Gator embryos bind
Louisiana, Australia

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It is a scientific kind of reptilian bond that provides at least one bridge over the oceanic gap between Louisiana and Australia. That bond is a common interest in the developmental stages of the alligator.

Louisiana alligator ranching recently occupied attention at a worldwide conference on crocodile conservation and management, held in Sydney, where topics included growing gators, skinning them, preparing their hides, and selling them.

Of particular importance at the conference was the topic of the effect that incubation temperature has on hatching sizes and on their growth rates.

Professor Ted Joanen, a research biologist at the Rockefeller Refuge near Grand Chenier, spoke on the topic—and piqued the interest of Professor Jean Joss, a teacher of vertebrate evolution at Sydney's Maquorie University.

Joss followed Joanen to the local refuge, where he studied the changes in incubating alligator embryos and the effect that egg temperature has on both size and growth.

As an endocrinologist, Joss believed that it was more the case that hormone levels affected the growth rate, as well as the sex, of the alligator. So, she made arrangements to study the alligator embryos during their 65-day incubation period.

"I've been taking the embryos, several weeks prior to hatching, and looking at the gonads that haven't yet become ovaries or testes," Joss said. "I've looked to see if there's any difference in the hormone activity of the eggs incubated at male temperatures and those incubated at female temperatures."

Those eggs incubated at male temperatures are much more active in making hormones.

Joss also collected the brains of the alligator embryos and will take them back to Sydney for further studies. There, she will be able to determine the stage at which the brain is capable of relaying information to cause the release of master hormones, which cause development of either ovaries or testes.

The discovery that egg temperature affects the determination of sex among alligator hatchlings is a distinction that the Louisiana refuge claims as one of its greatest research efforts.

Since the early 1970s, alligator eggs have been artificially incubated at the Rockefeller Refuge so that scientists could analyze them.

"Our purpose is to learn how to handle the eggs and to provide information to alligator farmers here in the United States as well as some foreign countries," said biologist Larry McNeese.

"We found that incubation temperatures of 85 degrees Fahrenheit or below will produce all females; 91 degrees or above, all males; and 88 degrees will produce a mixture," McNeese said.

The temperature ranges have
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A hatchling at the Rockefeller Wildlife Refuge

Gators (Continued from front page)

been found to hold true in the wild as well as in controlled environments.

Each summer in late June and early July, Rockefeller biologists collect eggs from nests in the wild marshes of the refuge area as well as the large penned enclosures, where alligators are monitored for growth rate while being fed a special vitamin supplement in ground nutria meat.

Biologist David Richard said that 8,000 eggs had been collected and incubated this summer.

"We have to be careful with each egg," said Joanen, who explained that the market value of alligator hide and meat gives each egg a potential value of as much as $190.

The eggs from the wild are placed in boxes with hardware wire fabric tops and bottoms, stocked with natural nesting grass collected along with the eggs. The boxes are then placed in incubators, where the nests are monitored for temperature and humidity control.

"We wet the nests about once a week," said Richard. "We have found that the moisture, along with the bacteria found in the nesting material from the wild nests, are necessary in the formation of a shell that can be easily broken by the hatching alligator."

As the eggs hatch in late August, records are kept of all live hatches, infertile eggs, and any deaths during incubation.

"The more data you collect, the more you learn," said Richard. "Keeping these records is how we found the ideal time to gather the eggs after they are laid."

The percentage of live hatchlings will be lower than normal this year because of the time the eggs were collected, McNeese said.

"It was so dry this year, we had to make a choice: either pick the eggs up early, or risk losing many eggs that would dry up in the hot, dry weather," McNeese said.

The best time to collect the eggs is during the first seven days after they are laid, or three weeks after they have been in the wild, the biologists said.

The second and third weeks are critical developmental periods when the embryo attaches itself to the inside of the egg. Handling the eggs at this stage may cause the embryos to detach and the gators to die.

"We projected an 89 percent live hatch rate this year instead of our usual 90 percent because we picked up many of the eggs 10 to 12 days into incubation," McNeese said.

Each year the research efforts at Rockefeller broaden in scope. Joanen hopes that her work will prove her theory that temperature and hormones—rather than chromosomes—determine the sex and growth rate of gators.