ysis, zeta sizer and transmission electron microscopy (TEM). Then PHEMA-IMEO nanoparticules were immobilized onto the surface plasmon resonance gold chip surface and the chip surface was investigated by contact angle, atomic force microscopy (AFM) and FTIR-ATR for surface characterization. Kinetic studies were performed using this SPR chip. To determine the kinetic and binding constants Scatchard, Langmuir and Freundlich and Langmuir–Freundlich models were applied to the experimental data. Nanoparticules are about 54.6 nm, depth of chip surface is 58.23 nm, contact angle value decreased from 63.5° to 45.3°. Kinetic studies were performed with increasing dilution ratios (1/500 to 1/25 000). The chip obeyed the Langmuir adsorption model. The prepared chip is suitable for IgG detection.

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E2

An amperometric biosensor based on modified nanoparticles with an electron transfer mediator for the determination of phenol derivatives

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A new type of amperometric phenol biosensor was fabricated for the determination of phenol and its derivatives such as catechol, *p*-cresol, *o*-cresol, 2-aminophenol, pyrrogallol and hydroquinon. The polymer poly(GMA-co-VFc), a polymeric electron transfer mediator containing copolymers of glycidyl methacrylate (GMA) and vinylferrocene (VFc) with different molar ratios, was synthesized by free radical copolymerization and using this polymer the surface of superparamagnetite nanoparticles were coated in order to enhance biosensor response. Characterization of the nanoparticle–polymer–enzyme network was adjusted by using Fourier transform infrared (FTIR) spectroscopy, scanning electron microscope (SEM), atomic force microscope (AFM) and cyclic voltammetry (CV). The effects of the polymer ratios, the nanoparticle–polymer–enzyme ratio, and the applied potential were evaluated with respect to optimal sensor properties. The enzyme horseradish peroxidase (HRP) was used for the detection of phenol and its derivatives. The amperometric response was measured as a function of substrate concentration, at a fixed potential of −0.50 V vs. Ag/AgCl in phosphate-buffered saline (pH 7.4). Analytical parameters for the fabricated phenol biosensor were obtained from the calibration curves. The basic features (Michealis–Menten constants, pHopt, pHstability, Topt, Tstability, reusability, and storage stability) of the enzyme electrode were determined.

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E3

Synthesis and characterization of the chemical properties of new classes of NO donors as potential dopamine releasers in the treatment of Parkinson's disease

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Nitric oxide (NO) is a radicalic reactive molecule having manifold biological functions. NO, mainly known for its ability to induce vasodilatation, is also an important cellular messenger involved in many physiological and pathological processes. An important role of NO in the central nervous system is for the regulation of striatal dopaminergic transmission on which it has a neuromodulating effect. The NO-induced dopamine (DA) release in the *corpus striatum* could be considered a compensatory mechanism and, potentially, a pharmacological target in the therapy of Parkinson's disease. The aim of this work is the study of the mechanisms and the kinetics of NO generation by Piloty's acid-derived NO-donors in physiological conditions. To this end cyclovoltammetric and amperometric methods with on purpose put up microsensors selectives for NO have been used and the results compared with those obtained with EPR spectroscopy with spin trapping experiments. The results show that Piloty's acid derivatives generate NO in physiological conditions; in particular electron acceptor substituents tend to favor the NO generation, while electron donor groups disfavor this process. After *in vitro* characterization and *in vivo* experiments on DA striatal neurochemistry, the most promising molecules could be suggested as drugs in the therapy of Parkinson's disease.

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Education & Biotechnology Section

F1

Plant biotechnology education in Turkey

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The study reports the importance of plant biotechnology education in the agricultural development of Turkey. The purpose of this study is to provide an overview of the status of plant biotechnology education at graduate and postgraduate level in the universities of Turkey from 1953 to 2011 and the impact of biotechnology education on commercial agricultural applications. Data collected for this paper show that applied agricultural biotechnology research is conducted both by the state and public universities, and the private

sector is the main beneficiary of this research. Major biotechnological research is carried out in universities at Ankara, Istanbul, and Izmir with emphasis on plant tissue culture, micropropagation, plant transformation techniques against biotic and abiotic stresses, pharmaceutical techniques for improved production of secondary metabolites, molecular markers for determination of genetic variability and mutations, phytopathology, polyploidy and others. Plant biotechnology was introduced into Turkey about 60 years back and the analysis of this period suggests that it has had a high impact in rapid developments in the Turkish agricultural sector. It is understood that to meet the needs of time, Turkey will need a large quantity of biotechnology trained manpower in the future; that could be fulfilled only by the improvement of plant biotechnology education and the development of teaching centres in universities.

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F2

Status of aquatic plant tissue culture in Turkey

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Many fascinating and attractive plants are grown world wide in aquariums for beauty, to maintain the quality of water besides providing food, shade, shelter and breeding places for many life forms including fish. Global trade has enabled people in Turkey to benefit from the unprecedented movement and establishment of new but locally unknown ornamental aquarium plant species. Local demand for aquatic plants has shown a steady increase in the past few years. In the absence of established propagation systems, local traders import aquatic ornamental plants illegally to meet the high demand of local people. If proper checks and measures are not taken, this may result in pollution of local aquatic ecosystems in the future. Plant tissue culture has made an appreciable contribution to micro-propagation of a wide range of ornamental, horticultural and other plants. However, tissue culture studies in aquatic plants are not impressive, with few published reports. The use of plant tissue culture techniques for the propagation of aquatic plants can help in reaping many benefits and advantages, including preventing threats to environment. This paper reviews efforts to introduce aquatic plant tissue culture along with its present status in Turkey.

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F3

Paradigms of biotechnology in Pakistan

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Human welfare activities are being revolutionized by opportunities in life sciences. Enriched by inputs from genomic research, biotechnology is a major force for development in all countries. The importance and potential of biotechnology was realized as far back as 1959 when Pakistan's first Commission on Science and Technology emphasized the need for setting up research organizations in areas of vital importance to national development. Entwined with culture and socio-ethical values, biotechnology is contributing to solve problems in the field of health, agriculture, medicines, environment and industry that impede national development in Pakistan. The establishment of biotechnology teaching and research programmes at national level enhanced the awareness, appreciation and application of biotechnology in various aspects. This particular study highlights the current status and future prospectus of biotechnology in the field of agriculture biotechnology, stem cell research, human infectious and genetics diseases, farming and biopharmaceuticals, environmental and industrial biotechnology. Success stories of different biotechnological products developed by outstanding institutes in Pakistan have also been reported that have ultimately inspired to gain momentum for the establishment of biotech parks in the country.

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F4

Role of molecular biology techniques for detection of *Mycobacterium tuberculosis* in difficult-to-diagnose cases of tuberculosis: short story of a long journey

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To introduce molecular diagnostics for tuberculosis in Pakistan regular and nested PCR, and dot blot hybridization techniques were validated using different target sequences. IS6110 based test was introduced in the country for rapid and accurate diagnosis of tuberculosis. A variety of clinical specimens were used for detection of *Mycobacterium tuberculosis.* The sensitivity and specificity of the molecular test is found to be comparable with that of culture and even better in cases where culture fails due to commencement of anti-TB therapy, and in difficult to culture specimens such as peripheral blood, urine, synovial fluid and pericardial effusion. Molecular diagnostic techniques were once labeled a fantasy but they have established their place due to their rapidity and high sensitivity. In a developing country like Pakistan, it was difficult to introduce polymerase chain reaction based diagnosis of tuberculo-