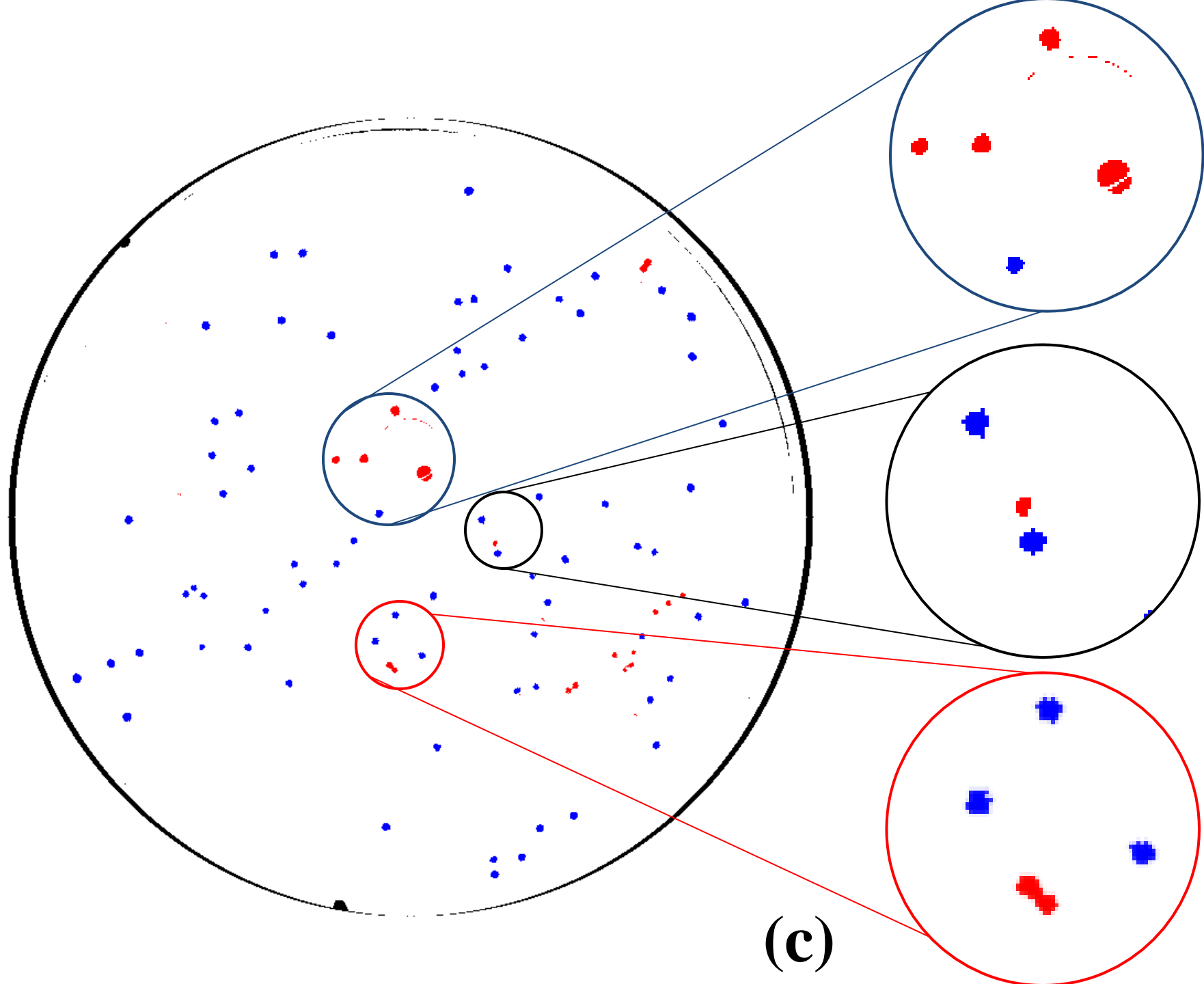# Mini BARDOT

Conventional diagnosis and identification of bacteria requires shipment of samples to a laboratory for genetic and biochemical analysis. This process can take days and imposes significant delay to action in situations where timely intervention can save lives and reduce associated costs. To enable faster response to an outbreak, a low-cost, small-footprint, portable microbial-identification instrument using forward scatterometry has been developed. This device, weighing 9 lb and measuring 12 × 6 × 10.5 in., utilizes elastic light scatter (ELS) patterns to accurately capture bacterial colony characteristics and delivers the classification results via (non-italic form) wireless access. The overall system consists of two CCD cameras, one rotational and one translational stage, and a 635-nm laser diode. Various software algorithms such as Hough transform, 2-D geometric moments, and the traveling salesman problem (TSP) have been implemented to provide colony count and circularity, centering process, and minimized travel time among colonies. Experiments were conducted with four bacteria genera using pure and mixed plate and as proof of principle a field test was conducted in four different locations where the average classification rate ranged between 95 and 100%.
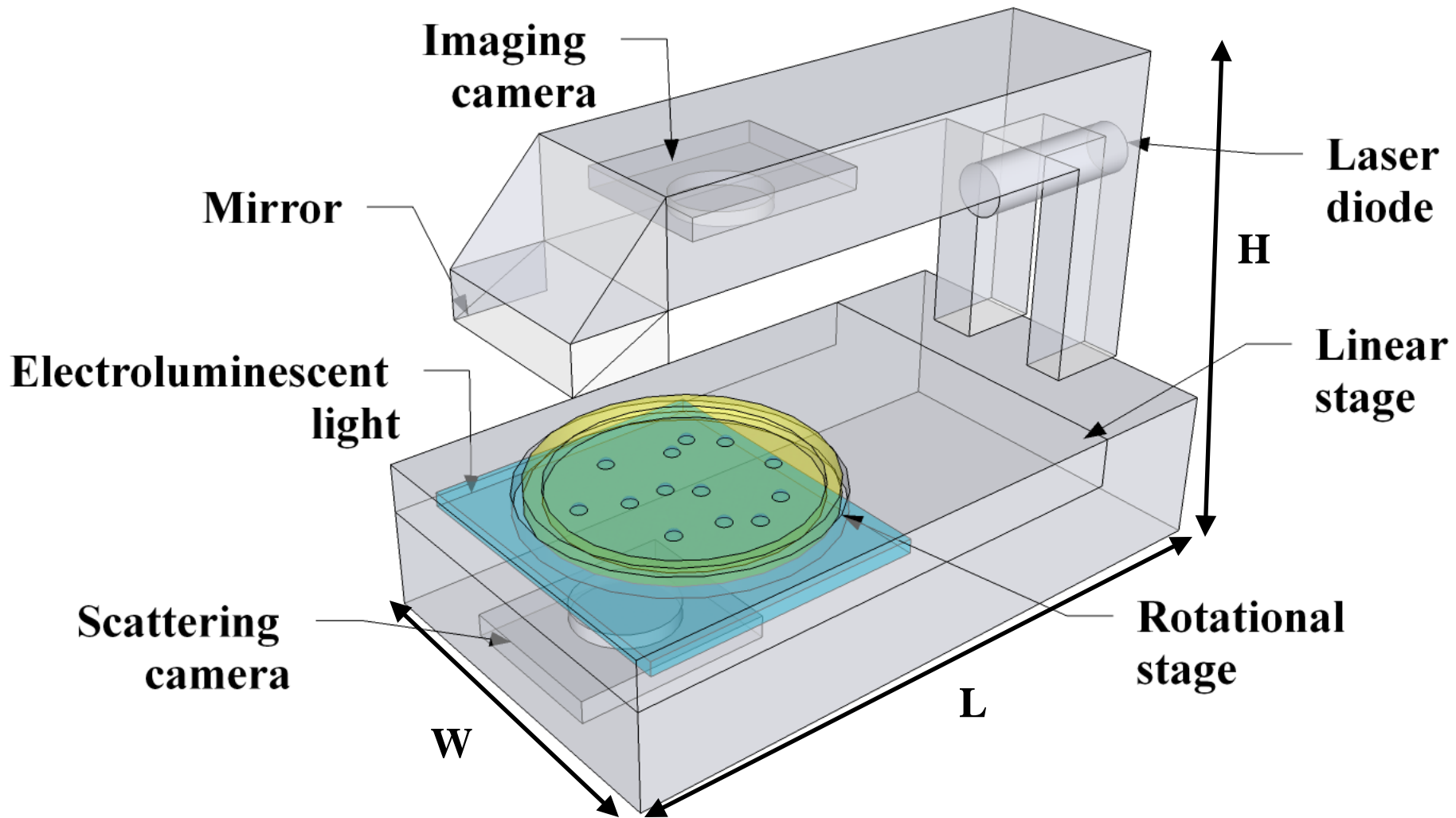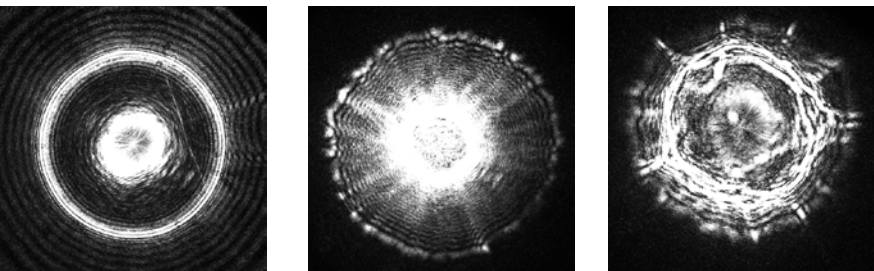
Schematic diagram of the portable bacterial identification system using elastic light scattering patterns. The system consist of a linear stage, a rotational stage, and two camera (imaging and scattering), laser diode of 635 nm, and electroluminescent light for back-illumination. Approximate size W x L x H = 6 x 12 x 10.5 inch cubed. Device weights about 9 pounds.

(c)

(a)

(b)

(a)

L. innocua
(100%)

Location 2
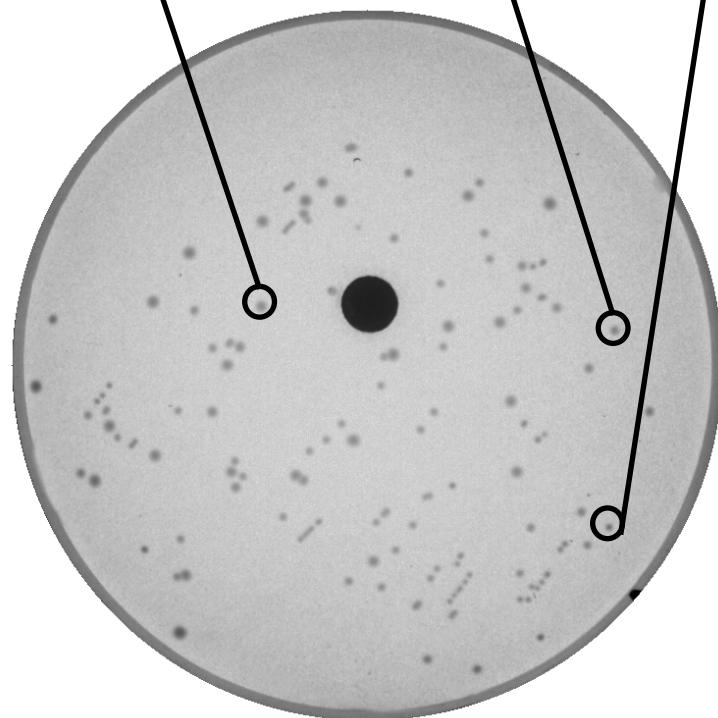
Location 3

Location 1

Location 4

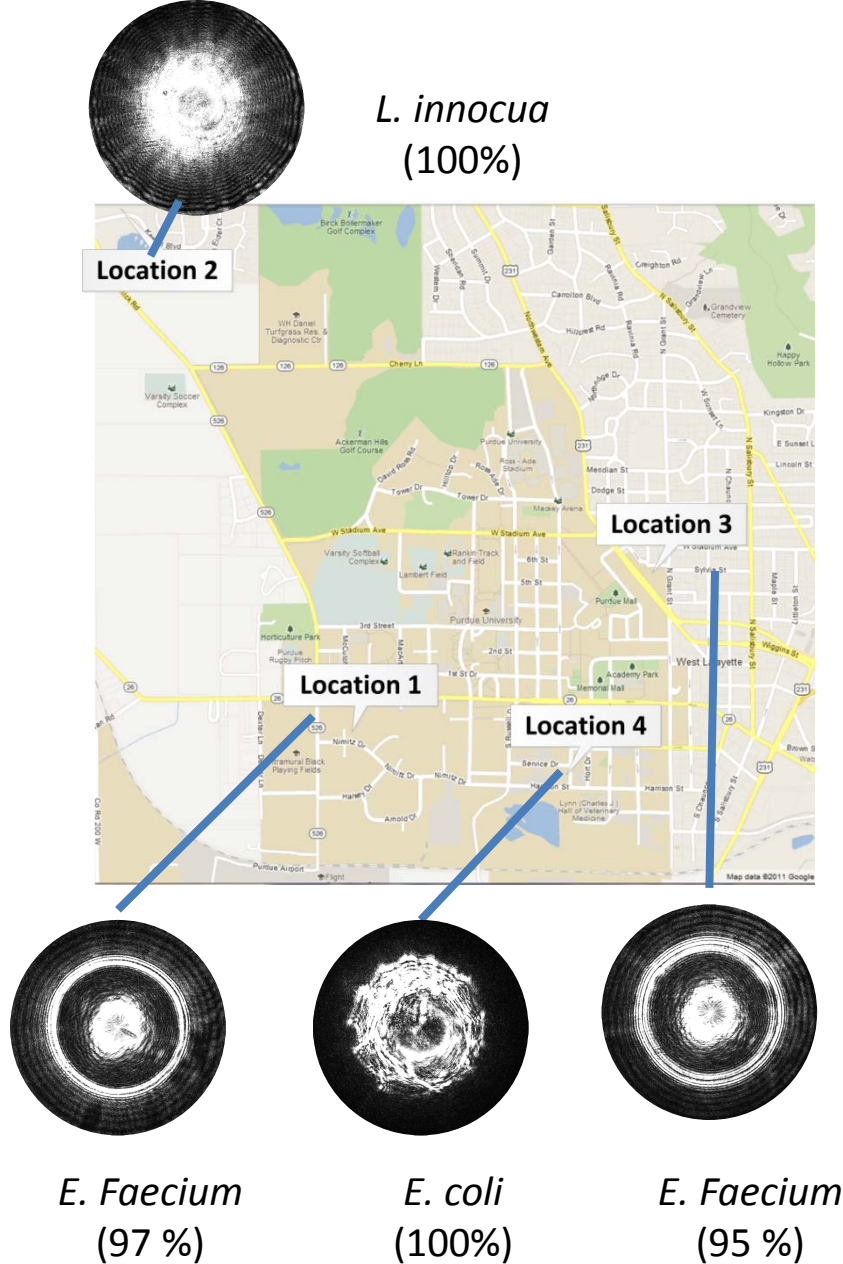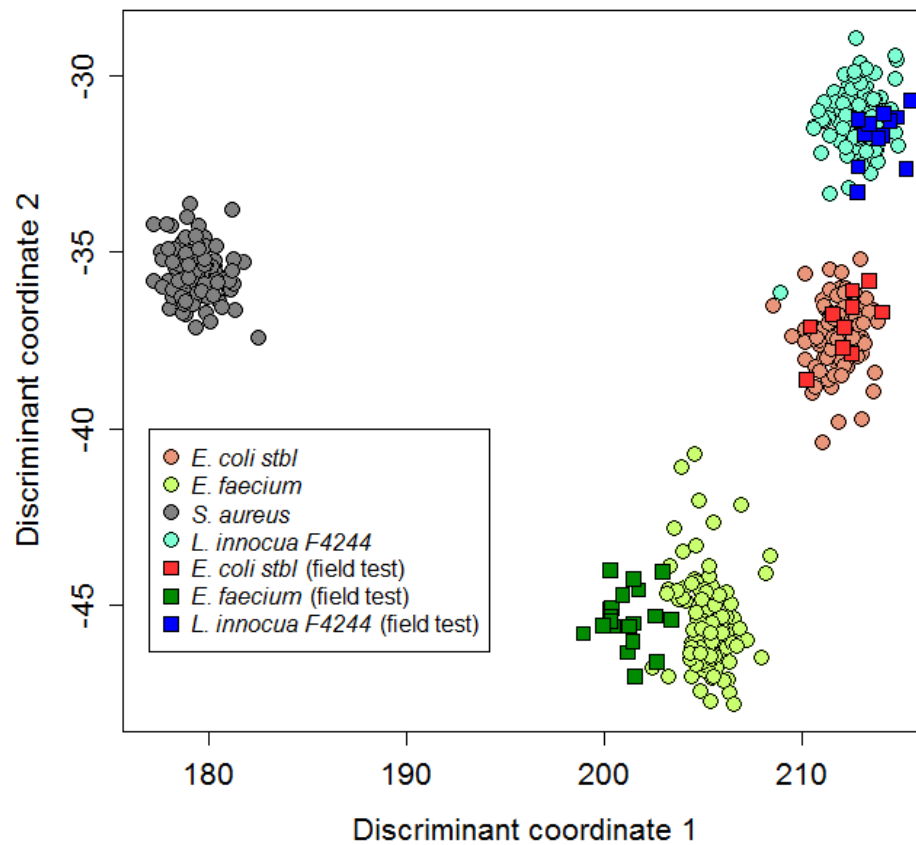E. Faecium
(97 %)

E. coli
(100%)

E. Faecium
(95 %)
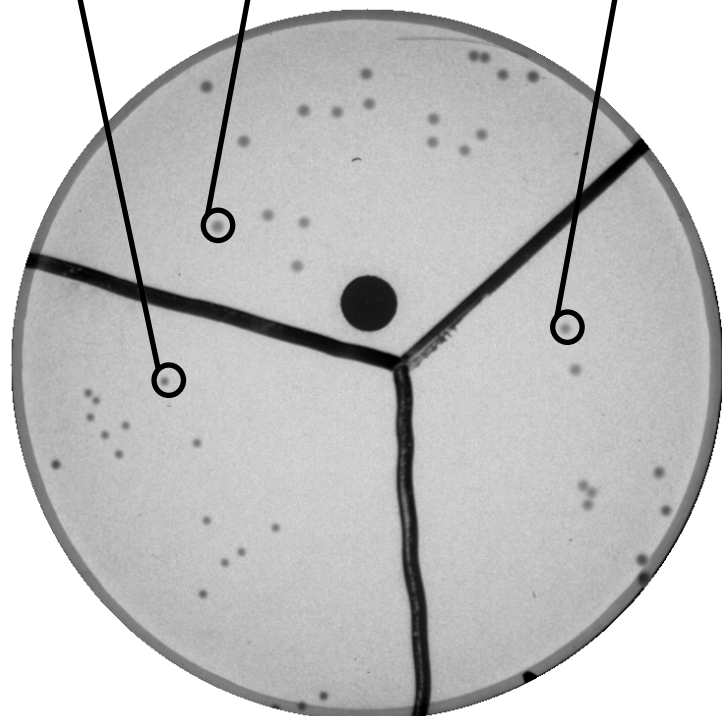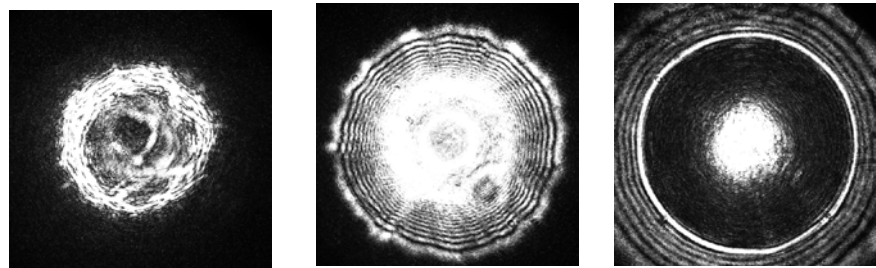
(b)

Field test results with representative scatter patterns and classification accuracy. miniBARDOT system was installed in a vehicle and operated via an UPS where only three different organism were test due to the safety regulation. Scan was performed in five different location with their GPS position recorded and database was accessed using commercial cellular network.