

THIOSTERANES AS BIOMARKERS TO ASSESS WATER POLLUTION

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Sewage pollution of surface waters is the largest and most common problem in developing countries. The Latin American region is suffering of a rapid deterioration in water quality due to the direct discharge of sewers in water bodies. Assessment of the extent and sources of pollution is important task to help authorities and policy makers define health risks, responsibilities in mitigation and pollution control actions. Several compounds including hydrocarbons, fecal sterols, bile acids, pharmaceuticals, personal care products, stimulants, etc., have been used as chemical tracers (Navarro et al., 2005; Sirivedhin et al., 2005). Thiosteranes have been already identified in marine sediments (Louati et al., 2001) and in the present study their presence and preliminary evaluation as tracers is reported.

The aim of this study was to assess the pollution of the Nexapa River, Mexico. Water samples were collected from 11 sampling stations located along 80 km of the river's course to characterize sewage discharge from the cities of Atlixco and Izúcar and to monitor river waters in the sampling sites between the two cities. Sampling and extraction procedures are described elsewhere (Navarro et al., 2000).

A homologous series of thiosteranes was identified on the basis of molecular ions at m/z 404 (A), m/z 418 (B) and m/z 432 (C), characteristic fragments at $M-15$, m/z 249, m/z 250 and m/z 215, and comparison of mass spectra with those reported in literature (Louati et al., 2001). Thiosterane A was present in all samples but the other two thiosteranes were not detected in samples with low concentrations of thiosterane A. Scatterplots of thiosterane A and coprostanol concentrations in the river show higher values where the Nexapa River receives highly polluted waters transferred from the city of Puebla for irrigation purposes. A slight increment is also observed at station 6, after the city of Izúcar. Taking into account that the discharges of this city go directly to the river and that the discharges of Atlixco go to the creeks and are used to irrigate (the polluted waters are filtered by the soil) and that coprostanol is a widely use biomarker of human pollution, we can conclude that thiosteranes are associated with anthropogenic inputs and may be used to evaluate them.

In the sewer discharges (Table 1), as expected, thiosterane concentrations were much higher than in the river (with the exception of station 2 that may be considered as receiving a sewer discharge from Puebla city).

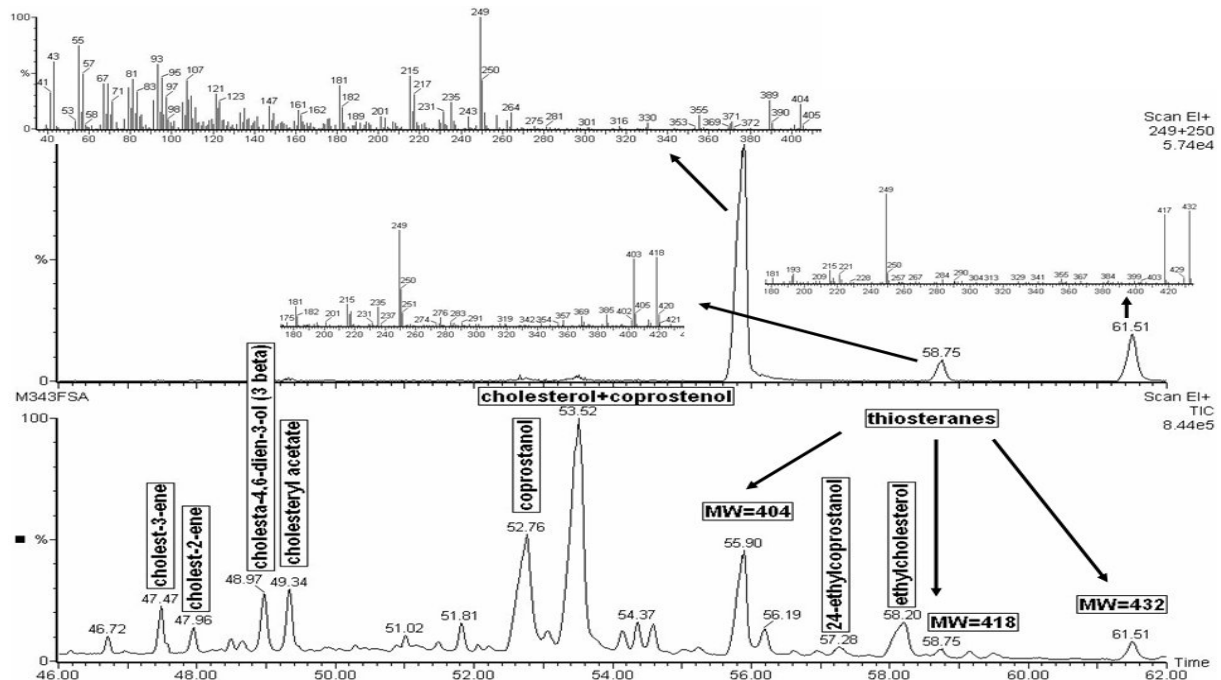


Figure 1.

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