Earlier this year Western Australia’s Perth Zoo reported to Puggle Post that they felt they were now two steps closer to uncovering more of the weird and wonderful world of monotreme breeding following the birth of their two echidna puggles, Mila and Chindi. The two puggles were born in August last year. Keepers won’t be able to determine if they are girls or boys, or one of each, until they are at least two-years-old.

This is only the second time echidnas have been born at Perth Zoo and the zoo’s latest editions are only the tenth and eleventh echidnas ever bred in captivity in Australian zoos.

Australian Fauna supervisor Arthur Ferguson has been working with the Zoo’s echidnas for many years to try and unravel the mysteries of echidna reproduction.

“They’re very unusual animals and being monotremes – mammals that lay eggs – is only part of the mystery,” Arthur said.

“I’ve been working with the Zoo’s echidnas for nine years now and over that time I’ve been watching them and observing their reproductive behaviour – or lack thereof – and trialling different things. With the new exhibit and a change in animal management strategies, we’ve been able to successfully hatch and raise echidnas.

The puggles bred at Perth Zoo are being monitored 24 hours a day seven days a week via camera surveillance. The information provides an opportunity to study maternal care, development and age of maturity of Short-beaked Echidnas.

continued page 2...
The three adult females – of which two produced puggles – were also fitted with tiny data loggers, weighing just three grams, which record temperature every 15 minutes. The whole colony of six adults is being studied to look for trends and comparisons between male and female echidnas.

"A few key factors for successful breeding stand out. Firstly, the females should be kept separate from each other. Secondly, the burrow environment is very important and thirdly males should be separated from the females after mating.

"Echidnas like a cool burrow but also need a warm spot to bask in the sun on cool days, just like reptiles. We found that the female prefers a cool burrow where she can regulate her body temperature during egg incubation. When not disturbed and the temperature is just right, the female is able to successfully incubate her egg. Without this, the egg may not develop properly. We’ve also found that the female won’t eat or drink for at least 10 days during the egg incubation process.

"Of the three pairs put together this year, two successfully bred so we think two of the matches we’ve got at the moment work well. They still go through the usual echidna courtship though, which we have seen last for approximately seven to eight days."

Echidnas take part in courtship ritual in the lead up to mating called an echidna train. Potential males queue up behind a female and follow her around for up to six weeks before mating. As they follow her they nudge her tail, or side, with their snouts. When the female signals she’s ready to mate, she’ll dig her front legs and head into the sand. This is a signal for the males to start digging a trench near her.

When a rut is formed in the ground the males start trying to push each other out the way by going head to head.
Finally one male is left standing and mating begins with the male slightly under the female and turned on his side. "The video monitoring has proved invaluable because we can observe rarely seen reproductive behaviour," noted Arthur. "We can also determine when mating has taken place and then separate the male. Separating the male allows the female to lay and incubate the egg undisturbed. We've also seen when the female enters the burrow to start the incubation process. From that information we know when the puggle will hatch and when to check the female's pouch to confirm the presence of a puggle."

About 23 days after mating, the female lays an egg which she deposits into her pouch. It stays there for 10 days before hatching. At hatching, the puggle is underdeveloped with closed eyes and tiny buds for hind legs. However, its front legs have tiny claws which it uses to make the climb from deep in the pouch to the mother's milk patch or areola for its first drink. "We're discovering the importance of a good burrow to these animals, especially when it comes time to deposit the puggle," said Arthur. By that stage, the puggle is about two months old, its spines are just starting to grow and it can be seen literally hanging on for dear life as its mum goes about her business. "We haven't found out yet whether the mother removes the puggle from the pouch herself or if it comes out naturally but we're hoping to discover this with more study.

"Once deposited in the burrow, the puggle – which is only about 280 to 350 grams and fits easily into the palm of a hand – is left alone. The mother back fills the burrow and blocks up the entrance to stop the puggle crawling out. At this stage of its life, it is defenceless so would be easy prey to nearly anything. Blocking up the entrance may also help regulate the temperature within the burrow. The mother returns every two-to-five days to feed it."

"We've had three successful breedings now and want to build on this," said Arthur. "I believe we're on the right track but with more study we can gain even greater understanding. It has been a really exciting study so far and I have a feeling it’s only going to get better."

It is hoped that research into the reproduction of Short-beaked Echidnas will help provide vital information to help save its endangered cousin, the Long-beaked Echidna. Long-beaked Echidna is now only found in New Guinea and faces extinction in the wild. They have never been bred in captivity. About eighteen months ago Arthur visited Peggy and Mike at their Pelican Lagoon residence on Kangaroo Island. "Having read Peggy's research publications it was great to meet her in person and talk to her about her experience working with and studying Echidnas in the field", said Arthur. "Unfortunately we didn't get to see any of the Echidnas Peggy was studying but it was still great to talk with her and see the Pelican Lagoon research site.

"One of the key things for me in the lead up to our success was to understand Echidnas in their natural environment and apply this knowledge to enhance aspects of our husbandry and management" concluded Arthur.

Arthur has recently spent a week at Currumbin Sanctuary in Queensland helping with the Echidna Research project there.

Dr Peggy getting a cuddle from a long-beaked echidna

UPDATE: Mila first appeared out of the nursery burrow on January 23rd and at it’s last weigh in mid March it clocked 1.782kilos on the scales. Chinda on the other hand took his/her time and hung around until February 19th before venturing out and at the same weigh in came in at 2.911kilos - a big boy (or girl)
Julie and John Barrie paid a short trip to Kangaroo Island last September. They came with an Australian Plant Society group to have a quick look at how native vegetation had regenerated after the 2007 bushfires. What they didn't expect was a very special echidna encounter.

Julie takes over the story.

"We were travelling in two cars with a tentative and somewhat unreliable communication system of 2-way radios with a very short range. Rather than stick to the main roads which do not give a great variety of native vegetation, we travelled on smaller tracks. I was driving the following vehicle and as we crossed a bit of a ford I had the impression of a leaf blowing in the wind across from the center of the road towards the right hand side. It looked a silver grey, was very floppy and just did not quite fit my idea of any sort of leaf my brain could quite put together."

"I tried to radio the leading car but they were already out of range. I stopped the car saying, 'I've seen something on the road' and raced back to the ford where I had seen the 'leaf'. My friend followed asking 'What did you see?'. But I couldn't describe anything that would make sense 'I don't know', I told her, 'but it was something different!'

"As we got close to the ford, I saw my 'leaf' was actually a puggle and was right in amongst the bigger rocks on the side of the road, desperately trying to clamber over them. At first I thought he had been hit by a car but when I picked him up I realized that he was just caked in dry mud which brushed off cleanly with no signs of injuries."

"So what do you do with a puggle running around in the middle of a road? I could not see a mother anywhere. We couldn't leave it there so, rather than upset it by handling it too much, we put it into the pocket of a green shopping bag where it snuggled in quite happily."

Julie and John's daughter and son-in-law live on Kangaroo Island at Flinders Chase so they contacted them and they in turn got in touch with the rangers at Seal Bay and also Dr Peggy.

"When we arrived at Seal Bay the rangers were waiting for us and we handed our puggle over". Well how lucky can one little puggle be. He ended up growing into a healthy echidna at Dr Peggy and Mike's place at Pelican Lagoon.

Dr Peggy follows up.

"It turned out that Coona was still a pouch young and when he first came in he refused to eat. In fact, I was ready to send him up to the genetics department as a tissue sample!"

Anyway, after about 14 days Coona avoided the genetics department and started to eat and, at the time of writing this, some six months later, he is out and about doing his own thing enjoying the scrub around Pelican Lagoon.
It is normally impossible to tell the sex of a young echidna. "But we know for sure that Coona is a boy", said Dr Peggy, "because when he was eating the thirty to forty per cent of his body mass, his little penis would come out!"

As Julie told Puggle Post, "I still do not know what really made me recognize that the strange grey leaf was something I should check out, but I am very glad I did. I am thrilled that he has thrived and the last photo I saw of him at Christmas he was different to say the least - he obviously likes his food".

Julie and John are very interested in Australian Native Plants and have a small nursery in Coonalpyn in South Australia. They grow a wide range of species from annuals in the form of paper daisies to grafted grevilleas, verticordias, eremophilas and everything in between. They specialise mostly in plants that will thrive in dry, alkaline conditions and have written a book called Good Choices, Simple Steps, which shows how to match the right plants with the right conditions, and shows how plants CAN be grown without the addition of extra water.

"Good Choices, Simple Steps" can be ordered from http://www.goodchoices.com.au
Prominent on the South Australian Museum’s annual calendar is The Waterhouse Natural History Art Prize - Australia’s largest purse for a natural history art competition.
The exhibition celebrates our intricate and complex global diversity and encourages excellence in natural history art.
There were 693 entries in last year’s exhibition with judges having the arduous task of short listing the numbers down to 102 exhibits. Amongst those exhibits a poignant colograph (ink on paper) by local South Australian artist Maria Bray caught my eye. A short piece of beautiful prose accompanied the drawing telling the sad tale...

...it happened very quickly
One moment the road was clear
Then a shadowy form appears
The thud sounds
The car does a u-ie and inspects the form
Impact gives the mortal blow
A distressed motorist (me) takes the body home
Before, a non religious burial
the artist records it’s beauty
so this death is not in-vane,
and a short life on earth will be remembered.
The echidna has returned to the spirit of the land
This image, its legacy to human kind.

Maria Bray was born in Germany, escaped from communist East Germany and arrived in Australia at an early age. A trained nurse and midwife, Maria started the trees for life in the mid north of South Australia and has worked on various environmental projects on the south coast.
Nineteen year ago she had a career change studying art and receiving her Bachelor of Visual Arts and Applied Design. Maria has exhibited both in Australia and overseas. In 2006 she was a finalist in two major national art awards, The Waterhouse Natural History Prize in Adelaide and the Silkcut Lino Award in Melbourne.
South Australian nature photographer Stephen Carter was certainly at the right place at the right time last December when he captured these wonderful shots of a feasting echidna.

"I was invited for a tour of the Native Rainforest Flora Nursery in Summertown by owner, Darryl Kinnaine, who knew I was a keen photographer", explained Stephen. "They have a rainforest on their property which has been developed over many years and offered lots of wonderful colours, shapes and dappled light to photograph.

"We spent several hours walking around the forest and while walking along one path Darryl spotted the Echidna, a couple of metres from the track, with its nose deep inside a rotting tree trunk which was covered in ants. I took a few photos from a distance and it didn't seem too perturbed, so I ventured closer to get some shots from different angles.

"Again it didn't seem worried by my close proximity and lifted its nose from the stump to peer at me, giving me a great opportunity to take some photos of its furry underside, nose and eyes. I was thrilled to have seen an echidna in such detail and felt very lucky to be armed with my camera.

"I live opposite Cleland National Park and while walking in the park a couple of years ago I was fortunate to have seen an echidna along the way - my first exposure to one in the wild, but unfortunately didn't have my camera with me. Nowadays I carry my camera more often, because you never know when you'll see a gem in the wild.

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Forty-two year old Stephen claims he refuses to act or feel his age, preferring to think of himself as being in his mid 20’s (don’t we all?). “Living opposite Cleland National Park, we are surrounded by nature and wildlife and the tranquility that brings”.

Stephen’s day job is a Computer Systems Analyst which he balances after hours by instructing kids in World Taekwondo, taking photos of his surroundings, bush walking, health and fitness, music, Buddhist philosophy, cooking, science, technology and continuing to learn new and interesting things.

Now that’s a full life!

If you would like to see more of Stephen’s delightful photographs check out his website - http://www.flickr.com/photos/imagegratification
Hi Peggy,

I thought that this might interest you... I have had a puggle in care for about 6 weeks now - came in at 90 grams - now just over 300 grams. Ears just opened - putting on weight well. I figure he is about 'average'.

I received another puggle yesterday that was found in a river south of Brisbane in a suburban area after some heavy storms and flooding. They said it was a puggle but was much bigger than their hand. Mmm?

Turned out to be exactly the same stage of development as my little one but weighed 1.1 kilos!

He has the same size spines and looks like the ears have just opened as well.

Nice big fat puggle and healthy (other than a case of pneumonia from being in the water). He is doing a lot better today - more responsive - he was very exhausted and flat yesterday when he came in.

Just goes to prove that you definitely can't use weight as a guide to age.

Would love to see the mother!

I have attached a photo of the two of them together. The little one had a full belly (was fed last night) and the new one is nervous. I took the photo very quickly - hence the quality - so I could get them back to ‘bed’ quickly.

Regards, Karen Scott, Education Coordinator Wildcare Australia

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Did you know that echidnas come in blondes, brunettes and redheads?

This little blonde lives on Kangaroo Island and is often spotted by locals going about her business.

This photo however was taken by a surprised visitor Malcolm Cook from the mainland.

No - we are not going to do any blonde jokes!
Has your membership lapsed? Or would you like to make a research donation? Know someone who wants to join Echidna Care Inc?
Membership fees for Echidna Care are for a 12 month period. There are several membership categories:

- **Standard-Individual**: $15
- **Student/pensioner**: $10
- **Group Membership**: $25
- **Overseas**: $A25

Please send your fees or donations to:
Echidna Care Inc. Post Office Penneshaw Kangaroo Island South Australia 5222

Echidna Care Inc have produced **Echidna Road Signs** that have been designed to help protect your local echidnas from becoming just another road kill statistic. Put up warning signs on any roads your echidnas may have to cross so you can warn motorists of the danger (to the echidnas!).

The yellow plastic signs with the wording “Echidnas Next 4Kms” are available in 4 different sizes:
- 12 x 12cm (swing, with suction cup) $2
- 18 x 18cm $3
- 25 x 25cm $4
- 38 x 38cm $6

**Bonus:** Buy any two signs and get a free Echidna Watchers Guide (what all good echidna watchers should have) and road sign magnet.

Postage for any two signs $4

Postal address: Echidna Care Inc Post Office Penneshaw Kangaroo Island South Australia 5222

Any Questions? e-mail: echidna@kin.net.au

Please don’t let this be the fate of the echidnas in your area...