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## RESOURCE OF INTEREST

## LOW-COST LABORATORY METHODS FOR FINDING MICROPLASTICS IN ENVIRONMENTAL SAMPLES

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Studies on microplastics usually require the contaminant to first be isolated from the sample substrate by density separation and removal of organic matter (reviewed by Cole *et al.* (2014) and Tagg *et al.* (2015)) before sorting from other materials in the filtrate, counting the number of microplastics, and identifying the type of plastic if possible. While the easiest and cheapest method of separating microplastics is by visual sorting using light microscopy, small plastic fragments or fibers can be difficult to see. The most accurate methods involve Fourier transform infrared spectroscopy (FT-IR, specifically reflectance micro-FT-IR or ‘molecular mapping’), pyrolysis gas chromatography coupled to mass spectrometry (pyrolysis GC/MS), Raman spectroscopy, and fluorescence microscopy (see Hidalgo-Ruz *et al.* (2012) and Tagg *et al.* (2015)). However, these processes are time consuming and the equipment is expensive to purchase. During our studies on microplastics (see Balasubramanian and Phillott on pages 13-16 in this issue of IOTN), we identified some cheaper alternatives.

Fluorescence microscopy (the simplest and cheapest of the methods described above) reduces the risk of underestimating the number of plastic fragments present in samples. A cheaper alternative to a fluorescent microscope is a NIGHTSEA Stereomicroscope Fluorescence Adapter (~US\$1,100), which can add *fluorescence* illumination to dissecting microscopes. Six different wavelength sets plus bright light are available; Royal Blue (440-460nm) is being used to identify microplastics (P. Dustan pers.comm., 2016). NIGHTSEA products are distributed by Electron Microscopy Sciences (EMS), and their distributors in the Indian Ocean region and Southeast Asia can be found at [http://www.](http://www.emsdiasum.com/microscopy/company/agents.aspx)

[emsdiasum.com/microscopy/company/agents.aspx](http://www.emsdiasum.com/microscopy/company/agents.aspx).

Fluorescence illumination can also be obtained by retrofitting an old light microscope with a brightfield vertical illuminator and very bright low-voltage light emitting diode (LED), although this option relies on the availability of a suitable microscope, vertical illuminator and LED flashlight. Steps to disassemble the vertical illuminator, attach the flashlight and assemble the internal optics are described in Babbitt *et al.* (2013).

Nile Red is a fluorescent dye that is usually used with cell and tissue samples, but is also reported to stain polyethylene, polypropylene and expanded polystyrene (Song, 2014) and may improve isolation of microplastics from samples (Cole *et al.*, 2011) The dye may be added to the sample before filtration (3µg/mL; Desforges *et al.*, 2014; 50mg/L, Song *et al.*, 2014).

Researchers working in labs without a camera mounted on the microscope may also be interested in the simple cell (mobile) phone camera mount, built using inexpensive and common materials, described by Martin and Shin (2016). The mount ensures the phone camera is positioned correctly with relation to the ocular lens and the beam of light to improve the image quality.

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