



CREW ReView



Lindner Center for Conservation and Research of Endangered Wildlife • Cincinnati Zoo & Botanical Garden

Fall 2009

CryoBioBank



Roth's Remarks CREW's CryoBioBank™

Dr. Terri L. Roth
VP of Conservation & Science and Director of CREW

In the heart of the CREW building and vital to CREW's mission is the CryoBioBank. CREW's CryoBioBank consists of numerous specialized tanks filled with small vessels containing tiny animal and plant samples surrounded by liquid nitrogen. Cryopreserved at -320°F, these samples all but cease metabolic activity remaining viable in their suspended state for decades or even centuries. CREW's CryoBioBank is a safe haven for some of the world's most valuable and irreplaceable biological samples from rare and endangered plants and animals. For example, nowhere else in the world are viable Sumatran rhino spermatozoa preserved. Embryos from the imperiled Pallas' cat lay waiting to be thawed and transferred into recipients to carry on the genetic lineage of their deceased parents. And, cryopreserved tissue from the Northern Wild Monkshood offers the only hope for restoring a genetic line now extinct in the wild. To-date, samples from 75 animal and 210 plant species populate the tanks. Because CREW's mission focuses on propagating and genetically managing endangered plants and animals, the CryoBioBank primarily contains tissue and cells necessary for propagation. Animal samples encompass sperm, embryos and oocytes, whereas plant samples include shoot and root tips, pollen and seed. The CryoBioBank is a reservoir of genetic diversity, but it is not a static collection. Instead, samples are added to and removed from these tanks year-round as CREW scientists use them to further their research and to produce genetically valuable offspring and seedlings so desperately needed by rare populations in decline. CREW's CryoBioBank is not the answer to the extinction crisis but it is one more powerful tool in the arsenal needed to combat the world's ongoing loss of biodiversity. (CREW is very grateful to Weldco Incorporated for generously donating all the liquid nitrogen needed to maintain CREW's CryoBioBank over the past 4 years.)





In Loving Memory of Emi

Emi, the Sumatran rhino that made history by producing three calves at the Cincinnati Zoo from 2001-2008, passed away in her sleep on Sept. 5, 2009. No animal at the zoo was more beloved than this amazing rhino who contributed more to saving her species than any other Sumatran rhino in the world. Because Emi was so docile and amiable, CREW scientists were able to study her in depth and unravel the mysteries of Sumatran rhino reproduction which led to our successful breeding program...the only one in the world. Although she left us too early, Emi's legacy lives on in her three beautiful healthy calves. Emi's first born, Andalas, was returned to Sumatra to serve as the catalyst for a breeding program in the species' native land. Her only daughter, Suci, remains at the Cincinnati Zoo and is fast-approaching puberty and her youngest son, Harapan, is growing up in Florida at the White Oak Conservation Center. Those of us who had the privilege to work with Emi will never forget her playful personality, her spirit when facing her mate, Ipuh, or the care she demonstrated when raising her calves. Emi may have left us too early, but the memories she created will last a lifetime and will provide endless inspiration to those of us striving to save the Sumatran rhino.



Photo by National Geographic, Robert Clark

Propagating Some of Nature's Most Intricate, Endangered Beauties

Many people are fascinated by orchids. Their elaborate flower structure and unique relationships with pollinators have made them objects of beauty and scientific study. An orchid is a species within the Orchidaceae, the largest family of flowering plants encompassing over 30,000 species, many of which are adapted to unique ecological niches and endangered from habitat loss and over-collecting.

At CREW, the Plant Research Division is developing and implementing propagation protocols for several rare orchids including three species from south Florida: Carter's orchid (*Basiphyllaea corallicola*), Cowhorn orchid (*Cyrtopodium punctatum*), and Young palm orchid (*Tropidia polystachya*). The tiny seeds of these orchids have been cultured at CREW for germination and use by collaborators at Fairchild Tropical Botanic Garden. One orchid pod may contain thousands of tiny orchid seeds devoid of food reserves. In nature, these seeds receive nutrients through fungal associations, but in the



Cowhorn orchid

lab, seeds are germinated under sterile conditions on a nutrient medium. Both the Carter's orchid and the Cowhorn orchid have germinated readily in culture producing many seedlings, but the Young palm orchid has proven more challenging, and different methods must be tested when more seed is available.

CREW's scientists have also successfully propagated two local orchid species, the Kentucky lady slipper (*Cypripedium kentuckiense*) and Showy lady slipper (*Cypripedium reginae*). The latter is not federally endangered, but was last seen in Hamilton County in the mid-1800s. CREW is working with the Hamilton County Parks to propagate and re-establish this beautiful species in the county for all to enjoy. However, beauty is in the eye of the beholder, and CREW is equally concerned about less visibly striking species on the brink of extinction. After all, concern for biodiversity is blind, but don't tell the exquisite orchids.

Suddenly Awash in Fishing Cats



Fishing cat kittens at the Cincinnati Zoo.

In 2003, Thai field ecologist Passanan (Namfon) Cutter began searching diligently for any evidence of fishing cats (*Prionailurus viverrinus*) in the last remaining wetland areas of Thailand. A mere four years later, she finally obtained her first camera trap photograph of a wild fishing cat. Not a terribly auspicious beginning for this aspiring Master's degree student at the University of Minnesota but, more ominously, also a likely reflection of the increasing scarcity of this aquatic cat species in the wild. In early 2009, Namfon expanded her field survey to Sam Roi Yot National Park using 10 new camera traps provided by CREW. Over a four month period, she obtained photographs of 15 individual fishing cats at this new site and, with assistance of several Thai veterinarians, captured and anesthetized six cats for placement of radiocollars. In fact, this unexpected abundance of fishing cats outstripped her ra-

diocollar supply, requiring an emergency infusion of equipment funding from U.S. zoos. Monitoring of these radiocollared cats is allowing Namfon to conduct the first comprehensive ecological assessment of this endangered species in Southeast Asia (see www.fishingcatproject.info for more details). Locally, the Cincinnati Zoo & Botanical Garden has experienced its own fishing cat population surge with the birth of three kittens in the Cat House; the first fishing cat kittens born here since 1993. The kittens' father and mother are descended from wild Thai and Cambodian fishing cats, respectively, making these three kittens extremely valuable genetically as the distant 'out-of-town' relatives of Namfon's radiocollared cats.

Pallas' Cats, Toxoplasma and the Island of Mongolia

Mongolia is a land of extremes. This Central Asian country, with the lowest human population density in the world, is characterized by rolling steppes with an average altitude of ~4000 feet, frigid winters (as low as -40°F) and very little rain (less than 12 inches annually), and is inhabited by a diversity of rare wildlife, including the Pallas' cat (*Otocolobus manul*). Having evolved in this extreme environment, Pallas' cats are undoubtedly unique as the only species in their genus. They also are peculiarly susceptible to dying of toxoplasmosis, caused by a normally harmless parasite (*Toxoplasma gondii*) of domestic and most nondomestic cats. In recent CREW research, we have been delving deeper into the causes of this unusual susceptibility. In June 2009, we obtained blood samples from 150 Mongolians, 147 domestic sheep and goats and 45 wild rodents in Mongolia to evaluate for antibodies against *Toxoplasma*. Amazingly, not a single sample tested positive; in the U.S., similar studies typically find 20-30% of humans, 30-70% of sheep and goats, and 10% of rodents have anti-*Toxoplasma* antibodies. These findings suggest that Mongolia is most similar to several island nations, such as Madagascar and Australia, where a historical absence of cats prevented *Toxoplasma* from ever becoming established, resulting in the native lemurs and kangaroos having little natural resistance. The Mongolian extremes (high altitude, cold temperatures, minimal moisture) combined with a lack of domestic cats and limited numbers of wild cats had a similar biogeographical impact – creating what is essentially a *Toxoplasma*-free island in the heart of Asia. Because Pallas' cats have been rarely, if ever, exposed to this parasite in the wild, they, like the other island species, never developed innate immunity and remain extremely vulnerable to toxoplasmosis as a consequence.



Dr. Bill Swanson collecting blood samples from goats in Mongolia.