NAME ;IRFAN ARIF

STUDENT ID 16955

FATHER NAME ; ARIFL GULL

DEPARTMENT ; BS MICROBIOLOGY 2ND SEMESTER

ANSWER NO 1 :

To determine the most probable number (MPN) of Coliform and to identify the Coliform bacteria present

in the raw milk in the three geographical areas of Khartoum state. Six hundred and forty four raw milk

samples were collected during the period between April 2008 to February 2009. The Coliform limits in

the raw milk accepted internationally are less than 100 cell/ml. About 51.3% of the samples from the

milk available for direct consumption in Khartoum state [vendor + (shops) market milk] satisfy this limit.

In winter and summer the percentages of milk samples which satisfy this limit were 70.4 and 51.3%,

respectively. Vendor milk is more contaminated with Coliform bacteria compared to milk from the

shops; only 47.8% were in the acceptable limits during winter and 43.7% summer. The difference

between winter and summer counts, and the differences between individual, bulk, vendor and shops

were statistically significant, at p(0.05). In this study 60.1% of all the raw milk samples in the state were

of counts between 0 to <100 cell/ml, but in winter the percentage (76.9%) was higher than summer

(53.6%). Statistically there was a significant difference between the two seasons in the state, but the

differences between these three areas were statistically insignificant. The majority of the Coliform

isolates from the raw milk consumed in Khartoum state were Escherichia coli 32%, Enterobacter

species 29.2%, Klebsiella species 19.4%, Serratia species 11.1% and Citrobacter 1.0%, in addition to

some Enterobacteriaceae.

ANSWER NO 2;

1) Both phosphorous and nitrogen are essential for plants and animals. These form their respective biogeochemical cycles that show the movement of nitrogen and phosphorus through the lithosphere, hydrosphere an biosphere. However, the atmosphere does not play a major role in the movement of phosphorous. Of the two, nitrogen is recycled whereas phosphorus is not.
2) Foodborne infection is caused by the ingestion of food containing live bacteria which grow and establish themselves in the human intestinal tract. Foodborne intoxication is caused by ingesting food containing toxins formed by bacteria which resulted from the bacterial growth in the food item.

3) Scientific definitions for pasteurization A process in which an unfermented liquid, such as milk, or a partially fermented one, such as beer, is heated to a specific temperature for a certain amount of time in order to kill pathogens that could cause disease, spoilage, or undesired fermentation

4) The microbial quality of air in the operation theatres (OTs) is a parameter which appreciably controls the healthcare-associated infections. However, there is currently no international consensus on the most suitable method to be used for air sampling or any set policy on how to achieve the total viable count (TVC) values although the optimum goals have been set.

5)Ultrafiltration removes bacteria, protozoa and some viruses from the water. Nanofiltration removes these microbes, as well as most natural organic matter and some natural minerals, especially divalent ions which cause hard water. Nanofiltration, however, does not remove dissolved compounds

ANSWER NO 3

A) Causal Agent

Giardia duodenalis is a protozoan flagellate (Diplomonadida). This protozoan was initially named *Cercomonas intestinalis* by Lambl in 1859. It was renamed *Giardia lamblia* by Stiles in 1915 in honor of Professor A. Giard of Paris and Dr. F. Lambl of Prague. However, many consider the name, *Giardia duodenalis,* (Davaine 1875) to be the correct taxonomic name for this protozoan.

Cysts are resistant forms and are responsible for transmission of giardiasis. Both cysts and trophozoites can be found in the feces (diagnostic stages) (**1**). The cysts are hardy and can survive several months in cold water. Infection occurs by the ingestion of cysts in contaminated water, food, or by the fecal-oral route (hands or fomites) (**2**). In the small intestine, excystation releases trophozoites (each cyst produces two trophozoites) (**3**). Trophozoites multiply by longitudinal binary fission, remaining in the lumen of the proximal small bowel where they can be free or attached to the mucosa by a ventral sucking disk (**4**). Encystation occurs as the parasites transit toward the colon. The cyst is the stage found most commonly in nondiarrheal feces (**5**). Because the cysts are infectious when passed in the stool or shortly afterward, person-to-person transmission is possible. While animals are infected with *Giardia*, their importance as a reservoir is unclear.

B) Despite since 1880S plasmodium blood stages have been recognized, our knowledge of liver stage parasite is still six decade old. Even after a long time of its discovery, the exo-erythrocytic forms of the parasite have remained adamant to reveal their biological secrets. Till date, our understanding of liver stage of parasite is in vague. Infection in human is initiated when plasmodium sporozoite enter through the bite of female Anopheles mosquito during their obligatory blood meal (1). Under the skin of host an average of 15-123 sporozoites have been reported to be deposited where they infect hepatocytes and begin to develop into merozoites (2). Depending on the species of plasmodium, thousands of merozoites per invading sporozoite between 2 and 16 days are released in blood stream for erythrocytic infection. Although the

obligatory step of sporozoite establishment and full development inside is symptomati-cally silent, it gives rise to thousand of merozoites in the hepatocyte.All our efforts related to eradication of malaria to date are towards the erythrocytic stage of the parasite as a consequence very few drugs are available for exo-erythrocytic form of parasite. An appealing target for the antimalarial vaccine or prophylactic drug as they would function before the onset of pathology is the hepatic stage (3). In order to ad-dress the unmet need of drug target for hepatocyte stage parasite an ex-vivo system should be establish so as to discover a sporozoiticidal drug for prophylactic treatment of malaria. The hepatoma cell line con-stitutes an invaluable and widely used tool to study the aspect of he-patic infection by plasmodium. Till date it has been proven to be ideal for rodent parasite. These days the advancement is towards the human cell line which could support the growth of human parasite Plasmodium falciparum (4). To some extent the cell line HC-04 has proven its worth but still some fundamental question are needed to be answered. These present advance lays a ground for a standardization of an ex-vivo system through which we gain an acceleration in the progress of malaria elimi-nation research

ANSWER NO 4

Transformation

A) In **transformation**, a bacterium takes in DNA from its environment, often DNA that's been shed by other bacteria. In a laboratory, the DNA may be introduced by scientists (see biotechnology article). If the DNA is in the form of a circular DNA called a **plasmid**, it can be copied in the receiving cell and passed on to its descendants.

TRANSDUCTION

In transduction, viruses that infect bacteria move short pieces of chromosomal DNA from one bacterium to another “by accident.”

Yep, even bacteria can get a virus! The viruses that infect bacteria are called bacteriophages. Bacteriophages, like other viruses, are the pirates of the biological world—they commandeer a cell’s resources and use them to make more bacteriophages.

However, this process can be a little sloppy. Sometimes, chunks of host cell DNA get caught inside the new bacteriophage as they are made. When one of these “defective” bacteriophages infects a cell, it transfers the DNA. Some bacteriophages chop the DNA of their host cell into pieces, making this transfer process more likely^1

Conjugation

In **conjugation**, DNA is transferred from one bacterium to another. After the donor cell pulls itself close to the recipient using a structure called a pilus, DNA is transferred between cells. In most cases, this DNA is in the form of a plasmid.

Donor cells typically act as donors because they have a chunk of DNA called the **fertility factor** (or **F factor**). This chunk of DNA codes for the proteins that make up the sex pilus. It also contains a special site where DNA transfer during conjugation begins^2squared.

If the F factor is transferred during conjugation, the receiving cell turns into an F^+start superscript, plus, end superscript donor that can make its own pilus and transfer DNA to other cells. Here's one analogy: this process is sort of like how a vampire can turn other people into vampires by biting them.

B)

Lytic Cycle	**Lysogenic Cycle**
The DNA of the virus doesn't integrate into the host DNA	The DNA of the virus integrates into the host DNA
Host DNA hydrolyzed	Host DNA not hydrolyzed
Absence of prophage stage	Presence of prophage stage

Viral DNA replication occurs independently from the host DNA replication	Viral DNA replication occurs along with the host DNA replication
Occurs within a short period of time	Takes time
Symptoms of viral replication are evident	Symptoms of viral replication not evident
Genetic recombination in the host bacterium not allowed	Genetic recombination in the host bacterium allowed
The cellular mechanism of the host cell completely taken over by the viral genome	The cellular mechanism of the host cell slightly disturbed by the viral genome

ANSWER NO 5

A blood smear is a sample of blood that's tested on a specially treated slide. For a blood smear test, a laboratory professional examines the slide under a microscope and looks at the size, shape, and number of different types of blood cells. These include:

- Red blood cells, which carry oxygen from your lungs to the rest of your body
- White blood cells, which fight infection

- Platelets, which help your blood to clot

Blood Samer have two type (1) thick (2) thin. In thick we have observed malaria parasite and think we have observed TLC and DLC

Procedure of Leishman staining:

Leishman Stain is a neutral stain for blood smears which was devised by the British surgeon W. B. Leishman (1865–1926). It consists of a mixture of eosin (an acidic stain), and Methylene blue (a basic stain) in Methyl alcohol and is usually diluted and buffered during the staining procedure. Pour Leishman's stain drop wise (counting the drops) on the slide and wait for 2 minutes. This allows fixation of the PBF methyl alcohol. Add double the quantity of buffered water drop wise over the slide (i.e. double the number of drops).Mix by rocking for 8 minutes. Wash in water for 1 to 2 minutes. Dry in air and examine under oil immersion lens of the microscope