CONICET

National Council For Scientific and Technical Research

Argentina

Technology Offer

Ministerio de Ciencia, Tecnología e Innovación Productiva
Presidencia de la Nación

CONICET

INDEX

Human Health, Pharma & Biotechnology

Know–how & Technological Services

Molecular Biology

DNA/RNA and recombinant DNA Services

- Cloning (Gateway/de novo-). PCR cloning and subcloning.
- Mutagenesis
- Design, construction, production, and purification of viral vectors (adeno, retro, adeno–associated)
- DNA sequencing / Real–time PCR / Northern/Southern blot PCR
- Molecular microbial ecology
- Bacterial DNA fingerprinting
- Design and construction of reporter recombinant dengue virus and replicons from infectious clones of dengue virus
- Reverse genetics of RNA viruses
- ARN-ARN and ARN-protein interaction studies
- Atomic force microscopy studies of nucleic acids

Gene Library Construction & Screening. High throughput assays.

- Whole_genome de novo sequencing
- Whole_genome re-sequencing
- Transcriptomics
- Chromatin immunoprecipitation coupled with high throughput sequencing (CHIP-seq)
- Bisulfite sequencing to determine its pattern of methylation (BS-Seq, Methylation-seq)
- Amplicon-deep sequencing
- Genotyping
- cDNA library construction and screening. Clone analysis and ORF identification and cloning.
- Microarrays. Functional genomics.
- Dengue virus replicon system for dengue antiviral compounds (drugs and siRNAs)
- Phylogenetic inference, evolutionary analysis, and prediction of functional sites

Strain Engineering

- Design and construction of custom strains In *E. Coli*, yeast and *T Cruzii*. Gene knockout. Gene tagging. Site directed mutagenesis. Gene knockdown.

Gene Expression

- Bacterial gene expression. *E.coli*. Small–scale expression of recombinant protein in selected *E. coli* strains and under optimal conditions. Pilot Scale–up: 2-5 litres.
- Yeast and *T. Cruzii* gene expression
- Insect and mammalian cell lines gene expression

Molecular Microbiology

- Identification and characterisation of bacterial species
- Detection of virulence genes in pathogenic species
- Studies on the microbiological quality control of food and industrial products

Protein Science

Protein Purification

- Purification of recombinant proteins from various host systems
- Automated purification systems (FPLC) employing different matrices
- Protein purification from inclusion bodies via refolding

Protein Characterisation

- Protein quantification
- Electrophoresis / Western blot / IEF/ ELISA (direct or sandwich)
- Enzyme activity assay
- Analytical size exclusion chromatography
- Proteomics studies. DIGE Technology.
- Mass spectrometry (MALDI-TOF). Protein sequencing and post–transductional modification studies.
- Circular dichroism studies. Protein stability studies. Pharmacological drug QC. Formulation development.
- Design and characterisation of proteins of biotechnological and medical importance
- Studies on design of drugs to interact with proteins

Cell Line Services

Mammalian Cell Culture

Established and primary cell lines

Cell Line and tissue culture Development & Analysis

- Establishment of cell lines expressing construct of interest
- Transient transfection of cell lines for recombinant protein production
- Stable cell lines expressing tagged/untagged proteins, GPCRs, Receptor/ Ligand
- Analysis of protein expression
- Primary tissue culture. Normal and tumour tissue.
- Cell–based assays.

Special Cellular Biology Studies

- Mesenchymal stem cells (MSCs): isolation, characterisation, and differentiation studies. In vitro and in vivo migration and biodistribution assays (Real–time in vivo tracking of fluorescent MSCs).
- In vitro antitumour drug screening
- Immunohistochemical and immunocytochemical studies
- FACS analysis
- Microinjection in *Xenopus laveis* oocytes

Cell Banking

- Expansion of cells for cryopreservation
- Viability testing
- Sterility and mycoplasma testing

Immunology & Virology

- Production of polyclonal and monoclonal antibodies
- Single–domain llama antibody production. Applications: enzyme inhibitors and molecular mimicry studies.
- Purification of antibodies. Speed and conjugation of antibodies.
- Commissioning and validation of ELISA kits
- Studies of rotavirus
- Viral detection in biological and environmental samples
- Antibody detection studies of humoral and cellular immune competence in humans and animals
- Studies on biocontrol of pest insects using baculoviral and bacterial tools
- Design and development of molecular traceability techniques applicable to prokaryotic or eukaryotic viral systems

In vivo Studies

Small Animal Studies

Drosophila, *C. Elegans*, zebrafish systems

Rat and Mice Studies

- Toxicity and biodistribution studies
- Intracranial surgery (stereotaxis)
- Special in vivo studies
- In vivo antitumour drug testing
- Rat and mice brain stereotaxis
- EPO biological determination
- Biological potency assay for Hepatitis B
- High throughput method for screening of genes in neurodegeneration and anti–neurodegenerative drug screening

Chronobiology

- Studies applied to biological rhythms in human beings and laboratory animals
- Development of techniques and sampling equipment, data acquisition, statistical analysis and graphic advice and protocols on aspects of applied chronobiology, including cases of clinical studies, occupational medicine, shift work sleep disorder, and desynchronisation

Drug Targeting

- Design of nanotechnologies applied to controlled molecular release
- Custom developments for pharmaceutical, food, and cosmetics industries
- Liposomes and micelles: *In vivo* biodistribution studies of lipid formulations. Studies in natural and artificial membranes.

Vaccine Development

- Vaccine production in plants
- Viral antigen expression for developing veterinary vaccines by means of chloroplast transformation

SELECTED PROJECTS & PATENTS

Oncology, Inmmunology & Vaccines

Propietary Know–how, Tools and Animal Models for Glycobiology Studies
Conicet researchers have identified a novel mechanism, mediated by lectin/glycan interactions, by which tumours can evade immune responses, which involves a highly–conserved beta–galactoside–binding protein, Galectin-1. A novel tolerogenic circuit mediated by galectin-1-glycan lattices was identified, which is propagated from dendritic cells to T cells and contributes to immunosuppression at sites of tumour growth; promotes tolerance at the feto–maternal interface; and favours the resolution of inflammation. Taken together, this fundamental contribution sets the basis for a novel paradigm, governed by the information encoded by the 'glycome', by which galectin–glycan lattices 'fine–tune' immune cell homeostasis. This pioneering discovery opens new avenues in the design of novel therapeutic strategies aimed at enhancing antitumour responses, preventing fetal loss and favouring the resolution of chronic inflammation and autoimmune diseases.

Antitumour Drugs
Formulations based on the galectin-1 inhibitor with antitumour activity.
Method of preparing the therapeutic formulation, comprising galectin–induced tolerogenic dendritic cells. In the incubation medium containing galectin, the galectin is encapsulated in liposomes, nanospheres or cyclodextrins. The organ to be transplanted is selected from kidney, liver, heart, pancreas, lung, bone marrow, and cornea. ***Patent Status.*** US20090004259 AR020104428

Antitumour Vaccine
Modified immunogen based on the Thomsen-Friedenreich Disaccharide (tfd). Its production procedure. It has potential applications in the treatment of patients suffering from tumours of epithelial origin, such as in breasts, intestine, prostate, lung, etc. Formulations, use and treatment methods. ***Patent Status.*** AR070105146

Preparation of Vaccines for Intranasal Immunisation
Formulation of adjuvants for intranasal vaccines. Vaccine composition. Chimerical protein. Use for vaccine preparation and method for boosting the immune response. ***Patent Status.*** AR050104481

Antitumour Treatment — Novel Oncolytic Vectors for Cancer Gene Therapy

Sparc promoter sequence and its use for directing a heterologous gene expression in tumour cells. The first developed vector is called AdF512, and replicates and eliminates melanomas and ovary tumours established in nude mice. ***Application:*** AdF512 can be used to target melanoma tumours and ovarian tumours. At present, this oncolytic vector is being improved by addition of specific DNA sequences that act as enhancers and maintain specificity. ***Development Status & Patents.*** All the proof of concept has been accomplished and the product is ready for use in preclinical trials (toxicity). Biodistribution has been performed for both vectors. ***Patent Status.*** PCT WO2007/127347 A2

Antitumour Gene Therapy Vector for Targeting Colorectal and Melanoma Tumours by Reactive Oxygen Species (ROS)-Mediated Mechanisms

Genetic construct based on the capacity of a synthetic sequence to 'sense' the levels of ROS in a given disease. This product has been named E6(40)VE. A toxic product has been genetically cloned downstream of E6(40)VE, which was able to eliminate established human colorectal and melanoma tumours in nude mice, i.e., mice accepting xenografts of human tumours. ***Application:*** E6(40)VE is useful for local administration and has been useful in xenografts models following intratumour electroporation. ***Development & Patent Status.*** The inventors are preparing an immuno–nanoparticle to be used systemically employing VHH from camelids targeted to specific receptors. This particle will also contain an enhancer of intracellular ROS levels to increase promoter activity. PCT WO2008/133971 A2

Development of Attenuated Viral Strains

Procedure for the development of attenuated virus strains for producing vaccines and pharmacological compounds. The methodology comprises contacting at least one sulphated polymer and a virus susceptible to the inhibition of said polymer, via successive passages of the virus with increasing polymeric concentrations, where said amenable virus is characterised by the method of reducing viral plates and where the strain resulting from the attenuated virus has stable phenotypic and genotypic characteristics, different from that of the virus strain in wild state that generated thereto. ***Application:*** Preparation of vaccines and pharmaceutical compositions, e.g., Herpes HSV-1 & HSV-2; the effective action thereof for inhibiting a wide spectrum of enveloped virus may be mentioned such as the retrovirus: human immunodeficiency virus type 1 and 2 (HIV-1 and HIV-2); herpes virus: herpes virus types 1 and 2 (HSV-1 HSV-2), human cytomegalovirus (HCMV), pseudorabies virus; flavivirus: dengue virus type 2; smallpox virus: variola virus; hepadnavirus: hepatitis B virus (HBV); ortomixovirus: influenza A virus (inf A); paramixovirus: respiratory syncytial virus (RSV) and parainfluenza virus; rhabdovirus: vesicular stomatitis virus (VSV); arenavirus: Junin virus, Tacaribe virus and togavirus: Sindbis virus, Semliki Forest virus (Table I), and against some naked viruses, such as the encephalomyocarditis virus, hepatitis A virus and papillomavirus (HPV) (Buck C B et al., 2006), both DNA and RNA. ***Advantages:*** New and advantageous process for producing the attenuated viral strains, which may satisfactorily resolve many of the disadvantages of the previous art processes. ***Development & Patent Status. Laboratory scale.*** WO/2009/066247 Europe, Argentina, China, India, Brazil, USA

Novel Oral Vaccine against Intestinal Parasitic Protozoa

Modified protozoan expressing at least two variable surface proteins (VSP), vaccine comprising it and procedures, uses and methods thereof. Modified protozoa parasites comprising simultaneous expression on its surface of at least 2 variable surface proteins (VSP). Can be applied to any protozoan showing antigenic variation (*giardia*, *babetsia*, *plasmodium*, *trypanozoma*). The modified protozoa may also simultaneously express the complete repertoire of variable surface proteins. Protozoa show reduced expression of Dicer, RNA-dependant RNA-polymerase (RdRP) enzymes or both, wherein the RdRP gene and/or the Dicer gene has been silenced. ***Application:*** Protozoan vaccines. ***Advantages:*** It blocks the antigenic variation mechanism of parasites, allowing long–term protection against infection. First protein–based vaccine can be orally applied. ***Development & Patent Status.*** Animal vaccine proof of concept / WO/2010/064204 Australia, Brazil, Canada, Chile, Colombia, Costa Rica, Ecuador, EPO, India, Japan, México, Peru, New Zealand, USA

Novel Platform for Oral Vaccine Production
Pharmaceutical compositions comprising a polypeptide with at least one Cxxc motif, e.g., the Variable Surface Protein (VSP) off *giardia* parasites and heterologous antigens and uses thereof to develop a mucosal or oral vaccine. ***Application:*** Vaccination against selected heterologous antigens, such as tumour antigens, microbial antigens or other antigens. ***Advantages.*** It permits a wide range of antigens. For oral or mucosal administration. ***Development & Patent Status.*** **WO/2011/120994**

Novel Anti-human VEGF Antibodies with Unusually Strong Binding Affinity to Human VEGF A and Cross–reactivity to Human VEGF-B
Use of the humanised version of the antibodies here disclosed for treating VEGF–related angiogenic diseases, including cancer, age–related macular degeneration, rheumatoid arthritis, and diabetes. ***Advantages:*** VEGF-B cross–reactivity

Diagnostics Kits

Celiac Disease: Kit for Prolamin Detection
Prolamin detection kits using camelid antibodies
AR07014922

Diagnostics Kit for Chagas Disease
Recombinant chimerical proteins, the electrode having these proteins on its surface, diagnostics methods and kit for diagnosing Chagas Disease
AR060103687

Diagnostics Kits for Easy and Fast Detection of Pathogenic Intestinal Parasitic Protozoa
Novel monoclonal antibodies against *Giardia lamblia*, *Entamoeba histolytica*/dispar and *Cryptosporidium* sp. CONICET researchers have generated a diagnostics kit in a dipstick format. The strip consists in positive controls using *Giardia* cysts generated in vitro, immunoaffinity–purified antigen from *Entamoeba* cyst walls, and oocytes of *Cryptosporidium* purified from the stool of experimentally–infected calves. They use a particular antibody for the capture of the parasitic forms from stool samples and a secondary antibody directly–labeled with HRP for detection. The tests can be performed by untrained personnel and have a high sensitivity (can detect up to 50 cysts or oocytes per ml or resuspended stool samples), and can be performed in less than one hour directly in the field, without the need for any additional equipment.
□

Controlled Release

Pharmaceutical Composition Comprising Modified–release Polymeric Microparticles
For oral administration of therapeutically active antiparasite substances, selected from the group of benzimidazoles, nitrofurans, and nitroimidazoles, where said microparticles have an average diametre roughly between 10 and 50µ. ***Advantages;*** High stability in cellular culture media and, more significantly, in simulated intestinal fluids (There is no variation in its physical–chemical properties for at least four hours.).

Iridium Complexes and Carbon Monoxide–releasing Compounds

A drug for the treatment of a mammal with disorders requiring CO-releasing agents.
The disorders may be pathological situations where the vasoactive, anti–inflammatory, antiproliferative, and anti–oxidant effect of CO are favourable against tissular damage induced by ischaemia/reperfusion, cardiovascular disorders, inflammation, septic shock, hypertension, oxidative stress, or erectile dysfunction, among others. ***Advantages:*** Water soluble, there is no precipitation after CO release. In addition, as there is a single CO in the coordination sphere, the maximum dose to be applied to a patient can be ensured. CO release is produced spontaneously in the presence of agents that can capture CO, an indication that there is an interesting stability in the complexes. ***Patent Status.*** AR

Chemistry/Pharmaceutical Compounds & Compositions

Compound Derived from Benzo[b]carbazole
Compounds with antimicrobial and antifungicide activity, with the possibility that they may be administered to a patient by means of any acceptable route of administration. ***Patent Status.*** AR

Photodynamic Antimicrobial Agent
Consisting in a derivative of porphyrin substituted by three trimethylammonium groups and one trifluoromethyl group, together with the formation of a metal complex with Pd(II). ***Application:***
Inactivation of bacteria by photodynamic therapy to inactivate bacteria, fungi, algae, and viruses. The treatment may be applied on infections located in body membranes accessible to irradiation in human beings or animals. It may also be of interest in decontaminating biological fluids and contaminated waters. ***Patent Status.*** AR

Trap for Hematophagous Insects, Control Methods, and Detection of Said Insects
The trap comprises at least one source with a chemical attractor (possibly CO2), an entomopathogenous agent (it may be a cuticular lipid extract of hemotophagous insects) and a chemical facilitator for the dissemination of the entomopathogenous agent (a fungi, e.g., *Beauveria bastiana*). ***Patent Status.*** AR

Pharmaceutical Compounds in Aqueous Solutions for Oral Administration of Antiretroviral Agents
Compounds based on polymeric micelles and other nanoscopic structures, particularly useful for administration of antiretroviral agents (etravirine , Efavirenz) to paediatric and geriatric patients and, in general, to patients that have difficulties in degluting solid pharmaceutical formulations, or that require an adjustment in the dosage either because of body weight or after monitoring plasmatic levels.. Because of its high hydrophobicity, just like Efavirenz, Etravirine exhibits very low aqueous solubility and, in addition, very low permeability through lipophilic membranes. ***Advantages:***

- The solubility of the drug in an aqueous medium is at least 100 times better in relation to its intrinsic solubility in a medium free from micelles or other nanoscopic structure.
- By oral administration of the invention's composition, there can be an increase of at least 50% in the value of C_{max} (maximum plasmatic concentration) and an increase of at least 35% in the oral bioavailability of the drug.
- Less than 30% reduction in interindividual variability. ***Patent Status.*** AR

Anti–inflammatory and Antioxidant Composition
A combination of at least coffee extract and an extract from a plant of the *Larrea* genus in addition to excipients. It may come in the form of creams, ointments, lotions, gels, or emulsions.

Application: Treatment of skin disorders (inflammatory or produced by oxidative processes) such as, for example, antiage treatments or acne.
The activity of superoxide dismutase, catalase, sequestration of free radicals, carrageenan–induced inhibition of oedema in female ducks, TPA–induced inhibition of ear oedema in mice and primary dermal irritation test in rabbits of the composition were subjected to testing. ***Patent Status.*** AR

Compositions Absorbing UVB Radiation and Anti–oxidants
Compositions containing at least 0.1% p/v mycosporines, from yeasts of *Xanthophyllomyces dendrorhous/Phaffia rhodozyma, Dioszegia* sp. or *Rhodotorula minuta* species. ***Advantages:*** The production of mycosporines can surpass 50 mg g^{-1} at least two times higher than in filamentous fundi, and at least 20 times higher than in algae. They are easier to obtain, with an estimated production cost of 0.02 grammes of MGG per each gramme of bacteriological quality glucose, which can be drastically reduced in fermentations at an industrial scale.
The developed compositions can be incorporated to different vehicles for topical application (creams, gels, emulsions, etc.). ***Application:*** Solar sunscreen and anti–oxidants. ***Patent Status.*** AR

Water soluble pharmaceutical composition comprising at least one therapeutically active substance having hydrophobic properties and at least one compound selected from among sialoglycosphingolipids and glycosphingolipids
The invention relates to injectable sterile compositions formed by nanomicelles of glycosphingolipids or modified glycosphingolipids, which can be non-covalently coated with albumin and which allow the delivery and controlled release of highly hydrophobic molecules.
The effectiveness of many drugs, especially the hydrophobic characteristics, is limited mainly by its inability to reach the correct site of therapeutic action. In many cases, and even when the drug is soluble in water, only a small fraction of the administered dose reaches its therapeutic site, while most of the drug is distributed throughout the body. Thus, this distribution in organs and tissues is often limited to dosage.
This technology is applicable for delivery of active principles that present hydrophobic nature and possess a very low or limited water solubility or, for example, those used in oncological treatments (such as Paclitaxel, Docetaxel and Doxorubicin), antifungals (such as Amphotericin B), hormonal (such as Progesterone), and anesthetics (such as Propofol). Also included are prostaglandins, Isosorbide dinitrate, testosterone, nitroglycerin, estradiol, vitamin E, cortisone, dexamethasone and its esters, and betamethasone valerate. ***Advantages:*** This composition permits a great solubility of the drug in aqueous medium, which is stable and complex without dissolution and at the same time concentrate only in the site of action. ***Development& Patent Status.*** WO2011/113981

Stem Cells

Stem Cell Consortia (http://www.cicema.org.ar). Created to develop highly qualified research on stem cells with an intra and inter institutional synergistic strategy. Projects aimed at determining the therapeutic potential of human and animal stem cells derived from bone marrow, umbilical cord blood, adult brain and embryonic stem cells in cardiovascular diseases, nervous system and cancer. Animal models of human diseases based on mice, rats, sheep and rabbits will be used. A joint effort in understanding basic principles of cellular reprogramming and the therapeutic application of induced pluripotent stem cells (iPS) will be pursued.

Probiotics

Vaginal Probiotic
Development of strains that produce different biocidal compounds such as hydrogen peroxide, bacteriocins, and organic acids. Scientifically proven efficacy without side effects. Suitable for formulating pharmaceutical products (gels, vaginal suppositories, creams).

Further probiotic developments on page

Medical Devices & Methods

Implantable ocular microapparatus to ameliorate glaucoma or an ocular overpressure causing disease

A microapparatus implantable in the eye comprises a cuasi-bistable microvalve commanded by an intraocular pressure sensor in situ. The microvalve mechanism includes a diaphragm made of a conjugated polymer that shows high deformation and biocompatibility capabilities and whose volume depends on the electric potential applied by its pair of electrodes. The sensor and actuator-valve are coupled to a drainage conduit, the first to deform by the pressure in the ocular globe and the second in a position of buckling to normally close the drainage conduit. The sensor is a membrane of conductive polymeric material with these same properties and whose ohmic resistance varies with the mechanical deformation produced by ocular pressure. ***Application:*** This invention is applicable to ophthalmologic surgery and refers to amelioration or eventual cure of high intraocular pressure related to glaucoma. ***Advantages:*** miniaturisation of the implant. Active control of intraocular pressure, biocompatibily of the implant during its Llfetime Effective treatment for reduction of intraocular pressure (vs drugs or surgery). Same or better effectiviness at reduced cost. Remote monitoring of patient. ***Development & Patent Status.*** PCT/IB2007/055169

Method for detecting deglutition in babies
The method allows diagnosing and recording when the preterm infant is capable of coordinating respiration and deglutition, providing a document of the measurements recorded, such as an electrocardiogram or electroencephalogram. By surface sensors, it is possible to detect trachea, glottis or hyoid bone movements generated at the time of deglutition. ***Application:*** Diagnosis and recording device during milk ingestion of preterm infants. ***Advantages:*** Neonatology services do not discharge a preterm infant until the capability of coordinating respiration–deglutition has been developed. The use of the present device will allow maternities to avoid additional days of admission to intensive care units and reduce considerably the treatment costs of preterm babies. ***Development Status & Patents.*** There have been several trials to demonstrate its usefulness and portable models of this device are now being made. PCT/IB2007/054349 Argentina, Brazil, Europe, and the USA

Device and procedure for diagnosis of physiologic status and/or selection of the best spermatozoa of a semen sample based on chemotaxis

The methodology is based on sperm separation according to chemotactic activity (orientation of sperm movement towards the source of an attractant molecule). This method enables the diagnosis of the physiological state of a given sperm sample, on the one hand, and the separation and concentration of spermatozoids with the best physiological state to fertilise an oocyte, on the other hand, thus allowing for their subsequent use to improve the results of Assisted Reproduction Treatments (ART) This method combines material and low–cost reagents by means of a quick and simple procedure that requires no trained personnel for its use. The assay, including the final results, takes no longer than 45 minutes. An almost insignificant time frame when compared with the minimum four-hour time frame necessary to prepare the semen samples. This method makes possible up to a 700% enrichment in sperm capacitation. ***Application:*** 1) The diagnosis of the physiological state of a semen sample at low cost. 2) The selection and concentration of the best sperm in no more than 45 minutes. Lastly, it should be noted that this methodology can also be used in ART protocols applied to animal species of economic significance (e.g., bovines, horses, other domestic animals) as well as endangered species. ***Advantages:*** Simple and inexpensive device the diagnosis and selection of the best spermatozoa in only one step. *Development & Patent status.* Positive results in studies performed in Argentina and Brazil. With this device, an enrichment of capable spermatozoa of up to 600% superior to the original semen sample can be obtained. Said enrichment was verified determining the ratio of spermatozoa performing the pharmacologically induced acrosome reaction, a procedure known as capacitation indicator. /WO/2010/100615 **Japan, the USA, and Europe**

A biodegradable, biocompatible and non-toxic material, sheets consisting of said material, and the use thereof in food, pharmaceuticals, cosmetics and cleaning products

A biodegradable, biocompatible and non–toxic material is disclosed, which may be used to isolate and/or to protect a product from the environment, wherein said material comprises a matrix composed by starch, glycerol and starch nano–crystals dispersed in said matrix. The material may be used in the form of foils, sheets, films, coatings, gels, etc, to isolate and/or to protect a product from the environment. ***Application.*** The replacement of synthetic polymers by biopolymers in the area of packaging and wrapping is one of the most important items for the last years. Within this context, the starch as a thermoplastic material has been under study for about twenty years, as it refers to raw material which is cost efficient, abundant, renewable, and biodegradable. However, up–to–date, small–scale applications have been able to be achieved, mainly, since the thermoplastic starch shows a great sensitivity to water, which is enhanced by the presence of a plasticiser (which, generally, is a polyalcohol). The material may be used to isolate and or to protect food, pharmaceuticals, cosmetics, and cleaning products. Also, it is completely thermoplastic, renewable, and flexible, and can be easily conditioned to different processes of heat plasticisation by the use of equipment commonly used in the manufacturing of synthetic polymers. It may successfully substitute the typical stretchable PVC films used to protect, among others, fruits or products found in trays of so–called ‘fast food’. ***Advantages:*** Since strong increases have been observed either in the storage module or in water vapour permeability, these new compounds appear to be excellent from the point of view of their possible application to packaging materials. It has unique properties of water vapour permeation, mechanic resistance, transparency to material,

etc. ***Development & Patent Status.*** WO2011/083438. Patent applications have not yet entered into national phases.

Method for the identification of genes involved in neurodegenerative processes: Behavioural profiling to identify neurodegenerative drugs

The invention involves a method for the identification of genes involved in late onset of neurodegenerative processes by means of a genetic screen comprising the measurement of sleep–wake cycles in mutant flies**.** ***Application:*** Automated assay to detect potential neurodegenerative effects of novel drugs. Identification of genes that progressively alter behaviour. Generation of new disease models. *Development & Patent Status:* PCT/IB2009/053681

HTS Drug Screening System

Locomotive activity can represent a relevant biomarker to study various model diseases such as addiction, Parkinson, Alzheimer, Huntington, and diabetes. The invention refers to a methodology and associated device for High Throughput Screening of drugs using small animal models (*C. elegans*, zebra fish larvae and similar). In brief, the developed system automatically detects the behaviour of small animals cultured in microtitre plates (96 well plates or 384 well plates). ***Application:*** Drug discovery and drug screening applications using animal disease models (based on behavioural defects). Neurodegenerative disorders (Alzheimer, Huntington, Parkinson): lifespan, antioxidants, drug toxicity evaluation. ***Advantages:*** Automation (low cost, small size, stackable, robot–capability). ***Development & Status.*** Commercial prototype (384 channels) developed and tested. Some protocols already tested. Proof of concept, drug toxicity measurements, antioxidant tests, *C.elegans* lifespan records**.** ***Patent Status***. **PCT/IB2007/054628 The USA and the EU 05/2009**

Novel biological tools for dengue virus studies

Dengue Virus Reporter System for HT Screen. Genetically modified dengue virus encoding reporter gene luciferase. This virus infects mosquitoes and mammalian cells producing high levels of luciferase. The assay has been optimised in a 384 well plate format for HT screens. ***Application:*** Compound library screening. Evaluation of activity in antiviral compounds. Determination of mechanisms of action for potential antiviral drugs.

Nanotechnology & Materials

- Development of an internal radiation therapy system by managing radionuclides coupled to nanoparticles
- Nanovectors to carry drugs or nucleic acids for cancer treatment, and chemotherapy and radiotherapy sensitivity
- Metallic nanoparticles covered with medicine for bacterial activity control
- Nano adjuvants for non–parenteral routes of administration
- Ultradeformable vesicles for topical application of leishmanicide agents
- Dendrimeric therapies
- Molecular basis for the action of antioxidant nanovehicles on the skin
- Protein nanoparticles as potential drug carriers

Dental Restauration Material

Rigid material which has the following properties: Opalescence similar to the tooth. Low volumetric shrinkage during polymerisation. Adjustable thermal expansion coefficient with the percentage of $Si0_2$. High wear–out resistance.

Nanostructured Biomaterial

Hydroxyapatite and polycaprolactone–based active functionalised by processes using carbon dioxide in supercritical state (SC CO2) as clean methodology.

Treatment of Metallic Implant Surfaces

For improving the interaction of its surface with ions, molecules, and cells, contributing to the binding of the bone tissue to the implant surface (osseointergration) of the titanium surface, such as the superficial treatment by chemical attacks, and textured by laser ablation.

Analytical Services

Biochemical – Bioanalytical and PK assays

- Spectrometric
- Luminometric
- Fluorimetric
- Radiometric

Functional Mode

- Receptor functional assay
- Enzyme activity
- Process (methods) design for in vitro enzyme activity determination on viral proteases, polymerases, helicases, and NTPases.
- Extract preparation and assays for in vitro translation studies
- Biochemical studies for identification and characterisation of RNA–protein interactions
- Biomolecule interaction determination (biomolecule organic compounds/ protein–DNA interaction / Antigen–antibody interaction
- Specific biochemical studies (*T. Cruzii*, yeast, oligosaccharide studies)
- High throughput screening of drugs

Imaging Studies

- Bright field, fluorescence and confocal microscopy studies

Special Equipment

- NGS (Next–Generation sequencing) Roche-454 GS FLX equipment
- Applied Biosystems 3130 and 3130xl Genetic Analysers
- Bioanalyser (Agilent 2100)
- ADN Hydroshear (Genomic Solutions)
- Robot for microarrays printing (BioRad)
- Microarray scanner model GenePix (Axon)
- Bioanalyser lab-on-a-chip
- 2-photon microscope
- Stereoinvestigator – estereology
- Real–time PCR, LightCycler 480 II with 384 wells (Roche)
- ANYmaze software for behavioural studies in mice
- Cryostat
- Microtome
- Stereotaxic surgery apparatus
- IVIS Lumina optical imaging system. To perform in vivo optical imaging using fluorescent and/or bioluminescent reporters.
- Dynamic Light Scattering Instrument (DLS)
- MALDI TOF Microflex Daltonics
- NanoDrop
- Stereo–fluorescence system Leica MZ-FLIII
- Micromanipulator for yeast genetic studies (spore dissection)
- Proprietary Fast Throughput Tracking System for Small Animal Drug discovery and drug screening applications (read-out: activity in *C Elegans* and *Drosophila*).
- Spinning disk microscopy
- Bioreactor (5L). Pilot scale recombinant protein production.
- Spectrofluorimetre. High sensitivity analysis of ligand–protein interactions
- Perkin Elmer fluorimetre
- Microcalorimetre. Measurements of calorimetric determination of molecular interactions. Useful on targeted drug design.
- CD Spectrometre. QC of drugs.
- Crystallisation robot
- Luminometre
- Oocyte micromanipulator and microinjector
- Nuclear Magnetic Resonance Unit

Food Industry

Know–how & Technological Services

Dairy

Certification of hydrolysation quality.
Allergies to milk proteins are frequent in breastfeeding infants, the majority of which are also allergic to soya proteins (first choice substitute). Scale development of hydrolysed casein and certification of hydrolysation quality. At present, there is no food consisting in hydrolysed casein in the Argentine domestic market.

Low Lactose
Special formulas for lactose intolerance: use of whey from cheese making for the elaboration of functional food with very low lactose content. New varieties of yogurt with very low lactose content.

Low Fat and Low Cholesterol Cheeses
Semi hard cheeses and goat cheeses with the addition of probiotic bacteria.

Cheeses
Accelerated ripening to cut back on time and costs by using enzymes or increasing enzymatic activity. Development of goat and sheep cheeses. Preservation of soft cheeses by freezing. Selection of lactic ferments for primary cheeses and adjuncts depending on their capacity to generate aromas.

New Probiotic Bacteria
Beneficial to health and bacteria resistant to bacteriophages for industrial applications. Development of economical means of culture.
Customised Probiotics: Design, formulation, and development of probiotics, biopreservatives, bioingredients, culture initiators, and adjuncts for a wide range of fermented products.

Oils and their By–products

- Study of environmental conditions as to the quality and productivity of extensive crops for oil production
- Implementation of biochemical, agronomic, and molecular tools for the characterisation, identification, and preservation of olive germplasm collections
- Enzymatic treatment of sunflower oil to improve its extraction and sensory characteristics
- Characterisation, processing, and alteration in the quality of edible oils and their by–products
- Elimination of trans fat acids by means of enzymes
- Degumming of natural oils
- Enzymatic modification of lecithins

Meat Products

- Preservation of meat products by the use of bacteriocins and bioactive films
- Modification of proteins with an impact on the functional quality of the meat (by the use of lactic bacteria)

- Design of ferments to enhance the sensory quality of cured meats
- Processing of meat products by the use of high pressure technology
- Formulation of cooked/pasteurised prepared meat–based products
- Modelling and simulation of thermal and non–thermal treatments
- Study on the effect of hydrostatic high pressure on food safety, physical/chemical properties, sensory quality, and stability
- Emulsified lean meat products enriched with unsaturated fatty acids and phytosterols
- Various developments in animal health as to weight yields, meat quality, and reproduction
- Methods for identifying and choosing animals that have increased meat redness, and a decrease in the dimming speed. Methods to choose meat cuts having that attribute.

Poultry Production

- Development of a combination of whey protein–based fat substitutes and gum to industrially achieve stable emulsified cured poultry meat products with a low fat content suitable for celiac patients
- Development of additives for poultry feed
- Prevention strategies aimed at reducing mycotoxins in poultry feed

Bread Goods and Sweets

- Biopreservation of bread goods
- Formulation and characterisation of biscuits/crackers with natural ingredients, aimed at persons with different nutritional requirements
- Incorporation of ingredients to improve technological, sensory, and nutritional qualities
- Optimisation of the baking process in bread and baked goods
- Enrichment by vegetable protein concentrates and bioactive peptides
- Development of functional food products: healthy flaky pastry
- Development of wholegrain, gluten–free food products
- Healthier confectionery and biscuits/crackers based on buttermilk protein concentrates, less sugar and fat, more proteins and fibre
- Formulation of low glycaemic food products: the same sensory properties of the original product, but a low sugar content, with microbiological stability
- Formulation of starches and hydrocholloids (hydroxypropyl methylcellulose, gels, xanthan gum, ovalbumin, milk whey concentrate, powdered eggs, etc.) for the elaboration of gluten–free pasta
- Study on extensibility and Texture Profile Analysis (TPA) of uncooked and cooked dough
- Characterisation of rheological behaviour by means of dynamic oscillatory tests and Dynamic Mechanical Thermal Analysis (DMTA), relating it to the formulation of the product
- Characterisation of changes in quality parameters during product cold storage (modified atmosphere, time–temperature).
- Determination of variables for drying operations in relation to product quality parameters and establishment of optimum processing conditions
- Development of high–protein wheat/soya bread products
- High fibre biscuits
- Pasta with the addition of non–traditional ingredients that enhance the nutritional profile: food fibre, soya protein, amaranth, nut solids
- Non–dairy puddings with vegetable protein

Fruits, Vegetables, and their By–products

- Development of technologies to extend the post–harvest life of fruits and vegetables
- Obtainment of fruit–based products by applying new processing technologies for raw material
- Effect of post–harvest treatments on the quality and nutritional value of minimally processed fruit
- Dehydration and formulation of fruit–based products using combined methods of impregnation and drying or combined cooking
- Study of the development of microbial bio–films in fruit juice concentrate processing equipment
- Study of microorganisms causing deterioration in the juice industry
- Control of pathogenic fungi in pears during post–harvest
- Study of the effect of hydrostatic high pressure (HHP) on food safety, physical/chemical properties, sensory quality, and stability
- Stabilisation and clarification of fruit juices
- Cultivation of capers and the development of nutraceuticals therefrom
- Cultivation of cactaceae
- Tinned squash fortified with high bioavailability iron
- Technological dehydration process to obtain low–calorie pectin gels from apples and laminated gels from tomato puree
- Technological process for Red Delicious or Granny Smith apple cubes kept in orange juice with the addition of chemical preservatives
- Technological process to extend the shelf life of highly perishable vegetables by the use of starch–based coatings
- Technological process to split starch suitable for the food industry
- Processing to extend the shelf life of pre–peeled potatoes

Fermented Beverages

- Counselling on the influence of environmental factors in productivity and sensory qualities of grapes and fermented products
- Characterisation of non–conventional yeasts for fermented beverages
- Microorganisms for the production of fermented beverages: biodiversity, selection, and handling of contaminants. Accommodations to low temperatures and other conditions of interest.
- Development of adjunct cultures of non–*Saccharomyces* yeasts to improve the organoleptic properties of fermented beverages

Processes

- Development of Experimental Models: Evaluation of safety in food ingredients, determination of food and ingredient functionality, and pre–trial studies
- Innovative developments in functional, edible, or degradable packaging, among other specific characteristics
- Techno–functional properties of proteins
- Determination of optimum conditions for processing by means of process simulation
- Development of solar thermal heating methods for industrial drying
- Counselling and training in food hygiene

Process Auditing

Monitoring and verification activities by means of standardised, recorded processes based on

varying auditing criteria depending on the requirements of the context

- Good Manufacturing Practice Audits, according to technical regulations under MERCOSUR GMC 80/96
- Hazard Analysis and Critical Control Point (HACCP) Audits according to the *Codex Alimentarius* or IRAM 14104 standard
- Audits on Food Safety according to ISO 22000:2005
- Audits on Production Processes
- Standardised Sanitation Operating Procedures (SSOPs)

SELECTED PROJECTS & PATENTS

Nutraceutical and Functional Dairy Products

New Humanised Milk
Milk with exceptional probiotic qualities as a result of bifidobacteria isolated from human breast milk.

Biological Regulator of Hyperlipidaemia
Dairy products designed to modulate cholesterol. Excess cholesterol is a risk factor in the development of arteriosclerosis and other coronary diseases.

Milk for Gastritis
Gastritis is an inflammation of the stomach lining, affecting 80% of the world population according to the WHO. This product is fermented milk (*St. thermophillus* CRL 1190) that is effective both to prevent as well as to treat this pathology, thanks to the production of exopolysaccharides, which reportedly are immunoregulators and have antiulcer properties.

Antihypertensive Milk
Arterial hypertension is a risk indicator for the development of cardiovascular diseases. It is fermented milk characterised by the release of bioactive peptides with antihypertensive properties.

Supplements
Lactic bacteria with production of B12 (*L. reuteri* CRL 1098 *and L. coryniformis* CRL) and B2 vitamins. Lactic Bacteria with production of conjugated linoleic acid (CLA) produced by lactic bacteria.

Functional Additive with Probiotic Bacteria
In powder, storable at room temperature, as an end product or in the elaboration of other food products. Elaborated from buttermilk.

Protein Concentrate of Animal Origin
Procedure for obtaining a protein concentrate from animal plasma, to be added to meat derivatives, drinks, milk derivatives, bread products, energising drinks, dietary supplements, etc.

Meat Products

Procedure for Obtaining a Protein Concentrate of Animal Origin

It contains a low amount of denatured proteins and has organoleptic properties, which is useful for its application in the preparation of food for human beings, even when using a high concentration of the protein concentrate.

The protein is mostly BSA (Bovine Serum Albumin), characterised by a high digestibility, and containing all the essential amino acids in the quantities required by the FAO/WHO/UNU to achieve a diet with the protein content required for the optimum development of human beings. It has excellent dissolution properties and a low saline content (2.8%). The lyophilised product may be stored and distributed at room temperature (18-25º C). It is an excellent emulsifier, water ligand, gelling agent, and emulsion stabiliser.

It can be used in the preparation of meat derivatives, fruit juice–based beverages, milk derivatives such as ice cream and yogurt, bread and bakery goods such as cakes, custards, jams, jellies, as well as energy drinks, dietary supplements, pasta, etc.

Bread Goods and Sweets

Process for Starch Fractionation
A process for obtaining a product with an amylose/amylopectin ratio similar to genetically modified starches (50%), with the advantage that it requires a lower solubility temperature (100° C).

Advantages:
Simplicity, safe reagents, and relative low cost.

Method for Obtaining Dietary Fibre from Squash and Bread Goods
A food additive without any residue of toxic chemical products, which can be applied in the food industry, particularly the flour industry. In addition, the method offers an alternative for processing waste from the fruit and vegetable industry, thus incorporating added value and reducing environmental impact from waste.

Pie and Pasty Gluten Free Dough
It is a starch–free mix of hydrocholloids, milk whey proteins, with a fat phase and an aqueous phase.

Fruits, Vegetables, and their By–products

Method for Obtaining Pectins
With a degree of acetylation expressed as a molar percentage between 1.0 and 2.0, and a molecular weight between 90000 and 2300000 Da. Exhibits thickening and/or gelling activity at room temperature.

Fermented Beverages

A Procedure for Elaborating an Alcoholic Beverage Similar to Gluten Free Beer

A technique was perfected for the cultivation of millet, by which enhanced palatability and similarity to craft beer is achieved, but the content is gluten free.

Processes

Biodegradable Film
The film comprises chitosan, tannic acid, and glycerol.

Edible Film
The edible film comprises low methoxyl pectins, at least one plasticiser, and at least one anti–oxidant. The film presents low water mobility.

Device for Chemical or Biological Analyte Sensing
The device contains optical microcavities prepared with multilayers of nanostructured porous silicon.

Advantages

No need for a white light source or absorbance measurement, just a position detector is required.
The sample volume is reduced (the actual measurement area can be reduced some tenths of square micrometres).
High response rate (less than 1 second), only limited by the diffusion of the analyte in the porous network.

Analytical Services

- Evaluation of the risk of transmitting verotoxigenic *Escherichia coli* for the consumption of hamburgers
- Evaluation of risks for thermophilic *Salmonella spp*. and *Campylobacter* for the consumption of poultry meat
- Phenolic profiling and anti–microbial bioactivity and honey antioxidants
- Chemical and functional characterisation of honey
- In vitro testing of the virulence factors in *Bacillus cereus* and *Bacillus megaterium* isolated from honey
- Analysis of the physical/chemical, functional, and sensory properties of dehydrated food products and ingredients
- Detection and quantification of volatiles in grapes and wine
- Composition: Proteins, fat, ashes, salts, dry extracts, total reducing sugars, etc. Quantification of free amino acids, specific proteins, sugars, and organic acids. Detection of allergens. Availability of minerals.
- Adulteration and Contamination: Quantification of preservatives (ascorbic, benzoic, and propionic acids) and study of adulterations. Detection of pharmaceutical drugs in cow's milk and dairy products in general. Determination of heavy metals.
- Storage stability, shelf life (at real–time and accelerated conditions)
- Sensory evaluation
- Molecular Microbiology: Identification and characterisation of microorganisms
- Food Traceability Analysis, with the capacity to produce a thumbprint of the product associated to the area of origin

- Food Safety Analysis
- Determination and Calculation of Nutritional Labelling
- Quantitative evaluation of risks throughout agri–food chains
- Valuation and characterisation of raw material and elaborated products. Instrumental quality.
- Characterisation of Matrices: olives and olive oils, walnuts, goat dairy products (milk and cheeses), tomatoes, potatoes, honey, beef and goat meat

Animal Health

Know–How & Technological Services

Animal Feed

- Lactic bacteria and yeast for decontamination of mycotoxins in silage
- Effect of energetic supplementation in calves nutrition
- Effects of dietary additives on ruminal digestion
- Supplementation of feed in poultry with essential oil components

Genetics

- Genetic traceability using molecular markers. Individual identification.
- Bioinformatics tools for diagnostic and characterisation of the foot–and–mouth virus
- Epigenetics effects on reproduction in rabbits and goats

Reproduction

- Production in vitro of bovine oocytes
- Maturation and fertilisation in vitro of bovine and porcine oocytes
- Cryopreservation of spermatozoa
- Gamete and preimplantation development: antioxidant requirement during bovine oocyte maturation, fertilisation and embryonic development in vitro
- Study of certain factors which affect reproductive efficiency in meat rodeos inseminated on fixed time: salts of estradiol, ovulation, and sperm quality synchronisation

Animal Cloning

- Optimisation of methods for producing transgenic rumiants
- Equine Reproductive Cloning: Intrafollicular transfer of embryos and new activation methods

Poultry

- Vaccines for poultry based on recombinant poxvirus
- Quantification of medicine metabolites in poultry products

SELECTED PROJECTS & PATENTS

Prevention of Intestinal Infections in Calves

It is a powdered product to be added to any other food item, and combines probiotics with minerals and vitamins, eliminating the use of antibiotics by recovering balance in the intestinal microbiota.

Prevention of Bovine Mastitis

Therapy with probiotic bacteria, non–existent in the pharmaceutical market, which is directed towards restoring autochthonous microbiota. It comes in powder form.

Prevention of Bovine Metritis

Preventive treatment with probiotic bacteria brings down production costs and cuts back on antibiotic traces in milk and the dissemination of resistance to antibiotics. It comes in powder form to resuspend applied as intravaginal infusion and gelatin capsules.

Intranasal Vaccine against Whooping Cough

Intranasal vaccine for prevention of infections produced by *Bordetella pertussis*, immunisation method and preparation procedure

Vaccines against Equine Influenza

Development of Equine Rinoneumonitis and Influenza vaccines

Plant Production & Health

Know–how & Technological Services

- Development of biological systems and enzymatic reactors for the revaluation of waste and the obtainment of products of industrial interest
- Optimisation of recombinant protein production processes in different systems of expression
- Transformation of plants used as experimental models under stable and transitory forms. Evaluation of associated phenotypes. Proof of concept studies.
- Evaluation and counselling on genetically modified organisms
- Early detection of fungal infections in plants
- Impact of fungicide, bacterial extracts and natural antioxidants application such as prevention strategies of toxicogenic fungi
- Development of new phytosanitary bioproducts for intensive agriculture

Hydroponics

Analysis and development of hydroponic nutrient solutions in greenhouse cultivation

Irrigation

Strategies of irrigation control in intensive agriculture based on optimisation using the sensor fusion

Reforestation

- Integrated approach and assessment of desertification. Alternatives for the sustainable development of drylands.
- Genetic, systematic and evolutionary studies in species of the genera *Prosopis* and *Acacia* (*Leguminosae*).
- Ecophysiological basis of forest productivity, resource use, stress resistance, and wood quality
- Integrated studies of soils in the Patagonian Andean region: erosion, ecology, and forestry health
- Effect of human disturbance on arbuscular mycorrhizal fungi diversity, implications for reforestation and restoration

SELECTED PROJECTS & PATENTS

Virus-resistant Potatoes
Development of potato varieties resistant to PVY (Potato Virus Y)
AR02 0103173

Improved Plant Yield and Tolerance to Abiotic Stress
Transgenic plants encoding genes providing tolerance to abiotic stress and improved yield.
HaHB11 Provides Improved Plant Yield and Tolerance to Abiotic Stress
HaHB11 belongs to the HD-Zip family of transcription factors, provides improved-tolerance to abiotic stress and has dual functionality, affecting both drought and flooding tolerance. Moreover, transgenic plants expressing HaHB11 exhibit larger rosettes and improved yield as compared with controls under normal growth conditions (e.g., normal irrigation and no salt stress) and conditions of severe abiotic stress.

Analytical Services

- Functional quantification and characterisation of biomolecules
- Analysis of the physical quality of soils: density, stability, mechanical resistance, water retention, conductivity
- Assessment about pollination of crops
- Assessment about land–use criteria
- Assessment on land management (particularly in relation to fungal microorganisms)
- Detection and quantification of ectomycorrhizal colonisation of important forest trees (conifers, eucalyptus, etc.)
- Detection and quantification of fungal colonisation (mycorrhizal fungi and pathogens) in roots in general
- Assessment about cultivation of edible fungi
- Assessment about the detection of air (air quality), water, and soil (heavy metals and hydrocarbons) pollution
- Soil microbiology and chemistry
- Pest ants in interaction with other plant or animal species and different soil types

Materials

Know–how & Technological Services

Composite Materials

With Nanoclays
Development of nanoclays from bentonites by means of chemical, physical, and/or biological modifications

Applications
Polymeric materials for automotive use and environmental remediation for the retention of agrochemicals and remediation of waste from mining and galvanoplasty

With Carbon Nanotubes
Block copolymers for designing and developing nanostructured polymeric matrices based on epoxy resins

Applications
Materials with enhanced mechanical and electrical properties

Carbon Nanotube Synthesis at Low Temperatures In Situ
On polymeric substrates by using 'Chemical Vapour Deposition' (CVD), assisted by radiofrequency plasma

Plasma–treated Surfaces
Obtaining and characterising nanostructured coatings by cathodic arcs or by duplex treatments combining arc deposition with metal and/or gas plasma immersion ion implantation

Treatments for Hardening Stainless Steel
By using titanium nitride and amorphous carbon coatings

Materials Resistant to High Temperatures for the Aerospace Industry
Enhancement of mechanical properties, degradation resistance, dimensional stability, rigidity, high temperature resistance, and flame resistance

Coatings and Packagings

Antimicrobial Paint
- With metallic nanoparticles, mainly silver–based. To inhibit bacterial and fungal growth.
- Development of insect–repellent paint

All paints are water–based acrylics, with non–toxic pigments and low environmental impact, suitable for interior painting.

Coatings based on Steel Corrosion Inhibitors
(Eco–compatible and chrome free), with molybdenum–modified zeolites and Ce(III)–modified zeolites

Wood Impregnation: Fire Retardants and Protection against Biological Hazards
With soluble alkaline silicates based on silica nanoparticles

Biodegradable Films

Based on nano–compounds obtained from polyhydroxybutyrate or starch. To be used in containers and/or packagings with nano–reinforcements, such as nanocellulose or native and modified clays.

Development of Low–Cost Plastic Films for Active Packaging of Fruit, Vegetables and Cereal Goods
Inclusion polymers by nanometric rigid loadings, e.g., talc and sepiolite, for superficial modification and/or mixed with other polymers

Development of Polyethylene Fibres with Acicular Nanofillers
Aroma absorbent properties, for use in textile fibres, upholstery, and carpeting

High Performance Coatings
With furan resins replacing traditional phenolic resins, to avoid the use of formaldehyde. Applications in the food and oil industries.

Other Developments
Antifouling paint having low environmental impact for marine and riverine contexts

- Sol–gel coatings for metals
- Creation and characterisation of compound electrolyte deposits or alloyed metals with special properties
- Paint and coating formulation

Building Materials

- Enhanced hygrothermal behaviour in masonry by incorporating expanded polystyrene waste recovered from urban solids
- Cement self–repair by using resin–based microcapsules
- Innovation in emulsifiers for the formulation of conventional cationic asphalt emulsions
- Foundry sand valorisation in Portland cement concrete pavements
- Design and characterisation of fibre–reinforced self-compacting concrete for surface structural elements

Bio-plastics

Biopolymer Production in Bacteria
Development of transformed strains of *Escherichia coli* that produce intracellular biopolymers, and the procedure for obtaining these biopolymers

Bio-plastics Obtained from Protein
Obtained from agronomic waste (soya bean, sunflower, etc.) for producing food packaging (covers, films and containers) or as bio-plastics for agriculture

Bio-plastics Obtained from Starch
Production of bio-plastics from modified starch on their own or in combination with other polymers, with the aim of assuring longer durability in vegetable conservation.

- Design of spheroidal graphite (SG) cast iron alloys for specific uses
- Development of production processes for austempered spheroidal cast iron (ADI)

Analytical Services

- Designing and evaluating duplex systems (painted galvanised steel) for anti–rust applications
- Studying corrosion and contamination in potable water networks
- Developing, optimising, and validating chromatographic analysis methods
- Electrochemical studies and application of electrochemical noise technique to the study of systems of interest
- Monitoring of protective coatings in oil well extraction areas by developing spectroscopic impedance methodology and wireline wear resistance in tube and container coatings
- Studying what causes abnormal corrosion of conductor rollers in electro–galvanising lines
- Quality control of polymeric material in high– and medium–tension cables due to accelerated aging simulating the characteristics of material exposed to weather conditions UV camera–based aging tests according to ASTM Standards D5208 in polyethylene films to ascertain photo–oxo–degradability properties
- Accelerated assays to ascertain the durability of paint schemes
- Metallographic analysis
- Macrographic analysis. Non–destructive testing.
- Spark–based chemical/spectrometric analysis (Fe, Cu and Al bases)
- Atomic absorption spectroscopy
- Failure analysis
- X-ray diffraction
- Differential gravimetric thermal analysis
- Measuring mechanical properties in all types of materials under different conditions
- Evaluating electrical properties in materials
- Real and apparent densities (and porosity)
- Specific BET surface area in a single point
- Microstructural analysis
- Different mechanical strength testing methods
- Effect of fall of potential in crack propagation
- Implementing and auditing quality systems in testing laboratories (ISO Standard 17025)
- Studying what causes corrosion failure
- Designing and monitoring of cathodic protection systems for underground and underwater
- Evaluating corrosion failure in reinforced concrete structures

Industry

Know–how & Technological Services

Renewable Energy

- Development of advanced electrode materials for energy conversion and storage
- Development of absorbents for the energy generation using Fresnel type linear reflector
- Modelling and characterisation of graded-gap inorganic solar cells and organic bulk hetero–junction solar cells
- Preparation and characterisation of semiconductor films by vapour phase evaporation
- Control and observation of nonlinear dynamic systems. Application to conversion systems based on renewable energies.
- Novel nanostructures for conversion of carbon dioxide to useful fuels
- Electro–catalytic properties of Ru-polypiridyl complexes for solar hydrogen generation
- Characterisation of self–assembled monolayers of organic molecules on crystalline surfaces
- Structures derivative of photosensitiser agents with applications to the development of photo–electroactive organic materials
- Degradation and reliability of semiconductors devices under irradiation

Electronics, Automation and control

- Developments applying advanced knowledge in the areas of electronics, automation, and process control
- Instrumentation, automation and control applied to industry
- Solutions and developments on integrated instrumentation and automation systems for industries
- Research and development of new techniques in computational mechanics for nonlinear analysis of structures and mechanisms
- Development of fault diagnosis strategies for electric drives
- Teleoperation of mobile robots
- Nonlinear control. Applications to electrical, electronic and electromechanical systems.
- Dynamic behaviour of slender structures made of composite materials, linear and nonlinear aspects
- Power electronics, special electric machines and their control. Applications related to: control and conversion of energy in wind systems; electric and hybrid vehicles; fault detection and diagnosis in electric drives.
- Transformer Modelling. Network models, diagnostics, aging and remnant life.
- Complementary sequences and random sampling in power electronics energy injection to electrical grid
- Welding of advanced materials for strategic technological applications: welding procedure, microstructural evolution, mechanical properties, corrosion and wear resistance

Information & Communication Technologies

- Proof theory of programming languages based on Justification Logic

- Interaction among intelligent agents using argumentation: formalisation and applications in electronic institutions
- TICs to collaborative business processes management
- Models and techniques for the development of dependable systems
- Architecture–based design evolution
- Application of belief revision techniques and database updating in computational environments and multiagent systems
- Information technology to support semantic management of heterogeneous information sources
- Distributed logic programming with primitives for synchronisation, communication, and negotiation among intelligent agents
- Intelligent methods for recommendation and personalisation of content on the Web
- Collaborative processes for defining and managing software platforms: models and support architectures
- Extension of modern machine learning methods and applications
- Development of integrated information systems and decision support systems for the optimal design and operation of complex systems and processes
- Signal processing and classification
- Flexible real time systems
- Development of multi–objective evolutionary algorithms and machine learning techniques oriented to applications of bioinformatics
- Advanced studies in Information and Commmunication Technologies for Development (ICT4D)
- Information technology for the integration and collaborative management of supply chains
- Implementation of resource reservation mechanisms with QoS control and process synchronisation

Environment

- Method for reducing Cr (VI) to Cr (III) and its removal from waste water by using microorganisms, activated mud and charcoal
- Bioremediation of copper, chrome and cadmium using regional actinomycetes in soil samples
- Monolithic metallic devices for the elimination of liquid and gas contaminants
- Catalysts for the removal of nitrates and nitrites in water
- Generation of reactive oxygen species (ROS) for degradation of refractory pollutant materials to biological metabolism and/or environmental self 0150purification
- Design, development, and specification of processes and reactors for the treatment of industrial waste: chemical treatment line (i2 redox process) and biological treatment line. Operation, control, implementation, intensification, and miniaturisation processes.

Chemical Processes

- Feasibility, conceptual and basic engineering, scale–up, lab trials and pilot plants, start–up of chemical processes
- Problem solving, designing, and re–engineering of processes (T–excursions, low activity/selectivity, catalyst poisoning, revamping units for new services, increase in production, catalyst regeneration)

- Quality control of fuels. Design, synthesis, characterisation, and industrial manufacturing of catalysts
- Petrochemistry: FCC, reformed, hydrotreatment/crackling, isomerisation, alkylation
- Liquid fuel reforming processes for the production of hydrogen, reactor design, energy integration, operations and implementation
- Separation processes by distillation: complex, integrated, azeotropic, and reactive systems
- Design of siliceous micro–mesoporous materials for application in processes for controlled adsorption/desorption of pharmaceutical substances or biocides
- Development of heterogeneous multimetallic catalysts for use in environmental catalysis and sustainable chemical catalysis
- Design of active systems based on solid acids and biocatalysts for eco–compatible applications in the pharmaceutical industry
- Modification of filtration membranes and polymer surfaces with enzymes for the development of biocatalysts
- Modification of materials to develop chromatography matrix
- Development of micro and nanometric films for catalytic processes
- Micro–reactors and sensors based on nanometric zeolite films
- Coating with oxide and/or zeolites of sponges and monolite, ceramic or metal, to obtain structured catalytic systems

SELECTED PROJECTS & PATENTS

Method for Obtaining Hydrogen
Procedure for obtaining a catalyst to break down hydrocarbons in connection with the development of hydrogen and synthesis gas using this catalyst, particularly with a method of producing hydrogen and water vapour from reformed ethanol.
PCT/ IB2008/052789

Turnkey Bio-Diesel Plants
Design of custom–made processes and plants for producing biodiesel from vegetal oil and/or animal fat, at all acid levels, by using methanol or ethanol. Continuous or batch production plants, up to 50,000 litres per day.

Development of a Kit to Detect Phosphatase Inhibitory Toxins
For monitoring of water and shellfish quality.
The kit consists in a colorimetric assay of easy application for the detection of toxins from algae based on the inhibition of the enzymatic activity of phosphatase PP2A isolated from soya bean roots.
It is a laboratory method for the detection and quantification of Microcystins and toxins from Diarrheic Shellfish Poisoning (DSP).

Applicable to the analysis of:
1. Water samples with presence of microcystins and/or Nodularins;
2. Cyanobacteria samples with presence of microcystins and/or Nodularins;
3. Bivalve molluscs with DSP toxins.
4. Phytoplankton samples with DSP toxins.

Analytical Services

- Electrochemical and electrochromic properties of thin oxide and polymeric layers
- Complex systems analysis, routing and communication on networks
- Pollution monitoring (VOC, NOx, SOx, particulates, etc.)
- Analysis of samples by high–performance liquid chromatography (HPLC) with UV-visible detection, diode array and mass spectrometry (HPLC-MS)
- Studies on hazards and operability (HAZOPs)

Strains of Technological Interest

***L. rhamnosus* CRL 1505**

(used in products for social welfare programmes, and in the Yogurito and Biosec yogurt brands)

Properties

- Immunostimulant
- Prevents respiratory and intestinal infections
- Coadjutant in antiparasitic drugs
- Good growth in milk
- Good production of active biomass under controlled fermentation conditions
- Producer of flavour compounds
- Good tolerance to spray drying
- Good tolerance to cold conditions

Applications:

Fermented milks, yogurts, cheeses, etc. Can be used as a dietary supplement.

Level of Progress

Studies for Phases I, II, III, and IV (in vitro assays, preclinical trials [experimental animals], and clinical trials)

***St. thermophillus* CRL 1190**

Properties:

- Produces exopolysaccharides
- Gastroprotective effect (a functional property of the bacterial EPS)
- Produces aroma compounds (diacetyl)
- Compatible with commercial yogurt ferments
- Viscous

Applications

- Tested in fermented milk, yogurt, and vegetable juices (soya bean aqueous extract)
- Soft paste cheese and spreadable cheese

Level of Progress

Studies for Phases I, II, and III (gastroprotective fermented milk); Studies Phase III (experimental animal model, superficial chronic and active chronic gastritis). No need to keep strain 1098 viable in the food product.

***L. reuteri* CRL 1098**

Properties

- Produces vitamin B12
- Good tolerance to stress conditions (thermal, osmotic)
- Good production of biomass under controlled fermentation conditions

Applications

Tested in confectionery (e.g., sweets, cereal bars, chewing gum) and soft curd cheese (adjunct culture)

Level of Progress

Studies for Phases I, II, and III (preclinical trials in experimental model adjusted to a nutritional deficiency of vitamin B12); No need to keep strain 1098 viable in the food product.

L. paracasei subsp. paracasei CRL 75

Properties

- Produces exopolysaccharides
- Immunostimulant effect
- Good tolerance to stress conditions (thermal, osmotic)
- Good production of biomass in controlled fermentation conditions

Applications

Tested in confectionery (e.g., sweets, cereal bars, chewing gum) and soft curd cheese (adjunct culture)

Level of Progress

Studies for Phases I, II, and III

L. plantarum CRL 778

Properties

- Acidifying
- Biofungicide; producer of antifungal metabolites (phenyllactic acid, acetic acid)
- Good production of biomass in controlled fermentation conditions

Applications

- Tested as a biopreservative in bread goods; flavour enhancer in sourdough
- Can be used as an inoculant for silage.

Ped. Acidilactici CRL 1753

Properties

- Biofungicide; producer of antifungal metabolites (phenyllactic acid, acetic acid)
- Proteolytic
- Good production of biomass in controlled fermentation conditions

Applications

- Tested as a biopreservative in bread goods
- Can be used as an inoculant for silage

L. curvatus CRL 705

Properties

- Bioprotector: Produces two types of bacteriocins, an antilisteria
- Good acidifying capacity in meat fermentation
- Moderate proteolytic activity in meat proteins (release of peptides and amino acids)

- No production of biogenic amines; degrades them in vitro
- Sequenced genome

Applications

- Tested in in vitro meat fermentations and in cured meats at laboratory scale. Tested as a bioprotective culture in cooked meat products (e.g., ham, frankfurters, etc.). Its bacteriocin anti–listeria was successfully tested in bioactive films.
- Can be used as part of an initiation culture for fermented meat products and as a bioprotector for fresh meats vacuum packed at low temperatures, as well as in cooked products packed with bioactive films containing their bacteriocins.

***L. plantarum* CRL 681**

Properties

- Very good acidifying capacity in meat fermentations
- Moderate proteolytic activity in meat proteins (release of peptides and amino acids)
- No production of biogenic amines; degrades them in vitro

Applications

- Tested in in vitro meat fermentations and in cured meats at laboratory scale
- Can be used as part of an initiation culture for fermented meat products to ensure fermentation.

Extra Information:

Participation of CONICET in MINCYT1´s Sector Funds Program.

A Sector Fund is a group of economic and human resources coming from different sector, public and/or private, assigned to one or several high impact development tasks for a productive and or social sector which is administered through a consortia composed od institutions , universities, non-profit associations, entreprises , etc, collaboratively committed in successfully reaching a highly innovative target. The MINCYT has prioritized initially 8 big sectors that include: a) transversal development platforms: biotechnology, nanotechnology and information and communication technologies (TICS), b(in specific sectors Agroindustry, social development, energy, health and environment and climate change. Up to date more than U$S 70 M have been allocated to these sector funds.

CONICET is part of several Public –Private with the following projects in course:

BIOTECHNOLOGY

1. Development of commercial transgenic pastures with biotic and antibiotic stress tolerance. Activities will focus on introducing drought and saline resistance, insect and viral resistance, and increased digestibility and food quality. The platform will include all stages of the innovation process, from the discovery of genes to the development and production of transgenic varieties and bioinoculants.

2. Biotechnological strategies to control diseases affecting dairy cattle, mainly tuberculosis and paratuberculosis.

3. Biotechnological solutions for the Brucellosis situation in the milk sector.

4. Development and implementation of a technological plataform oriented to producing recombinant proteins of pharmacological interest; monoclonal recombinant antibodies; and the galenic formulations for human use

5. Development of technological platforms for the production of human viral vaccines and biotechnological drugs based on monoclonal antibodies for the treatment of infectious diseases of viral origin.

NANOTECHNOLOGY

6. Development of modified nanoclays and innovative products from domestic clays.

7. Generation and development of nanobiotechnological platforms for their use in medicine. Specifically focus on development of controlled release platforms of oncological drugs.

[1] *Mincyt: MInistry of Science and TEchnology. The Program is coordinated through the National Agency for Scientif and TEchnological Promotion (Agency). More specifically these Sector funds are under the scope of FONARSEC funds from the Agency.

8. Nanotechnological Cluster: Design, Characterisation, and Creation of Nanomaterials and Functional Surfaces.

10. Development of textiles with new functions by the use of nanotechnological tools to solve problems of national interest (ej repellent textiles)

NEW START UP CREATION

11. Domestic development of a prophylactic vaccine against the Human Papillomavirus (HPV).

12. Development of vaccines for aquaculture Industry.

13. Development of diagnostic reagents (kits) to accurately identify the foot–and–mouth disease virus, as well as other viruses having an impact on livestock production.

14. Development of of biodegradable and biocompatible activated polymer platforms for pharmaceutical and biomedical use

15. Development, industrial–scale production and application of controlled release platforms for bioactive drugs for veterinary use and/or pest control affecting livestock production

16. Development of a kit for skin regeneration, made up of a bioabsorbable membrane, a surgical tool, and an automatic device.

17. Production of Factors involved in coagulation processes by mass production of recombinant–based drugs

18. Development of a technological platform for modelling and simulating information signals, systems, and processing for three relevant high technology applications: radars, sonars, and oil exploration.

AGROINDUSTRY

19. Production of protein supplements with bioavailable minerals for human and animal use, as well as supplies for a sustainable agriculture, from milk whey.

20. Development of functional dairy products from incorporating probiotics, antihypertensive peptides, and a functional food additive in powder form.

21. Development of a Molecular Detection Method for early diagnosis of congenital Chagas disease in peripheral blood samples from neonates.

22. Development of a highly sensitive kit for detection of Chagas in neonates and individuals with congenital Chagas.

Technology Transfer Office
Rivadavia Ave. 2358 – 4th
(C1034ACP) Buenos Aires City, Argentina
Te. 54-11-4951-7172 / 7137 / 4611 ext. 102
vinculacion@conicet.gov.ar