San Diego Zoo Institute for Conservation Research [1]

By: Love, Karen Keywords: Frozen Zoo [2]

The San Diego Zoo Institute for Conservation Research (SDZICR) in San Diego, California, is a research organization [3] that works to generate, use, and share information for the conservation of wildlife and their habitats. In 1975, Kurt Benirschke, a researcher at the University of California, San Diego (UCSD) who studied human and animal reproduction, and Charles Bieler, the director of the San Diego Zoo, collaborated to form the Center for Reproduction of Endangered Species (CRES). In 2009, the San Diego Zoo announced the creation of SDZICR, which expanded and replaced CRES, to provide central organization [3] and management of scientific programs at the San Diego Zoo. By 2004, Allison Alberts was the director of research and for more than a decade oversaw the SDZICR’s many research initiatives, including the collection and storage of genetic and reproductive information of rare and endangered animal and plant species.

Bieler was executive director of the San Diego Zoo from 1973 to 1985. He hired Benirschke in 1975 to create a research organization [3] that focused on the issues that arose when breeding rare and endangered species in captivity, issues such as inbreeding and disease. Inbreeding occurs when two closely related individuals mate and have genetically similar offspring. These offspring often have a higher than normal rate of birth defects [4] and health problems, as well as lowered life expectancy than non-inbred animals.

Benirschke participated in the creation of the CRES and directed the Research Department at the San Diego Zoo from 1976 to 1987. Prior to the formation of CRES, Benirschke was a professor at UCSD. While at UCSD, Benirschke studied human reproduction, placental pathology, cytogentic's, and reproduction in a range of organisms. He later studied cell preservation of exotic species. Benirschke collaborated with Bieler to create CRES, which aimed to preserve rare and endangered species, including their reproductive cells and genetic material.

Under the leadership of Benirschke, who became director of research in 1976, CRES established the Frozen Zoo. The Frozen Zoo became a collection of frozen cells of rare and endangered mostly mammalian species used in many research practices, including in vitro [8] fertilization [9], the preservation of species, and the investigation of evolutionary lineages. Scientists from across the world contributed mammalian cells to the Frozen Zoo’s collection. In the early decades of the twenty-first century, the Frozen Zoo expanded to include material from birds [7] and reptiles.

In 2009, CRES was renamed the San Diego Zoo Institute for Conservation Research (SDZICR), and the organization [3] expanded to include other branches of conservation research, such as applied animal, plant and behavioral ecologies. By 2015, the SDZICR housed in the Arnold and Mabel Beckman Center for Conservation Research, a building that opened in 2004 located adjacent to the San Diego Zoo’s Safari Park campus in Escondido, California. The Beckman Center for Conservation Research became a research hub for greater than 150 scientists who contributed too many different aspects of wildlife conservation, from population biology to wildlife diseases. The Beckman Center also housed the Frozen Zoo and Plant Seed Bank, a collection of genetic materials from plants from the greater San Diego area.

In addition to departments related to animal and plant ecology, the SDZICR housed a division for genetics. The division partly aimed to recover genetic information for species that have suffered a bottleneck event. A bottleneck event occurs when a large portion of a species dies because of an environmental pressure and leaves few individuals, all of which are closely related, and the offspring of which face a greater than normal risk of genetic mutations and susceptibility to diseases.

By the late 2000s, researchers at the organization [3] began reprogramming somatic cells from organisms of endangered species into pluripotent stem cells [8]. The genetics division, directed by Oliver Ryder, converted skin cells from endangered species into pluripotent stem cells [8], which are cells that can become any other cell in the body. The team proposed to use such pluripotent stem cells [8], along with cloning [9] technologies, to facilitate the reproduction of endangered species in captivity and to create genetic stability in those species that have suffered a bottleneck event. In the 2011 article scientists at the SDZICR reported that they converted skin cells to pluripotent stem cells [8] for two highly endangered species, a primate [10] called drill (Mandrillus leucophaeus [11]) and the northern white rhinoceros (Ceratotherium simum cottoni [12]).

The SDZICR partnered with a number of other organizations to strengthen global conservation efforts. In 2012, the San Diego Zoo and the US Fish and Wildlife Service, headquartered in Falls Church, Virginia, declared a partnership to work together to prevent the extinction of endangered species. In 2013, the San Diego Zoo and the Audubon Nature Institute in New Orleans, Louisiana, announced a partnership, creating the Alliance for Sustainable Wildlife, a one thousand acre facility that houses breeding groups of rare and endangered species, such as the whooping crane (Grus americana [13]) and the Masai giraffe (Giraffa camelopardalis tippelskirchi [14]), in New Orleans, Louisiana.
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