing any bee loss or injury to the bees.

5. Remove wild swarms safely. A healthy bee colony increasing in size will swarm, leaving some bees and a queen in the old hive and a new queen with her followers leaving to find a new location. Holes in trees, roofs and buildings may be suitable homes for a bee colony. A swarm that is still looking for a home may rest on a branch or side of a house temporarily. If you find you have a swarm nearby, contact a beekeeper to have it removed professionally. He will take those bees and start a new beehive with them rather than killing them unnecessarily.
6. Support your local beekeeper. Buy local honey when available. Taking care of bees is an expensive task and time consuming. Selling honey is one way that beekeepers can recover some of the costs of buying and maintaining hives, equipment etc. Our bees need to be cared for by beekeepers in order to remain healthy. Our environment needs bees. Therefore we need as many happy beekeepers as possible.

The beekeeping industry is going to need more beekeepers to keep the industry alive. If you are interested in keeping bees or even having

bees kept on your property, contact a local beekeeper to express your interest.

Ref: <http://en.wikipedia.org/wiki/Bee>

www.drgreene.com/tip/tips-avoiding-bees-and-preventing-bee-stings

In our next issue of Envirotalk we will be discussing medicinal herbs in bee health.

Claire Jessey

Plant Protection Officer

TALES FROM THE SNAIL TRAIL...SLIP SLIDING AWAY...

This is a familiar story, told several times in the past two decades, of the demise of our endemic land snail *Poecilozonites circumfirmatus*. A weighty name for a tiny snail, the surviving member of Bermuda's only endemic animal genus. It is a unique animal that is suffering the same predictable fate as many other island animals globally, as the result of human action and inaction. We know now that two related endemic species, *P. bermudensis* and *P. reinianus* probably became extinct in the 20th century. The decline of our endemic snails was decried by the great evolutionary biologist the late Dr. Stephen Jay Gould, who had studied their fossil cousins and the alarm was sounded again by Bermuda's eminent biologist Dr. Wolfgang Sterrer in the 1990s. Now it is time to rally interest in saving our remaining minute mollusk from extinction on our island. Its loss would represent the end of a lineage that stretched back through the Pleistocene, for at least one million years.

A landmark survey of the island's snails, by Drs. Rudiger Bieler and John Slapcinsky in 1998, revealed very sparse numbers of our endemic snail island-wide. Only 30 years earlier it was described as "common everywhere". In response, the Bermuda Biodiversity Project conducted follow-up surveys in 2002, 2004 and 2006 with very few animals located at sites where it had been reported previously. The release of three predatory snails in the 1950s and 1960s, as biological control agents for the super-abundant agricultural pest snails, *Otala lacta* and *Rumina decolleta*, are threats to our land snail. Also, Wolfgang Sterrer discovered a newly introduced predatory flat worm, *Bipalium kewense*, that appears to have an appetite for our endemic snail.

The Recovery Plan

By 2003, the Bermuda Biodiversity Strategy and Action Plan (BSAP) had been published and the Bermuda Protected Species Act had been passed. These actions created the framework to recognize threatened and endangered species and resulted in the *Poecilozonites circumfirmatus* recovery plan written by Dr. Samia Sarkis of the Department of Conservation Services

earlier in 2010. The primary objective is to re-establish self-sustaining populations of snails at appropriate sites. The plan lays out the need to locate any existing wild populations and to evaluate the potential threat from the known predators. If any live *P. circumfirmatus* are found then it would be important to characterize their genetic identity, in part to compare with the captive-bred animals. We are fortunate that Wolfgang Sterrer had sent our snails to the Zoological Society of London in 2004, where they have been breeding successfully in the London Zoo. The plan anticipates the need to re-patriate some of the captive bred animals, develop captive breeding facilities at BAMZ and use these animals as seed populations for a re-introduction programme at appropriate sites.

We have a workable plan – this summer I began with the first step by conducting surveys for all snails at the sites where previous live *P. circumfirmatus* had occurred in either the 1998, 2002 or 2004 surveys. I was ably assisted by volunteer Dylan Smith, Alison Copeland (DCS BSAP Coordinator) and Ron Burchall (DCS Summer student).

Negative Results

Intensive searches of suitable habitat (rocks, bay grape litter, coastal grasses) have been done at four sites: A.B. Smith Preserve in Paget, Devonshire Bay, Hungry Bay and at Spittal Pond. I must report that we have *not* found any live *P. circumfirmatus*. The most abundant living snail we have found is *Oligyra convexa*, followed by *Otala lacta* and then *Bradybaena similaris*. All of these are introduced species. A single specimen of the introduced predator, *Gonaxis quadrilateralis* was found under a rock at Spittal Pond (but no others under the 50+ rocks we inspected in the immediate area) and a specimen of *Gonaxis kibweziensis* was found on a trail at Spittal Pond as well. A single introduced predatory flat worm *Bipalium kewense* was found at the A.B. Smith Preserve.

Positive Results

A key component of the recovery plan is the re-introduction of captive-bred snails into suitable habitats. It is vital for the success of the plan that the predatory snails and flatworms are absent from any proposed restoration site. The good news at this point is that the predator numbers are very low and, most significantly, I have not found any live rosy wolf snails, *Euglandina rosea*, and very few empty shells at all.

Moving Forward

It is not encouraging, or surprising, to have failed to find any live endemic land snails after searching 200–300 m² at four sites. Not a large area,

considering Bermuda has about 24 km² of protected areas left to examine, a formidable task. At this point it is clear to me that they are not at the sites where they were 8–10 years ago, in the habitats they had been found in: under rocks and stones, associated with bay grape leaf litter. My deduction is based on the general absence of “fresh” empty *P. circumfirmatus* shells, a good indicator of their recent occurrence. My reading of the papers by naturalists from the 19th century and early 20th century (Pilsbry, Heilprin, Piele, Verrill) did not give many clues, but their sparse notes indicate that they were found “everywhere”. So I intend to broaden my search in two ways: searching more inland sites that were not considered in the most recent surveys and by encouraging an active monitoring of live snails by my colleagues in the Ministry and the public at large (...yes...you, the reader!).

My goal in the latter effort is primarily to increase our knowledge on the distribution and abundance of the introduced snails as we move into cooler and wetter conditions where the snails may become more active. A useful clue to snail activity, particularly the rosy wolf and milk snails, is the glistening “slime trail” each animal leaves behind when it is moving around on hard surfaces, such paved driveways, walkways etc. These can be obvious first thing in the morning.

As *P. circumfirmatus* is a protected species it is important to alert the public that, since the snails cannot be collected, they can only inform me of their whereabouts! However, one introduced snail, *Oligyra convexa*, is fairly similar to our protected land snail in size and colouration, when viewed from the top of the shells. But when you flip them over and look at the underside of the shells, you can see clearly that our land snail has a visible “hole”, called an umbilicus, that is *absent* in *Oligyra* (Figure 1 c, d). It won't take a second to discern this difference and this should prevent a lot of “false positive” reports back to me!

I would like to request that you pass information on to me, via email to srsmith@gov.bm about any living snail activity you observe at work, at your residence or places you are visiting around the island.

The most helpful information would include:

- The date of the observation and time of day

- The specific site information, e.g. a house or building address, a trail location in a nature preserve, a landmark, etc.

- The location you saw the animal, e.g. on a rock, on leaf litter, etc.

- Your identification of the animal based on the photos provided in this article.

A photo would be great, although you will need to master your macro-

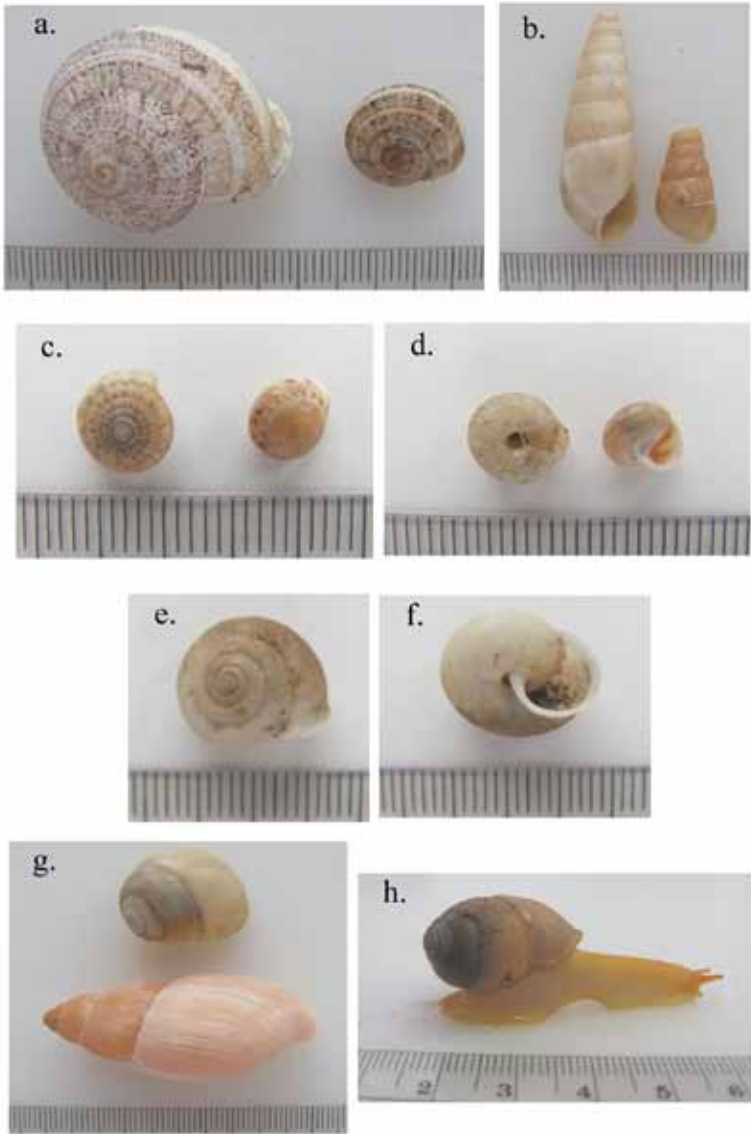


Figure 1. a, *Otala lacta*, adult and juvenile; b, *Rumina decolleta*, adult and juvenile; c, *Poecilozonites circumfirmatus* top (L) and *Oligyra convexa* top (R); d, *Poecilozonites circumfirmatus* bottom (L) and *Oligyra convexa* bottom (R); e, *Bradybaena similaris* top; f, *Bradybaena similaris* bottom; g, *Euglandina rosea* lower and *Gonaxis kibweziensis* upper; h. *Gonaxis quadrilateralis* on the move! The scale is in millimeters.

photographic skills for the small snails!

I plan to respond to each reported occurrence. I would prefer that you collect and kill any of the predatory snails by putting them in a ziplock bag and freezing them. I would be happy to collect them from you.

I would greatly appreciate your assistance in collecting any data on the living land snails in Bermuda. An assessment of the status of *P. circumfirmatus* and an evaluation of the potential threat from introduced predators are critical first steps in the Recovery Plan. It will take a concerted effort to accomplish these tasks and it is important that we make progress as no action aimed at restoration can be accomplished without this information. A plan is not useful sitting on a shelf or in a file cabinet.

I borrowed the phrase in the title "slip sliding away" from a Paul Simon song. The remainder of the refrain is "...the nearer your destination, the more you slip sliding away". I hope that our goals in the recovery plan will not elude us and that we can bring our land snail back home!

Robbie Smith
Curator, Natural History Museum

IN THE KITCHEN

Classic Pumpkin Pie

Ingredients:

1 cup all-purpose flour

1 teaspoon sugar

¼ teaspoon salt

3 tablespoons canola oil

1 tablespoon butter, melted

2-3 tablespoons cold water

Filling: 1 egg

1 egg white

½ cup packed brown sugar

¼ cup sugar

½ teaspoon salt

½ teaspoon

ground

cinnamon

⅛ teaspoon each

ground allspice, nutmeg and

cloves

1 can (15 oz) solid-pack pumpkin

1 cup fat free evaporated milk



Procedure:

Pre-heat oven to 375 degrees.

In small bowl, combine flour, sugar and salt. Using a fork, stir in oil and butter until dough is crumbly. Gradually add water until dough holds together. Roll out between sheets of plastic wrap into an 11-inch circle. Freeze for 10 min.

Remove top sheet of plastic wrap and invert into 9-inch pie pan. Remove remaining plastic wrap from dough and trim and flute edges. Chill until ready to use.

Roll pastry scraps to $\frac{1}{8}$ inch thickness. Cut with a 1-inch leaf shaped cookie cutter. Place pieces on an ungreased baking sheet and bake at 375 degrees for 6-8 minutes or until edges are very lightly browned. Cool on a wire rack.

In a large bowl, beat the egg, egg white, sugars, salt and spices until smooth. Beat in pumpkin. Gradually beat in milk. Pour into pastry shell and bake for 40-50 minutes or until a knife inserted near the center comes out clean. Cool on wire rack. Garnish with leaf cutouts and whipped cream.

(Recipe supplied from 'Taste of Home' website)

Scalloped potatoes

Ingredients:

1 bag potatoes (5 lbs)

5 onions

$1\frac{1}{2}$ – 2 cups of milk (2%)

2 cans cream of mushroom soup

1 can of cheddar cheese soup

$\frac{1}{2}$ bag ($1\frac{1}{2}$ cups) mild/sharp

cheddar cheese shredded

2 tablespoons mustard

1 teaspoon pepper

$\frac{1}{2}$ teaspoon garlic salt

$\frac{1}{2}$ teaspoon salt

$\frac{1}{2}$ teaspoon celery salt

Procedure:

Pre-heat oven to 400 degrees.

Pour $1\frac{1}{2}$ cups of milk into a medium size pot on medium heat. Add cans of cream of mushroom and cheddar cheese soup one at a time stirring well with each addition until lumps are at a minimum. Add mild or sharp shredded cheese to sauce and stir well. Add mustard, pepper, garlic salt, salt and celery salt to sauce. Taste and add additional ingredients as needed.

Slice potatoes to $\frac{1}{2}$ cm (5 mm) thickness and add to large oven-safe glass or ceramic bowl. Chop onions, in rings, $\frac{1}{2}$ cm in thickness and add to potatoes and mix well. Pour sauce over potatoes and onions and mix to evenly distribute sauce. Cover bowl with foil and place into oven. Bake for 2 hrs or until potatoes are tender. Uncover and bake for additional 10 minutes.

(Recipe supplied by Kimberly Burch)

PLANTING CALENDAR – WHAT TO PLANT IN THE FALL..



VEGETABLES

September

Beans, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Cucumber, Eggplant, Kale, Leeks, Mustard Greens, Parsley, Pepper, Potatoes, Radish, Rutabaga, Tomato, Turnip.

October

Beans, Beets, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Chives, Cucumber, Eggplant, Endive, Kale, Leeks, Lettuce, Mustard Greens, Onions, Parsley, Pepper, Potatoes, Radish, Rutabaga, Spinach, Squash, Strawberries, Thyme Tomatoes, Turnip.

November

Beans, Beets, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Chard, Chives, Kale, Leeks, Mustard Greens, Onions, Parsley, Potatoes, Radish, Rutabaga, Spinach, Squash, Strawberries, Thyme, Tomatoes, Turnip.

FLOWERS

September

Celosia, cosmos, gazania, globe amaranth, impatiens, marigold, salvia, snow-on-the-mountain, vinca and zinnia.

October

Ageratum, antirrhinum, snapdragon, aster, aubrieta, begonia, bells of Ireland, candytuft, carnation, centaurea, chrysanthemum, cineraria, dahlia, dianthus, geranium, gerbera, gypsophila, impatiens, larkspur, lathyrus, nasturtium, nicotiana, pansy, petunia, phlox, rudbeckia, salpiglossis, salvia, statice, snow-on-the-mountain, spider flower/cleome, star-of-the-veldt, stock, sweet William, verbena and viola.

November

Ageratum, antirrhinum (snapdragon), aster, aubrieta, begonia, bells of Ireland, candytuft, carnation, centuarea, chrysanthemum, cineraria, dahlia, dianthus, geranium, gerbera, gypsophila, impatiens, larkspur, lathyrus, nasturtium, nicotiana, pansy, petunia, phlox, rudbeckia, salpiglossis, salvia, statice, snow-on-the-mountain, spider flower/cleome, star-of-the-veldt, stock, sweet William, verbena and viola.

ON HER MAJESTY'S SERVICE



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