Discovering the dragon

A powerful hunter, the Komodo dragon is the top carnivore on the islands

The Komodo dragon's razor-sharp teeth, toxic saliva, appalling breath and remote homes are just preliminary problems for scientists investigating this fascinating creature. **Claire Ellis** reports

Looking as if it just stumbled straight from the set of Steven Spielberg's *Jurassic Park*, the Komodo dragon is held in awe. Its three-metre-long lumbering frame and carnivorous eating habits have made it an object of curiosity.

Fame and recognition came instantly with its discovery in 1912, yet because of the remote harshness of its island home, the Komodo dragon has been reluctant to give up lifestyle secrets. Scientists are beginning slowly to piece together the facts to understand how this animal survives so well in its dry surroundings and its future chances of survival.

Varanus komodoensis, the so-called Komodo dragon, captures imaginations. Today about 30,000 tourists a year visit the dragons' home. Yet the animal remains little understood in terms of biology and behavioural ecology. Why did it evolve to be the biggest lizard in the world? It has the smallest range of any of the world's large carnivores, living only on a few small islands in eastern Indonesia, and its range never appears to have been much greater. Why? It is suspected the population is slowly declining but all the factors involved are not known.

Unravelling the threads of its past, as well as its present-day biology, has not been easy. Dr Walter Auffenberg from the University of Florida did some pioneering research between 1969 and 1973, including a 13-month study on the islands. He showed the Komodo to be a solitary, diurnal hunter that lies in ambush to catch its prey (deer are the favourite), but also scavenges.

Some have home territories that include basking sites, burrows to sleep in at night or in the heat of the day and game paths to lie patiently beside, waiting for prey. Other Komodos seem to be transients, wandering at will.

They mate in June/July. Females lay their eggs underground more than

Food attracts the usually solitary Komodo dragons to one location (right)

a month later and the young hatch eight to nine months after this, at the end of the rainy season (March to May) when there is plenty of food for them.

Auffenberg established the basics. Modern analysis techniques are now allowing others to flesh out his work.

Detailed incubation knowledge has been crucial for ensuring captive breeding success. Intensive work by the National Zoological Park, Washington DC, USA, showed that eggs incubate at 27.5–29°C. Slight temperature alterations do not appear to alter the sex of the dragon babies, as is true for some reptiles, but simply changes the length of incubation period.

The toxic soup of their saliva has kept scientists busy. Once believed to contain poison, as everything they bit died, the Komodo dragon's saliva is now known to be home to a number of virulent bacteria that are lethal to the unfortunate victim.

This has served the Komodo well. Ambushed prey may struggle and get away. But, once bitten, it weakens over the next few days and the Komodo, using its superb sense of smell, will track the animal and continue to harass it, until the dragon finally gets its meal.

The bacteria probably comes from scavenged, decaying meat. As it eats, the dragon's razor sharp teeth frequently cut into its own gums. The subsequent saliva-blood combination seems to provide an ideal culture, keeping the bacteria alive until days or weeks later when the Komodo bites a healthy animal and passes on its lethal cocktail.

Toxicologists are fascinated. An American team is examining how the Komodo avoids its own infectious brew. Its body may contain a natural antidote that could prove to be medically useful for humans.

The Komodo dragon's body may contain a natural antidote that could prove to be medically useful for humans

Specific research tasks sound simple. The collection of saliva, blood and skin samples with today's battery of equipment and technology should be straightforward. But Komodo Island is remote.

Transportation on and off ships means equipment must be robust yet portable. There is also the complication that the Komodo is a reptile and doesn't take well to being tranquillised.

Baiting and trapping the Komodo has been the standard way to catch the animal. It then requires a little wrestling to ensure the animal is safely tied up before measurements and sampling starts. Of course, being that close is not everyone's cup of tea. Their breath is awful. The skin is rough and scaly and a tail swipe can break a leg.

Finding answers to defined questions has taken time, patience and dedication, not to mention sweat and tears, but understanding the evolution of the animal is a more complex detective job.

Chromosomal work reveals that Komodo dragons are more closely related to their Australian goanna cousins than to other monitor lizards spread across Africa or Asia.

This suggests the Komodo ancestors came from Australia. While Indonesia is fairly poor in fossil records, Australia has some extensive beds of the right age where the remains of

Rich coral reefs (left) are increasingly attracting underwater enthusiasts to the area

Young Komodo dragons (top) live in trees for the first few years of their lives to avoid being eaten by adults; a two-year-old dragon (above), bound for transport; a day-old baby (left) has much brighter markings than an adult lizard

Megalania prisca have been unearthed. The reconstructed bones look just like a Komodo dragon, but it was a seven-metre-long monster. If this was the Komodo's ancestor, the present-day Komodo dragon, rather than an example of evolutionary gigantism, is now a dwarf.

An EarthWatch programme under the guidance of an Italian scientist, Claudio Ciofi, has also been taking samples from the Komodo dragon, as well as working on a broader study of the animal. Ciofi is a chromosomal expert.

The Komodo dragons from Flores and Rinca look slightly redder than those on Komodo Island, which are a little blacker in colour. Ciofi is examining how distinct the genes of the reptiles are.

Differences indicate that there has been little mixing between the island populations for a considerable time and this has significant implications for the management of Komodo National Park.

As well, Putra Sastrawan from Udayana University in Bali is continuing his long-running research and association with the area.

National park rangers regularly take surveys of both Komodo dragon numbers and their key prey species to check on population levels and refine their management programme.

The issue of identifying the sex of adult Komodo dragons in the wild daunts scientists. Auffenberg estimated there were 5000 dragons with a ratio of 3.4 males to every single female. PHPA (the local national park authority) now estimates there are about 3000 dragons and, if Ciofi's work proves there is little mixing of geographically separate populations, a significantly skewed male-to-female sex ratio means there may not be as many breeding females as first impressions indicated.

Ideas, hypotheses and arguments swirl among the scientific community, making answers difficult to reach. Yet slowly new information is cast up. As scientists from different fields piece together their part of the picture, facts about the dragon emerge.

Further studies should shed more light on this mysterious animal, ensuring it continues to stalk the savannahs of eastern Indonesia for millions more years. G

Claire Ellis is a writer based in Jakarta. Her book Land of the Komodo Dragons *was recently published by Times Editions*