



Blood Borne Parasites

07 October 2008

The purpose of the New York State Proficiency Testing Program in the category of Blood Borne Parasites is to monitor the performance of applicant laboratories in detecting and identifying parasites on blood films. This document reports the results for the October 2008 proficiency test in Blood Borne Parasites. **Important news about the February 2009 proficiency test is included on the last page.**

Sample Preparation and Quality Control

All slides used in this test were prepared and stained by a commercial source. 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.

08B-K

Correct diagnosis: *Plasmodium ovale*.

Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
<i>Plasmodium ovale</i>	4/19	21	3/10	Correct
<i>Plasmodium malariae</i>	9/19	47	7	No Penalty
<i>Plasmodium vivax</i>	2/19	11	0	No Penalty
<i>Babesia</i> sp.	2/19	11	0	Incorrect
No Parasites Seen	2/19	11	0	Incorrect

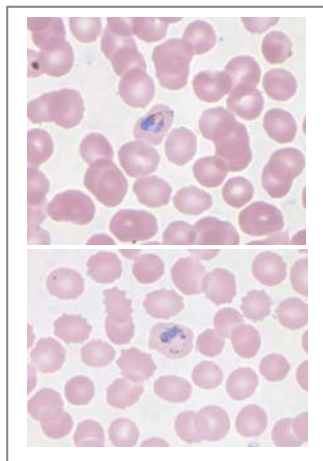
Quality Control and Referee Information

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. 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.

Participating and referee laboratories failed to agree that *Plasmodium ovale* was the correct response but did agree that *Plasmodium* sp. was present (80% and 100% respectively). Therefore credit was given for reporting any species of malaria.

Diagnostic Characteristics



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, may be fimbriated, and may 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 images at left, taken from this sample, show 2 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 images shown below for sample 08B-O.

08B-L

Correct diagnosis: *Brugia malayi*.

Results of Participating Laboratories

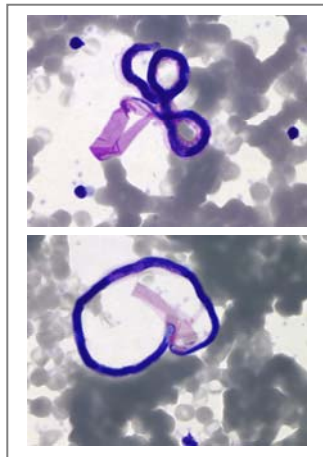
Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
<i>Brugia malayi</i>	6/19	32	5/10	Unauthenticated
<i>Wuchereria bancrofti</i>	5/19	26	4	
<i>Loa loa</i>	2/19	11	1	
No Parasites Seen	6/19	32	0	

Quality Control and Referee Information

Participating and referee laboratories failed to agree that *Brugia malayi* was the correct response. Quality control examination of 4% of this sample showed an average of 6 microfilaria per slide. The organisms have a pink staining sheath and two terminal nuclei.

Remember to always scan blood slides for proficiency testing, or from patients that reside in or visit areas where filariasis is endemic, on low (10X) power.

Diagnostic Characteristics



Brugia malayi is an arthropod-borne worm that resides in the lymphatic system of humans. Infection is spread by the arthropod intermediate host, in this case the mosquito. Adult female worms produce large numbers of sheathed larvae called microfilariae which can be detected in the peripheral blood. These microfilariae range in size from 177-230 μm and have a clearly visible pink sheath when stained with Giemsa stain. *Wuchereria bancrofti* and *Loa loa* also have sheaths but they are not well stained with giemsa. *Brugia malayi* is also characterized by the presence of two terminal nuclei the second of which is located in the tip of the tail. *Wuchereria bancrofti* has no nuclei in the tip of the tail and *Loa loa* has a continuous row extending all the way to the tip.

08B-M

Correct diagnosis: *No parasites seen.*

Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
No Parasites Seen	18/19	95	10/10	Correct
<i>Babesia</i> sp.	1/19	5	0	Incorrect

Quality Control and Referee Information

Participating and referee laboratories agreed that No Parasites Seen was the correct response (95% and 100% respectively). Quality control examination of 4% of this sample showed erythrocytes of normal size and staining characteristics. Normal blood elements are present and exhibit typical staining characteristics. No inclusions are present.

08B-N

Correct diagnosis: *Plasmodium falciparum*.

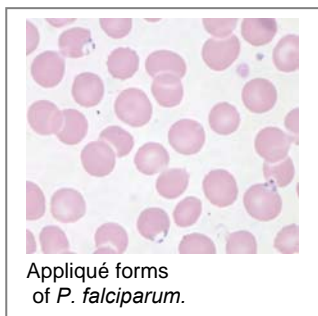
Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
<i>Plasmodium falciparum</i>	17/19	89	10/10	Correct
<i>Babesia</i> sp.	1/19	5	0	Incorrect
<i>Plasmodium vivax</i>	1/19	5	0	Incorrect

Quality Control and Referee Information

Participating and referee laboratories agreed that *Plasmodium falciparum* was the correct response (89% and 100% respectively). Quality control examination of 4% of this sample showed organisms in every 100X oil-immersion field. The only stage seen is the ring form. Appliqué forms were abundant.

Diagnostic Characteristics



Plasmodium falciparum is one of the four species of *Plasmodium* known to infect humans. It causes the most dangerous and severe form of malaria and is always considered to be a medical emergency. Death may occur rapidly if proper treatment is not started immediately. Its distribution is limited to the tropics, primarily Africa and Asia. *P. falciparum* invades all ages of RBC's, resulting in high parasitemias which may exceed 50%. The usual stages seen in the peripheral blood are rings and gametocytes. Since schizogony occurs in the internal organs, it is rare to see other stages, although they may be present in cases of severe malaria. Infected RBC's are not

enlarged nor do they contain Schüffner's dots. Rings are generally small, and may have one or two chromatin dots. Appliqué forms are also characteristic. The mature trophozoites are compact with a mass or a few grains of coarse pigment. Gametocytes are rounded to banana-shaped and contain a single well defined chromatin and coarse rice-grain like pigment.

08B-O

Correct diagnosis: *Plasmodium malariae*.

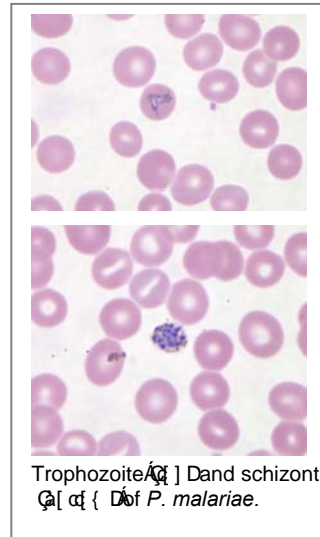
Results of Participating Laboratories

Organism reported	# of labs reporting	% of labs reporting	Referee results	Status
<i>Plasmodium malariae</i>	19/19	100	10/10	Correct

Quality Control and Referee Information

Participating and referee laboratories agreed that *Plasmodium malariae* was the correct response (100%). Quality control examination of 4% of this sample showed parasites in every 8-10 oil-immersion fields. The predominant stages seen were the mature trophozoite and the schizont, containing 8-12 merozoites.

Diagnostic Characteristics



Plasmodium malariae is the least common species of malaria to infect humans, and is sporadic in distribution. It tends to infect older red blood cells, typically resulting in lower parasitemia. The ring stage is short lived, and therefore is not usually seen. The most common stages seen are mature trophozoites and schizonts. Infected cells are not enlarged and may actually be smaller than uninfected cells. There is no stippling. The trophozoites are not amoeboid and often appear as compact rounded or band forms. The schizonts contain 6-12 merozoites, which are usually arranged in a rosette although they may be in an irregular cluster.

Scoring Information

Distribution of Scores

Score	# of labs	% of labs
100	13/19	68
80	5/19	26
60	1/19	5

Answer Key

Sample	Correct Answer	Points
08B-K	<i>Plasmodium ovale</i> *	20
08B-L	<i>Brugia malayi</i> **	20
08B-M	No parasites seen	20
08B-N	<i>Plasmodium falciparum</i>	20
08B-O	<i>Plasmodium malariae</i>	20

TOTAL POSSIBLE POINTS 100

* Specimen was authenticated to the genus level and credit was given for any species of malaria reported.

** Specimen was unauthenticated and credit was given for all answers.

Grading

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. 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 **February 3, 2009**. You are responsible for notifying the New York State Parasitology Unit **before February 10, 2009** if you do not receive your test. Proficiency test results must be electronically submitted through EPTRS by **February 17, 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, and 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 will change**. 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 will be in effect. Under the new scoring system, grades will be based only on the specimen or organism types processed by your laboratory. For example, if your laboratory does not diagnose microfilarian infections, your score on this test would have been based on the four other 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.