

Bacteriological Examination of Water

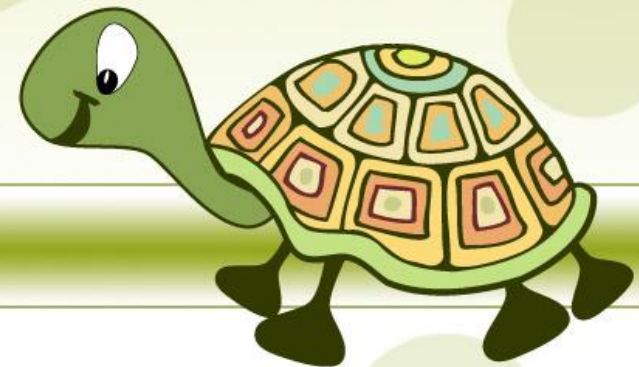


Coliforms

- most commonly measured indicators of water quality (easy to detect and enumerate in water)
- Gram-negative, rod-shaped bacteria capable of growth in the presence of bile salts or other surface-active agents with similar growth-inhibiting properties and able to ferment lactose at 35–37°C with the production of acid, gas, and aldehyde within 24–48 hours.



- They are also **oxidase-negative** and **non-spore-forming** and display **β -galactosidase** activity
- Includes several genera, may be of faecal origin
- Some species:- frequently associated with plant debris or may be common inhabitants in soil or surface water.





Faecal coliforms

(thermotolerant coliforms) :- subgroup of total coliforms, having same properties except that they grow at higher temperature of 44 °C.

- Measurement of faecal coliforms :- a better indicator of contamination by material of faecal origin.
- the group includes the genus *Escherichia* and some species of *Klebsiella*, *Enterobacter*, and *Citrobacter*.





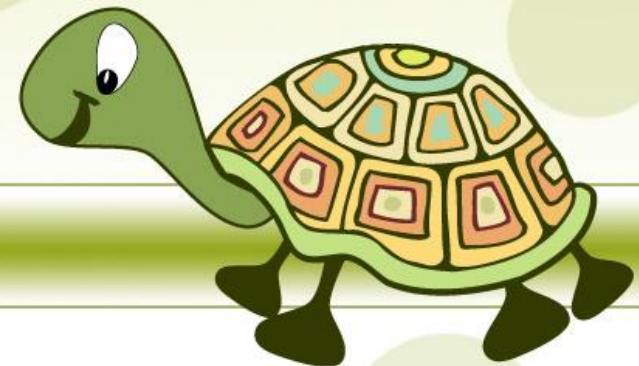
Escherichia coli is exclusively of faecal origin.

- a member of the family *Enterobacteriaceae*,
- Possess the enzymes *b-galactosidase* and *b-glucuronidase*.
- grows at $44-45^{\circ}\text{C}$ on complex media,
- ferments *lactose* and *mannitol* with the production of *acid* and *gas*, and produces *indole* from tryptophan.





- Collect the sample in a sterilized glass-stoppered bottle supplied by the N.H.L
- Samples must reach the laboratory within the **shortest time possible**





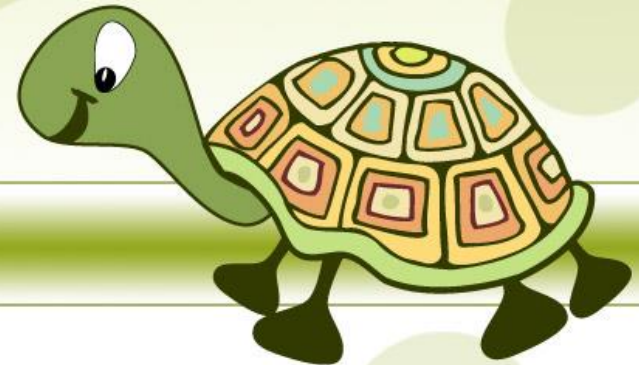
- **Sources of water to be samples**

Water sources can be divided into three basic types

(a) Water from a tap or fixed hand pump

(b) Water from a reservoir (lake, tank, river)

(c) Water from a dug well



(a) Water from a tap or fixed hand pump



(b) Water from a reservoir (lake, tank, river)



(b) Water from a reservoir (lake, tank, river)









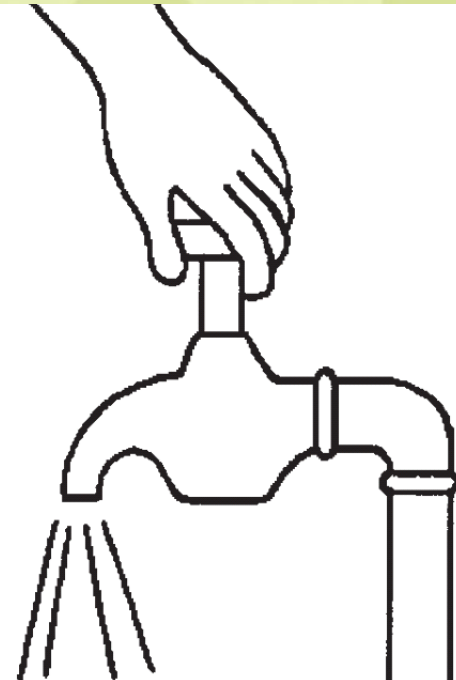
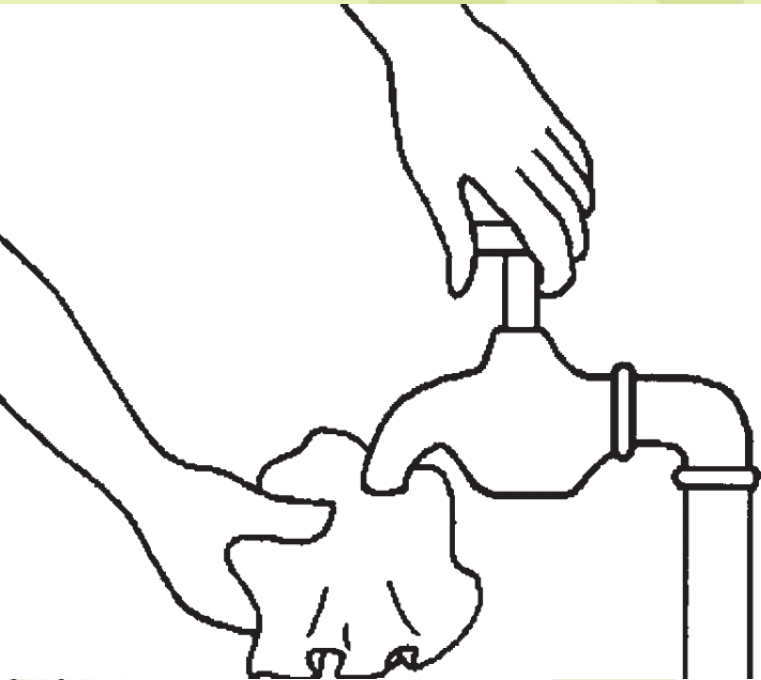
(c) Water from a dug well



Sampling methods for bacteriological testing

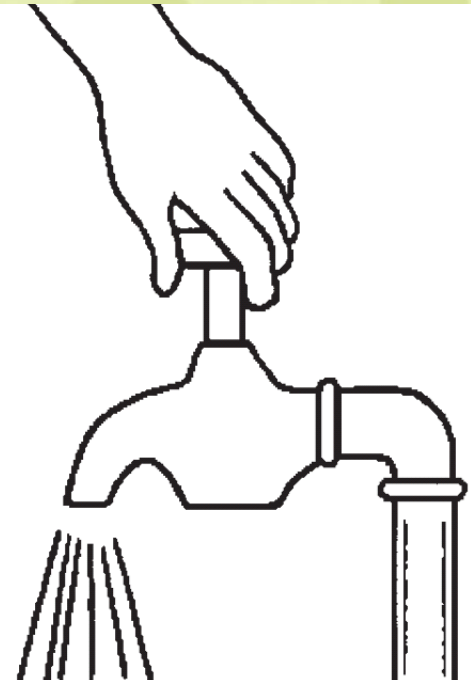
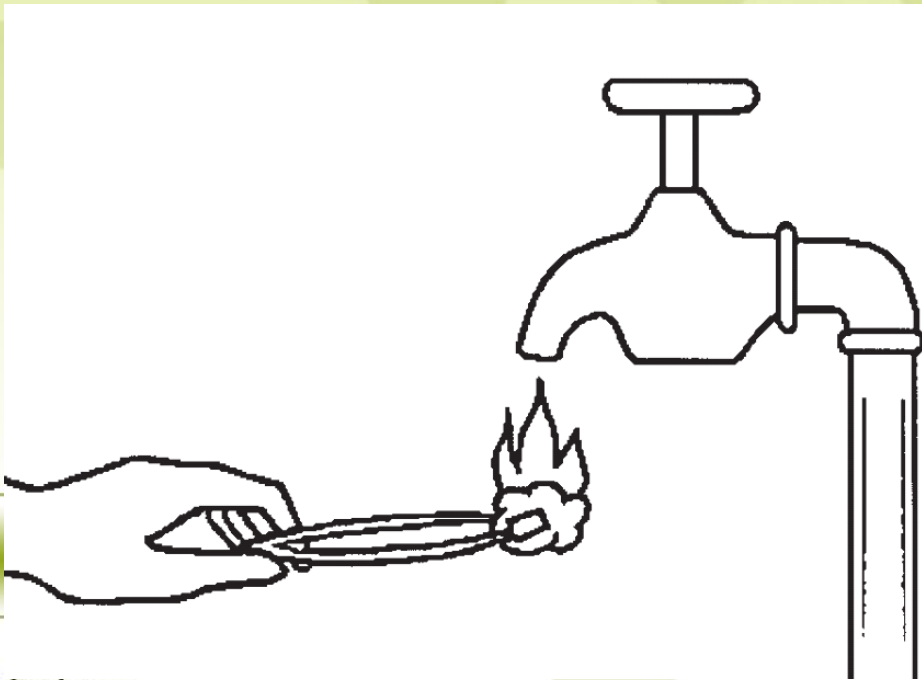
1. Sampling from a tap or pump outlet

- Clean the tap
- Open the tap (1–2 minutes at a maximum flow)



Sampling methods for bacteriological testing

- Sterilize the tap with the flame
- Open the tap before sampling
(1–2 minutes at a medium flow rate)



Sampling methods for bacteriological testing

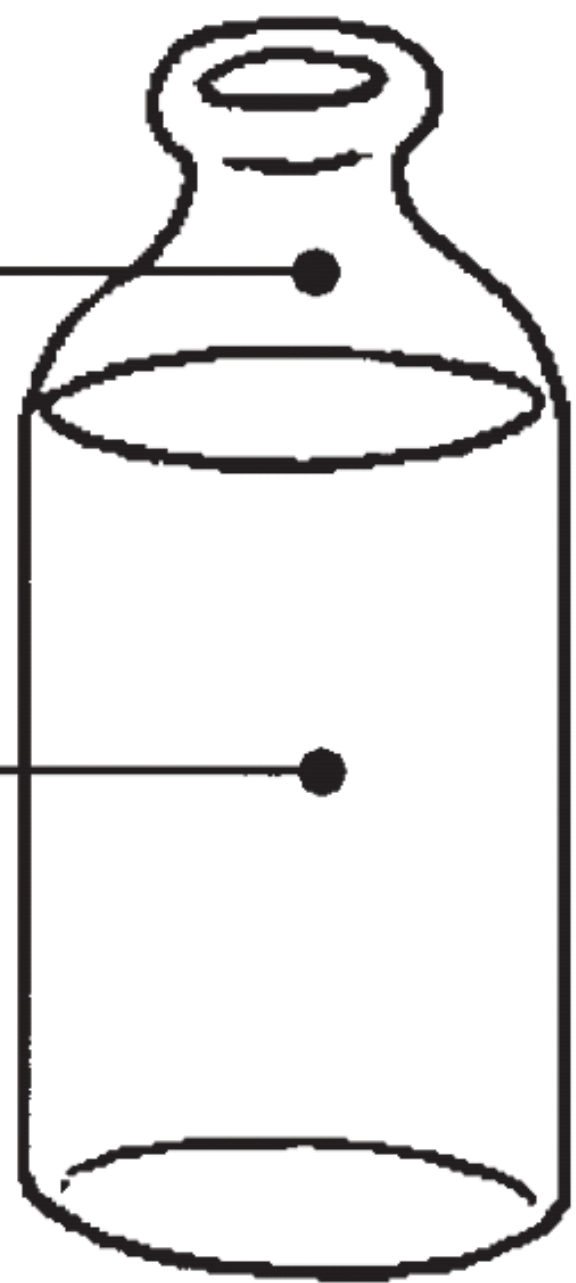
- Open the sterilized bottle and Fill



air

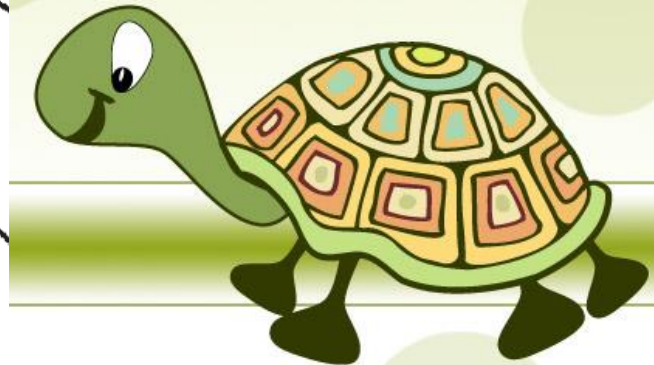


water



Sampling methods for bacteriological testing

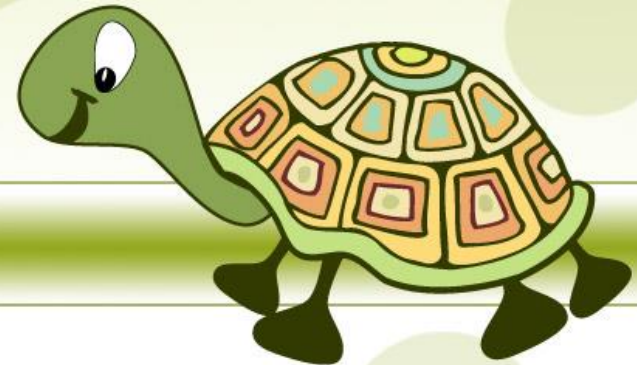
- Stopper or cap the bottle

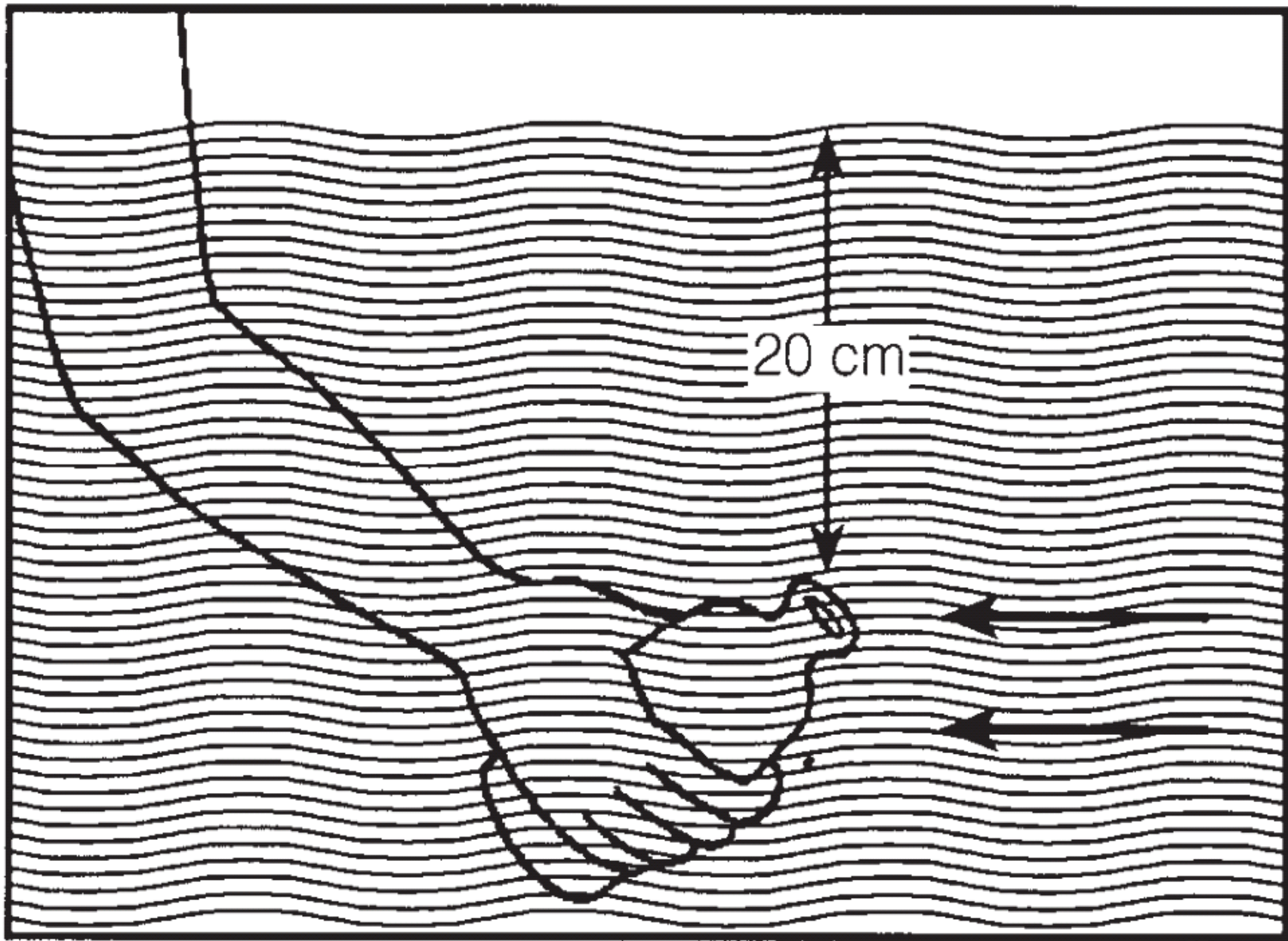


Sampling methods for bacteriological testing

2. Sampling from a watercourse or reservoir

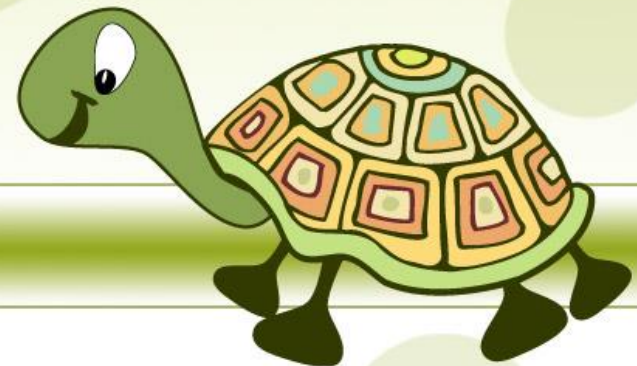
- Open the bottle under sterile conditions
- Holding the bottle by the lower part, submerge it to a depth of about **20cm**, with the mouth facing slightly upwards.





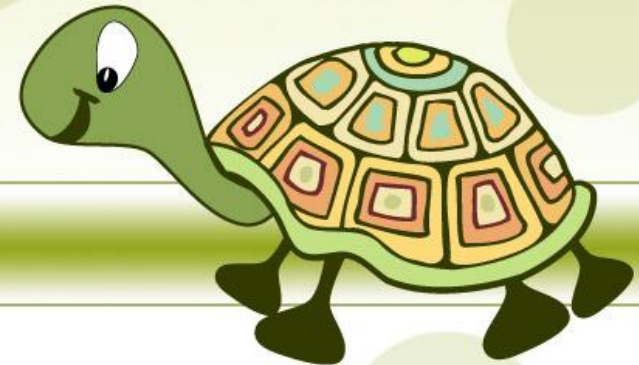
Sampling methods for bacteriological testing

- **If there is a current, the bottle mouth should face towards the current.**
- **The bottle should then be capped or stoppered as described previously.**



Sampling methods for bacteriological testing

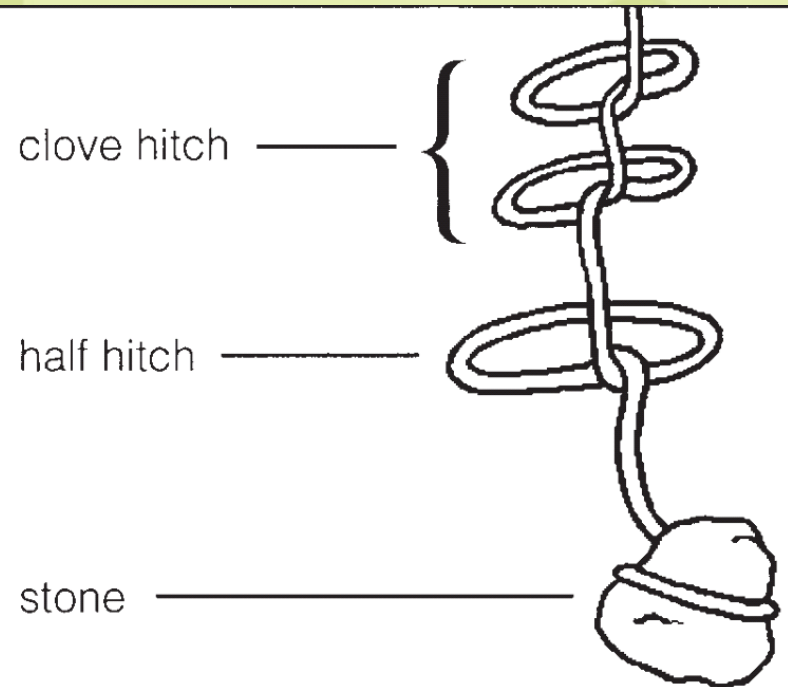
3. Sampling from dug wells and similar sources



Sampling methods for bacteriological testing

Prepare the bottle

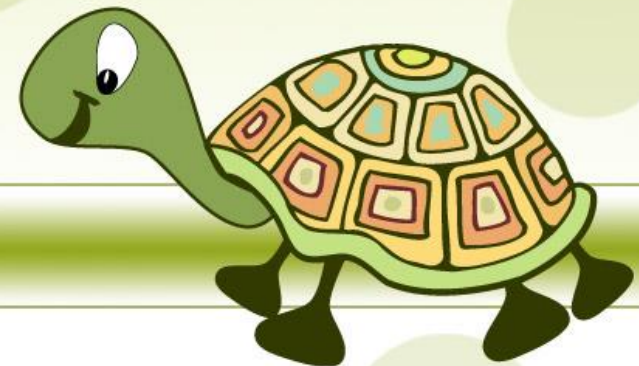
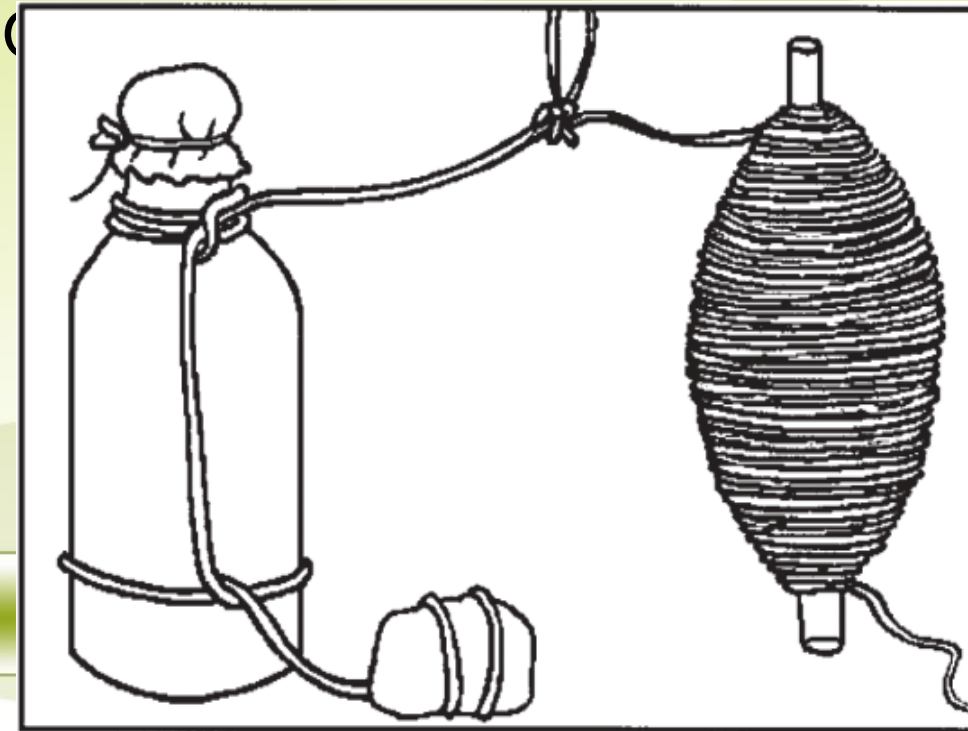
With a piece of string, attach a clean weight to the sampling bottle.



Sampling methods for bacteriological testing

Attach the bottle to the String

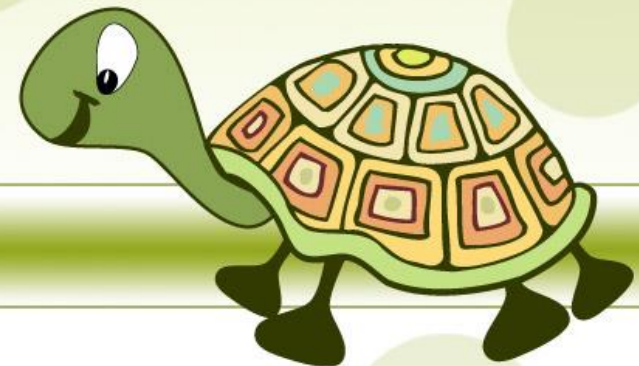
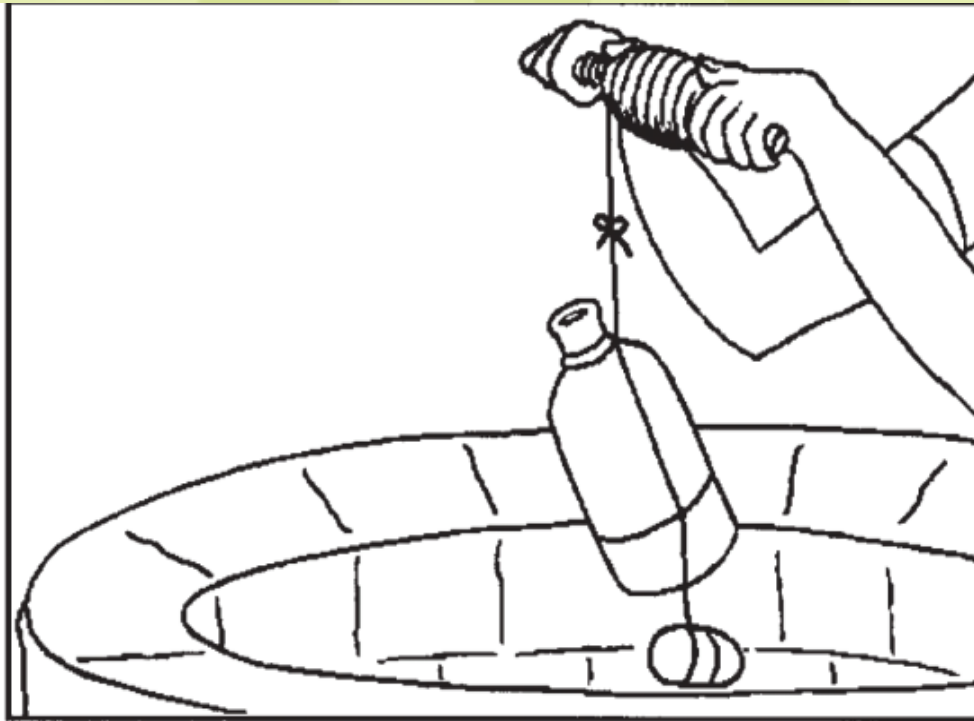
Take a 20-m length of clean string rolled around a stick and tie it to the bottle string



Sampling methods for bacteriological testing

- **Lower the bottle**

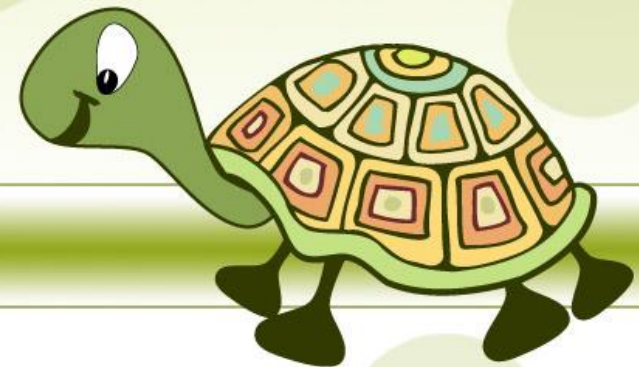
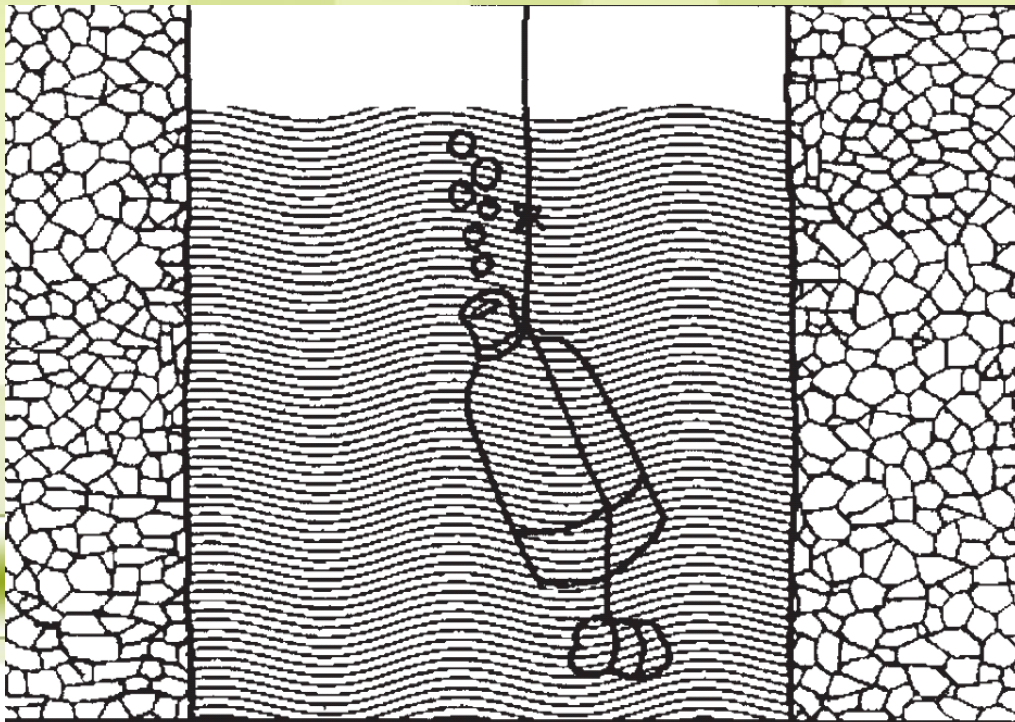
Lower the bottle, weighed down by the weight, into the well, unwinding the string slowly. Do not allow the bottle to touch the sides of the well.



Sampling methods for bacteriological testing

- **Fill the bottle**

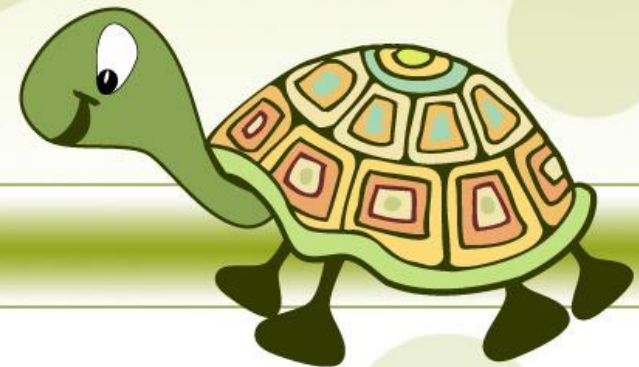
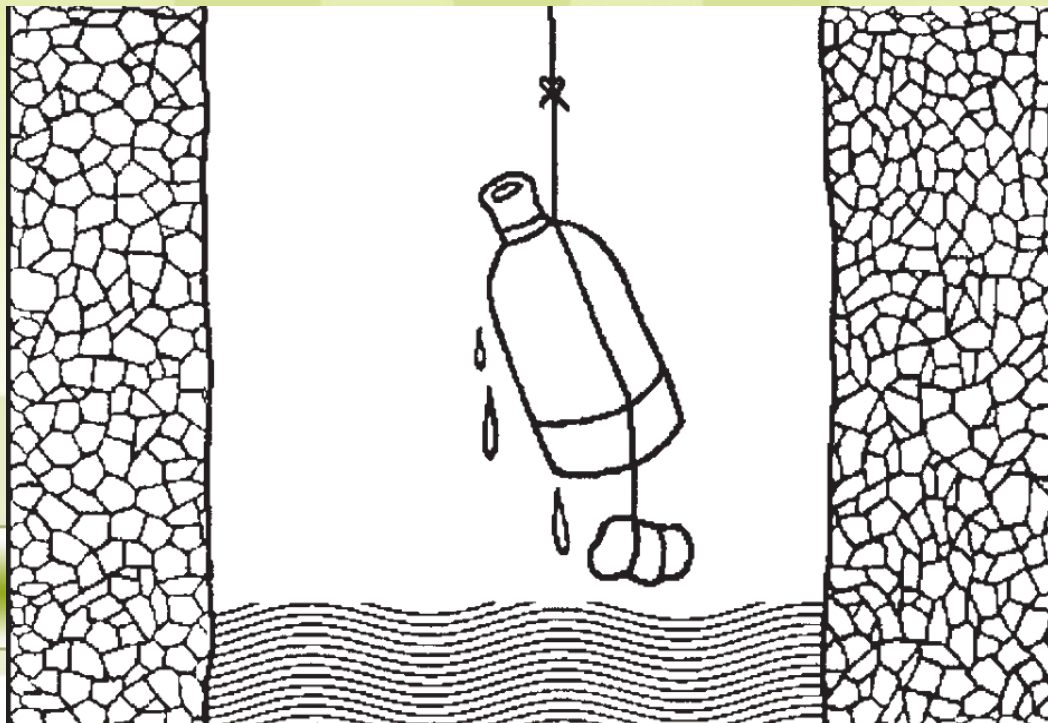
Immerse the bottle completely in the water and lower it well below the surface without hitting the bottom or disturbing any sediment.

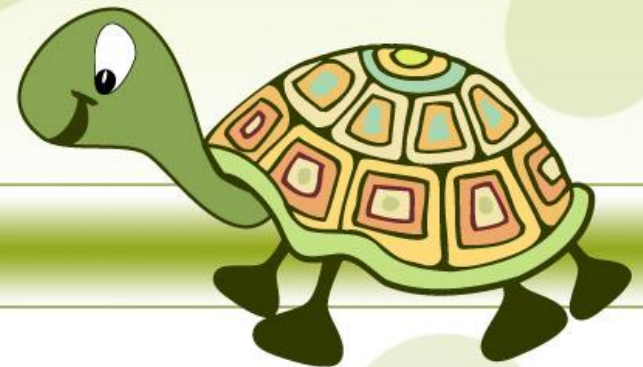


Sampling methods for bacteriological testing

- **Raise the bottle**

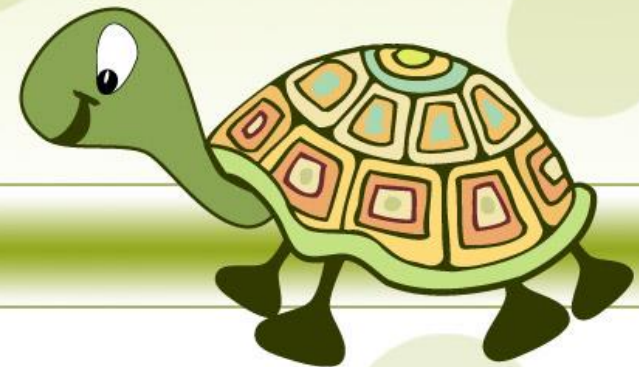
Once the bottle is judged to be filled, rewind the string on the stick to bring up the bottle. If the bottle is completely full, discard some water to provide an air space.



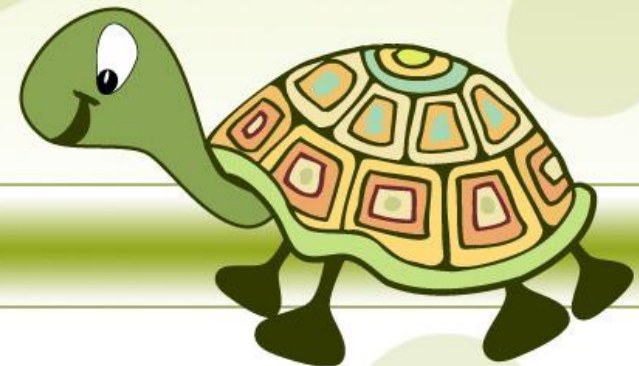


Storage of samples for microbiological analysis

- the time between sample collection and analysis should not exceed **6 hours**, and **24 hours** is considered the absolute maximum
- immediately placed in a lightproof insulated box containing **ice** or **ice-packs**
If ice is not available, the transportation time **must not exceed 2 hours.**



- While sampling chlorinated water
0.5 ml of **sodium thiosulphate** solution
(18 gm/L) should be added to the
sampling bottles to neutralize the
residual chlorine present in water



Thank You

