

Introduction

This book contains a compilation of works which were presented at the International Conference on Antimicrobial Research (ICAR2010), which took place in Valladolid (Spain), during November 3rd-5th 2010 (<http://www.formatex.org/icar2010>). This inaugural edition was attended by more than 500 delegates from about 60 countries.

Plenary Lectures were given by Paul Williams, from the Centre for Biomolecular Sciences, Nottingham University (UK), who talked about “Quorum sensing as an antibacterial target”; Stephen Bentley, from the Wellcome Trust Sanger Institute, Cambridge (UK), with a speech entitled “Viewing evolution and global spread of drug resistant bacterial pathogens through whole genome sequencing”; and Thierry Jouenne, from the Facility of the European Institute for Peptide Research, University of Rouen (France), who delivered the speech “The Biofilm proteome: the holy grail”.

This conference series will provide a new forum in Europe for the presentation, exchange and dissemination of information and experiences on anti-microbe strategies (against bacteria, fungi or protozoans), in biotic or abiotic environments, in planktonic or adhered states, in biologically specific or unspecific ways, *in vitro* or *in vivo*, in a general context marked by the threat posed by the increasing antimicrobial resistance of pathogenic microorganisms. “Anti” is here taken in a wide sense as “against cell cycle, adhesion, or communication”, when harmful for human health, industry or economy (infectious diseases, chemotherapy, food, biomedicine, agriculture, livestock, biotechnology, water systems...). It will include topics on antimicrobial resistance, (early) microbial and resistance detection, enhancement of innate defences against pathogens, as well as methods & techniques.

The topics discussed at the conference were:

Antimicrobial chemistry (experimental and computational). Analytical detection of antibiotics in complex samples.

Synthesis and screening of novel chemical compounds for antimicrobial action. Natural, synthetic and semi-synthetic antibiotics. Analogs. Structural determination. *In-silico/ab-initio/de-novo* antimicrobials discovery. New targets for antimicrobials. Rational design of antimicrobials. Bioinformatics and comparative genomics for the identification of antimicrobial targets...

Antimicrobial natural products.

Antimicrobial substances from terrestrial and marine organisms. Antimicrobial peptides. Antimicrobial enzymes. Essential oils. Bioactive phytochemicals. Plant/Herbal extracts. Purification. Structural determination...

Antimicrobials mechanisms of action.

Methods and Techniques.

Antimicrobial resistance. Superbugs. Multi-resistant strains. Emerging and re-emerging pathogens.

Microbial resistance to antibiotics and biocides. Molecular mechanisms. Resistance genes. Prevention of resistance. Surveillance & statistics. Genetics and Proteomics. Emerging and re-emerging bacteria and fungi in humans, animals, and plants. Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin Intermediate/Resistant *Staphylococcus aureus* (VISA/VRSA), *Clostridium difficile*, *Mycobacterium tuberculosis*, Vancomycin-resistant *enterococcus* (VRE), *Cryptosporidium*, *Plasmodium parasite*, *Plasmodium falciparum*, *Leishmania* species, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Acinetobacter baumannii*, *Cryptococcus*, *Escherichia coli* O157:H7, *Helicobacter* spp., *Enterobacter sakazakii*, *Serratia* spp., Fluoroquinolone-Resistant *Pseudomonas aeruginosa* (FQRP)...

Antimicrobial microbes.

Microbial-derived toxins. Bacteriocins (colicins, microcins, lantibiotics...). Archaeocins. Biocontrol approach to microbial invasions (probiotics, lactic acid bacteria...). Biosynthesis of antibiotics. Genetic and metabolic engineering. Gene regulation...

Antimicrobial viruses.

Bacteriophages. Phage therapy and biocontrol in humans, animals (agriculture-farm animals, aquaculture), plants, food industry... Materials functionalization with bacteriophages. Using bacteriophages for microbiological detection...

Antimicrobial materials science and surface chemistry. Biofilms.

Antimicrobial, anti-adhesive surfaces & coatings. Microbial adhesion to surfaces. Biofouling. Biofilm formation, control and eradication. Novel characterization techniques. Physical and chemical (inorganic (e.g. silver, copper compounds) and organic) surface modification. Cationic surfaces. Functionalization strategies for polymers, metals, metal oxides, ceramics. Drug-eluting concepts. Biofilms susceptibility to antimicrobials. Antibiotic resistance of microorganisms in biofilms. Genomics and Proteomics...

Antimicrobials in consumer products.

Textiles (hygienic clothing, activewear, medical textiles...), paper industry, active packaging (food industry...), public buildings (hospitals, schools, restaurants, day care centers, nursing homes...). Safety and toxicological aspects...

Antimicrobial physics.

Exploitation of physical properties for killing/inactivating microbes: surface tension (nano-emulsions), radiation, ultrasounds, temperature, specific properties of nano-materials (nano-particles, nano-tubes/wires, nano-crystals, nano-grained materials...). Resistance to physical agents...

Non-antibiotic biocides. Hygiene and Sterilizing.

Disinfectants, antiseptics, preservatives... Mechanism of action. Resistance to non-antibiotic biocides. Combination of physical and chemical treatments. Hygiene and Sterilizing. Sanitizers. Regulatory issues. Good practices...

Techniques and Methods.

Susceptibility Testing. Rapid microbial and resistance detection. Detection of antibiotics in environmental samples. Microscopy, microanalysis & spectroscopy, single-cell studies, high-throughput studies, nanomechanical studies, microfluidics, lab-on-a-chip concepts, miniaturized science, analysis of microbial surfaces, heterogeneity, statistics. Interaction of antimicrobial drugs with model membranes. Analytical techniques...

The Intelligent war.

Interfering microbe-microbe communication (quorum sensing) as antimicrobial strategy.

Strengthening of innate immune system as antimicrobial strategy.

Immunotherapy, immunomodulating agents, cytokines (interleukins, colony-stimulating factors, interferons...), hormones... Novel vaccines for preventing or treating disease...

Antimicrobials evaluation. Pre-clinical and clinical trials.

Public awareness, learning & teaching, influence on policy-makers. Regional regulatory frameworks and experiences on antimicrobials.

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Contents

Introduction	v
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Antimicrobial Peptides

A new class of Scots pine antimicrobial proteins, which act by binding β -glucan <i>Sanjeewani Sooriyaarachchi, Adrian Suárez Covarrubias, Wimal Ubhayasekera, Frederick O. Asiegbu and Sherry L. Mowbray</i>	3
Antimicrobial aza- β^3 -peptides: Structure-activity relationship? <i>B. Legrand, M. Laurencin, C. Zatylny-Gaudin, J. Henry, A. Bondon and M. Baudy Floc'h</i>	7
Differential antimicrobial activities of Human Beta-Defensins against Methicillin Resistant (MRSA) and Methicillin sensitive (MSSA) <i>Staphylococcus aureus</i> <i>N. D. S. Herathge, J. T. George and D. A. Rowley</i>	9
Isolation of antimicrobial peptides from New Zealand spinach <i>Tetragonia tetragonioides</i> <i>T. Neubauerová, M. Macková, T. Macek, M. Šanda, M. Králová, I. Doležilková and P. N. Holmsgaard.</i>	13
Lysostaphin: molecular changes that preserve staphylolytic activity <i>S. Becker, J. Foster-Frey, A. Powell, H. Mohammadi, D. E. Kerr and D. M. Donovan</i>	18
Purification and characterization of antimicrobial peptides from fleshfly larvae haemolymph <i>T. Neubauerová, M. Macková, T. Macek, M. Šanda and Z. Vobůrka</i>	23
Structural and functional diversity of natural antimicrobial oligopeptides <i>Alexander A. Zamyatin</i>	28
The role of Gram-negative envelope LPS on the bactericidal properties of proteins and peptides: the case of eosinophil cationic protein <i>D. Pulido, M. Torrent, M. V. Nogués and E. Boix</i>	34

Non-antibiotics Biocides

Evaluation of biocidal activity of Evolyse, a disinfectant based on hydrogen peroxide and silver nitrate <i>M. Barbara Pisano, V. Altana, M. Elisabetta Fadda, L. Mura, M. Deplano and S. Cosentino</i>	41
Increased resistance to detergent in <i>Enterococcus faecalis</i> <i>Jacqueline Keyhani and Ezzatollah Keyhani</i>	46
<i>Legionella pneumophila</i> isolation rate in a Spanish hospital pre- and post-installation of an electro-chemical activation system for potable water disinfection <i>Jose-Maria Rivera, Juan-Jose Granizo, Jose-Maria Aguiar, Ana Vos-Arenilla, Maria-Jose Giménez and Lorenzo Aguilar</i>	51

Antimicrobial Evaluation: Clinical and Pre-clinical Trials

Adherence to ART and its associated factors among HIV Aids Patients in Addis Ababa <i>Ezra Muluneh</i>	57
---	----

Effectiveness and safety of miconazole with hydrocortisone (Daktacort) feminine care cream in the treatment of vulvar candidiasis <i>J. Perez-Peralta and G. Balaccua</i>	67
Natural Products: Terrestrial and Marine Organisms	
Analysis of the 2-Phenylethyl isothiocyanate present in <i>Brassica</i> leaves and their potential application as antimicrobial agent against bacteria strains isolated from Human and Pig gastrointestinal tracts <i>A. Aires, C. Dias, R. N. Bennett, E. A. S. Rosa and M. J. Saavedra</i>	75
Antimicrobial effect of carvacrol on <i>Escherichia coli</i> K12 growth at different temperatures <i>C.M. Belda-Galbis, A. Martínez and D. Rodrigo</i>	80
Bacteriostatic effect of cocoa powder rich in polyphenols to control <i>Cronobacter sakazakii</i> proliferation on infant milk formula <i>M. C. Pina-Pérez, D. Rodrigo and A. Martínez-López</i>	85
Curcumin: a natural antibiofilm agent <i>Maya Moshe, Jonathan Lellouche and Ehud Banin</i>	89
Evaluation of <i>in vitro</i> and <i>in vivo</i> antibacterial and antifungal activity of “Camelyn M” <i>Benedikte Maglakelidze, Guguli Abashidze, Inga Dadeshidze, Vakxtang Mshvildadze, Andre Pichete, Vincent Perreten, Shota Tsanova, Nata Shubladdze and Koba Gurielidze</i>	94
<i>In vitro</i> antifungal activity of several essential oils from aromatic plants of Aragón (NE, Spain) <i>S. Lorán, O. Segman, C. Rota, P. Conchello and A. Herrera</i>	99
Influence of some natural compounds on freshwater microfoulers <i>O. A. Cuzman, C. Faraloni, T. Turchetti, M. Camaiti and P. Tiano</i>	104
Natural antimicrobial agents against the microbiota associated with insoles <i>N. Cuesta Garrote, M. M. Sánchez Navarro, F. Arán Aís and C. Orgilés Barceló</i>	109
Plant essential oils and their components for the control of phytopathogen and mycotoxigenic fungi in crops <i>C. Morcia and V. Terzi</i>	114
Possibility of using <i>Rosmarinus officinalis</i> , <i>Myrtus communis</i> and <i>Origanum sp.</i> 's essential oil as fungicide in pickling and tanning processes <i>Eser Eke Bayramoglu</i>	118
Screening of aqueous methanol plant extracts for their antibacterial activity <i>Kashif Nauman and Muhammad Arshad</i>	123
Antimicrobial Surfaces. Biofilms. Quorum Sensing. Consumer Products.	
Antimicrobial active packaging films based on sorbic acid <i>C. Hauser, J. Wunderlich and G. Ziegleder</i>	131
Bacteriophages actions on <i>Salmonella</i> Enteritidis biofilm <i>A. A. Ferreira, R. C. S. Mendonça, H. M. Hungaro, M. M. Carvalho and J. A. M. Pereira</i>	135

Biocompatibility and antibacterial property of cold sprayed ZnO/Titanium composite coating <i>Noppakun Sanpo, Chen Hailan, Kelvin Loke, Koh Pak Keng, Philip Cheang, C. C. Berndt and K. A. Khor</i>	140
Effect of penicillins on the acidification of yogurt made from ewe's milk during the storage <i>M. I. Berruga, M. C. Beltrán, B. Novés, A. Molina and M. P. Molina</i>	145
Exploring thermostable quorum quenching lactonases to counteract bacterial infections in cystic fibrosis <i>L. Mandrich, E. Porzio, L. Merone, F. Febbraio, R. Nucci and G. Manco</i>	150
Furanones and Thiophenones in Control of <i>Staphylococcus epidermidis</i> Biofilm Infections? <i>J. Lönn-Stensrud, T. Benneche and A. A. Scheie</i>	155
Innovative High Surface Area CuO Pretreated Cotton Effective in Bacterial Inactivation under Visible Light <i>A. Torres, C. Ruales, C. Pulgarin, A. Aimable, P. Bowen, V. Sarria and J. Kiwi</i>	160
Is synergy of antimicrobials the effective way of management of resistance among cosmetically significant skin microflora? <i>B. K. Mohanty, S. Gokul Shankar, M. S. Ranjith and M. Prabhmanju</i>	164
Microencapsulation of <i>Melaleuca alternifolia</i> (tea tree) oil as biocide for footwear applications <i>M. M. Sánchez-Navarro, N. Cuesta-Garrote, F. Arán-Aís and C. Orgilés-Barceló</i>	170
Plasma polymerisation and retention of antibacterial properties of terpinen-4-ol <i>Kateryna Bazaka, Mohan V. Jacob, Russell J. Crawford and Elena P. Ivanova</i>	175
Preparation of silver or zinc loaded nanocapsules with core-shell architecture and their application as metal-ion release agents in plastics leading to antibacterial and fungicidal surface properties <i>M. Gladitz, S. Reinemann, J. Bauer and H. J. Radusch</i>	180
Structure-reactivity relations for DC-magnetron sputtered Cu-layers during <i>E. coli</i> inactivation in the dark and under light <i>C. Castro, R. Sanjines, C. Pulgarin, P. Osorio, S. A. Giraldo and J. Kiwi</i>	186
Study of submerged and biofilm fermentation of <i>Bacillus subtilis</i> using fish protein for production of lipopeptide antibiotic iturin A <i>Umme Salma Zohora, Abdul Wahab Khan, Masahiro Okanami, Takashi Ano and Mohammad Shahedur Rahman</i>	190
The influence of DC air plasma and cellulase enzyme on the antimicrobial activity of Azadirachtin (neem leaf extract) treated cotton fabric <i>E. Nithya, S. Jayakumar, K. Vaideki and R. Rajendran</i>	196
Urolithins, metabolites produced by human colonic microflora, act as <i>Quorum Sensing</i> inhibitors of <i>Yersinia enterocolitica</i> affecting its gene expression <i>J. A. Giménez, P. Truchado, M. Larrosa, J. C. Espín, F. Tomás-Barberán, M. T. García-Conesa and A. Allende</i>	202
Use of lactic acid bacteria biofilms as biocontrol agents <i>Emel Ünal, Selin Kalkan and Zerrin Erginkaya</i>	207

Methods and Techniques. Mechanisms of Action. Physics.

A new approach for detection of bacterial contamination in cooling lubricants <i>D. Oberschmidt, A. Spielvogel, C. Hein, J. E. Langbein, D. Lorenz, U. Stahl and E. Uhlmann</i>	213
Development of a liquid-medium assay for screening antimicrobial natural products against marine bacteria <i>M. Geiger, J. Dupont, O. Grovel, Y. F. Pouchus and P. Hess</i>	219
Experimental planning can help to optimize the selective photoinactivation of microorganisms <i>J. R. Perussi, P. L. Fernandes, C. Bernal and H. Imasato</i>	225
Fungal evaluation on oolong tea irradiated with different water activities <i>G. B. Fanaro, R. C. Duarte, F. T. Rodrigues, B. Corrêa and A. L. C. H. Villavicencio</i>	230
Gamma radiation effects on bacteria and fungi in coffee (<i>Coffea arabica</i> L.) <i>F. T. Rodrigues, R. C. Duarte, G. B. Fanaro and A. L. C. H. Villavicencio</i>	233
Irradiation effect on antifungal potential of clove essential oil <i>R. C. Duarte, G. B. Fanaro, F. T. Rodrigues and A. L. C. H. Villavicencio</i>	236
Microarray for rapid detection of microbial resistance genotypes <i>Tomasz A. Leski, Gary J. Vora, Brian Barrows, Guillermo Pimentel and Chris R. Taitt</i>	241
Photosensitization as human and environmentally friendly antimicrobial tool <i>Zivile Luksiene</i>	246
Rapid diagnosis of neonatal bacteremia using polymerase chain reaction <i>Amany El-Sharif and Raghdaa Ali</i>	249
Shelf life extension of semi-dried fish Nile Tilapia (<i>Oreochromis niloticus</i>) by ultraviolet and infrared irradiations <i>Narumol Matan</i>	254
Study on the effect of RF plasma pretreatment on the antimicrobial efficacy of neem leaf extract processed cotton fabric <i>K. Vaideki, S. Jayakumar, E. Nithya and R. Rajendran</i>	259

Resistance and Susceptibility

A 3-year review on the profile of multidrug-resistant Gram-negative in a tertiary teaching hospital in Malaysia <i>H. Habsah, Z. Z. Deris, M. Zeehaida, A. R. Zaidah, H. Siti Asma' and I. Nabilah</i>	271
Antimicrobial susceptibility in clinical isolates of <i>Staphylococcus aureus</i> harbouring of <i>mecA</i> and <i>lukFS-PV</i> genes in Northern Portugal <i>N. Silva, C. Prudêncio, C. Tomaz and R. Fernandes</i>	275
Antimicrobial susceptibility profile and effect of stem bark extracts of <i>Curtisia dentata</i> on multi-drug resistant verotoxic <i>Escherichia coli</i> and <i>Acinetobacter</i> spp. isolates obtained from water and wastewater samples <i>Hamuel James Doughari, Patrick Alois Ndakidemi, Izanne Susan Human and Spinney Benade</i>	281
Antimicrobial utilization in Intensive care units of a private tertiary care hospital <i>Pramil Tiwari, Vani Yadav and Shilpi Singh</i>	288

Bacterial clearance from blood in mice infected by <i>S. pneumoniae</i> (penicillin MIC = 16 µg/ml) presenting specific IgG (non-protective levels) and treated with sub-therapeutic regimens of ceftidoren (a highly bound cephalosporin) <i>Fabio Cafini, Jose Yuste, Maria-Jose Giménez, David Sevillano, Lorenzo Aguilar, Luis Alou, Martha Torrico, Natalia González, Ernesto García, Jose Prieto and Pilar Coronel</i>	292
Characterisation of methicillin resistant <i>Staphylococcus aureus</i> isolates from hospitalised patients <i>Vladimir Kmet, Daniela Ohlasova and Milan Niks</i>	295
Characterization of methicillin-resistant coagulase-negative Staphylococci Isolates from blood cultures in a Brazilian University Hospital <i>Valéria Cataneli Pereira and Maria de Lourdes Ribeiro de Souza da Cunha</i>	298
Control of bacterial contamination in boar semen doses <i>J. M. Morrell and Margareta Wallgren</i>	303
Diffusion of extended-spectrum β-lactamase producing <i>Enterobacter cloacae</i> in a kidney transplantation unit <i>S. Hammami, I. Boutiba-Ben Boubaker, A. Kamoun, R. Ghozzi, M. Saidani, A. Slim and S. Ben Redjeb.</i>	309
Effect of antifungal agents on non- <i>Candida albicans</i> <i>Candida</i> species enzymatic activity <i>M. Negri, T. Lorenço, S. Silva, M. Henriques, J. Azeredo and R.Oliveira</i>	313
Effect of chitosan, nisin and storage time on the growth of <i>Listeria innocua</i> and <i>Shewanella putrefaciens</i> in fish homogenates <i>L.I. Schelegueda, M.F. Gliemmo and C.A. Campos</i>	318
ESBL-producing Enterobacteriaceae in the northern portugal – antimicrobial susceptibility and molecular epidemiology <i>R. Fernandes and C. Prudêncio</i>	323
Observations on the antimicrobial susceptibility of <i>Staphylococcus pseudintermedius</i> following the introduction of ceftovecin for clinical use in Europe <i>Y. Chaudhry, A. Robinson and K. S. Godinho</i>	329
Oxacillin resistance among <i>Staphylococcus aureus</i> isolated from peritoneal dialysis related peritonitis <i>C. H. Camargo, T. M. C. Moraes, M. L. R. S. Cunha, J. Caramori, A. L. Mondelli, A. C. Montelli and P. Barretti</i>	334
Resistance detection and susceptibility profile in <i>Staphylococcus</i> spp. isolated from patients with Urinary Tract Infection (UTI) <i>Adriano Martison Ferreira, Mariana Fávero Bonesso, Alessandro Lia Mondelli and Maria de Lourdes Ribeiro de Souza da Cunha</i>	338
Resistance distribution profile of MBL, ESBL and multidrug resistant Gram negatives isolated at a tertiary care hospital in India <i>K. H. Bhutada and V. R. Shende</i>	343
Study on selection and transfer of antimicrobial resistant <i>Escherichia coli</i> from broiler breeders to their progeny <i>G. Manfreda, F. Pasquali, A. Lucchi, A. De Cesare, D. Giovanardi, M. Stonfer and A. Franchini</i>	347
Survey of <i>Fusarium</i> species infecting potato and their resistance to fungicides used in Canada <i>K. Lugosch, R. D. Peters, T. Barasubiye and K. Drake</i>	352
Vancomycin Resistant Enterococci (VRE) in equine-faecal samples <i>Mohamed O. Ahmed, Peter D. Clegg, Nicola J. Williams, Keith E. Baptiste and Malcolm Bennet</i>	357

Chemistry	
Antimicrobial cyclic pseudopeptides including Aza- β^3 -amino acids <i>M. Laurencin, B. Legrand, L. Mouret, A. Bondon, Y. Fleury and M. Baudy Floc'h</i>	365
Effect of paracetamol on the pharmacokinetics of cephalexin in dogs <i>N. A. Afifi, M. Atef, K. Abo-El-Sooud and N. El-Mokadem</i>	367
Importance of the C9 absolute configuration for the antifungal activity of natural and semisynthetic sesquiterpenes <i>M. Derita, M. Di Liberto and S. Zacchino</i>	373
Specificity determinants dramatically reduce hemolytic activity in amphipathic α -helical antimicrobial peptides: antimicrobial activity against Gram-negative pathogens, <i>Acinetobacter baumannii</i> and <i>Pseudomonas aeruginosa</i> <i>Ziqing Jiang, Adriana I. Vasil, Lajos Gera, Michael L. Vasil and Robert S. Hodges</i>	376
Studies to find a better high level disinfectant for heat-sensitive endoscopes <i>Norman Miner, Valerie Harris, Towanda Ebron and Natalie Lukomski</i>	381
Towards the rational design of antimicrobial peptides: Recent developments in computational tools <i>M. Torrent, D. Andreu, M. V. Nogués and E. Boix</i>	386
Antimicrobial Microbes and Viruses. Biosynthesis of Antibiotics	
Antimicrobial properties of <i>Lactobacillus plantarum</i> Tensia (DSM 21380) and Inducia (DSM 21379) <i>M. Rätsep, P. Hiit, R. Avi, M. Utt and E. Songisepp</i>	393
Cell growth control by tRNase ribotoxins from bacteria and yeast <i>Eyemen Kheir, Christian Bär, Daniel Jablonowski and Raffael Schaffrath</i>	398
Comparison of anti-listerial effect spectrum of bacteriocins <i>Selin Kalkan, Emel Ünal, Zerrin Erginkaya</i>	403
Isolation and screening of novel antibiotic producing <i>Streptomyces</i> from southwest Turkey soils <i>A. Ugur and O. Ceylan</i>	406
Production and characterization of enterocin from <i>Enterococcus faecium</i> IJ-06 and IJ-21 isolated from indigenous dairy products <i>Imran Javed and Safia Ahmed</i>	411
Structural model for a holin-like protein Tmp3 exhibiting broad spectrum antibacterial activity <i>Thangamani Rajesh and Paramasamy Gunasekaran</i>	416
The hospital environment as a source of new antimicrobial substances: antimicrobial activity of <i>Bacillus amyloliquefaciens</i> strain HNA3 isolated in a surgery room <i>M. Guida, R. A. Nastro, M. Inglese, M. Trifuoggi, S. Scherillo, R. Gesuele, V. Di Onofrio and G. Liguori</i>	421
The Inhibitor activity of <i>Lactobacillus rhamnosus</i> against rope-forming <i>Bacillus</i> strains <i>Selçuk Arslan, Zerrin Erginkaya, Emel Ünal</i>	425
Uncovering the mechanism of resistance against type III bacteriocin, enterolysin A <i>L. Maliničová, M. Píknová, P. Pristaš and P. Javorský</i>	428