New papers on Microbiology of the Built Environment, October 1, 2016

ELISABETH BIK

Microbes in subways

Bioaerosols in the Barcelona subway system – X. Triadó-Margarit – Indoor Air ($6 to rent, $38 to own)

NMDS ORDINATION ANALYSIS OF COMMUNITY SIMILARITIES BASED ON BRAY-CURTIS DISSIMILARITIES.

(…) We examined the microbiological composition and abundance in space and time of bioaerosols collected in the Barcelona subway system during a cold period. (…) Multitag 454 pyrosequencing of the 16S rRNA gene was used to assess bacterial community composition and biodiversity. The results showed low bioaerosol concentrations regarding the targeted microorganisms, although the bacterial bioburden was rather high (10^4 bacteria/m^3). Airborne bacterial communities presented a high degree of overlap among the different subway environments sampled (inside trains, platforms and lobbies) and were dominated by a few widespread taxa, with Methylobacterium being the most abundant genus. (…) Overall, we found that commuters are not the main source of bioaerosols in the Barcelona subway system.

Microbes in hospitals

Copper alloy surfaces sustain terminal cleaning levels in a rural hospital – Shannon M. Hinsa-Leasure – American Journal of Infection Control (OA)
COPPER ALLOYS WERE FREQUENTLY ABLE TO SUSTAIN BACTERIAL CONCENTRATIONS AT OR NEAR THOSE PRESCRIBED UPON COMPLETION OF TERMINAL CLEANING.

(…) A prospective intention-to-treat trial design was used to evaluate the effectiveness of copper alloy surfaces and respective controls to augment infection control practices under pragmatic conditions. Half of the patient rooms in the medical-surgical suite in a 49-bed rural hospital were outfitted with copper alloy materials. The control rooms maintained traditional plastic, metal, and porcelain surfaces. Components fabricated using copper alloys were found to have significantly lower concentrations of bacteria, at or below levels prescribed, upon completion of terminal cleaning. Vacant rooms were found to harbor significant concentrations of bacteria, whereas those fabricated from copper alloys were found to be at or below those concentrations prescribed subsequent to terminal cleaning.

Press: New Study Confirms Copper Alloys Continuously Kill Bacteria, Keep Hospital Rooms Cleaner

Copper Resistance of the Emerging Pathogen Acinetobacter baumannii – Caitlin L. Williams – Applied and Environmental Microbiology ($25 for 1 day)

GENOMIC ORGANIZATION OF PUTATIVE COPPER-RELATED GENES

Acinetobacter baumannii is an important emerging pathogen that is capable of causing many types of severe infection, especially in immunocompromised hosts. Since A. baumannii can rapidly acquire antibiotic resistance genes, many infections are on the verge of being untreatable, and novel therapies are desperately needed. To investigate the potential utility of copper-based antibacterial strategies against Acinetobacter infections, we characterized copper resistance in a panel of recent clinical A. baumannii isolates. Exposure to increasing concentrations of copper in liquid culture and on solid surfaces (…) Future characterization of copper resistance mechanisms may aid in the search for novel antibiotics against Acinetobacter and other highly antibiotic-resistant pathogens.

Characterization of Mould in Masonry in Hospital Environment–Case Study
Washington Batista de Souza – Open Journal of Civil Engineering (OA)

MOISTURE CONTENT OF MORTAR

The objective of this study is the characterization of mould inside and in the surface wall of a hospital. The present research was made on the wall of the Clinical Hospital of the Federal University of Paraná, Brazil. For the methodology the samples were extracted from the surface, mortar and brick. The samples were spread on Petri plates containing Sabouraud dextrose agar and incubated at 25°C for seven days. The results of the 90 samples collected showed growth of 39% of colonies with the following distribution of microorganisms: Aspergillus (present in 27% of samples), Cladosporium, Absidia, Rhizopus, Rhodotorula, Fusarium, Penicillium and Aspergillus flavus. (…) Diluted honey inhibits biofilm formation: potential application in urinary catheter management? —
Indwelling medical devices harbour biofilms which have been shown to cause infections and act as reservoirs for pathogens. Urinary catheters are often in place for considerable periods of time and are susceptible to both encrustation and biofilm formation. Strategies for minimising biofilm occurrence underpin an active research area in biomedicine. Manuka honey has, inter alia, well-established antibacterial properties. This study aims to assess the influence of honey on early biofilm formation in an established in vitro model. (…) Manuka honey at dilutions as low as 3.3% w/v in some protocols and at 10% or above in all protocols tested significantly inhibits bacterial attachment to a vinyl substrate and reduces further early biofilm development. No augmentation of growth over untreated controls was observed in any experiment.

Press: Manuka honey may help prevent life-threatening urinary infections — Simon Hendel — The Conversation
Honey May Be a Natural Way to Beat Bacteria— Alexandra Sifferlin — Time

Microbes and wastewater

Assessing the composition of microbial communities in textile wastewater treatment plants in comparison with municipal wastewater treatment plants — Ken Meerbergen — MicrobiologyOpen (OA)

Therefore, the aim of this study was to assess the microbial community composition over two seasons (winter and summer) in activated sludge from well-operating textile wastewater treatment plants (WWTPs) in comparison with municipal WWTPs, and to explain observed differences by environmental variables. 454-pyrosequencing generated 160 archaeal and 1645 bacterial species-level Operational Taxonomic Units (OTUs), with lower observed richness in activated sludge from textile WWTPs compared to municipal WWTPs. (…) High salinity, high organic loads, and a higher water temperature were important potential variables driving the microbial community composition in textile WWTPs. This study provides a general view on the composition of microbial communities in activated sludge of textile WWTPs, and may provide novel insights for identifying key players performing important functions in the purification of textile wastewaters.

Microbes and cultural heritage objects

Pink discoloration on frescoes from Hurezi Monastery, Romania — Ioana Gomoiu — Journal of Cultural Heritage ($35.95)
DISTRIBUTION OF PINK DISCOLORATION ON THE NORTHERN WALL

A multianalitical approach based on optical microscopy (OM), scanning electron microscopy (SEM), X-ray diffraction, grain size distribution and microbiological methods has been applied to characterize pink discoloration on the surface of both original painting and lime-mortar infillings of the frescoes of the refectory from the Hurezi Monastery, Romania. (...) Thick layers of bacteria developed around and into enlarged pores led to the alteration of substrate pore sizes and changes of moisture circulation. Acting simultaneously with efflorescences, disaggregation and fragmentation of the mortar and pictorial layer take place. Microbial origin of pink discoloration detected by OM and SEM was confirmed by culture based methods. The present study points out the analytical methods for identification of pink aesthetical damage of mural painting and its biological origin.

Fungi from the built environment

Annotating public fungal ITS sequences from the built environment according to the Mix’nS-Built Environment standard — a report from a May 23-24, 2016 workshop (Gothenburg, Sweden) – Kessy Abarenkov – MycoKeys

ANALYSIS OF THE MIXS-BE “BUILDING OCCUPANCY TYPE”

The 36 participants assembled a total of 45,488 data points from the published literature, including the addition of 8,430 instances of countries of collection from a total of 83 countries, 5,801 instances of building types, and 3,876 instances of surface-air contaminants. The results were implemented in the UNITE database for molecular identification of fungi (http://unite.ut.ee) and were shared with other online resources.