Mansoura University
Faculty of Science
Botany Department
El-Mansoura - Egypt

جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة - مصر

Final Theoretical Examination in Botany
First Term: January 2016

Educational Year: Forth Level **Program (Branch):** Microbiology
Subject: M 414 **Course(s):** Plant Tissue Culture
Time: 2 hours **Full Mark:** 60 **Date:** 2 / 1 / 2016

Answer all of the following questions

(Q_1) A- Complete the following sentences as suitable: **(6 marks)**

1. In *in vitro* culture media, the most frequently used amino acid is ..... while the most commonly added carbon source is .....
2. In 1966, Guha and Maheshwari cultured ..... to produce .....
3. ..... is an amorphous mass of highly vacuolated undifferentiated cells.
4. The time of subculture and subculture intervals depends on ..... and .....
5. Plant tissue culture is dated back to 1838 when ..... put forward the ..... theory which states that individual plant cells are autonomic.
6. Cultures, once initiated, are placed in incubators where ..... , ... and ..... can be controlled.

B- Mention the reason(s) for the following: **(9 marks)**

1. Agar is ideal as a gelling agent in plant tissue culture media.
2. Some kind of agitation is essential in liquid plant cultures.
3. About 10-15% of sucrose in plant culture media is converted into monosaccharides.

(Q_2) A- Mark as true or false with correcting the underlined parts when wrong: **(6 marks)**

1. Malt extract is an additive used mainly as a source of vitamins.
2. Both of 2,4-D and BAP can be described as phytohormones.
3. In horizontal laminar flow, the air filters are located at the back of the box.
4. As a rule of thumb, the initial pH of plant culture media is set at 4.5 – 6.0.
5. Micropropagation is a common traditional approach to cultivate higher plants in soil of fields, greenhouses or pots.
6. As heavy metal and halogen source, NaOCl can be used as a surface disinfecting agent.

B- Write briefly on: **(9 marks)**

1. Methods of acclimatization
2. Advantages of plant tissue culturing
3. Factors affecting explant preparation

(Q_3) Write briefly on: **(15 marks)**

1. Cell suspension cultures (types, significance and initiation)
2. Protoplast isolation and culture

(Q_4) Give a brief account on: **(15 marks)**

1. Culture of isolated microspores (pollen grains) and mention the advantages
2. Secondary products in tissue culture

Best Wishes;

Prof. Samy A. Abo-Hamed & D. Bardees M. Mickky

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Final Examination in Botany
First Term: Jan. 2016

Educational Year: Fourth Level **Program (Branch):** Microbiology
Subject: M(403) **Course(s):** Fermenters & industrial fermentation
Time: 2 hrs
Date: 05 /01/2016 **Full mark:** 60 **Question mark:** 20

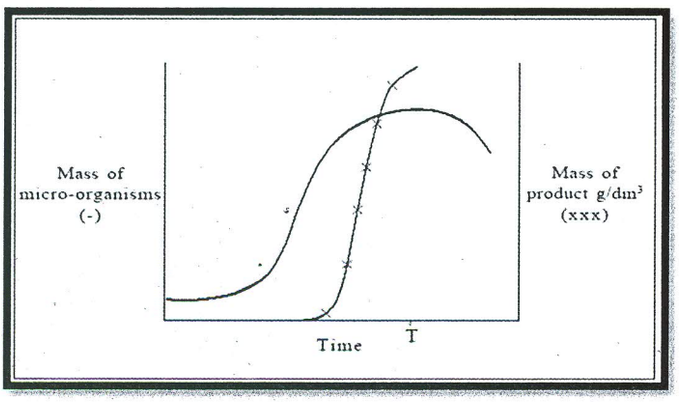
Answer the following questions:

1-A- Consider the growth of a microorganism in batch culture, inoculated at a concentration of 0.1 g/L, growing on glucose as the limiting substrate with initial concentration S_0= 10 g/L. After a lag time of 3 hours, the culture grows exponentially, with a doubling time of 2 hours. Stationary phase is reached after a total time of 14 hour. Assume that there was no decline phase.

Calculate:

- μ_{max} (h^{-1})
- $Y_{x/s}$ (g/g)
- The total time in culture to reach stationary phase if S_0 were 2 g/L, assuming that this concentration is also sufficient to support maximal growth (i.e. $S >> K_s$ during the entire fermentation).

B-



From this figure **discuss** the relation between the product formation and microbial growth

C- Illustrate the role of bioreactors in the solid state fermentation and their types.

2- A- Discuss in details Monod model of microbial growth kinetics.
B- I. Explain the stages of fermentation of lactic acid.
II. Describe the citric acid production by surface and submerged bioprocesses

3- A- Describe the stages of penicillin production.
B- Differentiate between batch mode and fed batch mode of fermentation.
C- What are the properties of a useful industrial microbe?

Examiners: **Assist. Prof. Dr. Mervat H. Hussein**
Dr. Ahmed S. Gebreil

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Final Examination in Botany First Term: Jan., 2016

Educational Year: Fourth Level **Program (Branch): Microbiology**

Course : Molecular Biology (M402) **Time: 2 hrs Date: 9 / 1 /2016 Full mark:** 60

Q-1- Choose the correct answer (one mark/each):

1- A sexually reproduced group of genetically similar organisms is called:

a- Population b- Family c- Order d- Clones

b- **Arrange the steps involved in gene cloning in the correct order:**

a- Insertion of isolated gene to the vector
b- Purification of the expression product
c- Introduction of recombinant vector in to the recipient host
d- Isolation of the target gene
e- Expression of the cloned gene

c- **An ideal plasmid to be used for recombinant DNA technology must have:**

a- Minimum amount of DNA
b- Relaxed replication
c- One site for specific restriction enzyme
d- All of the above
e- None of the above

d- **Which statement is true about restriction enzymes:**

a- All cut DNA at specific sites
b- All cuts DNA at random sites
c- All cuts DNA segments at palindromes with rotational symmetry
d- All cuts DNA at non-coding sequences
e- None of the above f- None of the above

e- **Southern blotting techniques is used in:**

a- Monoclonal antibody production
b- Genetic fingerprinting because the blotting is done from the south side
c- Quantitative polymerase chain reaction
d- Identifying proteins produced by specific clone

f- **Gene therapy is a potential technique to cure inherited diseases by:**

a- Repairing the faulty gene using virus vector
b- Replacing the faulty gene using virus vector
c- Adding healthier gene to the body using a plasmid
d- Introducing a healthier gene into the body using PCR

7- What is the function of the *amp*^{r} gene in a vector?

a- To allow resistant transformants to grow in selective medium
b- To distinguish introns from exons
c- To screen for vectors with inserts
d- To allow plasmid replication

8- A restriction enzyme with a recognition site of CAANNNTTG (where N is any base) cuts an average of every:

a- 14 b- 256 c- 400 d- 4.1 e- 65 bp

9 - A circular DNA of 4.7 Mb (Mb=million base pairs) length is cut with a restriction enzyme whose precise recognition sequence is not known. The digest shows ~75 fragments on a pulsed-field gel. What is the most likely conclusion from these data?

a- The enzyme is a 4-base cutter.
b- The enzyme is a 6-base cutter.
c- The enzyme is a 8-base cutter.
d- The enzyme leaves blunt ends.
e- This was a partial digest.

10 - Which of the following statements is false?

a- If you know the protein sequence, you know the DNA sequence.
b- If you know the DNA sequence, you can predict the protein sequence.
c- If you know the recognition sequence, you know the average size of the restriction fragment.
d- 1 & 3 are true e- None of the above

11- Insertion sequences and transposons are similar in that:

a- both encode a transposase.
b- both lack an origin of DNA replication.
c- neither contains the tra operon.
d- both contain inverted-repeat DNA sequences at each end.
e- both encode antibiotic resistance.
f- both can be acquired by plasmids.

12- Which is the most specific recombinant DNA library?

a- cRNA b- BAC c- genome d- cDNA e- YAC

13- How do you identify the bacterium in a library if you knew the sequence of protein it coded for? You would

a- use radioactive protein to screen the colonies grown in a perti dish
b- use specific radioactive nucleotide probe to screen the colonies grown in a perti dish
c- use ordinary DNA polymerase to screen the colonies grown in a perti dish
d- use specific antibiotics, to screen colony of interest would survive
e- Use specific antibodies to screen the colonies grown in a perti dish

14- Gene cloning is often called a "shotgun" process because:

a- Diverse pieces of DNA are used and many bacterial colonies are produced
b- It produces non-specific DNA fragments
c- Many different bacteria are used in a single experiment
d- Each gene is divided into smaller DNA pieces
e- Several different restriction enzymes are used in a single experiment

15- In the dideoxy sequencing approach, the primers used characterized by being:

a- Can have any nucleotide sequence
b- Has a nucleotide sequence complementary to the 3′ end of the desired gene
c- Has a nucleotide sequence complementary to the 5′ end of the desired gene
d- Must have a sequence beginning and ending with the same nucleotide

Q-2- Use T for true answer and F for false one, correct the false one

1- The purpose of the methylase in a restriction system is to make it possible for restriction endonucleases to cut DNA.
2- An restriction enzyme that recognizes 5'CAATTG3' also recognizes 5'GTTAAC3'.
3- Sticky ends can be ligated even when no 5' phosphate is present at pH 7.0.
4- In the absence of ligase, sticky ends are sticky because of non-covalent bonds.
5- The phosphodiester bond created by ligase is covalently bonded together.

6- The potential advantage of treating your prepared genomic insert fragments with phosphatase is the enhancement of ligation process.
7- The deoxy- and dideoxynucleotides used in chain termination sequencing cause the chain termination.
8- Yeast genes can be cloned and expressed into bacteria and bacterial genes can be cloned and expressed into yeast.
9- Transposons and insertion sequences are genetic elements that have the ability to generate copies of themselves, which can be inserted at random locations in the chromosomes.
10- Isomerizers are types of restriction enzymes that recognize the same cleaves sequence and produce blunt ends

Q-3- Choose the correct answers of 14 only (one mark/each):

1. Which of the following are the steps of chromatin packaging?
   a. 2,10,30,300,700 and 1400 nm
   b. 5,11, 30,600 and 1400 nm
   c. 2,11, 33,600 and 1400 nm
   d. 2,10,30,300,700 and 1400 mm

2. What are the three basic steps of conventional PCR?
   a. Denature, anneal, & strand displacement
   b. Strand displacement, synthesis & release
   c. Denature, anneal & extension
   d. Reverse-transcription, anneal & extend

3. RNA is copied into complementary DNA (cDNA) by:
   a. Taq DNA polymerase
   b. Reverse transcriptase
   c. RNA polymerase II
   d. Uracil-N-Glycosylase

4. The reverse transcriptase reaction can be primed by
   a. Target sequence specific primers
   b. Oligo dT primers
   c. Random hexamers
   d. All of the above

5. Which of the following statements is false?
   a. PCR inhibitors can lead to false negative results
   b. PCR examines a large proportion of the tissue leading to false positive results
   c. Pathogen diversity at primer sites may lead to false negative results
   d. Contamination may lead to false positive results

6. Which of the following is an advantage of nested PCR (nPCR)?
   a. Provides a quantitative assessment of initial starting copy number
   b. Second round PCR products can be a source of laboratory contamination
   c. Is less time consuming than single round conventional PCR
   d. Typically has high sensitivity and specificity

7. Which of the following is <u>not</u> an advantage of quantitative PCR (qPCR)
   a. Reliable indicator of viable infection
   b. Highly sensitive, specific and repeatable
   c. No post-PCR handling of products
   d. Can obtain quantitative results

8. Which is <u>not</u> a property of real-time PCR assays?
   a. Incorporate dyes that bind double-stranded DNA

b. Incorporate an internal hydrolysis probe
c. Be performed at single temperature with no specialized instrumentation required
d. Be interpreted as a plus / minus result or as a quantitative result

9. Choose the statement that correctly finishes the sentence:
"A PCR reaction that contains only one copy of the target sequence (1 copy /reaction)...

a. is typically amplified in a highly repeatable manner"
b. may amplified but its detection is not likely to be highly repeatable"
c. can be precisely and accurately quantified using quantitative PCR"
d. All of the above

10. DNA is typically more stable than RNA
a. True b. False

11. Expression of a housekeeping gene would be an example of a
a. Control c. Standard
b. Exogenous normalizing variable d. Endogenous normalizing variable

12. RNA is highly stable and can be frozen and thawed many times without degrading.
a. True b. False

13. A PCR efficiency of '2' means
a. 100% efficiency / initial target copies are doubled by the end of the reaction
b. 95% efficiency / each target copy is doubled every cycle
c. 100% efficiency / each target copy is doubled every cycle
d. 95% efficiency / initial target copies are doubled by the end of the reaction

14. Which of the following is a character of histones?
a. are special highly conserved proteins c. are positively charged proteins that bind to DNA
b. are divided into 5 classes d. all of the above

15. Which of the following is not a character of heterochromatin?
a. Peripheral, 10 % of the chromatin c. remains in a condensed,
b. densely stained d. compacted form throughout interphase

Q4: <u>Answer 4 only of the following using the instructions between brackets: (16 Marks)</u>

1- Supercoiled chromatin Loops (Draw only) 2- Colony PCR (Draw only)
3- Gene delivery by microinjection (Discuss only) 4- Nested PCR (Draw only
5- Nucleosomes (Discuss)

Best of luck: Professor Yehia Ellazeik Dr. Ashraf A. Elsayed

Mansoura University **Faculty of Science** **Chemistry Department** **Subject : Spectroanalytical and Electroanalytical Chemistry**	كلية العلوم جامعة المنصورة	**1 st Term, 4th level Students** **Date : January 12th, 2016** **Time Allowed: 2 hours** **Full Mark : 60 Marks** **Specialist :** **(Microbiology Students)**

Answer the Following Questions

1-A- Write an account about the quantitative **polarography** with reference to the ***Ilkovic's equation*** and show how it can be used for the determination of [Cd^{2+}] ion in unknown plasma solution of poisoning blood sample. **(8 Mark)**

1-B- The organic aniline is easily brominated according to following equation:

$$C_6H_5NH_2 + \ldots Br_2 \longrightarrow C_6H_2Br_3NH_2 + 3\,HBr$$

This equation forms the basis for coulometric titration of aniline with the electrogenerated bromine. A 200 ml sample of polluted water by aniline is acidified and 8 gm of solid KBr is added. The coulometric titration requires 8.264 min at 0.0485 A to reach the end point. Calculate the aniline content in the sample in μg/ml. Show whether the water sample is polluted by the organic aniline or not (polluted water contains more than 0.124 aniline) At.Wts. C = 12, O = 16, H = 1.008 and N = 14. **(7 Mark)**

2-A- Write an account the about the the coulometric titration for the determination of arsenite ion in insecticide sample with reference to the mechanism of reaction and the calculation of percentage of arsenic in the insecticide sample. At.Wt. As = 79.42. **(8 Mark)**

2-B- Calculate the liquid junction potential, E_J **, volt** across a membrane at 25°C, in which compartment (1) contains a mixture of KCl (4.2 M) + HCl (2.5 M) and compartment (2) contains a mixture of KCl (3.5 M) + HCl (0.5 M). The transport numbers are $t_{K^+} = 0.49$, $t_{Cl^-} = 0.51$ and $t_{H^+} = 0.72$. **(7 Mark)**

3-A- Write an account about <u>Two only</u> of the Following:
a-- Monochromators in Spectrophotometry b- Photomultiplier and its importance in Spectrophotometer c-Types of interferences and its avoidance in FAAS. d- Types of burners and combustion gases in Fame AAS. **(8 Mark)**

3-B- 0. 215 gm sample of steel was dissolved in con. HCl acid and diluted to a total volume of 100 ml by redistilled water. Two 10 ml solutions of the sample were prepared by oxidation of Mn in the steel samples using KIO_3 in acidic medium are taken. To one solution is added 15 ml of standard $KMnO_4$ of concentration $1.05X10^{-4}$ M. The data are summarized below:

Please Turn Over ⟶

Type of solution	Unknown Solution (1)	Unknown Solution(1) + Standard Solution (2)
Original Solution	10 ml sample	10 ml sample
Solution Added	None	15 ml of $1.05X10^{-4}$ M
Total Volume	10 ml	25 ml

- If the transmittance, T of the 1st solution is **0.2319** and the transmittance, T of the 2 nd solution is **0.3548**. Calculate the % concentration of Mn in the steel sample. Show whether the steel sample is of commercial use or not ***(commercial use sample of steel must contains less than 1 % of Mn as impurities)*** At.Wt. Mn = 54.94. **(7 Mark)**

4-A- Write Short notes about <u>one only</u> of the Following:

a- Show why the device which isolate a limited region of spectra is placed **after** the sample in case of flame **AAS**, while it is placed **before** the sample in case of **Spectrophotometry**.

b- The importance of **Qualitative Polarography** and the method of calculation of $\mathbf{E^{o}_{1/2}}$ of certain metal ion experimentally. **(6 Mark)**

4-B- 0.568 gm of an alloy sample 0f cobalt and nickel was dissolved in conc. HCl and diluted to a total volume of 100 ml by redistilled water. The solution mixture of cobalt and copper ions (violet) was found to have a transmittance of **0.1578** and **0.233** at λ of **500** and **650 nm** respectively.

- Calculate the concentration in **ppm** and percentage by weight of each constituent in the mixture from the following data: **(9 Mark)**

No.	Cation	ε, $mol^{-1}\ l\ cm^{-1}$	At.Wt.
1-	Co^{2+}	$\varepsilon_1, \lambda_1 = 1000$, $\varepsilon_1, \lambda_2 = 450$	58.930
2-	Cu^{2+}	$\varepsilon_2, \lambda_1 = 500$, $\varepsilon_2, \lambda_2 = 805$	63.5

Good Luck

Prof. Dr. Medhat Hafez
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4St level Microbiology (Credit hrs) Course: Fungi , Host parasite and control (BM405)

Time: 2 hrs Date: 16 / 1 / 2016 Full mark: 60 Question mark: 20

1- (A) Complete the following sentences (two marks for each point):-

1- Host eradication is ..... While crop rotation is .....
2- Eumycota are classified into 4 classes are ....., ..., ...
3- Biochemical defense in response to infection by the pathogen by .....
4- Spores produced in the hosts of *Puccinia graminis* are .....,.....,.....,.....
5- Nutrition in mycophta is .....,.....,.....
6- Allelopathy phenomena is ..... While soil suppression is .....
7- Enzymatic chemical weapons of pathogen may be classified into .....
8- Steps of disease cycle of the pathogen are ....., ..., ..., ..., ...
9- Epidemic disease is .....While epiphytic disease is .....
10- Pre-existing defense structures by means .....,.....,.....,.....

2- Write short notes with labeled diagrams on the following:-

1. Classification of Mucorales into genera (5 marks).
2. Five function of AM Fungi (5 marks).
3. Common smut disease of corn (5 marks).
4. Preexisting biochemical defense (5 marks).

3- Compare and contrast between the following pairs:-

1. Rusts and Smuts diseases (5 marks).
2. Peronosporales and Saprolegniales (5 marks).
3. Microbial toxins and biological methods to eradicate the inoculums (7 marks)..
4. Infectious and non-infectious diseases (3 marks).

"Best of Luck"

Examiners: Prof. Dr. Gamal M. Abdel-Fattah Dr. Huda. M. Soliuman

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Final Examination in Botany
First Term: Jan. 2016

Educational Year: Fourth Level | **Program (Branch): Microbiology**
Subject: (M 406) | **Course(s): Genetics**
Time: 2 hrs | **Date: 11 / 1 / 2016** | **Full mark: 60** | **Question mark: 20**

Answer the following questions:

Q.1: Give an account on the following: **(20 marks)**

1- Inheritance of skin colour in man. **(5 marks)**

2- Recessive lethal genes. **(5 marks)**

3- Inheritance of coat colour in rabbits. **(10 marks)**

Q.2: Choose the correct answer in the following sentences. **(20 marks)**

1- When studying an inherited phenomenon, a geneticist discovers a phenotypic ratio of 9:3:3:1 among offspring of a given mating. A possible explanation for this is two locus-two alleles at each locus system that exhibits

a. epistasis b. linkage c. pleiotropy d. independent assortment

2- When crossing a homozygous recessive with a heterozygote, what is the chance of getting an offspring with the homozygous recessive phenotype?

a. 0% b. 25% c. 50% d. 75%

3-A monohybrid cross which of the following rule?

a. Rule of Independent Assortment
b. Chromosome Theory of Inheritance
c. Rule of Segregation
d. Cell Theory of Gametes

4- A 9:3:3:1 phenotypic ratio is characteristic of which of the following?

a. a monohybrid cross
b. a dihybrid cross
c. a trihybrid cross
d. linked genes

5- 1:2:1 phenotypic ratio in the F2 generation of a monohybrid cross is a sign of

a. complete dominance. b. multiple alleles. c. incomplete dominance. d. pleiotropy

6- In snapdragons, heterozygotes have pink flowers, whereas homozygotes have red or white flowers. When plants with red flowers are crossed with plants with white flowers, what proportion of the offspring will have pink flowers?

a. 25% b. 50% c. 75% d. 100%

7- Haemophilia is much more frequent in male than female, Haemophilia is

a- sex linked genes b- Holandric genes c- partially sex linked genes d- multiple alleles

8- Different forms of genes is known as

a. allele b. genotype c. Phenotype d. Genes

9- Complementary genes modifies the Mendelian F2 ratio into

a. 12:3:1 b. 9:3:4 c. 15:1 d. 9:7

10- Which of the following is a testcross?

a. AABB x AABB b. AaBb X AaBb c. AaBb x AABB d. aabb X AaBb

Q.3: A: Write a brief notes on each of the following: **(10 marks)**

1- Inheritance of comb shape in Poultry. **(5marks)**

2- Inheritance of Fruit colour in *Cucurbita pepo*. **(5marks)**

B: Complete the following sentences using suitable words: **(10 marks)**

1- The transmission of a gene from mother to son or father to daughter is.....

2- The sex chromosomes in birds are designated X and Y, the male is ..... and the female .....

3- Interaction of genes controlling the same character is called..... but interaction between alleles is known as.....

4- Colour blindness is.....trait.

5- F2 phenotypic ratio in agouti colour of mice is.....

6- Dominant Duplicate Epistasis modifies the Mendelian F2 ratio into.....

7- Crossing of F1 individuals with one of the two parents.....

8- Genes carried on X and Y chromosomes are known as.....

Examiners: Prof. Magda I. Soliman Dr. Rehab M. Rizk

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Final Examination in Botany
First Term: Jan. 2016

Educational Year: 4th Level **Program:** Microbiology
Code: B(401) **Course:** Physiology of Microorganisms
Time: 2 hrs
Date: 23/01/2016 **Full mark:** 60 **Question mark:** 20

Answer the following questions:

Q.1-A- Recognize chemolithotrophy in microorganisms and Demonstrate metabolism of reduced sulfur compounds. **(7 marks)**

B- Discuss the physiological basis of temperature tolerance in microorganisms. **(5 marks)**

C- Outline fungal mycelium adaptations for nutrient capture. **(8 marks)**

Q.2- A- Give an illustrated discussion on the growth mechanism in fungal hypha and the assembly of the wall at the hyphal apex. **(7 marks)**

B- Discuss maltose metabolism in bacteria **(3 marks)**

C- Categorize methods of measuring microbial growth either a direct or an indirect method. **(7 marks)**

D- Fill in the following table: **(3 marks)**

Method of Sterilization	Temp.	Time	Type of Heat	Type of action
Autoclaving				
Hot air				
Pasteurization				

Q.3- A- Draw the following growth curves for *E. coli*, starting with 100 cells with a generation time of 30 minutes at 35°C.

i. The cells are incubated for 5 hours at 35°C.
ii. After 5 hours, the temperature is changed to 20°C for 2 hours.
iii. After 5 hours at 35°C, the temperature is changed to 5°C for 2 hours followed by 35°C for 5 hours. **(6 marks)**

B- Name the cause of cell death **and give** the method of action resulting from damage to cell wall, proteins, plasma membrane and nucleic acids. **(6 marks)**

C- Differentiate between complex and chemically defined media. **(2 marks)**

D- Define catalase, peroxidase, superoxide dismutase **and explain** the importance of each enzyme for microorganisms. **(6 marks)**

Examiners: **Assist. Prof. Dr. Mervat H. Hussein**
Dr. Ahmed S. Gebreil