



## AP<sup>®</sup> Biology 2002 Sample Student Responses Form B

**The materials included in these files are intended for use by AP teachers for course and exam preparation in the classroom; permission for any other use must be sought from the Advanced Placement Program<sup>®</sup>. Teachers may reproduce them, in whole or in part, in limited quantities, for face-to-face teaching purposes but may not mass distribute the materials, electronically or otherwise. These materials and any copies made of them may not be resold, and the copyright notices must be retained as they appear here. This permission does not apply to any third-party copyrights contained herein.**

These materials were produced by Educational Testing Service<sup>®</sup> (ETS<sup>®</sup>), which develops and administers the examinations of the Advanced Placement Program for the College Board. The College Board and Educational Testing Service (ETS) are dedicated to the principle of equal opportunity, and their programs, services, and employment policies are guided by that principle.

The College Board is a national nonprofit membership association dedicated to preparing, inspiring, and connecting students to college and opportunity. Founded in 1900, the association is composed of more than 4,200 schools, colleges, universities, and other educational organizations. Each year, the College Board serves over three million students and their parents, 22,000 high schools, and 3,500 colleges, through major programs and services in college admission, guidance, assessment, financial aid, enrollment, and teaching and learning. Among its best-known programs are the SAT<sup>®</sup>, the PSAT/NMSQT<sup>®</sup>, and the Advanced Placement Program<sup>®</sup> (AP<sup>®</sup>). The College Board is committed to the principles of equity and excellence, and that commitment is embodied in all of its programs, services, activities, and concerns.

Copyright © 2002 by College Entrance Examination Board. All rights reserved. College Board, Advanced Placement Program, AP, SAT, and the acorn logo are registered trademarks of the College Entrance Examination Board. APIEL is a trademark owned by the College Entrance Examination Board. PSAT/NMSQT is a registered trademark jointly owned by the College Entrance Examination Board and the National Merit Scholarship Corporation. Educational Testing Service and ETS are registered trademarks of Educational Testing Service.

4. A triploblastic animal is one in which three germ layers form during embryonic development. Triploblastic animals include acoelomate, pseudocoelomate, and coelomate (eucoelomate) organisms.
- Identify** the three germ layers of a triploblastic embryo and **discuss** the fates of these germ layers in embryonic development.
  - Describe** acoelomate, pseudocoelomate, and coelomate body plans. **Identify** an animal that is representative of **each** of these types of body plan.
  - Compare and contrast** the digestive systems of an acoelomate and a coelomate organism.

a) The three germ layers of a triploblastic embryo are the ectoderm, endoderm, and the mesoderm. The ectoderm, or the outer layer, through development will become the skin, the nervous system, and the spinal cord. The mesoderm is formed during gastrulation from the endoderm. It is fated to be the blood, bones, and organs of the organism. When the mesoderm is formed in the center is an empty cavity called the coelom which will hold the organisms organs. The endoderm formed during gastrulation through the invagination of the ectoderm will become the digestive tract of the organism.

## ADDITIONAL PAGE FOR ANSWERING QUESTION 4

b) A acoelomate organism does not have an empty body cavity <sup>or coelom</sup> for organs. An example of this is the flatworm. The organism simply has an ectoderm, mesoderm, endoderm and then a digestive cavity. A coelomate organism has a empty body cavity surrounded by the mesoderm. The coelom is formed during development and holds the organs. An example of this is the human.

A pseudo coelomate is an organism which has a coelom but it is not a true coelom because it was not formed from the formation of the mesoderm. Therefore the coelom is not surrounded by a mesoderm, instead it has a mesoderm on one side & an endoderm on the other ~~side~~. An example of this is the ~~repto~~ neptatodes.

c) Both acoelomate & coelomate organisms perform extra cellular digestion, where through the secretion of

enzymes foods are broken down and then the nutrients are absorbed.

However the digestive system of the coelomate organisms is far more complicated due to the presence of digestive organs such as the stomach, intestines, liver, & pancreas. In acoelomate organisms, <sup>in</sup> the alimentary canal ~~is~~ out digestion is one way w/ no back tracking. In coelomate organisms digestion starts in the mouth w/ saliva & breaks carbohydrates down a bit. In the stomach there are specialized enzymes for the digestion of proteins called pepsin which is activated in the presence of protein. This is still all extracellular. In the small intestine, bile from liver emulsifies the lipids and lipase & amylase break down lipids and carbohydrates. Then the nutrients are absorbed through the small intestine into the

## ADDITIONAL PAGE FOR ANSWERING QUESTION 4

blood and the nutrients are distributed as needed.

**END OF EXAMINATION**

THE FOLLOWING INSTRUCTIONS APPLY TO THE BACK COVER OF THE SECTION II BOOKLET.

- MAKE SURE YOU HAVE COMPLETED THE IDENTIFICATION INFORMATION AS REQUESTED ON THE BACK OF THE SECTION II BOOKLET.
- CHECK TO SEE THAT YOUR AP NUMBER APPEARS IN THE BOX(ES) ON THE BACK COVER.
- MAKE SURE YOU HAVE USED THE SAME SET OF AP NUMBER LABELS ON ALL AP EXAMINATIONS YOU HAVE TAKEN THIS YEAR.

4. A triploblastic animal is one in which three germ layers form during embryonic development. Triploblastic animals include acoelomate, pseudocoelomate, and coelomate (eucoelomate) organisms.
- (a) **Identify** the three germ layers of a triploblastic embryo and **discuss** the fates of these germ layers in embryonic development.
- (b) **Describe** acoelomate, pseudocoelomate, and coelomate body plans. **Identify** an animal that is representative of **each** of these types of body plan.
- (c) **Compare and contrast** the digestive systems of an acoelomate and a coelomate organism.

a) During embryonic development, the three germ layers produced are the ectoderm, mesoderm, and endoderm. As gastrulation occurs, these layers emerge. The ectoderm produces the neuro tube that rolls ~~and~~ up and becomes the the central nervous system in most animals. <sup>Some</sup> Cell from this neuro tube migrate to other parts of the embryo to become teeth and other ~~can~~ body components. These cells that migrate are called a neuro crest that forms adjacent to the two sides of the neuro tube. The ectoderm also becomes the the skin or outer most membrane or layer of the organism. The mesoderm produces much of the organs that develop during ~~organogenesis~~ organogenesis. It gives rise to the ~~the~~ body cavity, kidneys, and other organs. The endoderm becomes the lining of the digestive tract and also gives rise to the ~~the~~ ~~liver~~ & lungs.

b) Acoelomate is when the organism doesn't have a body cavity although it has three germ layers. The mesoderm is just solid in the ~~the~~ body.

## ADDITIONAL PAGE FOR ANSWERING QUESTION 4

An acoelomate is ~~acoelomate~~ <sup>flatworm (planarian)</sup>; Pseudocoelomate is a body cavity that isn't completely lined by the mesoderm.

- Most acoelomate organisms have gastrovascular cavities, one opening that serves as mouth + anus
  - These organisms have complete digestive systems which means two openings for mouth and anus each. This allows specialization during digestion.
- ~~Acoelomate~~ a pseudocoelomate would be a ~~roundworm~~ nematoda (roundworm).

Coelomate is a body cavity that is completely lined by mesoderm tissues. This is the most advanced cavity of the three and is found in earthworms (annelid).

- c) Since acoelomates don't have a true body cavity and the digestive system has only one opening for mouth + anus, the gastrovascular cavity is very branched so that all nutrients can be distributed to the entire body. Planarians are representative of such body plans. Since there is only one opening, specialization in digestive can't occur since all the food is mixed up with wastes. Digestion occurs with intracellular method. ~~Just~~
- Digestive juices secreted by the pharynx can digest the food externally and then taken in as liquid or smaller parts. ~~They~~ are once inside

GO ON TO THE NEXT PAGE.

body, the food vacuoles "eat" them up and hydrolytic enzymes break the molecules up and they are absorbed by the body cell easily. Contrastly coelomate animals have unidirectional digestive system since there are two <sup>different</sup> openings for mouth + anus. This allows specialization. Both ~~intra~~ and extracellular digestion can occur which allows these animals to eat ~~large~~ <sup>bigger</sup> food. In the example of humans, the food is first digested in mouth, then esophagus, then stomach, then small intestine and finally large intestine. These parts all have different functions during the process such as the mouth only starts the digestion of carbohydrates (starch) <sup>with amylase</sup> and the stomach digests only proteins with the help of pepsin, gastric juice. Many enzymes + hormones are used during this process.

The two digestive systems are similar that the coelomate also uses intracellular digestion when some molecules are broken down small enough such as in the small intestine. Amino acids, glucose, and other monomers ~~are~~ are transported across the small intestine lining into blood stream by being taken up by cells in the lining. The two systems also are similar that they use enzymes to break down food polymers



## ADDITIONAL PAGE FOR ANSWERING QUESTION 4

to monomers.

---

**END OF EXAMINATION**

THE FOLLOWING INSTRUCTIONS APPLY TO THE BACK COVER OF THE SECTION II BOOKLET.

- MAKE SURE YOU HAVE COMPLETED THE IDENTIFICATION INFORMATION AS REQUESTED ON THE BACK OF THE SECTION II BOOKLET.
- CHECK TO SEE THAT YOUR AP NUMBER APPEARS IN THE BOX(ES) ON THE BACK COVER.
- MAKE SURE YOU HAVE USED THE SAME SET OF AP NUMBER LABELS ON ALL AP EXAMINATIONS YOU HAVE TAKEN THIS YEAR.

4. A triploblastic animal is one in which three germ layers form during embryonic development. Triploblastic animals include acoelomate, pseudocoelomate, and coelomate (eucoelomate) organisms.
- Identify** the three germ layers of a triploblastic embryo and **discuss** the fates of these germ layers in embryonic development.
  - Describe** acoelomate, pseudocoelomate, and coelomate body plans. **Identify** an animal that is representative of **each** of these types of body plan.
  - Compare and contrast** the digestive systems of an acoelomate and a coelomate organism.

2. The three germ layers of a triploblastic embryo are the ~~the~~ endoderm, the ectoderm, and the mesoderm layers. The ectoderm is the "outer" layer and therefore develops into the skin, hair, nails, and the endoderm layer is the "~~the~~" "inner" layer and therefore develops into the internal organs ~~and~~ of organisms. It also becomes blood and the circulatory system. The mesoderm is the "middle" layer and becomes the spinal cord and nervous system, as well as muscles.

## ADDITIONAL PAGE FOR ANSWERING QUESTION 4

B. An organism which is acoelomate has no coelom cavity. The three germ layers for a solid layer: ectoderm, mesoderm, endoderm, ~~and~~ with no space between.

An example of an acoelomate animal is the flatworm.

This animal is parasitic so it has no real need for a ~~gastro~~ digestive system; but rather has a gastrovascular cavity. <sup>because it lives off of other organisms</sup>

~~Pseudo~~coelomate means that the coelom cavity is entirely surrounded by mesodermal tissue.

An example of a coelomate animal is a segmented worm, or earthworm. These organisms have digestive system ~~which is~~ in which ~~food~~ ~~only~~ everything

travels in the same direction; in one end & out the

other. A Pseudocoelomate animal has a coelom

cavity, but it is not entirely surrounded by mesoderm, ~~therefore~~ only partially. Therefore it is "pseudo"-and not "a-" coelomate. An example of a pseudocoelomate animal is a roundworm.

C. ~~The~~ The digestive systems of acoelomate & coelomate animals ~~are~~ <sup>different</sup> in that ~~acoelomates~~ <sup>coelomates</sup> are very specialized and ~~the~~ acoelomates are not. ~~A~~ ~~human~~ (coelomate) has ~~several~~ several organs that are crucial in the digestion of food. Everything is specialized and for the most part <sup>food</sup> goes one way. The flatworm's acoelomate gastrovascular cavity is not specialized, ~~but it is~~ ~~more like a bag~~ because it relies on other organisms to survive, because it is a parasite. When the organism is developing,

**GO ON TO THE NEXT PAGE.**

## ADDITIONAL PAGE FOR ANSWERING QUESTION 4

the blastopore of an acoelomate animal becomes the anus, with the second opening becoming the mouth. The opposite is true of the coelomate, where the blastopore becomes the mouth. One thing they do have in common is that they both have a mouth and an anus.

**END OF EXAMINATION**

THE FOLLOWING INSTRUCTIONS APPLY TO THE BACK COVER OF THE SECTION II BOOKLET.

- MAKE SURE YOU HAVE COMPLETED THE IDENTIFICATION INFORMATION AS REQUESTED ON THE BACK OF THE SECTION II BOOKLET.
- CHECK TO SEE THAT YOUR AP NUMBER APPEARS IN THE BOX(ES) ON THE BACK COVER.
- MAKE SURE YOU HAVE USED THE SAME SET OF AP NUMBER LABELS ON ALL AP EXAMINATIONS YOU HAVE TAKEN THIS YEAR.