Ripples

Newsletter of the ***AUSTRALIAN PLATYPUS CONSERVANCY***

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OF TIME AND THE PLATYPUS

In May of last year, a paper announcing that the sequence of DNA in the platypus genome had been mapped was published in the prestigious scientific journal *Nature*.

This project itself was an international enterprise of mammoth proportions: more than 100 scientists based at 32 universities and research institutes located in nine different countries (Australia, New Zealand, United States, United Kingdom, Germany, France, Spain, Japan and Israel) are credited with having contributed to the results.

With few exceptions, journalists reporting on this study were content to explain its findings in terms of the standard popular concept of the platypus: a weird hybrid between reptiles and "true" mammals that has been stuck in a static time warp since the age of dinosaurs.

Not surprisingly, the facts actually revealed by the study are both more complex and a lot more interesting.

To begin with, the majority of platypus genes (82%) are held in common with a wide range of other vertebrates such as dogs, mice, chickens, humans and opossums (a marsupial found in North America). These genes are presumed to be involved with core biological functions that haven't been altered for hundreds of millions of years.

Platypus genes that are held in common only with other mammals include those coding for the milk proteins known as caseins. As well as having a nutritional function, milk proteins also have anti-microbial properties—in fact, it has been suggested that the reptilian ancestors of mammals may have originally started producing milk-like substances in order to help protect their eggs from rotting as well as drying out.

By comparison, the researchers involved in the platypus genome project seem to have been less successful in identifying functional genes that the platypus shares only with reptiles.

For example, it turns out that the genes coding for platypus venom—a cocktail of 19 or more different substances—appear to have evolved quite independently from those coding for reptile venom, though both groups seem to have taken advantage of similar chemical pathways to achieve their ends.

Another example of how the platypus appears to have evolved in its own right involves its sense of smell. Olfaction is not normally a sense that one expects to be highly developed in aquatic animals. In keeping with this generalisation, the platypus has only about half the number of genes linked to odour detection as compared to land-based mammals.

However, scientists have been intrigued to learn that this species has an exceptionally large number of genes coding for specialised smell receptors in the vomeronasal (or Jacobson's) organ—a structure present in both mammals and reptiles that is most often used in social communication. In the case of the platypus, it has been suggested that these receptors may

either serve to detect chemical signals left by other platypus and/or to help locate underwater prey based on chemical cues.

Now that the platypus genome has been mapped, it is much easier to undertake further genetic research on the species. Accordingly, Ph.D. students have now begun to investigate how platypus populations in different parts of Australia may vary genetically.

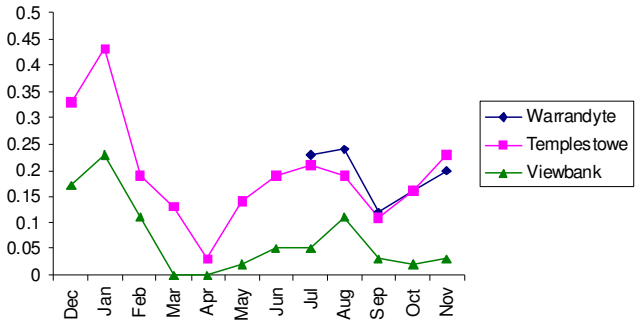
We look forward with great interest to learning about their results.

***PLATYPUS COUNT* POWERS ON**

In *Ripples* 38 we showed a graph that compared the average number of platypus seen in visual surveys carried out on a monthly basis from 2003 to 2006 along the Yarra River (in the Melbourne suburb of Viewbank) with the average rate at which platypus were captured in live-trapping sessions in the same catchment.

The two curves were remarkably similar in shape—platypus sightings and platypus captures both peaked in winter and early spring. This was ascribed to the fact that both variables respond to platypus activity, which should increase in winter for two reasons: (1) platypus have to work harder to find enough food as water temperatures drop, and (2) adult males become progressively more active and mobile as the spring breeding season approaches.

Volunteers have been working hard to provide information for a full-scale *Platypus Count* visual monitoring program along the Yarra River at Viewbank and Templestowe since December 2007, with data available for the Warrandyte area since July 2008. Results for the first year are shown below, in a graph summarising how many platypus were seen on average per viewing site in the three areas.



The shapes of the three curves are very similar, indicating that enough monitoring was carried out in each area to provide a valid indicator of platypus activity (which in turn presumably reflects the number of platypus found there).

In absolute terms, the rate of platypus sightings at Templestowe was similar to that recorded at Warrandyte throughout the period that data was available for both locations. By comparison, fewer sightings occurred at Viewbank, which is located farther downstream than the other two areas, near the lower geographic limit of where platypus are regularly found along the Yarra.

With respect to longer term trends, the average monthly rate of platypus sightings at Viewbank from 2003 to 2006 closely paralleled the rate of sightings recorded there in the first four months of 2008. In contrast, the incidence of sightings from May to November 2008 was much lower than in previous years. It is possible (though certainly unproven) that the reduced frequency of sightings in the winter and spring of 2008 may have been causally linked to the unusually low flow regime experienced along the Yarra through much of this period, e.g. if low flows contributed to reduced platypus breeding activity.

The use of community-based visual surveys to track the abundance of platypus populations is necessarily limited to water bodies where volunteers are available to undertake the work—live-trapping methods will probably always be required in places supporting few or no human inhabitants. However, in places where people do regularly visit waterways, platypus visual monitoring programs potentially offer numerous advantages over the use of nets:

(1) Far more cost-effective with respect to generating the large amounts of data needed for reliable monitoring.
(2) Does not entail any risk or disturbance to the animals.
(3) Less constrained by unpredictable or bad weather.
(4) Particularly well-suited for use along larger streams and rivers, i.e. the habitats that are likely to be most important to platypus conservation in any given catchment.
(5) Intensity of monitoring effort is not limited by animals learning to recognise and avoid nets ("trap-shyness").

More research is needed to determine if the seasonal variation in platypus sightings which predictably occurs along the Yarra River is replicated elsewhere in the platypus's range.

The Conservancy is accordingly grateful to the City of Manningham, City of Banyule and Shire of Yarra Ranges for their support in facilitating growth of *Platypus Count* along the Yarra River at the same time that The Norman Wettenhall Foundation is helping to fund development of new *Platypus Count* programs in country Victoria and New South Wales. Sincere thanks are also due to ACT Waterwatch for ongoing and very able assistance with setting up a *Platypus Count* program in the ACT and its environs.

TRANSLOCATION UPDATE

If you read *Ripples* regularly, you're probably already aware that platypus are believed to have disappeared from Cardinia Creek—a small, self-contained stream system located in Melbourne's outer southeastern suburbs—in the aftermath of the 1983 "Ash Wednesday" bushfires which wreaked havoc in the Cardinia Creek valley. According to local sources, the extinction may have partly reflected the fact that sections of the creek channel dried up for some time after the fire passed through the area, presumably due to evaporation.

Since 2004, the Conservancy has been working to re-establish a viable platypus population along Cardinia Creek, by translocating young animals from neighbouring water bodies and then monitoring how well they (and eventually their offspring) have been faring.

Earlier this year, APC staff were dismayed to learn that at least two members of the new population had been killed in illegally set crayfish traps (see *Ripples* 39).

However, the latest and very good news is that the population is doing its best to bounce back, with six juveniles captured in a survey session carried out in April. The youngsters comprised two boys and four girls, christened Peter, Piggy, Peach, Plum, Primrose and Princess. Thus, a grand total of at least seventeen home-grown platypus have been successfully weaned along Cardinia Creek since 2006.

Did You Know That....

Platypus occupy rivers and streams in western Victoria where salinity sometimes peaks at 10,000 to 14,000 EC units. By comparison, horses and sheep respectively can tolerate up to around 9,000 and 16,000 EC units in drinking water without suffering a decline in health and condition.

TOOROURRONG BUSHFIRE DESTRUCTION

Many persons will have fond memories of the *Platypus Insights* spotting tours that were run from the Conservancy's former research base at Toorourrong Reservoir Park, near Whittlesea on Melbourne's northern outskirts.

Unfortunately, the very hot bushfire which ignited near Kilmore in February 2009 destroyed vegetation and manmade structures throughout the park, including the four bedroom brick residence (a former caretaker's cottage) which served as the APC's base of operations from 1996 to 2007.

It is currently not known how the platypus living in Toorourrong and two smaller reservoirs located nearby (Wallaby Weir and Silver Weir) fared in the wake of the inferno.

As discussed in *Ripples* 39, the results of a study carried out by APC staff last year suggest that platypus may generally be expected to survive the direct impacts of bushfire (flames, radiant heat and smoke) due to their habit of sheltering in burrows located next to water.

However, the animals' ongoing survival after the disaster may be more problematic, particularly if a large amount of ash and other loose sediment is washed into the reservoirs and their associated streams this autumn or winter—and this in turn smothers or otherwise severely reduces the number of aquatic insects and other invertebrates that are available for platypus to eat.