



Presentation

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Symposium RETI Réseau d'Excellence des Territoires Insulaires 9 -10 juillet 2010, Corte, Corsica

Università degli Studi di Sassari Sardaigne (Italie)





CENTER OF EXCELLENCE for the Development of the Biotechnological Research and for the Study of the Biodiversity in Sardinia and the Mediterranean Area

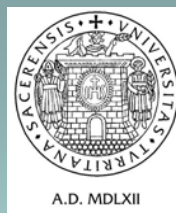
Principal Investigator: Prof. Bruno Masala

<http://www.uniss.it/php/proiettoreTesti.php?cat=99&xml=/xml/testi/testi9296.xml>

Established by the Italian Ministry of University and Scientific Research (DM n. 21 del 31/01/2001, n. 81 del 02/04/2001 e n. 263 del 22/12/2003) as the result of a national selection.

Staff: 15 research leaders; 45 researchers; 20 technicians.

During their activity, the research staff published several hundreds of articles in peer-reviewed, high I.F., journals.



Scientific Aims of the Center of Excellence

a) Natural resources:

1. *Biotechnological applications for the study of animal biodiversity and identification of genetic resources* (Molecular genetics of human and animal populations; Phylogenesis and systematic; Biotechnological reproductive applications for biodiversity preservation).
2. *Characterization of vegetal genetic resources* (analysis of genetic variability; characterization of autochthonous genetic resources; management of vegetal genetic resources; studies on genes involved in the cell-cycle control).
3. *Microbial biodiversity and biotechnology applications* (pathogen micro-organisms cause of human and animal diseases; micro-organisms isolated by agricultural food; genetic characterization and improvement of micro-organisms in wine technology; development of techniques to select *Trichoderma* Spp. antagonists useful as control agents against plant fungus; characterization of genomes and proteomes from bacteria and viruses of domestic and wild animals).

b) Human health:

4. *Complex-etiology diseases having a high prevalence in Sardinia* (auto-immune diseases; viruses as aetiopathogenetic co-factor of high prevalence diseases; multiple sclerosis in Sardinia).
5. *Development of new diagnostics and therapeutic approaches by means of natural molecules* (agricultural or human infectious fungine diseases; identification of molecular targets in therapy; gender pharmacology).



Higher Education at the Center of Excellence

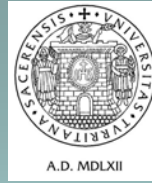
Higher education activities are carried out by means of the following PhD Schools:

- Biomolecular and Biotechnological Sciences*;
- Reproduction, production, animal welfare, and security of food of animal origin;
- Biomedical Sciences;
- Environmental Resources Sciences.

*Higher education activities of the Biomolecular and Biotechnological Sciences also include stages (up to two years) in foreign research institutions (USA, UK, France, Germany) and applications from foreign students are the most welcomed.

Actually, 3 Vietnamese and 2 Indian students attend to the research activities.

*The doctoral School in Biomolecular and Biotechnological Sciences is going to be transformed in International PhD School joined with the College of Medicine and Pharmacy of the University of Hue (Vietnam). **The International PhD School wishes to arrange similar joined agreement with other European and Mediterranean Universities.**



INTERNATIONAL COOPERATIONS

The research staff of the Center actively cooperate with researchers of Mediterranean Universities and Corporations.

Cyprus: Ministry of Interior, Nicosia.

Egypt: Suez Canal University, Ismailia; University of Mansura; Genetic Engineering and Biotechnology Research Institute, Alexandria.

France: Hôpital Henri Mondor, Créteil; Université de Corse; Institut Pasteur, Paris; Université Paris-Sud, Orsay; INRA, Digione; I.N.S.R.M., University Victor Segalen, Bordeaux .

Greece: Agricultural University of Athens.

Israel: National Center for Mariculture, Eliat; The Hebrew University, Jerusalem and Rehovot.

Morocco: University of Chouaïb Doukkali, El Jadida; Station INRA, Marrakech.

Portugal: Faculdade de Ciências da Universidade do Porto.

Spain: Museo Nacional de Ciencias Naturales, Madrid; National Wildlife Research Institute, Albacete; Hospital Clinic of Barcelona; Hospital Vall Hebron, Barcelona; Área de Genética y Reproducción Animal, Gijón; Universidad de León; Universitat Autònoma de Barcelona.

Tunisia: Université de Tunis; Technopark of Borj-Cedria; Laboratoire d'Analyse, Traitement et Valorisation des Polluants de l'Environnement et des Produits, Monastir; Institut Supérieur de Biotechnologie, Monastir; University of Sfax.

Turkey: University Medical School, Samsun; Animal Biotechnology Strategic Work Unit, Gebze/Kocaeli; Canakkale Onsekiz Mart University, Canakkale.

THE EUROPEAN INTERREG III PROJECT

The Center of Excellence markedly contributed to the fulfillment of the P.I.C. INTERREG III in the field of the study and management of natural resources in close relation with the Universities of Corte, Cagliari and Pisa.

Biochemical and genetic polymorphisms of endangered Sardinian-Corsican vertebrates of economic relevance. Partner: L. Manca e P. Franceschi

Protection and revaluation of Corse, Sardinia and seaside Tuscan animal biodiversity: a comparative study. Partners: A. Casale, L. Santini e B. Marchand

Anthropization impacts and management of Mediterranean marine resources. Partners: S. Rubino, M.A. Dessì, A. Cristini e C. Pergent

Corsican-Sardinian-Tuscan geology, terrestrial and marine geomorphology. Partners: G. Oggiano, A. Ulzega e J. Ferrandini

Molecular anthropology characterization of the Corse, Sardinia and Tuscany populations. Partners: P. Francalacci, G. Vona e L. Varesi

As the result, many of the above collaborations continue regardless to the outcome of the Project.

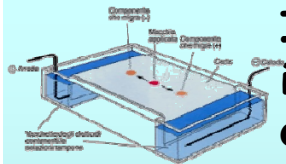
Main scientific interests



Structural and functional characterization of genetic variants of human hemoglobin, normal and abnormal structure of globin genes (including some thalassemic genes) and aspects of their expression.



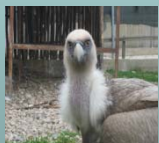
Polymorphism, mutations and functional aspects of hemoglobin in vertebrates (wild and domesticated Caprine i.e. European and Cyprus mouflon, *Ammotragus lervia*, urial, bighorn, argali, goat and sheep), Sardinian wild horse, Italian water buffalo (*Bubalus bubalis*), ecc.



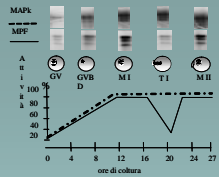
Improvement of methodologies for the study of hemoglobin polymorphism, identification of abnormal hemoglobin and of the organization and expression of globin genes.



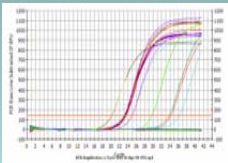
Phylogenetic relationships among vertebrates are also studied by means of mitochondrial DNA analysis.



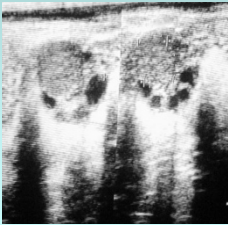
Populations dynamics studies in mammals and birds by mean of the genetics of microsatellites



Proteomic studies on mammalian gametes and embryos



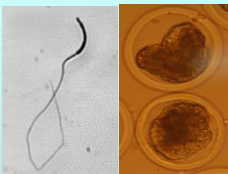
Gene expression studies on mammalian oocytes and embryos



Evaluation of follicular dynamics by transrectal ecography to improve superovulatory treatments efficiency in mammals



Laparoscopic ovum pick up from prepubertal and adult mammals to amplify reproductive fitness



Gametes cryopreservation to improve oocyte and sperm banking procedures in both mammals and birds



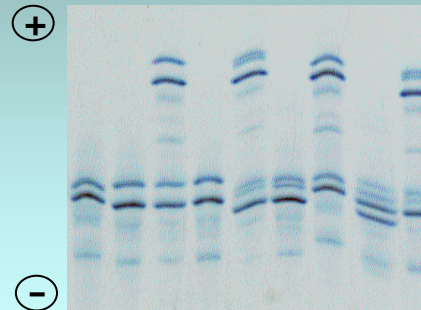
Artificial insemination in mammals and birds



In vitro embryo production, cryopreservation and embryotransfer in mammals

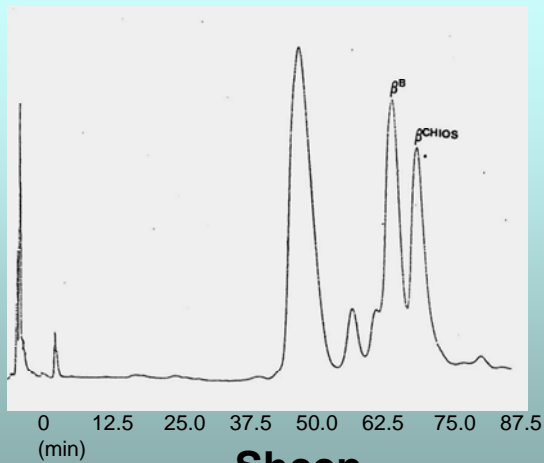
Electrophoretic and chromatographic techniques

Isoelectric Focusing of native Hb tetramers (IEF)



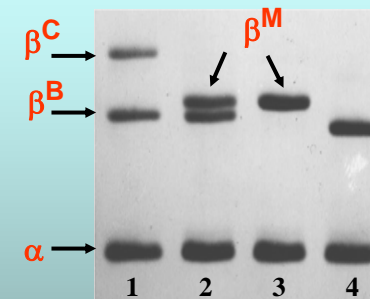
Goat

Reversed-Phase High Performance Liquid Chromatography (RP-HPLC)



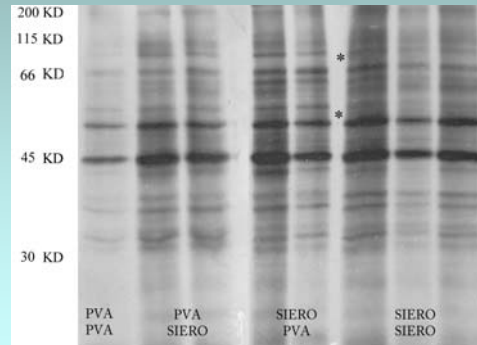
Sheep

Gel electrophoresis of dissociated globin chains in urea, Triton X-100 and acetic acid (AUT-PAGE)

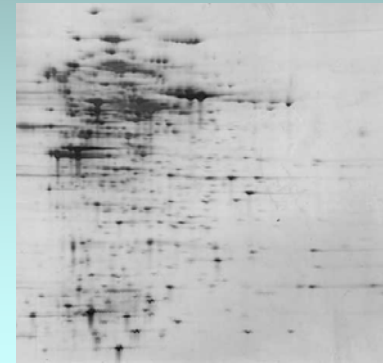


Mouflon

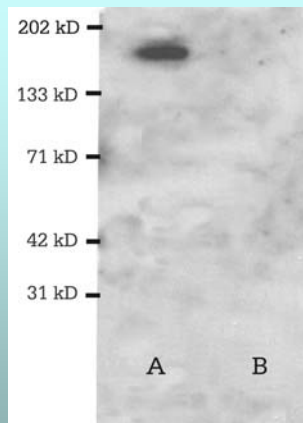
SDS gel electrophoresis of gametes and embryo proteins



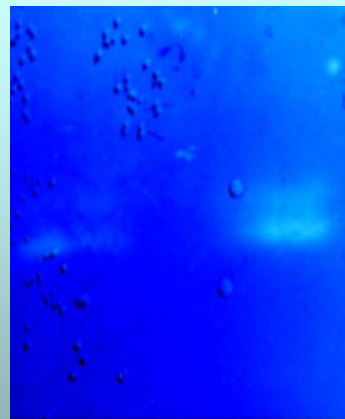
2D gel electrophoresis of gametes and embryo proteins



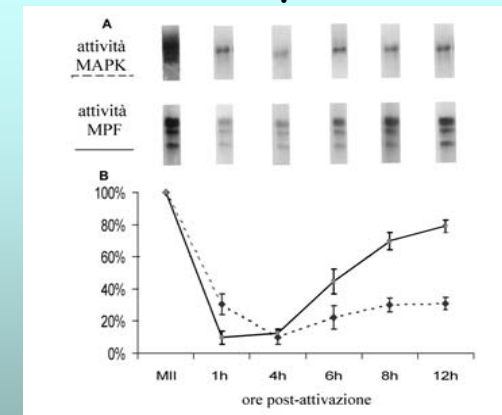
Immunoblotting of target proteins



Proteases zimographyc assays

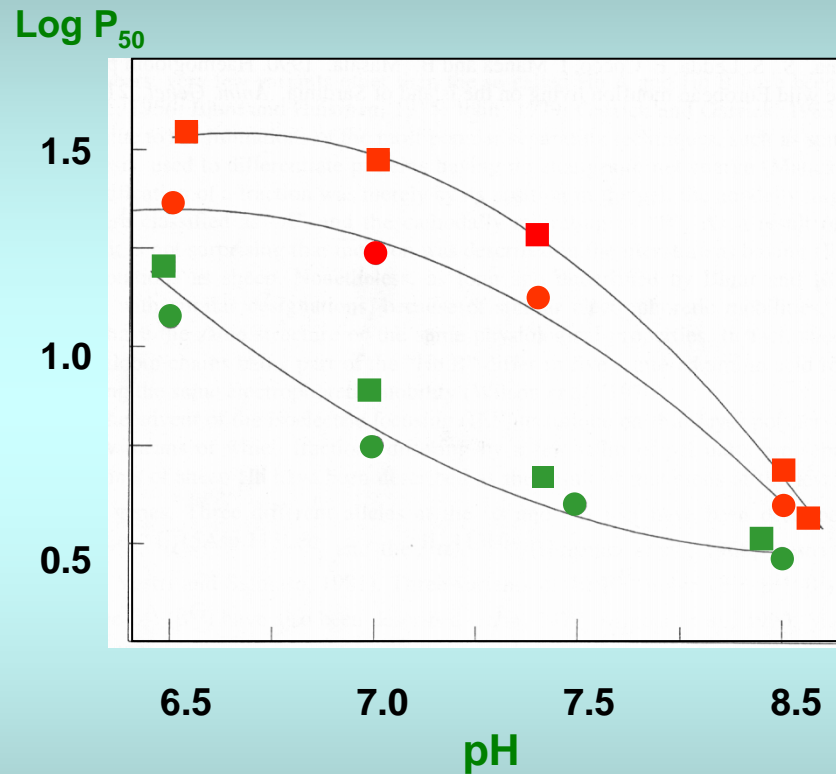


Electrophoretic kinase assays

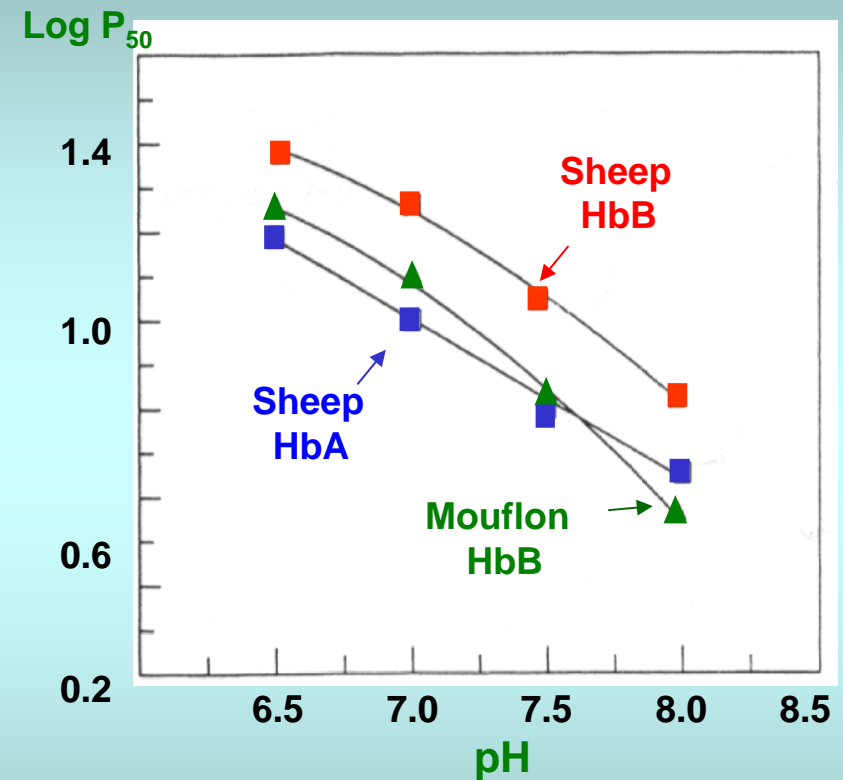


Functional studies

Oxygen Bohr effect of mouflon and sheep Hbs



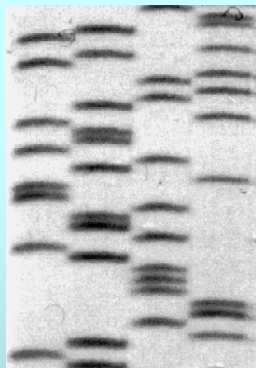
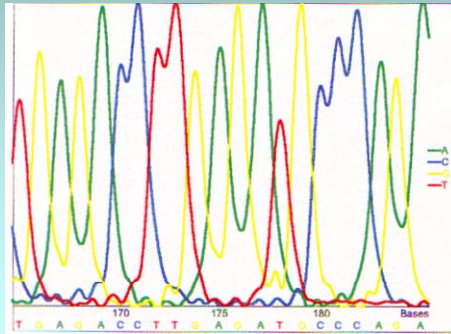
- Red symbols:** in presence of 2,3 BPG
Green symbols: in absence of 2,3 BPG
■ HbB sardinian mouflon
● HbB^{Cyprus} mouflon



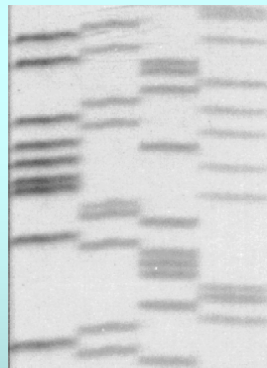
- In presence of Cl⁻
■ Sheep HbA
▲ Sardinian Mouflon HbB
■ Sheep HbB

Molecular biology techniques

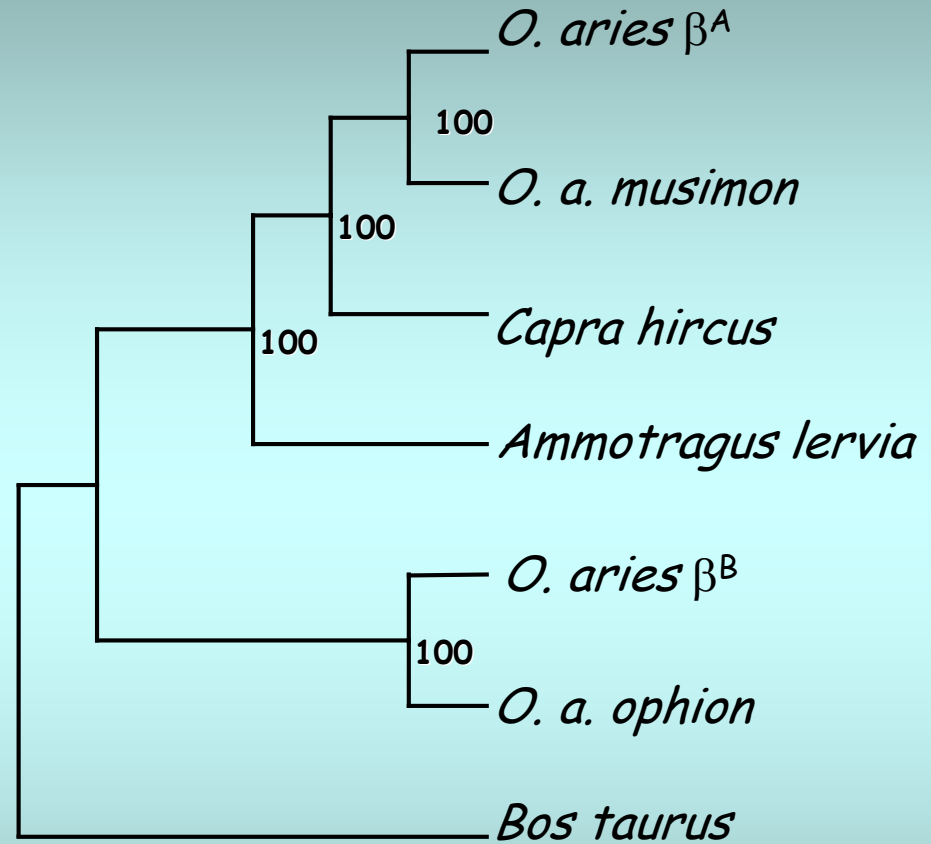
Genomic and mitochondrial DNA sequencing to assess phylogenetic relationships



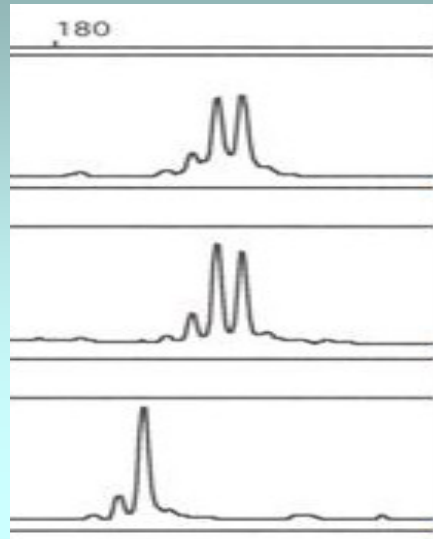
Mouflon



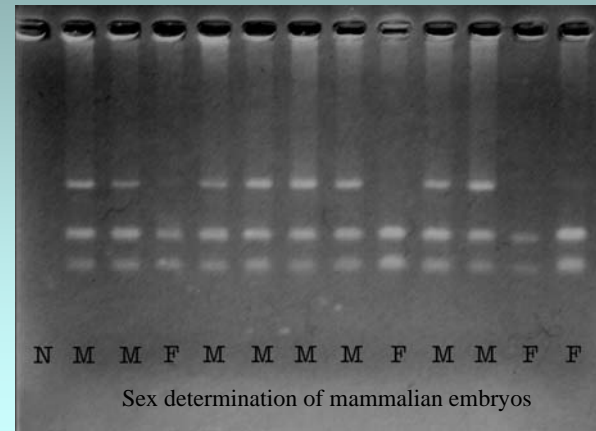
Sheep



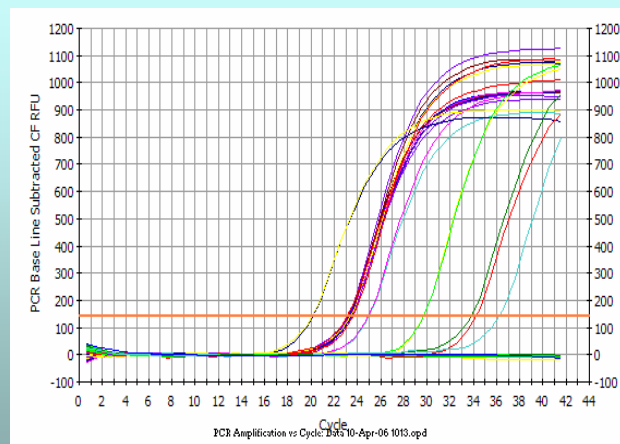
Capillary electrophoresis of microsatellite DNA



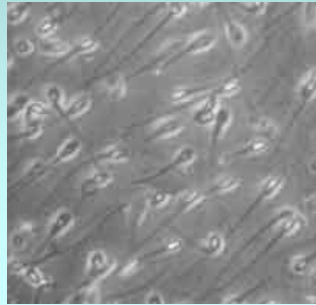
DNA PCR from 1-4 cell embryo biopsies



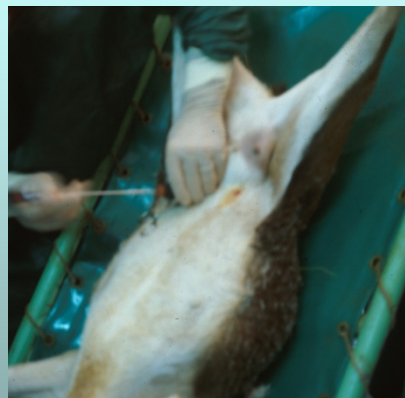
Gene expression by Real time PCR



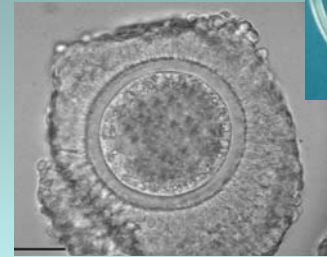
Reproductive technologies



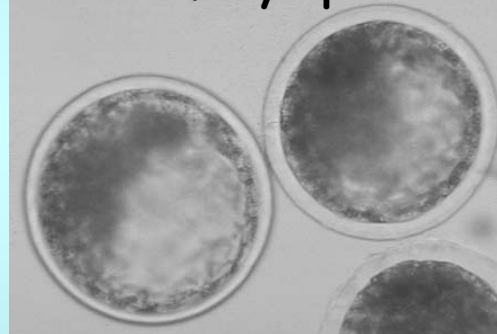
Sperm cryobanking



Artificial insemination



**Sperm and oocyte recovery
In vitro embryo production**

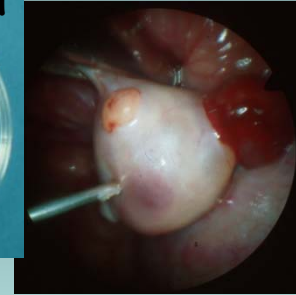


In vivo embryo production



Embryo transfer

Slaughtered ovaries



Ovum Pick Up

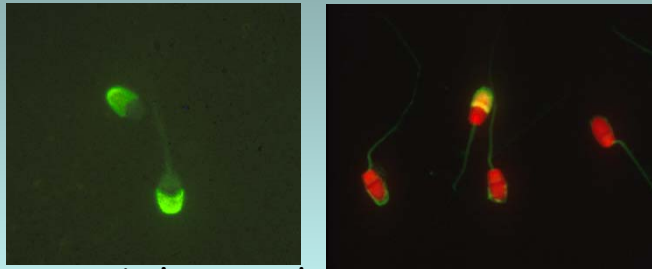


Oocyte cryobanking



Embryo cryobanking

evaluation of cell integrity and competence using fluorescence and electronic microscopy

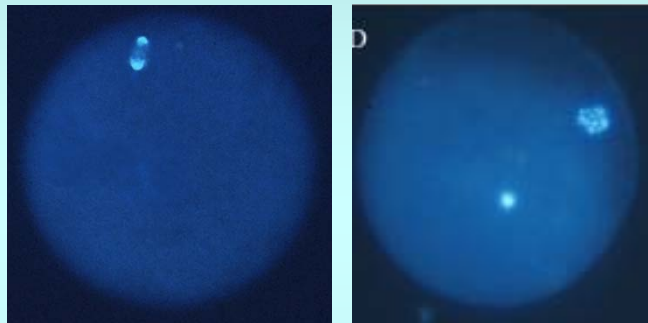


Viability and acrosome status

spermatozoa

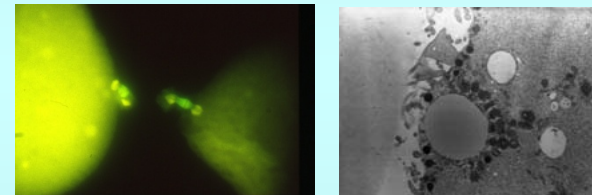
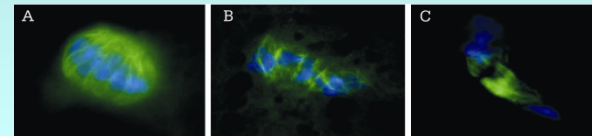


Viability and acrosome status

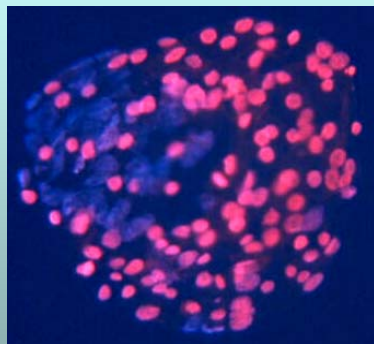


Meiotic progression

oocytes

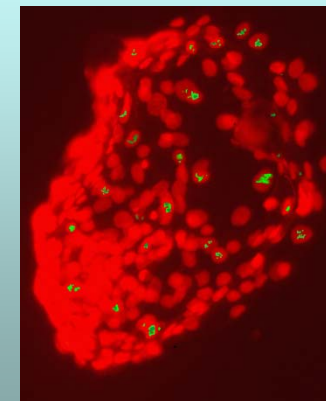
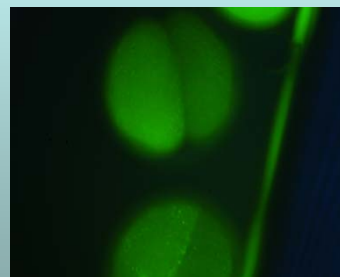


Cytoskeletal and organelles abnormalities



ICM and trophoblastic cell allocation

embryos



DNA break analysis
(Tunel)