



## NEW YORK STATE

*Parasitology Proficiency Testing Program*

### Parasitology (General) 03 February 2009

The purpose of the New York State Proficiency Testing Program in the category of Parasitology (General) is to monitor the performance of applicant laboratories in detecting and identifying parasites in fecal emulsions, fecal smears, and blood films. This document reports the results for the February 2009 proficiency test in Parasitology (General).

### Sample Preparation and Quality Control

All emulsions and slides used in this test were prepared by a commercial source. The emulsions were dispensed into the vials from pools which were continuously mixed during the loading process. Numerous samples of each test specimen were selected at random by the Parasitology Unit of the David Axelrod Institute for Public Health, and were assayed for quality and confirmation of contents. Extensive quality control tests were also conducted by the supplying vendor and a detailed quality control report was submitted to the New York State Parasitology Laboratory for inspection and verification. Samples were authenticated by 80% of participating laboratories and/or referee laboratories.

### 09-A (Helminths Only)

Correct diagnosis: *Necator americanus* / *Ancylostoma duodenale*

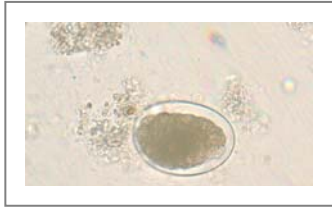
#### *Results of Participating Laboratories*

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
Hookworm	121/127	95	9/10	Correct
<i>Ascaris lumbricoides</i>	3/127	2	0	Incorrect
No Parasites Seen	3/127	2	1	Incorrect
<i>Strongyloides stercoralis</i>	1/127	1	0	Incorrect

#### *Quality Control and Referee Information*

Participating and referee laboratories agreed that **Hookworm** was the correct response (95 and 90%). Quality control examination of 4% of this sample showed an average of 4 ova per coverslip. Other tests performed include a Direct Immunofluorescent Assay and ELISA for *Giardia lamblia* and *Cryptosporidium* sp. which were negative for both organisms. A modified acid-fast stained smear was also negative.

## Diagnostic Characteristics



***Necator americanus*** (Hookworm) infection occurs in warm moist areas through skin penetration of filariform larvae from the soil. The larvae migrate through the heart and lungs, are swallowed, and take up residence in the small intestine where the adults mature. The diagnostic stage is the egg passed in stool. They are oval and measure approximately 60 X 40  $\mu\text{m}$ . They have a thin shell with a space between the shell and the developing embryo. Development is usually at the 8 to 32 cell stage. These eggs are indistinguishable from those of *Ancylostoma duodenale*.

## 09-B (Helminths Only)

Correct diagnosis: *Hymenolepis nana*

### Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
<i>Hymenolepis nana</i>	127/127	100	10/10	Correct
<i>Cryptosporidium</i> sp.	1/127	1	0	No Penalty
<i>Giardia lamblia</i>	1/127	1	0	No Penalty

### Quality Control and Referee Information

Participating and referee laboratories agreed that ***Hymenolepis nana*** was the correct response (100%). Quality control examination of 4% of this sample showed greater than 30 ova per coverslip. Hooks and filaments are visible in some of the eggs. Other tests performed include Direct Immunofluorescent Assay and ELISA for *Giardia lamblia* and *Cryptosporidium* sp. which were indeterminate for both organisms. A modified acid-fast stained smear was negative.

## Diagnostic Characteristics



***Hymenolepis nana***, also known as the dwarf tapeworm, is an intestinal cestode acquired by ingesting eggs from the environment or rarely by ingesting infected beetles. Internal autoinfection is also possible. *H. nana* is the only human tapeworm that does not have an intermediate host and transmission occurs from person to person. It has a worldwide distribution and is more commonly seen in children. The diagnostic stage is the egg recovered in stool. These eggs are spherical, thin shelled, and measure 30 to 47  $\mu\text{m}$  in diameter. They have a six hooked oncosphere with two polar thickenings from which filaments arise. These filaments are visible in the space between the embryo and the outer shell. Eggs of *H. nana* can be confused with the eggs of *Hymenolepis diminuta* and careful measurement with a calibrated ocular micrometer is essential. The eggs of *H. diminuta* are much larger measuring 70-85  $\mu\text{m}$ .

## 09-C (All Parasites)

Correct diagnosis: *Balantidium coli* and *Fasciola hepatica*/*F. buski*.

### Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
<i>Balantidium coli</i> .	120/127	94	9/10	Correct
<i>Fasciola hepatica</i> / <i>Fasciolopsis buski</i>	93/127	73	8/10	Correct
<i>Cryptosporidium</i> sp.	15/127	12	0	No Penalty
<i>Entamoeba coli</i>	9/127	7	0	No penalty
<i>Chilomastix mesnili</i>	8/127	6	0	No penalty
<i>Blastocystis hominis</i>	5/127	4	0	No penalty
<i>Paragonimus westermani</i>	3/127	2	1	No penalty
<i>Enterobius vermicularis</i>	2/127	2	1	No penalty
<i>Diphyllobothrium latum</i>	1/127	1	0	No penalty

### Quality Control and Referee Information

Participating and referee laboratories agreed that *Balantidium coli* and *Fasciola hepatica*/*Fasciolopsis buski* were the correct responses (94 and 90% and 73 and 80%). Quality control examination of 4% of this sample revealed greater than 30 *Balantidium coli* trophozoites and an average of 4 *Fasciola hepatica*/*Fasciolopsis buski* ova per coverslip. Many other organisms were also present in varying numbers and so no credit was deducted for reporting them. *Paragonimus westermani* and *Diphyllobothrium latum* were not seen on quality control examination and were probably misidentified due to failure to measure the eggs of *Fasciola hepatica*/*Fasciolopsis buski*. Other tests performed include Direct Immunofluorescent Assay and ELISA for *Giardia lamblia* and *Cryptosporidium* sp. which were negative for both organisms. A modified acid-fast stained smear was also negative.

### Diagnostic Characteristics



*Balantidium coli* is usually found in warmer climates but can occur in cooler climates. It is the only pathogenic ciliate to infect humans and the largest of all pathogenic protozoa. The trophozoites measure 50-100 micrometers by 20-50 micrometers and these protists are completely covered with cilia. They have two nuclei. One is a large bean-shaped macronucleus and the other is a small micronucleus. The nuclei in this preparation were difficult to see due to the large number of vacuoles present in the cytoplasm. The anterior end of the organism is slightly pointed and in most cases the cytosome is visible. Cysts measure 50-70 micrometers and also have a macro and micronucleus. No cysts were seen in quality control examination of this specimen.

***Fasciola hepatica*** is a liver trematode with a worldwide distribution. It is extremely rare in the United States. Humans become infected by eating uncooked aquatic plants containing metacercariae from the intermediate snail host. These metacercariae excyst in the duodenum and migrate to the liver. Once the larvae enter the bile ducts they mature and begin to lay eggs which are the diagnostic stage. The eggs are very large measuring 130-150 µm by 60-90 µm. They are thin shelled and have an operculum. Although these eggs are similar in appearance to *Paragonimus westermani* they are easily distinguished by size.



## 09-D (Protozoa Only)

Correct diagnosis: No Parasites Seen.

### Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
No Parasites Seen	120/127	94	10/10	Correct
<i>Dientamoeba fragilis</i>	3/127	2	0	Incorrect
<i>Entamoeba hartmanni</i>	2/127	2	0	Incorrect
<i>Endolimax nana</i>	1/127	1	0	Incorrect
<i>Blastocystis hominis</i>	1/127	1	0	Incorrect

### Quality Control and Referee Information

Participating and referee laboratories agreed that **No Parasites Seen** was the correct response (94 and 100%) Quality control examination of 4% of this sample showed typical staining with no parasites identified.

## 09-E (All Parasites)

Correct diagnosis: *Plasmodium ovale*.

### Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
<i>Plasmodium malariae</i>	100/120	83	10/10	Correct
<i>Plasmodium ovale</i>	4/120	3	0	Correct
<i>Plasmodium vivax</i>	4/120	3	0	Correct
<i>Plasmodium</i> sp.	4/120	3	0	Correct
<i>Babesia</i> sp.	1/120	1	0	Incorrect
No Parasites Seen	7/120	6	0	Incorrect

## Quality Control and Referee Information

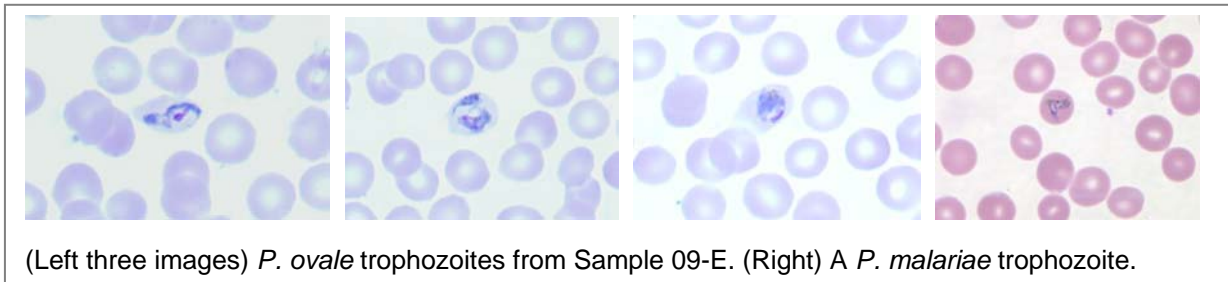
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Participating and referee laboratories failed to agree that *Plasmodium ovale* was the correct response but did agree that *Plasmodium* sp. was present (93 and 100%). Therefore credit was given for reporting any species of malaria. Quality control examination of 4% of this sample showed a low parasitemia with organisms in every 20-30 100X oil immersion fields. **Remember that at least 200-300 oil immersion fields should be examined before calling a specimen negative.** The predominant stage seen was the mature trophozoite. Most infected cells were slightly enlarged. The overall staining quality is good although little stippling was seen.

## Diagnostic Characteristics

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*Plasmodium ovale* infections occur primarily in Central West Africa and some South Pacific Islands and account for fewer than 5% of all malaria cases. *P. ovale* malaria is usually less severe than other species of malaria and often ends in spontaneous recovery. The infected cells are usually enlarged, oval, fimbriated, and have Schüffner's stippling. The cytoplasm of the trophozoites is usually compact. Schizonts have 4-12 merozoites compared to 12-24 for *P. vivax*. The chromatin is usually very pronounced and the pigment is scattered and coarse.



The three images above, taken from this sample, show mature trophozoites in enlarged oval cells. The cytoplasm is fairly compact, the chromatin is prominent, and the pigment is coarse. *Plasmodium malariae* does not enlarge the infected cell and in fact infected cells are often smaller than uninfected ones, as demonstrated in the image shown on the right.

# Scoring Information

## Immunoassay Results

<b><i>Cryptosporidium</i></b>	<b>09-A</b>		<b>09-B</b>		<b>09-C</b>	
<b>METHOD</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>
Meridian ImmunoCard STAT Crypto/Giardia	19	0	19	0	18	1
Meridian Merifluor Crypto/Giardia	20	0	14	6	19	1
Meridian Premier Cryptosporidium	1	0	1	0	1	0
Remel Prospect Cryptosporidium EIA	17	3	20	0	20	0
Remel Xpect Cryptosporidium	1	0	1	0	1	0
Remel Xpect Giardia/Cryptosporidium	4	0	4	0	4	0
TechLab/Wampole Test EIA	6	0	6	0	6	0
Techlab Cryptosporidium II Elisa	1	0	1	0	1	0

<b><i>Giardia</i></b>	<b>09-A</b>		<b>09-B</b>		<b>09-C</b>	
<b>METHOD</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>
Meridian ImmunoCard STAT Crypto/Giardia	20	0	20	0	20	0
Meridian Merifluor Crypto/Giardia	15	0	12	3	15	0
Meridian Premier Giardia	1	0	1	0	1	0
Remel Prospect Giardia EIA	27	0	2	25	27	0
Remel ProSpect Giardia EZ	1	0	1	0	1	0
Remel Xpect Giardia	3	0	3	0	3	0
Remel Xpect Giardia/Cryptosporidium	4	0	4	0	4	0
TechLab/Wampole Test EIA	9	0	9	0	9	0
Techlab Giardia II Elisa	1	0	1	0	1	0

## Distribution of Scores

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Score	# of labs	% of labs
100	115	91
90-99	0	0
80-89	0	0
70-79	7	6
60-69	2	2
50-59	1	1
0	2	2

## Answer Key

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Sample	Correct Answer	Points
09-A	<i>Necator americanus</i> / <i>Ancylostoma duodenale</i>	20
09-B	<i>Hymenolepis nana</i>	20
09-C	<i>Balantidium coli</i> and <i>Fasciola hepatica</i> / <i>Fasciolaopsis buski</i>	20
09-D	No parasites seen	20
09-E	<i>Plasmodium</i> sp.	20

**TOTAL POSSIBLE POINTS 100**

## Grading

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The answer key was derived from the response of all participating laboratories as per **CLIA Regulations**, Part 493, Subpart I, Section 493.917. These regulations can be viewed at [www.phppo.cdc.gov](http://www.phppo.cdc.gov). These regulations state that 80% or more of participating laboratories **or** referee laboratories must identify the parasite for it to be correct. Similarly, reporting of a parasite identified by less than 20% of the participating laboratories **or** referees finding parasites or ova is an incorrect response. Organisms reported by more than 20% but less than 80% of the participating laboratories **or** referees are "Unauthenticated", and are not considered for grading.

Each sample has a maximum value of 20 points. Credit is given according to the formula:

$$\frac{\text{Number of correct responses by lab}}{\text{\# Correct Parasites Present} + \text{\# Lab's Incorrect Answers}} \times 100$$

## Important Reminders

The mailout dates for Parasitology have been changed from the first Monday of February, June, and October to the first Tuesday.

The next Parasitology Proficiency Test is scheduled for **June 2, 2009**. You are responsible for notifying us **before June 9, 2009** if you do not receive your test. Proficiency test results must be electronically submitted through EPTRS by **June 16, 2009** or you will receive a zero. These requirements are clearly stated in your NYS Proficiency Testing Handbook provided by the NYS Clinical Laboratory Evaluation Program or can be accessed via the Internet at: <http://www.wadsworth.org/labcert/clep/ProgramGuide/WebGuide.pdf>

## News and Notes

Beginning with the February 2009 proficiency exam, the **grading policy has changed**. In order to make the score on the NYS Parasitology PT exam more accurately reflect laboratory performance, and be more consistent across categories, a new scoring system is in effect. Under the new scoring system, grades will be based only on the specimen types processed by your laboratory. For example, if your laboratory does not process blood smears, your score will be based on the four fecal specimens, each of which will be worth 25% of the total. Laboratories that process all of the types of samples included in the exam will not observe any changes in scoring method.