

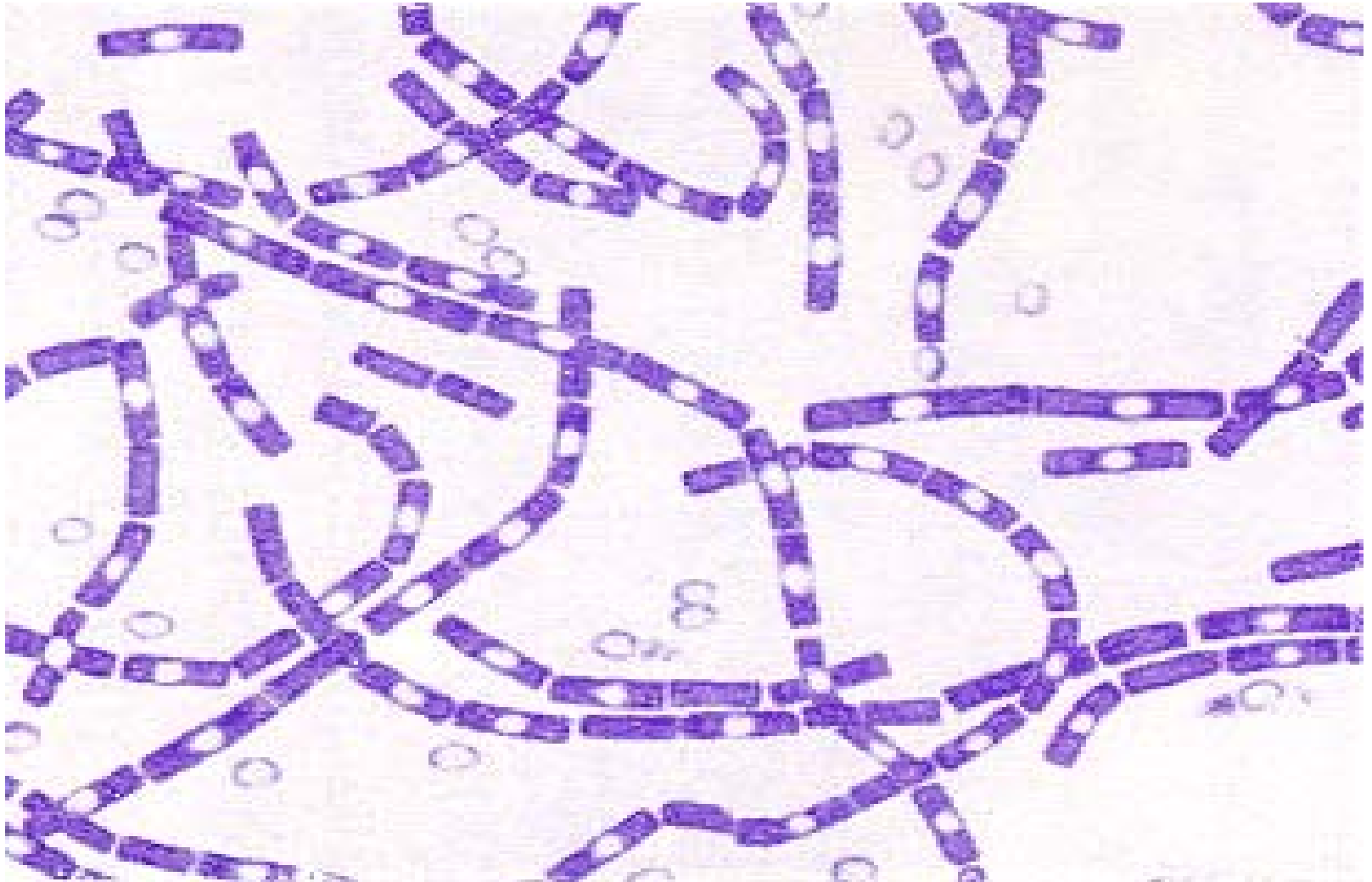
- **Anthrax scare at US mail centre**
(BBC News, Friday 7 November, 2003)
- **CBS worker contracts anthrax**
(The Guardian, Thursday October 18, 2001)
- **Anthrax panic spreads as top US senator is targeted**
(The Guardian, Tuesday October 16, 2001)

Building a Sampling Device for Spores of Biological Agents in an Enclosed Environment

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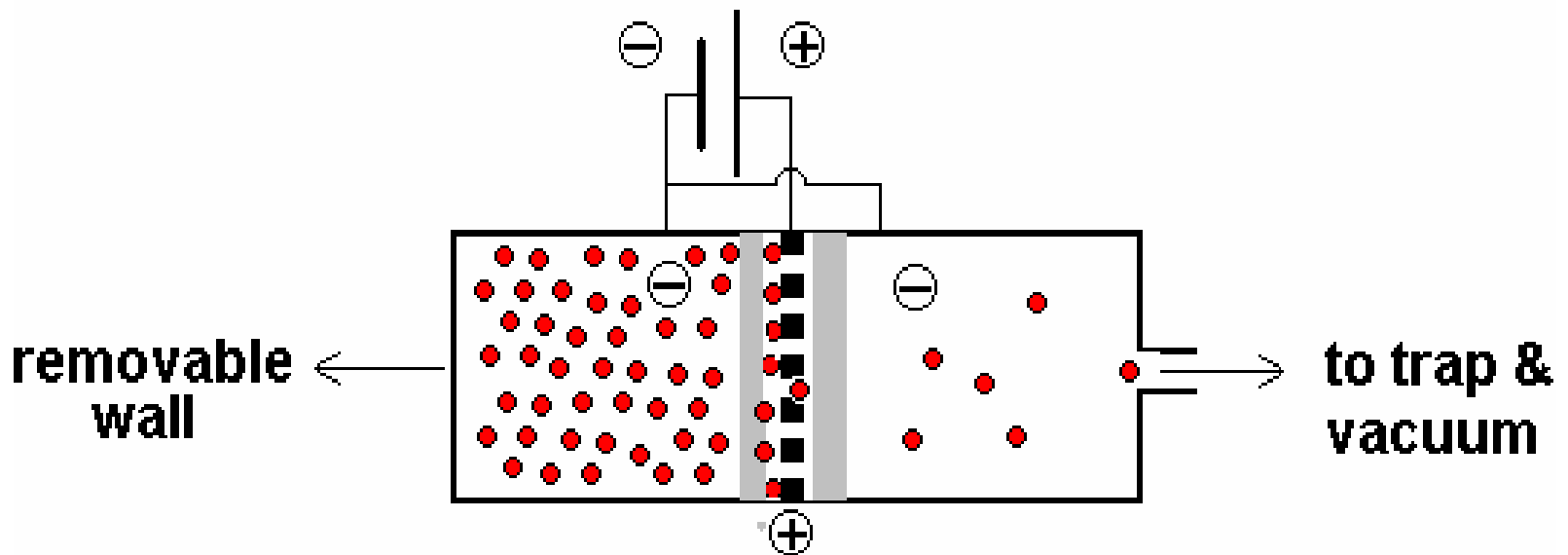
Anthrax cells bearing spores

Bacillus anthracis



SPORE SAMPLING DEVICE PROTOTYPE

Fig. 1



+ screen attracts - spores
- wall repels - spores

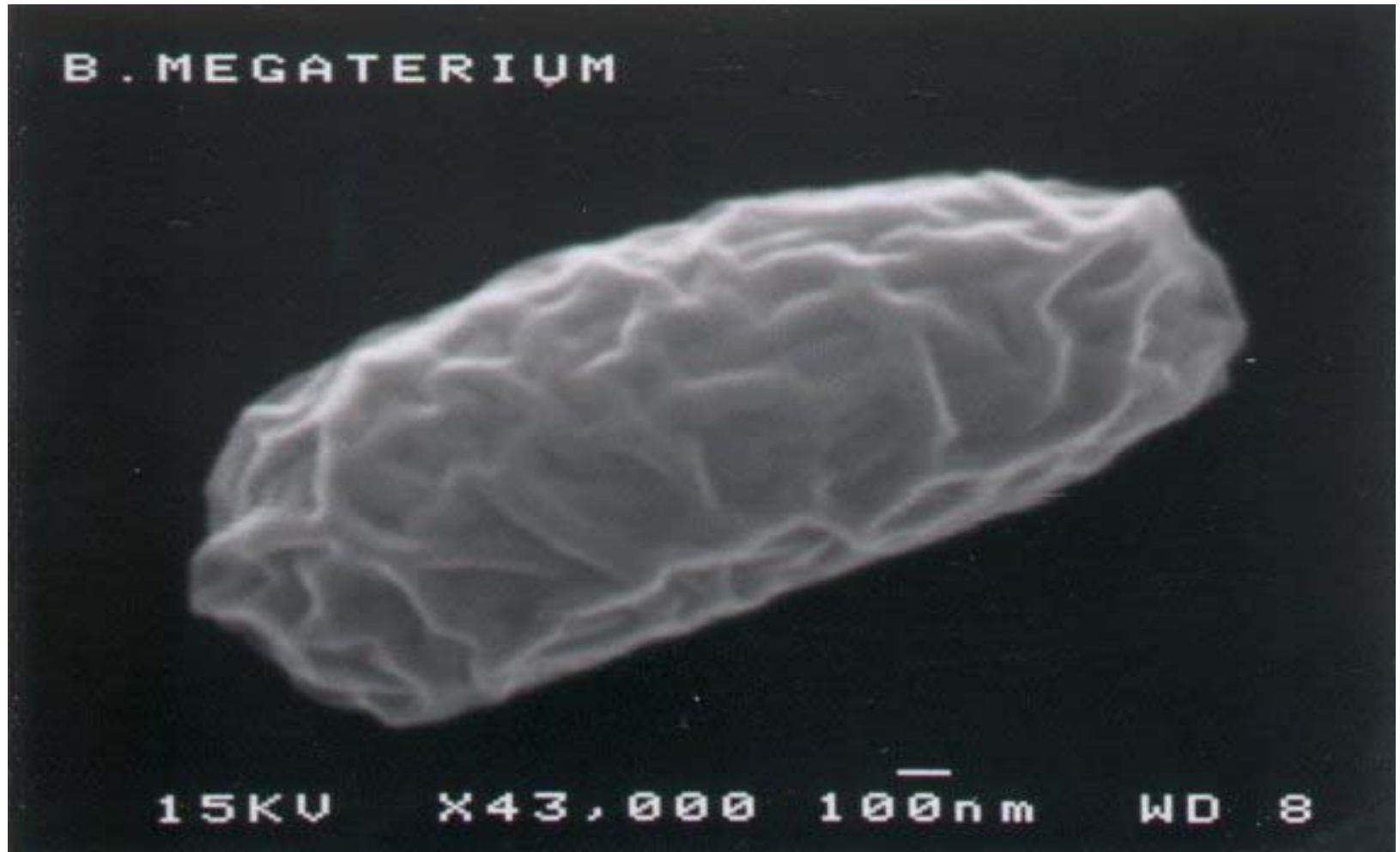
SPORE SAMPLING DEVICE PROTOYPE

- The spore collector consists of a box with a metal lining that is open at one end and carries a perforated metal plate at the other
- Air containing spores is drawn through a perforated metal plate by vacuum, and any spores not trapped by the plate are destroyed.

SPORE SAMPLING DEVICE PROTOYPE

- The perforated metal plate (screen) bears a positive charge, while the walls of the box have a negative charge.
- The negatively charged spores are attracted to the screen and repelled by the metal walls

Bacillus megaterium



Computer Simulation

Spore Detection Simulation

Screen Parameters

Hole Diameters mm

Distance b/w Centers mm

Calculate O/A

Open Area Percentage

Compartment Parameters

Length Breadth Width

Spore Parameters

Spore Count

Simulation Parameters

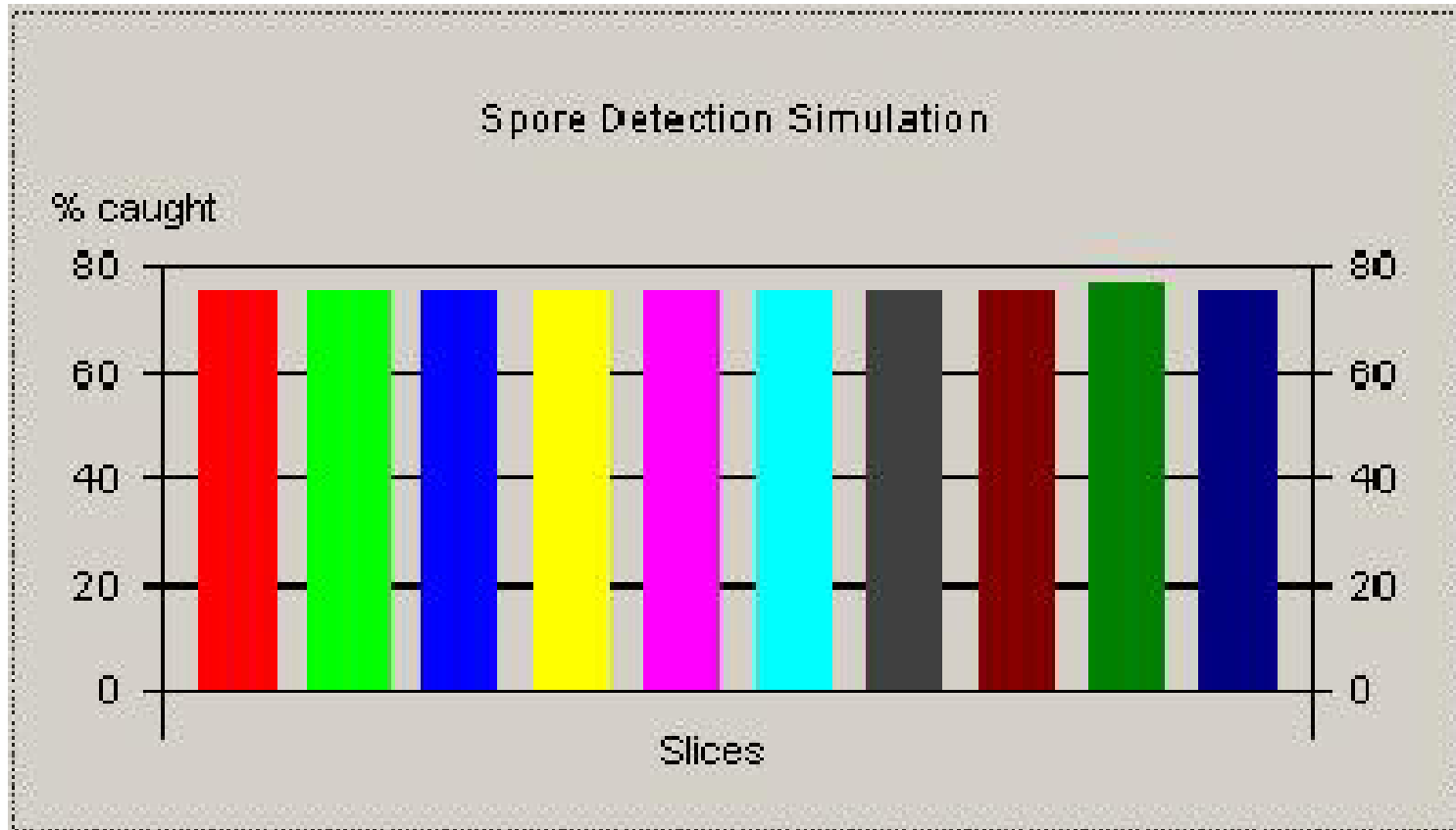
Number of slices

Start Simulation

Results

Percentage of Spores Caught

Results



Results

- The simulation was tested using the following configuration:
- Screen Parameters
 - Hole Diameters – 12 mm
 - Distance b/w centers – 20 mm
 - Resulting open area percentage – 28.27
- Compartment Parameters
 - Length – 100 mm
 - Breadth – 100 mm
 - Width – 100 mm
- Simulation Parameters
 - Number of slices - 10

Results

Spore Count	Percentage of spores caught
100,000	76.07
500,000	76.05
1,000,000	76.15
5,000,000	76.12

Algorithm

```
For i = 1 To numOfSlices
sporesCaughtInCurrentSlice = 0
//Spores per slice is calculated using the spore density and the number of slices
For j = 1 To sporesPerSlice
    // Generating a random row and column position for each row
    row = generateRandomNumber()
    col = generateRandomNumber()
    // Checking to see if the spore hits the screen wires
    If isCaught(row, col) Then
        sporesCaughtInCurrentSlice = sporesCaughtInCurrentSlice + 1
    End If
Next
// Calculating percentage caught in the current slice
percentageInCurrentSlice = sporesCaughtInCurrentSlice / sporesPerSlice
// Calculating the total percentage
totalPercentageCaught = (totalPercentageCaught * (i - 1) +
    percentageInCurrentSlice) / i
Next
```