Comment on:

Yao, Ren, Wei and Yue (2010) Biodegradation characterization and kinetics of *m*-cresol by *Lysinibacillus cresolivorans* (*Water SA* 37 (1) 15–20)†

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A methylated derivative of phenol, *m*-cresol, has been extensively used in products including phenolic resins, topical dental antiseptics, insulin preparations, herbicides, and a precursor of antioxidants and explosives (Andersen, 2005; Hamaguchi and Tsutsui, 2000; Wappler et al., 1996; Yan et al., 2006). Persistence of *m*-cresol in the environment has long been recognized (Callahan, 1979). When wastewater containing *m*-cresol enters the receiving water bodies, considerable damage to the aquatic organisms could occur due to its toxicity (Andersen, 2005; Zhou and Fang, 1997).

In the article entitled 'Biodegradation characterization and kinetics of *m*-cresol by *Lysinibacillus cresolivorans*', Yao et al. (2011) claimed that a new strain isolated from activated sludge is capable of biodegrading *m*-cresol. This study is very informative to researchers interested in the field of biodegradation of persistent chemicals. However, the article contains conclusions which are disputable and convincing evidence should be provided. We hope that this commentary will be useful in providing insights for understanding *m*-cresol biodegradation.

Bacterial enrichment and isolation of *m*-cresol-degrading strains was only vaguely described in Yao et al. (2011). It appears that the authors believed that by sub-culturing activated sludge over 4 times in a fresh sterile MSM medium with high-level of *m*-cresol concentrations (500 mg·L-1), the final isolates were *m*-cresol-degrading strains. The final step of isolation was carried out using streaking 3 times on LB plates, which contained carbon and energy sources other than *m*-cresol. It was an unwarranted conclusion that bacterial strains enriched in the presence of high-level *m*-cresol would be capable of degrading *m*-cresol. Thus, a further verification step should be followed. In Yao et al. (2011), the conclusion regarding biodegradation of *m*-cresol by the isolated stain was drawn mostly based on the observation that *m*-cresol concentrations in a liquid culture decreased over several hours. No attempt was made to elucidate the degradation pathway of *m*-cresol by tracking the degradation intermediates/metabolites. In the results and discussion, Yao et al. (2011) stated that 'it is thus favourable for biodegrading phenolic sewage containing other carbon pollutants', based on the result of the decrease in *m*-cresol concentration in the presence of glucose as an external carbon source. However, as all of the experiments were performed at higher concentrations than ambient concentrations, further study is required to conclude that the biodegrading ability of a *Lysinibacillus* strain would be still found in actual sewer systems at an ambient *m*-cresol concentration. In addition, the authors did not attempt to examine other possible causes for the decrease in *m*-cresol concentration during experiments. As the results with abiotic controls were not provided in Yao et al. (2011), the possibility of sorption to bacterial biomass for decreasing *m*-cresol cannot be excluded. Although the reason for the decrease in *m*-cresol concentrations was not attributable to any abiotic factors or experimental artifacts, a plausible degradation mechanism should be provided. The authors cited Bai et al. (2007) to demonstrate that the optimal pH value for the bacterial biodegradation of *m*-cresol was 7.0. However, the experiment for the pH optimization were not performed in Bai et al. (2007). Yao et al. (2011) also incorrectly cited Bai et al. (2007) as a reference for *m*-cresol as a priority pollutant for the United States Environmental Protection Agency (USEPA). However, Bai et al. (2007) do not mention the USEPA.

In conclusion, the study by Yao et al. (2011) should provide concrete evidence to confirm the biodegradability of *m*-cresol by a new isolate, *Lysinbacillus* strain.

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† The corresponding author of this paper was invited to respond to this comment but no response had been received at the time of publication.

http://dx.doi.org/10.4314/wsa.v42i2.19
Available on website http://www.wrc.org.za
ISSN 1816-7950 (On-line) = Water SA Vol. 42 No. 2 April 2016