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a culture of "technogeekism", where students are not afraid of using computers in their daily lives, and especially not in the academic setting. Part of keeping interest in the subject is my provision of new material on an ad hoc basis: this was especially relevant during the various recent outbreaks of Ebola haemorrhagic fever in Africa, a Crimean-Congo haemorrhagic fever scare in South Africa, and for BSE. One of my biggest contributions to general education at our University has been to provide an information page on HIV/AIDS, as a detailed introduction to the virus and the disease for first- and higher-level students who do not do my course. The biggest advantages of using the Web and the multimedia installation for both direct and indirect teaching are: (1) the ability to provide up-to-date teaching material, free to the students, available anywhere there is Web access or access to the University LAN; (2) the ability to use 3-D colour graphical and animated material to illustrate concepts; (3) the interlinking of personal and public material to provide an expanding universe of educational possibility. I regularly receive positive comments from individuals who access the material after searching for information on a given topic, such as "Emerging Viruses", "Virus Evolution", and - my biggest fan club - Ebola.! I have also received some negative comments from my own students: however, these mostly have less to do with content than with the paths the students find they can take through the material, because they do not like the number of choices they get as to how to proceed through it!

ROUND TABLE 24
ENVIRONMENTAL VIROLOGY

1 - THE IMPORTANCE OF A SANITATION PROGRAM ON SHELLFISH MANAGEMENT.

Simões, C.M.O.[1*]; Barardi, C.R.M.[2]; Sincero, T.C.[1]; Coelho, C.[2,3]; Vinatea, C.E.B.[2]; Rigotto, C.[2]; Spagnol, W.P.[2]; Heinert, A.P.[2] (Laboratório de Virologia Aplicada [1]Depto. de Ciências Farmacêuticas, CCS, [2]Depto de Microbiologia e Parasitologia, CCB; Universidade Federal de Santa Catarina, Florianópolis, SC, 88040-900; [3]Depto. Farmácia, CCS, Universidade do Vale de Itajaí, SC; E-mail*:claudias@reitoria.ufsc.br)

In order to safeguard consumers of shellfish against illnesses associated with contamination, many countries have adopted regulations governing the control of shellfish safety. An international review of these regulations indicates that the majority are based on the National Shellfish Sanitation Program, developed in USA after a typhoid outbreak in some cities caused by sewage contamination. This program has developed into a standard of excellence that is recognized all over the world and, for this reason, many country regulations related to shellfish and quality of shellfish processing, handling, etc. are often similar. It may seem obvious to say that the most effective way to tackle shellfish vectored human diseases is to prevent sewage pollution of shellfish harvesting areas, since prevention generally proving better than cure. In some countries, such as in Brazil, the shellfish industry is concentrated into a few geographical areas. Santa Catarina State is the biggest Brazilian producer of mollusks responding to the production of one million dozen of oysters and 11.2 thousand tons of mollusks during the year 2000. The local government has an agreement that it is essential to have an adequate sanitary control of these marine products. The federal legislation adopted as indicators the presence/absence of some specific bacteria, but the scientific consensus is that these indicators do not reflect the ocurrence of enteric viruses and parasites (*Giardia lamblia* and *Cryptosporidium parvum*) in the marine environment and shellfish eventually contaminated by sewage. New viral and parasite test methods based on PCR and on IMS/IF, respectively, and the development of alternative more reliable faecal pollution indicators, offer new approaches for the further development of public health controls. However, further work is required to build a scientific consensus and to understand the implications of their introduction into legislation.

2 - USING COLIPHAGE T4 AS A TRACER IN SOIL COLUMNS

Matos, B.; Pacheco, A.; Rodrigues, D.; Pellizari, V. Mehnert, D. [1] Agência Nacional de Águas, Superintendência de Planejamento de Recursos Hídricos, Sala 219, Setor Policial Sul, Quadra 03, Bloco L, 70610-200, Brasília-DF, Fone: 61-445.5346, E-mail: bolivar@ana.gov.br [2] Universidade de São Paulo, Instituto de Geociências, Departamento de Geologia Sedimentar e Ambiental, Rua do Lago 562, 05508-900, São Paulo-SP [3] Universidade de São Paulo, Instituto de Ciências Biomédicas, Laboratório de Microbiologia Ambiental, Av. Prof. Lineu Prestes 1374, 05508-900, São Paulo-SP [4] Universidade de São Paulo, Instituto de Ciências Biomédicas, Laboratório de Virologia, Av. Prof. Lineu Prestes 1374, 05508-900, São Paulo-SP

Cemeteries can be a source of environmental impact. Inadequate site and operation of cemeteries may contaminate the water resources by the leachate from the corpse decomposition. The leachate may contain chemical and biological contaminants. If the groundwater is contaminated in the internal area of the cemetery, that contamination may flow to surrounding areas and cause a health hazard to the people that use that water. This work was part of a project that assessed occurrence and transport of microorganisms in the groundwater of Vila Nova Cachoeirinha cemetery, located on pre-cambrian terrains at the northern zone of the city of São Paulo, Brazil. According to MATOS (2001), enterovirus and adenovirus were found in the groundwater and they traveled distances of tens of meters through the unconfined aquifer. We simulated virus transport in the cemetery porous media by injecting a known concentration of coliphage T4 in water saturated soil columns. The effluent was monitored during the experiment and a numerical model was fitted to the data in order to predict inactivation and adsorption.

METHODS

In the lab, glass columns were designed and filled with a sandy soil (90% sand) and a clayey (>40% clay) from the study area. Known concentration of chemical (NaCl) and biological tracers (coliphage T4) were injected in the columns, while the effluent was monitored. A numerical model was used to simulate the tracers' transport through the columns. Coliphage T4 (ICTV, 1995) was used as a tracer. The host (*Escherichia coli* B) was produced as in CARLSON & MILLER (1994). T4 was concentrated as in CARLSON & MILLER (*op. cit.*), KUTTER *et al.* (1994) and WIBERG (1994). Virus inactivation was calculated for different pH solutions. Adsorption isotherms were determined to the sandy and clayey soils in batch experiments and in the columns.

RESULTS

The inactivation of coliphage T4 was determined in two different pH solutions at room temperature (25°C). Inactivation (?) was equal to 0,012 h^{-1} for a pH of 5,0 and 0,004 for a pH of 6,5. T4 survived longer in a pH of 6,5 (half life = 58 hours) than in a pH of 5,0 (half life = 161 hours). Linear adsorption isotherms were fit to the data from batch experiments and from the numerical fitted models for the columns. For the sandy soil, the distribution coefficient (K_d) was equal to 52 mL/g in the batch experiments and 0,4 mL/g in the soil columns. For the clayey soil, the distribution coefficient (K_d) was equal to 295 mL/g in the batch experiments and 1 mL/g in the soil columns. Therefore, T4 adsorbs more to the clayey soil than to the sandy soil. Moreover, the batch experiments overestimated the adsorption observed in the columns for both soils. The fitted model for the soil columns showed that virus attenuation by the clayey soil (~7$\log_{10}$ in 0,34 m) was greater than by the sandy soil (~6$\log_3$).

CONCLUSIONS

Coliphage T4 was successfully monitored in the soil column effluent. T4 survived longer in a pH of 6,5 (half life = 58 hours) than in a pH of 5,0 (half life = 161 hours). T4 adsorbed more to the clayey soil than to the sandy soil. The batch experiments overestimated the adsorption observed in the columns for both soils. Virus attenuation at the clayey soil (~7$\log_{10}$ in 0,34 m) was greater than at the sandy soil (~6$\log_3$).

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3 - DETECTION OF ENTERIC VIRUSES IN OYSTERS: SANTA CATARINA´S STRATEGY.

Barardi, C.R.M.[1*]; Simões, C.M.O.[2]; Sincero, T.C.[2]; Coelho,C.[1,3]; Vinatea, C.E.B.[1]; Rigotto, C.[1]; Spagnol, W.P.[1]; Heinert, A.P. [1] (Laboratório de Virologia Aplicada [1]Depto. de Microbiologia e Parasitologia, CCB; [2]Depto. de Ciências Farmacêuticas, CCS, Universidade Federal de Santa Catarina, Florianópolis, SC, 88040-900; [3]Depto. De Farmácia, CCS, Universidade do Vale de Itajaí,SC; E-mail*:ccb1crb@ccb.ufsc.br)

Santa Catarina´s state is the biggest Brazilian producer of mollusks responding to the production of one million dozen of oysters and 11.2 thousand tons of mollusks during the year 2000. The local government has an agreement that it is essential to have an adequate sanitary control of these marine products. According to the CONAMA legislation ("Conselho Nacional do Meio Ambiente", Number 20-18/06/1986 reviewed by Portaria Number 1469 Ministério da Saúde de 29/12/2000) the accepted level of fecal coliform group of bacteria and the absence of *Salmonella* spp. and *Staphylococcus* coagulase positive are respectively accepted as the criteria for the sanitary quality of water and shellfish. The scientific consensus is that these indicators do