

'Surface recognition' in horse eosinophils and neutrophils: Sendai virus and antibody-coated target cells

M. Grob, Th. Müller, P. A. Chavaillaz, A. Jörg, Th. Bächli and E. Peterhans

Vet.-Bact. Institute, CH-3000 Bern, Biochemistry Dept., CH-1700 Fribourg, and Institute of Immunology and Virology, CH-8028 Zürich

Eosinophils and neutrophils share several biochemical features. Amongst these is the elaboration of reactive oxygen intermediates (ROI) toxic for both self and non-self. Using the technique of chemiluminescence (CL) measurement, we have investigated whether horse eosinophils produce ROI in response to a panel of agents known to activate neutrophils. Both neutrophils and eosinophils could be triggered to produce CL by A23187 and PMA, although only neutrophils generated a burst of CL when probed with Sendai virus. The virus agglutinated both eosinophils and neutrophils, and binding to the respective cell surfaces was also evident in electron micrographs. Moreover, antibody-coated erythrocytes and cells infected with equine Herpes virus Type I and coated with antiviral antibody evoked CL in neutrophils only. Our experiments suggest that different control mechanisms may underlie ROI generation in eosinophils and neutrophils once the stimulating agent has bound to the cell surface.

In vivo analysis of the immunosuppressive variant of minute virus of mice

P. B. Kimsey, H. Engers and B. Hirt
ISREC, CH-1066 Epalinges

The minute virus of mice (MVM) is an autonomously replicating parvovirus that commonly infects mice, without clinical disease. We have demonstrated previously (Engers et al., J. Immun. 127 (1981) 2280), that a variant MVM(i) inhibits a number of T-lymphocyte functions in vitro. The prototype virus MVM(p) shows none of this immunosuppressive behavior. The experiments described here were designed to investigate whether MVM(i) could have immunosuppressive activity in vivo. We used the following criteria to evaluate the immunological competence of mice infected with either MVM(p) or MVM(i): 1) Delayed type hypersensitivity response to sheep red blood cells and to inactivated herpes simplex virus. 2) Rejection of an allogeneic tumor from the peritoneal cavity. 3) Evolution of a footpad tumor induced by Moloney sarcoma virus. None of the immunological assays we performed revealed any differences between the in vivo effects of an MVM(p) or MVM(i) infection. To investigate the replication of MVM in infected animals, we have assayed for the presence of RF DNA in infected organs. To study the pathogenesis of the two strains in neonatally infected mice, we used the whole mouse hybridization technique.

Microbiology and Environment

Isolation of new aerobic nitrilotriacetate(NTA)-degrading microorganisms

Th. Egli, D. Wüest, H. U. Weilenmann and G. Hamer
ETH/EAWAG, CH-8600 Dübendorf

Until recently, only three *Pseudomonas* sp. which can grow with NTA as their sole source of carbon and nitrogen have been isolated in pure culture. Two of the species are known to metabolize NTA via a monooxygenase. By employing a different isolation strategy than was used previously, namely by setting up batch enrichment cultures with NTA as the sole nitrogen source and a mixture of glucose/acetate/methanol as carbon sources, several strains of non-pseudomonads were isolated in pure cul-

ture from both soil and wastewater samples. All the new isolates are also able to grow with NTA as their sole source of carbon and nitrogen. However, higher growth rates were observed when the cells were supplied with an additional carbon source together with NTA. In the new isolates tested so far no classical NTA monooxygenase activity could be detected in cell-free extracts of NTA-grown cells. This suggests that either this enzyme, if present in these microorganisms, is extremely labile or NTA is degraded via a different pathway. Additional properties and growth characteristics of the new strains are reported.

Acidic rain and microbiology: disturbances in biogeochemical cycles in aquatic ecosystems

K. W. Hanselmann

Department of Plant Biology, University of Zürich, Zollikerstrasse 107, CH-8008 Zürich

Acidic rain with its anthropogenic air pollutants leads to enhanced erosion of carbonate and silicate rocks and to acid leaching of soils. As a consequence, the release of metal cations and salt anions into aqueous environments is increased. Acidic rain therefore may influence microbial behavior in aquatic ecosystems two-fold:

- 1) Increased concentrations of certain cations inhibit various metabolic functions and
- 2) elevated concentrations of certain anions (NO_3^- , SO_4^{2-}) increase the extent to anaerobic mineralization processes. Concomitantly released nutrients and toxic metabolites lead to secondary disturbances. Microbial denitrification and sulfate reduction are affected most by acidic rain. These and associated microbial processes may serve therefore as sensitive indicators of environmental changes in lake ecosystems. Studies on sediments of eutrophic lakes and in the meromictic Lago Cadagno (TI, Switzerland) illustrate possible influences of acidic rain on biogeochemical cycles in these ecosystems.

Microbiological quality and spoilage of food

W. Schmidt-Lorenz

Institut für Lebensmittelwissenschaft, ETH, CH-8092 Zürich

The microbial spoilage of foods is determined by intrinsic and extrinsic factors which are highly influenced by processing. The associations of microorganisms of the 'biotope' food will therefore be determined decisively by the technology of processing. The modern and contrary demands made by the consumer on the foods are difficult to meet: less processing, naturalness, 'biological' and fresh, at the same time mostly pre-prepared and with a long shelf-life. All these requirements are not compatible for microbiological reasons:

- every preservation causes relatively drastic changes of the product,
 - freshness, i.e. a possibly careful processing can only be realized with a nonsterile food with a limited shelf-life.
- Important essentials for better preservation methods are a profound knowledge of:
- microbiological ecology of the 'biotope' food,
 - the microorganisms which cause spoilage as well as their properties important in technology,
 - the reaction mechanisms of inhibition, killing and also resistance of microorganisms in foods.

Microbial characteristics of disease-suppressive soils: a review

G. Défago

Institut für Phytomedizin, ETH-Zentrum, CH-8092 Zürich

The biological factors of disease-suppressive soils (soils which impeded the development of specific soil-borne diseases) are intensively studied at universities and in industries. The aim is to understand the mechanisms of disease-suppressiveness and to

exploite the microorganisms responsible for suppression in biotechnological venture as soil-borne diseases are only partially controlled by the pesticides available. Some forms of disease-suppressiveness may be due to non pathogenic fungi (*Phialophora*, *Fusarium*, *Trichoderma*) or to root colonizing fluorescent pseudomonads. The latter are an important factor of the suppressive capacity of soils against black root rot caused by *Thielaviopsis basicola*. These soils extend over a distinct geological area of 22 km² near Payerne, Switzerland. The actual knowledge will be discussed.

Microbiological processes in urban wastes management

M. Aragno

Laboratoire de Microbiologie de l'Université, 22, Chantemerle, CH-2000 Neuchâtel 7

Among the multiple processes which can take part in a waste management system, several are controlled by microorganisms; these include landfill disposal, which will undergo a slow biological oxidation, either aerobic or anaerobic; composting, i.e. optimized, aerobic and mainly thermophilic decomposition of solids; biological depuration (activated sludge or microbial beds), allowing the aerobic decomposition of dissolved organic pollutants; methanogenic digestion, i.e. anaerobic decomposition of suspended and dissolved organic matter allowing recuperation of biogas. Further processes could be involved, including the microbial oxidation of gases and volatile compounds occurring in the soil layers covering a landfill or in soil filters. The choice of a biological process in waste management should take into account the importance of recycling organic matter for humus regeneration in soils, the possible material and energy recuperation, as well as the negative effects of conventional systems on the environment. Two strategies including biological steps are discussed: one is centered on an optimized landfill disposal, with possible recuperation of gas and later of stabilized humus; the other implies intensive digestion of the organic fraction of waste combined with sewage sludge.

Modified 'Chalmer', a new medium for the enumeration (of the total) lactic acid bacteria among competitive flora

V. Vanos

Central Quality Assurance Laboratory, Nestec Ltd, CH-1800 Vevey

The commercialized media used at present for the enumeration of the lactic acid bacteria have two defects:

- They are inhibitory for some species due to the presence of substrates like acetic acid, sodium acetate, etc.
- They permit growth at certain nonlactic acid bacteria like *Bacillus* or *Micrococcus*, not differentiated by characteristic colony types.

The modified Chalmer medium contains no inhibitors for the gram +ve flora and allows distinction of lactic from nonlactic flora, by characteristic colony types which do not need additional confirmatory tests as the confirmation rate is 100%. Its repeatability is very satisfactory.

It can be used for the detection and enumeration of the total lactic acid bacteria in acidified dairy products and fermented meat products.

Measurement of virus inactivation in the environment

F. Traub, S. Spillmann and R. Wyler

Institute of Virology, Winterthurerstrasse 266a, CH-8057 Zürich

Survival of viruses in the environment is an important factor for human and animal health. We were specially interested in the question whether sludge fertilizer still contains infectious virus, and to what extent sludge treatment may reduce this risk. We measured inactivation of the model virus bacteriophage f2,

which in many respects resembles enterovirus and shows extraordinary heat stability. The virions were adsorbed to electro-positive filters, sandwiched between two inert filter membranes with pores smaller than the virus diameter, and exposed within filter holders with openings instead of inlet and outlet connections. After exposition, the surviving fraction was eluted and determined by plaque counting.

Aerobic thermophilic predigestion of sludge at 60°C led to a virus titer reduction of $5.9 \pm 1.15 \log 10$ units per h, thermophilic anaerobic digestion at 52–55°C reduced 0.54–3.28 log 10 units per h, whereas mesophilic anaerobic digestion at 35°C inactivated only between 0.53 and 2.33 log 10 units per day.

Similar inactivation studies with human and animal viruses, i.e. rota- and parvoviruses are in progress.

Rapid enumeration of *Escherichia coli* type 1 in water and foods by a membrane filter method

Arbeitsgruppe Mikrobiologie der Lebensmittelkontrolle Nordwestschweiz (corresponding author: T. Burki, Labor für Lebensmittelhygiene, Aarau)

A membrane filter method for the enumerating of *Escherichia coli* type 1 in water and foods is described. After a preincubation period of 2–4 h at 37°C or over night at 20°C on trypticase soy agar the membrane is transferred to ECD agar for an additional 12–24 h incubation at 44°C. *Escherichia coli* colonies are identified by a positive indole test performed directly on the membrane.

Rapid enumeration of microorganisms in foods by the direct epifluorescent filter technique (DEFT)

N. Jaeggi

Laboratorium für Lebensmittel-Mikrobiologie im Institut für Lebensmittelwissenschaft der ETH Zürich, CH-8092 Zürich

Membrane filtration and epifluorescence microscopy were used for the direct enumeration of bacteria in meat- and dairy products, vegetables, pastries and drinking water. The different homogenized food samples could be filtered after employing varying surfactants and enzyme mixtures.

Fresh and pasteurized products showed good correlation between the direct and the colony counts.

Limulus-amebocytes-lysate (LAL) tests with foods

Ch. Frick

Laboratorium für Lebensmittel-Mikrobiologie, Institut für Lebensmittelwissenschaft der ETH Zürich, CH-8092 Zürich

Three different micromethods of the LAL-test, i.e. the capillar, microplate and chromogene test for the rapid determination of the amount of gram-negative bacteria in perishable foodstuffs were compared with respect to their practical applicability.

All three micromethods showed comparable and reproducible results when applied to pure cultures or to various fresh foods such as lettuce, minced meat, poultry carcasses, etc., and also to natural, carbon-free mineral water. A relatively good correlation existed between the endotoxin contents and the number of colonies of gram-negative bacteria down to the amounts of 10^3 – 10^4 g⁻¹. At low colony counts, unknown interference factors which may originate from the products, have to be taken into account.

Microbial desulfonation of multisubstituted naphthalene sulfonic acids

A. M. Cook, A. Schmuckle and T. Leisinger

Mikrobiologisches Institut ETH, ETH-Zentrum, CH-8092 Zürich

Sulfonated aromatics, e.g. dyestuffs and their metabolites, are observed to be about 10% of the organic pollutants of the river