

Analysis of volatile compounds produced by different species of lactobacilli in rye sourdough using multiple headspace extraction

Kaseleht, Kristel; Paalme, Toomas; Mihhalevski, Anna; Sarand, Inga International journal of food science & technology 2011 / p. 1940-1946

Antifungal potential of lactic acid bacteria against *Aspergillus niger* strain isolated from rye bread [Online resource]

Kontram, Kärt; Viiaard, Ene; Surženko, Marianna; Sarand, Inga Tartu Ülikooli ASTRA projekt PER ASPERA : Funktsionaalsed materjalid ja tehnoloogiad : [7-8 märts 2017, Tartu : teesid] 2017 / [1] p <http://fmtdk.ut.ee/teesid/>

Assessment of spoilage microbial communities in modified atmosphere-packed ready-to-eat salad during cold storage : A comparative study using MALDI-TOF MS identification and PacBio full-length 16S rRNA and ITS sequencing

Asadi, Atefeh; Angerjas, Anna; Paalme, Viia; Huseynli, Lachinkhanim; Sarand, Inga International Journal of Food Microbiology 2025 / art. 111268 <https://doi.org/10.1016/j.ijfoodmicro.2025.111268>

Bacillus cereus* - the mother or the sister of *Bacillus thuringiensis

Kolsto, B.; Carlson, C.R.; Hegna, I.K.; **Sarand, Inga**; Gronstad, A. Proceedings of the First Nordic Workshop on *Bac.thuringiensis/Bac.cereus*, Oslo, April 1994 1994

The beneficial effect of reusable food boxes on the green transition

Tähemaa, Toivo; Sarkans, Martinš; Sarand, Inga; Pohlak, Meelis; Niidas, Alar Modern Materials and Manufacturing 2023 : Tallinn, Estonia, 2–4 May 2023 2024 / art. 030012 <https://doi.org/10.1063/5.0189325> [Conference proceedings at Scopus Article at Scopus](#)

Biodegradation of m-toluate by pine rhizosphere associated microorganisms

Sarand, Inga; Timonen, S.; Koivula, T.; Sen, R.; Romantschuk, M. UIB-GBF-CSIC-TUB Symposium "Biodegradation of Organic Pollutants", Mallorca, Spain, June 29 - July 3, 1996 1996

Biodegradation of m-toluate by pine, mycorrhizal fungus and associated bacteria

Sarand, Inga; Koivula, Teija; Timonen, Sari; Sen, Robin; Romantschuk, Martin EMS 96 teaduskonverents, 6.-7. juuni 1996, Tallinn = EMS 96 Scientific Conference, 6-7 June 1996, Tallinn 1996 / [1] p

Bioremediation in the mycorrhizosphere : characterization of mycorrhizal fungi and their associated biodegradative fluorescent *Pseudomonads*

Sarand, Inga; Timonen, S.; Sen, R.; Yrjälä, K.; Rajamäki, M.; Koivula, T.; Haahtela, K.; Romantschuk, M. Proc. 2nd Finnish Conf. Environmental Sciences, Helsinki, Nov. 16-18, 1995 1995 / p. 225-228

Bioremediation in the mycorrhizosphere : characterization of mycorrhizal fungi and their associated biodegradative fluorescent *Pseudomonas*

Sarand, Inga; Timonen, S.; Sen, R.; Yrjälä, K.; Haahtela, K.; Romantschuk, M. 7th Intern. Symp. on Microbial Ecology, Santos, Brazil, 27 Aug.-01 Sept., 1995 1995

Bioremediation in the mycorrhizosphere of pine

Romantschuk, Martin; Koivula, Teija; Koskiahde, I.; Peltola, R.; **Sarand, Inga**; Timonen, S.; Yrjälä, Kim; Haahtela, K.; Sen, R. Research Workshop on Environmental Biotechnology, Granada, Spain, Nov. 18-21, 1996 1996

Bioremediation of petroleum derived hydrocarbons in the plant mycorrhizosphere

Sen, R.; **Sarand, Inga**; Timonen, S.; Rajamäki, M.; Peltola, R.; Nurmiäho-Lassila, E.-L.; Koivula, T.; Haahtela, K.; Romantschuk, M. 1st International Conference on Mycorrhizae, California, USA, Aug. 4-9, 1996 1996

Bioremediation of petroleum waste products : a concerted effort of plants, mycorrhizal fungi and their associated bacteria

Timonen, S.; **Sarand, Inga**; Rajamäki, M.; Koivula, T.; Peltola, R.; Nurmiäho-Lassila, E.-L.; Haahtela, K.; Romantschuk, M.; Sen, R. 5th Meeting of Finnish Plant Scientists, Kuopio, Finland, May 23-24, 1996 1996 / p. 135-136

Comparative analysis of *Helicobacter pylori* strains isolated from Estonia in 2020-2022

Truu, Laura; Roots, Kaisa; Suurmaa, K.; Rütütmann, A.; **Sarand, Inga**; Spuul, Pirjo EHMSG – 36th International Workshop on *Helicobacter* & Microbiota in Inflammation & Cancer : abstract book 2023 / p. 131 https://doi.org/10.26355/mhd_20239_857

Comparison of lactic acid bacteria population in the continuously propagated industrial rye sourdough starter and the original lyophilised starter

Viiaard, Ene; Morozozova, S.; Sarand, Inga Food and nutrition = Toit ja toitumine 2009 / p. 10-21 : ill

Concepts and criteria defining emerging microbiome applications

Kostic, Tanja; Schloter, Michael; Arruda, Paulo; Berg, Gabriele; Charles, Trevor C.; Cotter, Paul D.; Kiran, George Seghal; Lange, Lene; Maguin, Emmanuelle; Meisner, Annelein; van Overbeek, Leo; Sanz, Yolanda; **Sarand, Inga**; Selvin, Joseph; Tsakalidou, Effie;

Smidt, Hauke; Wagner, Martin; Sessitsch, Angela Microbial biotechnology 2024 / art. e14550, 11 p. : ill <https://doi.org/10.1111/1751-7915.14550> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Development of microbiome biobanks – challenges and opportunities

Ryan, M.J.; Schloter, M.; Berg, G.; Kostic, T.; **Sarand, Inga** Trends in microbiology 2021 / p. 89-92

<https://doi.org/10.1016/j.tim.2020.06.009> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Diversity and stability of lactic acid bacteria during rye sourdough propagation = Piimhappebakterite mitmekesisus ja stabiilsus rukkileivajuurelise uuendamisel

Viiard, Ene 2014 https://www.ester.ee/record=b4440228*est

Diversity and stability of lactic acid bacteria in rye sourdoughs of four bakeries with different propagation parameters

Viiard, Ene; Bessmeltseva, Marianna; Simm, Jaak; Talve, Tiina; Aaspõllu, Anu; Paalme, Toomas; Sarand, Inga PLoS ONE

2016 / art. e0148325 <https://doi.org/10.1371/journal.pone.0148325> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Diversity of lactic acid bacteria in rye sourdough

Sarand, Inga; Paalme, Toomas The 9th Symposium on Lactic Acid Bacteria : Egmond aan Zee, The Netherlands, August 31 - September 4, 2008 : abstract book 2008 / p. A058

Effect of inoculation of a TOL plasmid containing mycorrhizosphere bacterium on development of Scots pine seedlings, their mycorrhizosphere and the microbial flora in m-toluate-amended soil

Sarand, Inga; Haario, Heikki; Ergensen, K.; Romantschuk, M. FEMS microbiology ecology 2000 / p. 127-141

Erratum: Microbiome definition re-visited: old concepts and new challenges (Microbiome (2020) 8 (103) DOI: 10.1186/s40168-020-00875-0)

Berg, Gabriele; Rybakova, Daria; Fischer, Doreen; Cernava, Tomislav; Vergès, Marie-Christine Champomier; Charles, Trevor C.; Chen, Xiaoyulong; Cocolin, Luca; Eversole, Kellye; **Sarand, Inga** Microbiome 2020 / art. 119, 1 p. <https://doi.org/10.1186/s40168-020-00905-x> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Establishment of microbial consortia in semi-solid laboratory rye sourdoughs during continuous propagation at different fermentation temperatures

Viiard, Ene; Bessmeltseva, Marjanna; Paalme, Toomas; Sarand, Inga FoodMicro 2012 - Global Issues in Food Microbiology : 3-7 September 2012, Istanbul : book of abstracts 2012

Evaluation of the microbial community in industrial rye sourdough upon continuous back-slopping propagation revealed Lactobacillus helveticus as the dominant species

Viiard, Ene; Mihhalevski, Anna; Rühka, Tiina; Paalme, Toomas; Sarand, Inga Journal of applied microbiology 2013 / p. 404-412 : ill <https://doi.org/10.1111/jam.12045> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Evolution of bacterial consortia in spontaneously started rye sourdoughs during two months of daily propagation

Bessmeltseva, Marjanna; Viiard, Ene; Simm, Jaak; Paalme, Toomas; Sarand, Inga PLoS ONE 2014 / p. 1-12 : ill

<https://doi.org/10.1371/journal.pone.0095449> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Fermentation patterns of mature laboratory rye sourdoughs

Viiard, Ene; Bessmeltseva, Marjanna; Sarand, Inga TÜ ja TTÜ doktorikool "Funktsionaalsed materjalid ja tehnoloogiad" : 04.-05. märts 2014, Tartu 2014 / [1] p

Growth characterization of individual rye sourdough bacteria by isothermal microcalorimetry

Mihhalevski, Anna; Sarand, Inga; Viiard, Ene; Salumets, Airika; Paalme, Toomas Journal of applied microbiology 2011 / 2, p. 529-540

Helicobacter pylori and the possible probiotic Lactobacillus salivarius co-exist in Estonian gastric biopsy sample

Roots, Kaisa; Kasak, Lagle; Suurmaa, Külliki; Sarand, Inga; Spuul, Pirjo Helicobacter 2020 <https://www.x-mol.com/paper/1304864948814581760> <https://onlinelibrary.wiley.com/journal/15235378?tabActivePane=> <https://doi.org/10.1111/hel.12745>

Impact of environmental factors on the dynamics of microbiota in sourdoughs

Lutter, Liis; Anderson, Helena; **Sarand, Inga; Jõudu, Mi** 14th Baltic Conference on Food Science and Technology "Sustainable Food for Conscious Consumer" : FoodBalt 2021 : book of abstracts 2021 / p. 39 https://tftak.eu/foodbalt/assets/files/Foodbalt_Book_of_Abstacts.pdf

In situ transfer of the TOL plasmid pWWO : Km into the indigenous microbial population of Scots pine myccorrhizosphere

Sarand, Inga; Romantschuk, M. VI International Congress on Pseudomonas : Molecular Biology and Biotechnology, Madrid, Spain, 4-8 Sept., 1997 : abstracts book 1997 / p. 162

Isolation and identification of novel non-dairy starter culture candidates from plant matrix using backslipping propagation

Andreson, Maret; Kazantseva, Jekaterina; Kallastu, Aili; Jakobson, Taaniel; **Sarand, Inga**; Kütt, Mary-Liis Fermentation 2024 / art. 663 <https://doi.org/10.3390/fermentation10120663> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Kooke kaunistatakse sageli pesemata marjadega. Miks seda teha ei tohiks ja kuidas värskaid marju õigesti pesta?

Skuin, Mari delfi.ee 2025 <https://omamaitse.delfi.ee/artikkel/120365628/kooke-kaunistatakse-sageli-pesemata-marjadega-miks-seda-teha-ei-tohiks-ja-kuidas-varskeid-marju-oigesti-pesta>

Maitsekas toiduteadus pikendab Eesti rahvusroa eluiga

novaator.err.ee 2023 [Maitsekas toiduteadus pikendab Eesti rahvusroa eluiga](#)

Means to improve the effect of in situ bioremediation of contaminated soil : an overview of novel approaches

Romantschuk, Martin L.; **Sarand, Inga**; Petänen, Tiina; Peltola, Rainer J.; Jonsson-Vihanne, M.; Koivula, Teija; Yrjälä, Kim; Haahtela, Kielo K. Environmental pollution 2000 / p. 179-185 <https://pubmed.ncbi.nlm.nih.gov/15092994/>

Metabolic changes underlying the higher accumulation of glutathione in Saccharomyces cerevisiae mutants

Nisamedtinov, Ildar; Kevvai, Kaspar; **Orumets, Kerti**; **Arike, Liisa**; **Sarand, Inga**; Korhola, Matti; **Paalme, Toomas** Applied microbiology and biotechnology 2011 / 4, p. 1029-1037 : ill <https://pubmed.ncbi.nlm.nih.gov/21052993/>

Metabolic changes underlying the higher accumulation of glutathione in saccharomyces cerevisiae mutants

Orumets, Kerti; **Nisamedtinov, Ildar**; Kevvai, Kaspar; **Arike, Liisa**; **Sarand, Inga**; Korhola, Matti; **Paalme, Toomas** Food and nutrition = Toit ja toitumine. XVII : book of abstracts : the 5th Baltic Conference on Food Science and Technology : Foodbalt-2010 2010 / p. 112 <https://pubmed.ncbi.nlm.nih.gov/21052993/>

Metadata harmonization-standards are the key for a better usage of omics data for integrative microbiome analysis

Cernava, Tomislav; Rybakova, Daria; Buscot, Francois; Clavel, Thomas; McHardy, Alice Carolyn; Meyer, Fernando; Meyer, Folker; Overmann, Jörg; Stecher, Bärbel; **Sarand, Inga** Environmental Microbiome 2022 / art. 33 <https://doi.org/10.1186/s40793-022-00425-1>

Microbial biofilms and catabolic plasmid harbouring degradative fluorescent pseudomonas in Scots pine mycorrhizospheres developed on petroleum contaminated soil

Sarand, Inga; Timonen, S. FEMS microbiology ecology 1998 / p. 115-126

Microbiome definition re-visited: old concepts and new challenges

Berg, Gabriele; Rybakova, Daria; Fischer, Doreen; **Sarand, Inga** Microbiome 2020 / art. 103, 22 p. : ill <https://doi.org/10.1186/s40168-020-00875-0> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Microbiome interconnectedness throughout environments with major consequences for healthy people and a healthy planet

Sessitsch, Angela; Wakelin, Steve; Schloter, Michael; Maguin, Emmanuelle; Cernava, Tomislav; Champomier-Verges, Marie-Christine; Charles, Trevor C.; Cotter, Paul D.; Ferrocino, Ilario; Kriiaa, Aicha; Lebre, Pedro; Cowan, Don; Lange, Lene; Kiran, Seghal; Markiewicz, Lidia; Meisner, Annelein; Olivares, Marta; **Sarand, Inga**; Schelkle, Bettina; Selvin, Joseph; Smidt, Hauke; van Overbeek, Leo; Berg, Gabriele; Cocolin, Luca; Sanz, Yolanda; Fernandes, Wilson Lemos; Liu, S. J.; Ryan, Matthew; Singh, Brajesh; Kostic, Tanja Microbiology and molecular biology reviews 2023 <https://doi.org/10.1128/membr.00212-22> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Microbiome-based solutions to address new and existing threats to food security, nutrition, health and agrifood systems' sustainability

Callens, Karel; Fontaine, Fanette; Sanz, Yolanda; Bogdanski, Anne; D'Hondt, Kathleen; Lange, Lene; Smidt, Hauke; Overbeek, Leo S. van; Kostic, Tanja; **Sarand, Inga** Frontiers in Sustainable Food Systems 2022 / art. 1047765 <https://doi.org/10.3389/fsufs.2022.1047765> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Multilevel control of GSH accumulation in mutant and wild-type Strains of S. cerevisiae under conditions of smooth cysteine addition

Nisamedtinov, Ildar; **Orumets, Kerti**; Kevvai, Kaspar; Viikari, Ene; **Sarand, Inga**; **Paalme, Toomas** IBIC 2010 : 2nd International Conference on Industrial Biotechnology : April 11-14, 2010, Padua, Italy 2010 / p. 91-96 <https://www.aidic.it/cet/10/20/016.pdf>

The need for an integrated multi-OMICS approach in microbiome science in the food system

Ferrocino, Ilario; Rantsiou, Kalliopi; McClure, Ryan; Kostic, Tanja; Correa de Souza, Rafael Soares; Lange, Lene; FitzGerald, Jamie; Kriiaa, Aicha; **Sarand, Inga** Comprehensive Reviews in Food Science and Food Safety 2023 / p. 1082-1103 <https://doi.org/10.1111/1541-4337.13103>

Novel Ligilactobacillus salivarius strains as potential probiotics in Helicobacter pylori eradication

Roots, Kaisa; **Ventsel, Lilian**; Kanistik, I.; **Sarand, Inga**; Suurmaa, Külliki; **Spuul, Pirjo** EHMSG – 37th International Workshop on Helicobacter & Microbiota in Inflammation & Cancer, Porto, Portugal, September 12-14, 2024 : abstract book 2024 / p. 113 https://doi.org/10.26355/mhd_20249_1023

Occurrence of potentially pathogenic bacteria in biofilm on bakery industry equipment

Lutter, Liis; Kuzina, Aljona; Jõudu, Ivi; **Sarand, Inga**; Andreson, Helene 14th Baltic Conference on Food Science and Technology "Sustainable Food for Conscious Consumer" : FoodBalt 2021 : book of abstracts 2021 / p. 40
https://tftak.eu/foodbalt/assets/files/Foodbalt_Book_of_Abstacts.pdf

Omega-3 fatty acid and B12 vitamin content in Baltic algae

Luhila, Õnnela; Paalme, Tiina; Tanilas, Kristel; **Sarand, Inga** Algal Research 2022 / Art. 102860
<https://doi.org/10.1016/j.algal.2022.102860> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

PCR-based fingerprinting and identification of contaminative fungi isolated from rye breads

Surženko, Marianna; Kontram, Kärt; **Sarand, Inga** Agronomy research 2017 / p. 288-297 : ill https://agronomy.emu.ee/wp-content/uploads/2017/03/Vol15Nr1_Surzenko.pdf#abstract-5072 [Journal metrics at Scopus](#) [Article at Scopus](#)

Population dynamics of lactic acid bacteria in industrial rye sourdough and the characterization of dominating species

Viiard, Ene; Mihhalevski, Anna; Paalme, Toomas; **Sarand, Inga** Food and nutrition = Toit ja toitumine. XVII : book of abstracts : the 5th Baltic Conference on Food Science and Technology : Foodbalt-2010 2010 / p. 121-122

Properties and microbial population stability of model rye sourdough composed from bacteria isolated from industrial rye sourdough

Bessmeltseva, Marjanna; Viiard, Ene; **Sarand, Inga** Food and nutrition = Toit ja toitumine. XVII : book of abstracts : the 5th Baltic Conference on Food Science and Technology : Foodbalt-2010 2010 / p. 91-92

Role of DmpR-mediated regulatory circuit in bacteria biodegradation rates and survival in methylphenol amended soils

Sarand, Inga; Skärfstad, E.; Forsman, M.; Romantschuk, M.; Shingler, V. Applied and environmental microbiology 2001 / 1, p. 162-171 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC92538/>

Role of regulatory circuits of Pseudomonas CF600 in (methyl)phenol biodegradation rates and survival in soil

Sarand, Inga; Romantschuk, M.; Shingler, V. Pseudomonas'99 : Biotechnology and Pathogenesis : September 1-5, 1999, Maui, Hawaii 1999

Rye sourdough bread, fermentation and stability

Paalme, Toomas; **Sarand, Inga**; Mihhalevski, Anna First European Food Congress : 4-19 Nov.2008, Ljubljana, Slovenia : abstract book 2008 / p. Q026

Selection of functional starter bacteria for type I sourdough process = Funktsionaalsete starterbakterite selektsioon tüüp I rukkileivajuurelise tootmiseks

Surženko, Marianna 2017 <https://digi.lib.ttu.ee/ii/?7674> https://www.ester.ee/record=b4677260*est

Study on volatile compound production by individual lactic acid bacteria in dough using multiple headspace extraction

Kaseleht, Kristel; Paalme, Toomas; Mihhalevski, Anna; **Sarand, Inga** Food and nutrition = Toit ja toitumine. XVII : book of abstracts : the 5th Baltic Conference on Food Science and Technology : Foodbalt-2010 2010 / p. 97

Survival of cheese bacteria in a gastrointestinal tract simulator

Sumeri, Ingrid; Adamberg, Signe; Uusna, Riin; **Sarand, Inga**; Paalme, Toomas International dairy journal 2012 / p. 36-41 : ill <https://www.sciencedirect.com/science/article/pii/S095869461200026X>

Survival of lactic acid bacteria in Estonian and Finnish open texture cheeses during gastrointestinal tract simulator (GITS) transit

Sumeri, Ingrid; Uusna, Riin; Adamberg, Signe; **Sarand, Inga**; Paalme, Toomas Food and nutrition = Toit ja toitumine. XVII : book of abstracts : the 5th Baltic Conference on Food Science and Technology : Foodbalt-2010 2010 / p. 115

TalTech ja Stockmann tutvustasid innovaatilist toidukarpide puhastamise seadet Violetta

Mente et Manu 2021 / lk. 10 : fot [Mente et Manu 1/2021](https://www.ester.ee/record=b1242496*est) https://www.ester.ee/record=b1242496*est

The effect of UV-C radiation on the durability of 3D printed plastic parts in disinfectant devices

Tähemaa, Toivo; Sarkans, Martinš; **Sarand, Inga**; Pohlak, Meelis; Niidas, Aadu; Saarna, Mart IOP conference series : materials science and engineering 2021 / art. 012046, 6 p. : ill <https://doi.org/10.1088/1757-899X/1140/1/012046>

The growth kinetics of Pseudomonas Putida on benzoate utilizing ortho- or meta-pathways

Sarand, Inga; Paalme, Toomas; Vilu, Raivo Kinetics, dynamics and physiology of microbial growth : [... held at the Gottlieb-Duttweiler Institute in Rüschlikon (Zürich), Switzerland, from October 17-20, 1992] 1993 / p. 69

The use of plant root systems in bioremediation

Lindström, K.; **Sarand, Inga** Saastunen maaperän ja pohjaveden puhdistus biologisin keinon : Il ympäristösymposio, Helsinki 27.-29.08.1998 1998 / s. 10

TOL plasmid : stability, transfer and activity in bacteria from soil and mycorrhizosphere

Sarand, Inga 2000 <https://researchportal.tuni.fi/en/activities/v%C3%A4it%C3%B6skirjan-esitarkastaja-sarand-i-tol-plasmid-stability-transfe>

Tolerance and biodegradation of m-toluate by Scots pine, a mycorrhizal fungus and fluorescent pseudomonads individually and under associative conditions

Sarand, Inga; Timonen, T.; Koivula, R.; Peltola, R.; Haahtela, K.; Sen, R.; Romantschuk, M. Journal of applied microbiology 1999 / p. 817-826

Traditional breads from the Baltic Countries (Estonia, Latvia, Lithuania)

Sarand, Inga; Traksmäa, Anna; Klava, Dace; Kunkulberga, Daiga; Straumite, Evita; Galoburda, Ruta; Murniece, Ruta; Juodeikiene, Grazina; Bartkevics, Vadims; Bartkiene, Elena Traditional European breads : An illustrative compendium of ancestral knowledge and cultural heritage 2023 / p. 41–59 https://doi.org/10.1007/978-3-031-23352-4_2

Иммобилизация микроорганизмов для деградации ксенобиотиков

Koroljova, Jelena; Holstinina, Natalja; Sarand, Inga Tallinna Tehnikaülikooli Toimetised 1990 / lk. 70-78: ill