Biotechnological Interventions – Laboratory for the Conservation of Endangered Species (LaCONES)

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Background

The Ministry of Environment & Forests, has played a key role in the creation of LaCONES and it could be traced back to 16th September 2001, when Thiru T.R. Baalu the then Minister of Environment and Forests laid the foundation stone of LaCONES and thus catalyzed the creation of this unique institution. The Central Zoo Authority & Ministry of biodiversity in a holistic manner since it influences, either directly or indirectly, various aspects of human life. However, this goal cannot be achieved singularly by the Ministry without the required equal cooperation and contribution made by the Ministry of Science & Technology through the Council of Scientific & Industrial Research (CSIR), the Department of Biotechnology, and State Government of Andhra Pradesh for creation of the LaCONES.

The LaCONES was dedicated to the nation by Shri A. P. J. Abdul Kalam, Hon'ble President of India on 1st February, 2007. The LaCONES is already functional and developed many modern technologies related to genetic characterization and assisted reproductive technologies which will go a long way in furthering the cause of conservation of endangered animals both *in situ* and *ex situ*. Definitely worthy of mention that the technologies developed at LaCONES for the non-invasive evaluation of genetic variation, for identification of animal species, for detection of fertility of animals and for sexing of birds. The creation of cell, tissue and genome banking needs to be developed into a national resource.

Till date the contribution of the Authority has been limited to providing financial assistance for construction of the laboratory. However, now the Central Zoo Authority has agreed in principle to provide an amount of Rs.20.00 lakhs per year to LaCONES, for initiating projects related to DNA finger printing, assisted reproduction and creation of a genome bank for endangered species of wild animals. It is in this background, the Technical committee of the Authority which had its meeting on 23.1.2007 has also cleared a project titled 'Conservation of endangered animals in India' to be taken up by LaCONES. An amount of Rs.100.34 lakhs will be provided by the Authority for this project to CCMB, during the 11th Plan period.

Considering that LaCONES is unique with respect to its capabilities and expertise built around modern biology and focused on conservation, it needs to be strengthened and recognized as a National facility for studying the genetics of endangered animals and for developing relevant technologies for assisted reproduction. One should not forget that biodiversity refers not only to charismatic animals such as lions, tigers and leopards but also non-charismatic animals like frogs, reptiles, birds, invertebrates, etc., and in addition of course plants and microbes.

Project LaCONES

Considering the national importance of genetic diversity among wild fauna, this is the first time that organisation such as the Central Zoo Authority (Ministry of Environment & Forests), the Centre for Cellular & Molecular Biology (CCMB) with the help of the Counsel for Scientific and Industrial Research and Dept. of Biotechnology (DBT), Govt. of India, New Delhi have come forward in 1998 which is aimed at the conservation of endangered wild animals through the use of biotechnological intervention. The Government of Andhra Pradesh and the Nehru Zoological Park at Hyderabad are also major partners in this project.

This facility is fully functional to establish India's first frozen zoo (genome bank) where sperm, egg, cell and tissue banks will be kept of all wild animals, birds and reptiles. This would be the ultimate approach to conserve endangered animal species and prevent their extinction from this planet – the extinction that will deprive the future generation from witnessing these live animals which are the wonderful creation of nature.

Objectives

1. Monitoring of genetic variation by modern techniques such as DNA fingerprinting.
2. Establishment of gene and cell banks by cryo-preservation of semen, eggs and embryos and tissues of endangered species to be used in future for various purposes including cloning.
3. Fertility Analysis based on semen profiles and hormonal profiles to facilitate captive breeding.
4. Artificial insemination: Although well established in case of domestic animals, this technique needs to be standardized for use in wild animals (primarily on common wild animals) and future transfer to endangered species.
5. In Vitro Fertilization (IVF) and embryo transfer
involves fusion of a spermatozoon with an oocyte *in vitro* and the transfer of the resulting embryo to the true or surrogate mother.
6. Cloning: The technology to be developed only for the use of those species, which are extremely critically endangered.

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Unique aspects of the project
This project is going to be unique in several ways in terms of its conception, organization, involvement and participation of Government agencies.

1. Perhaps this if for the first time that a number of organizations such as CSIR (CCMB), CZA, DBT, Govt. of AP have come together to undertake this programme jointly which none of them individually would have been able to undertake.

2. There is hardly any project of this scale, anywhere in the world, which will cater to the needs of not only big cats such as lions and tigers but other endangered animals also such as deers, non-human primates and birds.

3. The scope of the present project is much wider in terms of the spectrum of technologies related to the determination of genetic polymorphism and the development of assisted reproduction, which are expected to be developed during the course of work.

Achievements
- Developed species-specific microsatellite markers for lion, tiger and leopard and established that these animals are genetically polymorphic and not inbred.
- Developed non-invasive methods for DNA isolation from scat and hair samples; developed an universal primer for forensic use to identify animal species.
- Identified the Himalayan wolf as a new species *Canis himalayensis*.
- Demonstrated that the Ganges river dolphin is probably a 'living fossil'.
- Established that the Olive Ridleys are ancestral to all the other known ridleys.
- Based on molecular marker studies endangered star tortoise confiscated from smugglers have been rehabilitated successfully.
- Achieved pregnancy in Black buck, Cheetal and Blue rock pigeon by assisted reproduction.
- A Molecular DNA based method has been developed for sexing of birds.
- Developed DNA-based molecular marker for wildlife forensics.
- For the first time in the world, a method was standardized for the collection of semen from the white backed vulture.
- Produced 'Spotty', a baby deer using artificial insemination technique.
- Developed a non-invasive technique for estimation of tiger population based on DNA analysis of scat samples; useful for tiger census.

Let's wish that LaCONES expands its activity to all components of biodiversity and develop appropriate manpower and infrastructure so that it would culminate our zoos benefit in the scientific management of wild animals in captivity and contribute to the cause of wild life conservation in the country.

Inauguration. Photo by Brij K. Gupta

Photo of LaCONES. Courtest CCMB