

Isolation and Characterization Of Magnetic Bacteria from different water environment sources in Saudi Arabia

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Objective

- Isolation and characterization of Magnetic Bacteria from different water environment sources in Saudi Arabia.

Background

- Magnetosomes Definition.
- Consist two types of minerals :
 - 1- iron oxides magnetite (Fe_3O_4).
 - 2- iron sulfides greigite (Fe_3S_4).

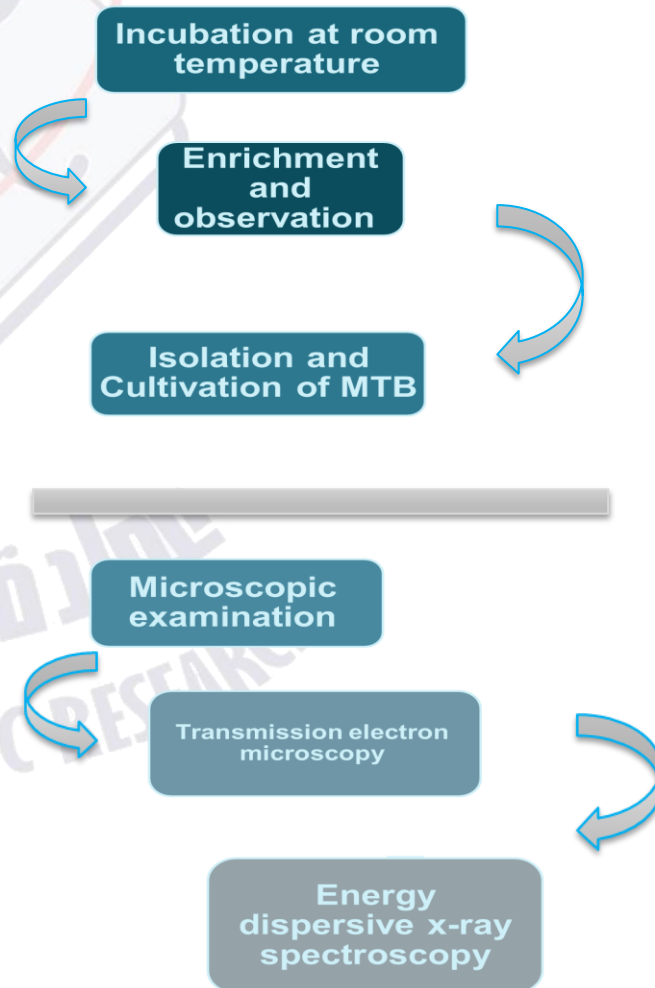


Materials and Methods

Locations of samples collection:



(Fig.1)



(Fig.2)

Materials and Methods



- **Enrichment and isolation of the suspected sample from natural environment.**



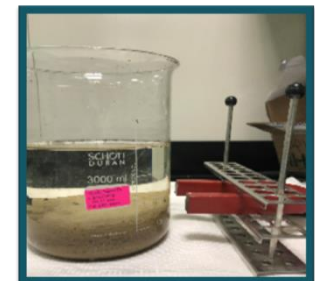
(Fig.3)



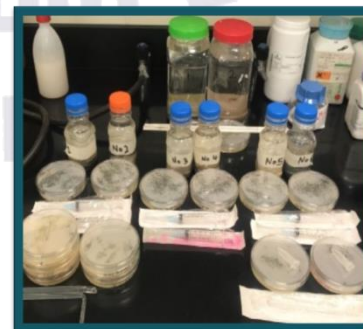
(Fig.4)



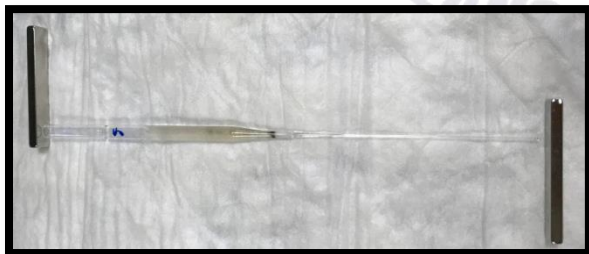
(Fig.5)



(Fig.6)



(Fig.7)



(Fig.8)

Result

A- Table shows site, type and date of collection, incubation period, enrichment and first hanging drop result for each sample.

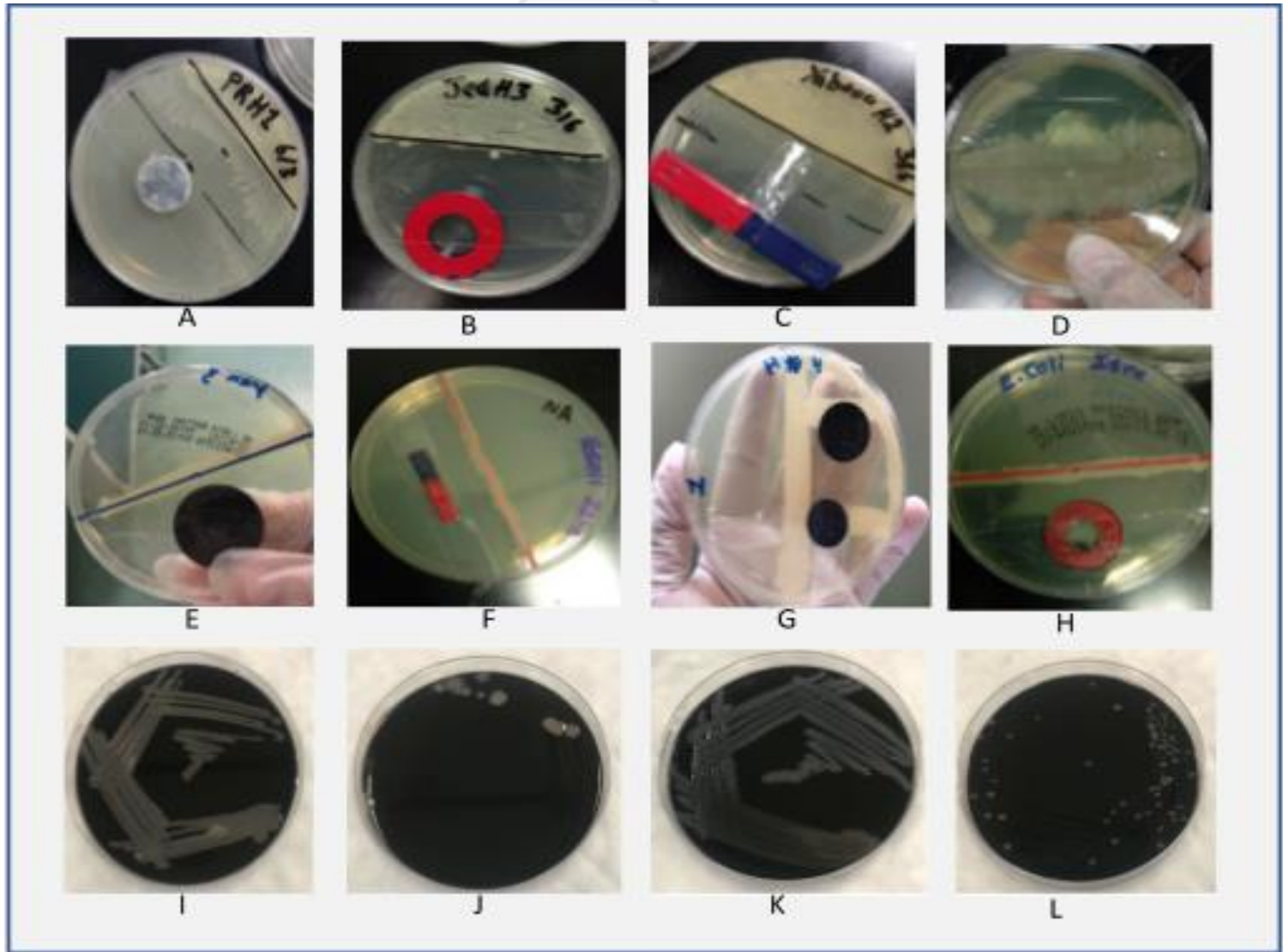
Sample code	<u>WH</u>	<u>JB</u>	<u>YB</u>	<u>KG</u>	<u>Control</u>
Locations	Hanifa Valley, Riyadh	Red sea, Jeddah beach	Red sea, Yanbu beach	Arabian gulf, AL-khafji beach	----
Type of sample	Fresh water	Seawater and sediment	Seawater and sediment	Seawater and sediment	<i>Escherichia coli</i> bacteria
Date of collection	The 6th of Feb 2018	The 9-10th of Feb 2018	The 15th of Feb 2018	The 1st of Mar 2018	----
First incubation period	22 days	18 days	13 days	----*	----**
Second incubation period	238 days	234 days	229 days	215 days	----**
Hanging drop method result	Moderate number of bacteria attracted to the magnetic pole	Small number of bacteria attracted to the magnetic pole	Moderate number of bacteria attracted to the magnetic pole	Small number of bacteria attracted to the magnetic pole	----**
Cultivation on NA (by spread plate procedure)	Dense growth of bacterial Colonies	Weak growth	Dense growth of bacterial Colonies	----**	Dense growth of <i>Escherichia coli</i> Colonies
Cultivation on NA (by streaking) from Previous culture + incubated with a magnetic pole	Showed attraction to the magnet after 3 days (Fig. 9A)	No attraction observed after 3 days (Fig. 9B)	Weak attraction to the magnet after 3 days (Fig. 9C)	----**	----**
Cultivation on LB (as a straight line) from Previous culture + incubated with a magnetic pole	Attraction to the magnet after 3 days (Fig. 9D)	----*	No attraction observed after 3 days (Fig. 9E)	----**	No attraction observed after 3 days (Fig. 9F)
Cultivation on NA (as a straight line) from Previous culture + incubated with a magnetic pole	Attraction to the magnet after 3 days (Fig. 9G)	----**	----*	----**	No attraction observed after 3 days (Fig. 9H)
Cultivation on Charcoal (by streaking) from Capillary Race-track	Dense growth of bacterial colonies (Fig. 9I)	Very weak growth of bacterial colonies (Fig. 9J)	Dense growth of bacterial colonies (Fig. 9K)	Weak growth of bacterial colonies (Fig. 9L)	----

1.*: The sample was excluded in the mentioned stage.

** : The test was not performed

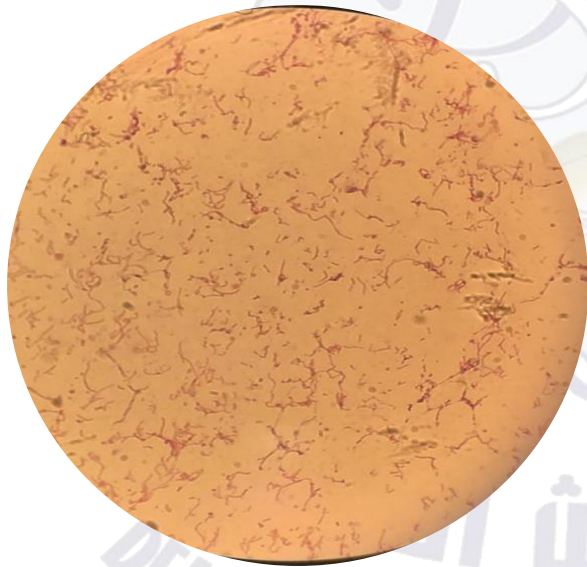
2. (LB) IS Luria-Bertani , And(NA) is nutrient agar. .

Isolation and cultivation of MTB

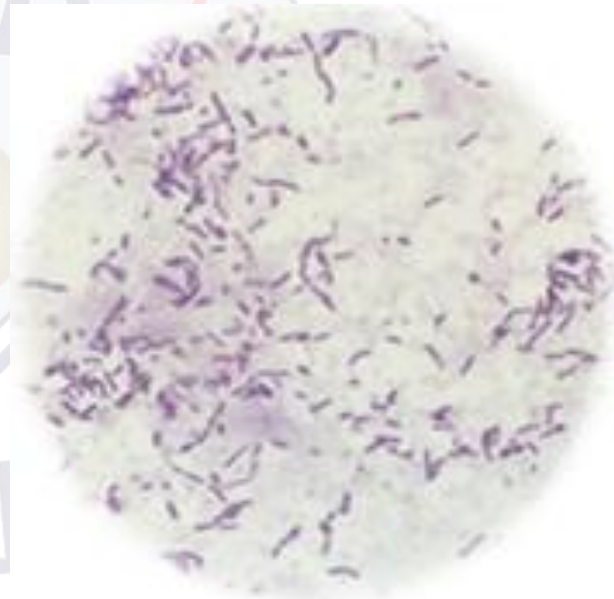


(Fig.9)

B- Light and Digital Microscopy:

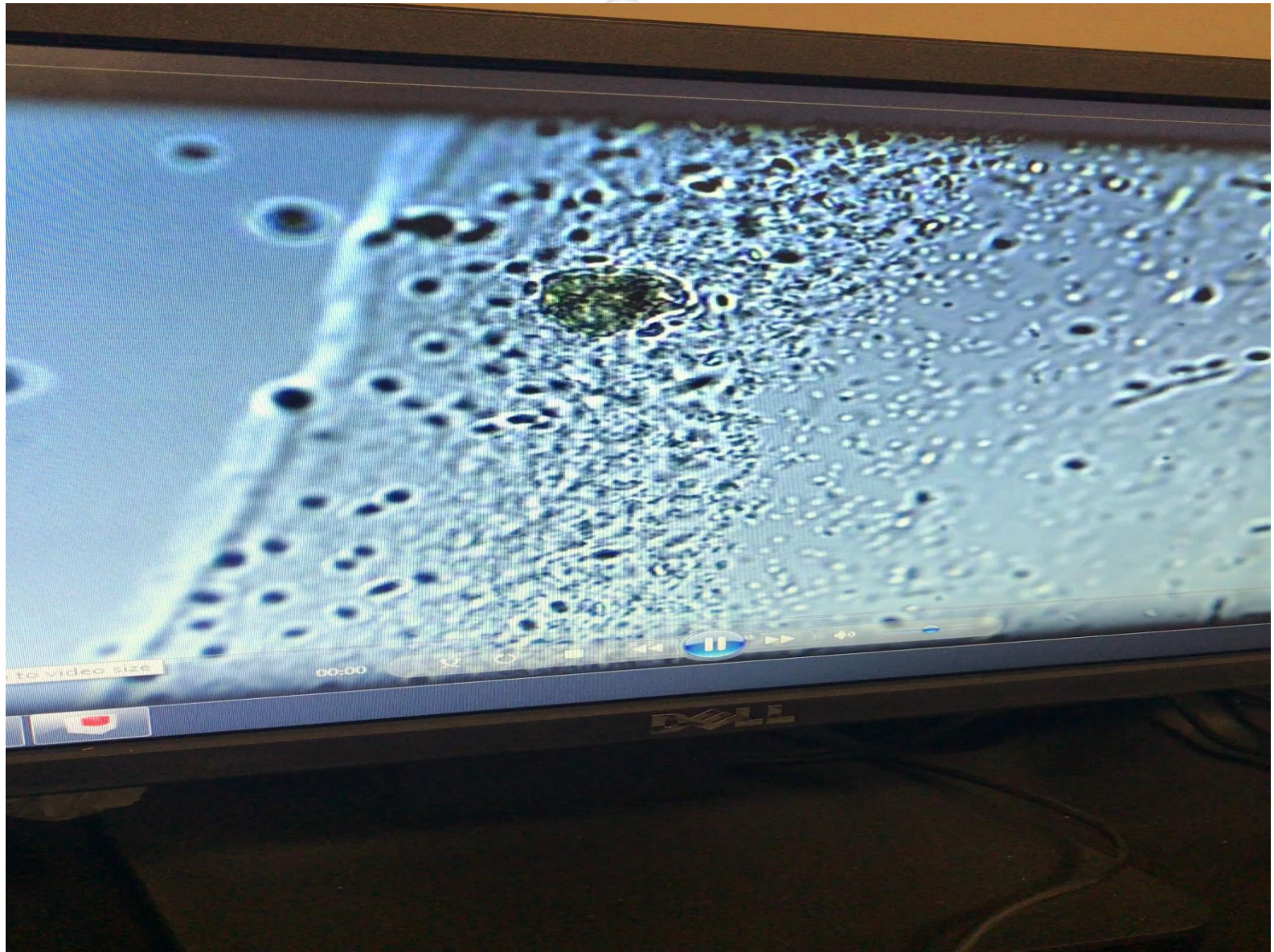


(Fig.10)

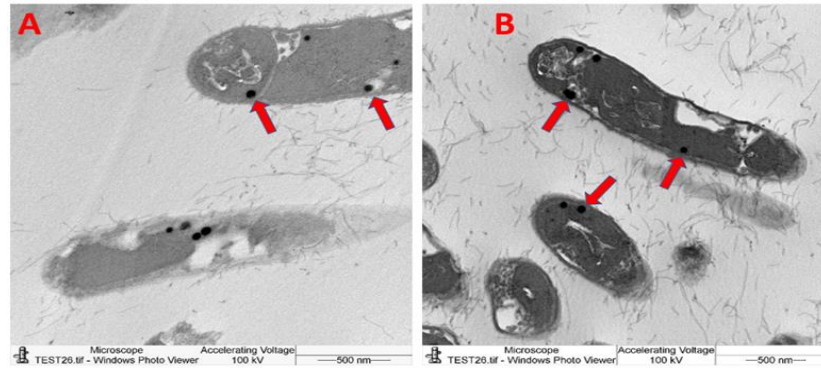


(Fig.11)

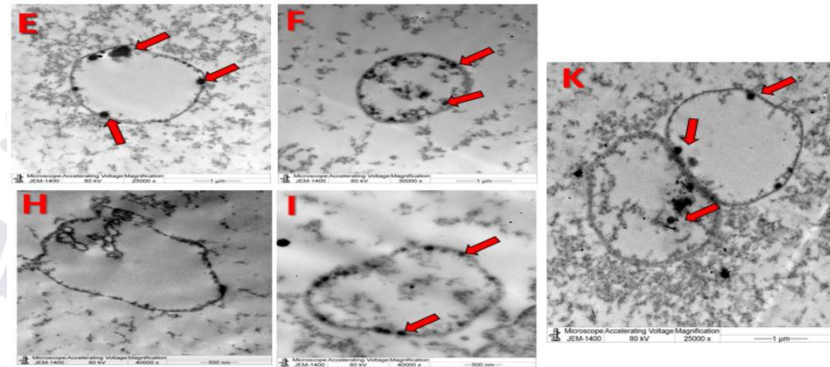
Gram Staining



C- Transmission Electron Microscope(TEM) :



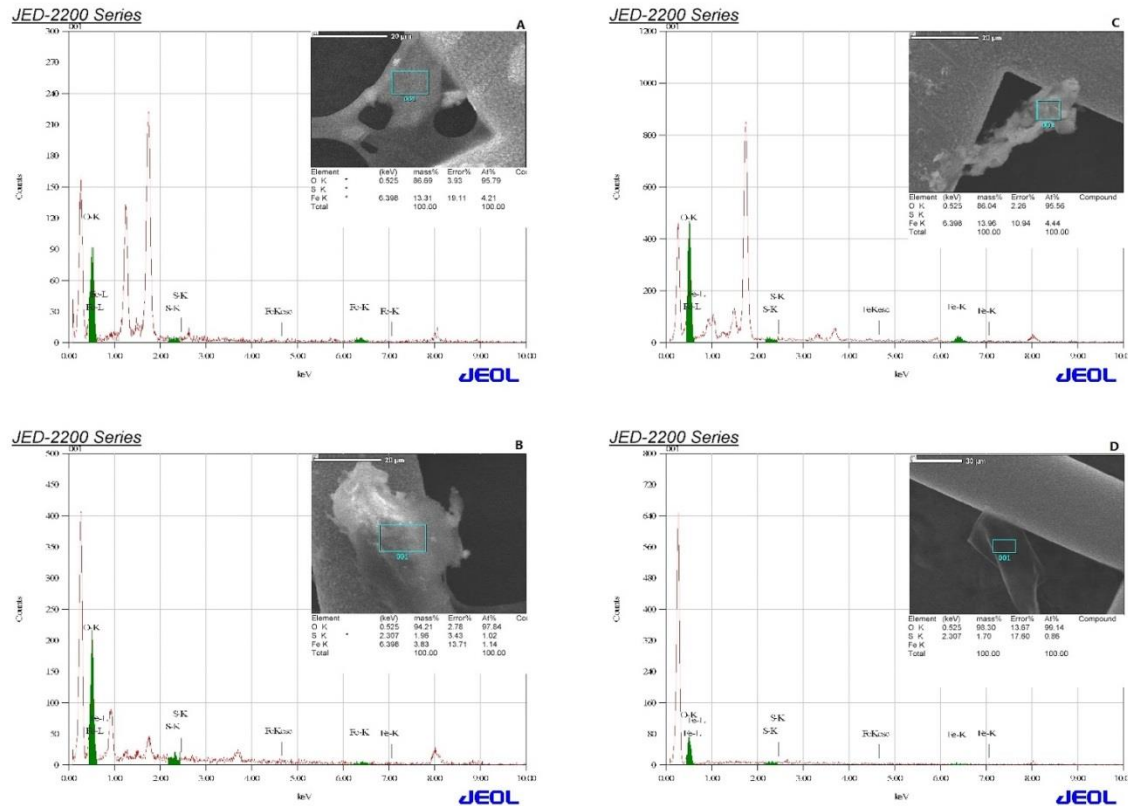
(Fig. 12) Transmission electron micrograph of a thin-sectioned cell of MTB showing growing magnetite crystals within the vesicles of the magnetosome membrane (MM).



(Fig. 13) Transmission electron micrograph of another thin-sectioned cell of MTB revealed the magneto particles to range between 10 to 20 nm in size presented in Hanifa Valley (freshwater) (E, K), Jeddah (F) and Yanbu (I) (Red Sea). All of them were coccoidal. Negative result appeared in Al Khafji city (H) (The Arabian Gulf).

D - EDXS analysis

Provided the following data :



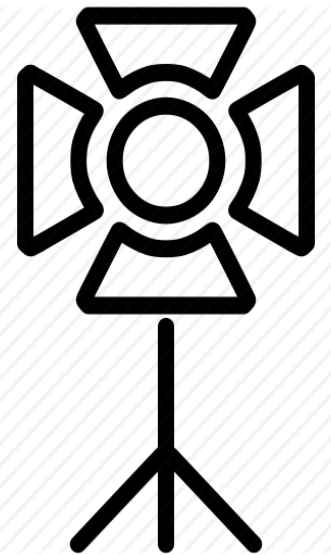
(Fig. 14) EDXS microanalysis of the grid (A)analysis revealed that Fe and O are present in the specimen of Hanifa Valley. (B)S, Fe and O are present in the specimen of Jeddah. (C)Fe and O are present in the specimen of Yanbu. (D)Fe does not exist in the specimen of AL-Khafji.

Applications

- Medically.
- Industrial.



محادثة البحث العلمي
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References:

1- Lefèvre, C.T.,and Abreu, F., Lins, U., Bazylnskim, D.A. 2011.A bacterial backbone: magnetosomes in magnetotactic bacteria. Springer 15, 75-102.

2- Yan L, Zhang S, Chen P, Liu H, Yin H, et al. (2012) Magnetotactic bacteria, magnetosomes and their application. Microbiol Res 167: 507-519.

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Thank you for listening



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