

High Magnification, high throughput slide scanning

Proposer's Name: Michael J. Dark

Please see the attached example images for a better idea of the magnifications being discussed. However, all example images in Appendix B were taken using a standard light microscope (similar to the VERSA scanning system proposed); our current system for slide scanning is only capable of 20X magnification with optical doubling to 40X. While this increases the magnification, it sacrifices image quality to do so, making these slides more difficult to use for instruction, especially of students who are just starting looking at microscope slides. (Please see Appendix C for example images from the current scanner.) High quality images are necessary for students to learn normal structures and introduce concepts of abnormality.

As an instructor in the first class introducing microscopic concepts in the veterinary curriculum (VEM 5115, Introduction to Histology), I find that a large number of our students have minimal prior background in microscopy. Digital microscopy is a boon to these students; they have the ability to access images at any time, from anywhere, and review concepts we cover in class and lab. However, these students in particular need to be able to see cellular features in as high a detail as possible. As we have no slide scanner on campus capable of handling oil immersion for high-objective scanning, we are significantly limited in our ability to show cellular details, limiting students ability to learn. (Please see Appendix C for examples of the limitations of the current system.)

Electronic and Information Technology Accessibility: This technology allows improved access for visually challenged students, as it allows microscopic images to be enlarged (via projection or large screens) to substantially larger sizes than would be available via a traditional microscope. No information is transmitted via audio, flashing, or blinking. The iPad interface allows for manipulation by those with limited mobility. We are working to modify the website to add breadcrumbs and alt tags; the iPad interface has these already.

Timeline: Once funded, the microscope will be ordered immediately. Leica typically expects to ship within a month of ordering. There will be approximately a week necessary for setup and integration of the system into our microscope server.

Sustainability: The College of Veterinary Medicine will provide space for the instrument and will pay for ongoing maintenance and the necessary Internet connection. We will charge nominal fees (likely \$3-5/slide) for slide scanning to cover the cost of hiring OPS students to perform the scanning.

BUDGET

A quotation from Leica Biosystems is attached. The basic system includes an 8-slide holder and 20X, 40X, and 63X objectives, as well as an automatic oiler (which is required for scanning at 63x). This would allow for scanning of slides at significantly higher magnification than is currently available.

The attached quotation also includes information on adding fluorescence imaging and a 200-slide loader for the system. Either can be added to the system at any time in the future to allow for the ability to view binding of antibodies to samples (fluorescence) or increased throughput by increasing the number of slides scanned in a batch without human intervention (200-slide loader). However, our request is for the basic system.

The quotation from Leica is for \$143,872.40 for the basic system.

Please see the attached quotation for additional information (Appendix A).

Appendix A: Quotation from Leica Biosystems

Q U O T A T I O N S.F60092AH1

Customer No. 1317315

Date Jun / 2 / 2017

Sales Person Robert Adams (7604735000)

robert.adams@leicabiosystems.com

ISR Kerry Hinton (7605391154)

Item Description Qty Unit Price Discount Total

USD USD

Leica VERSA

100 Aperio VERSA 200, Brightfield

No : 23VER200BXX001

1 165,000.00 165,000.00

200 Automatic oiler

No : 23ASLOILER

1 10,000.00 10,000.00

300 Versa System UPS 110VAC

No : 23VER8X2UPS110

1 1,000.00 1,000.00

Objectives

400 OBJ HC PL APO 20X

No : 23OBJ020PAPDRY

1 1,746.90 1,746.90

500 OBJ HC PL APO 40X

No : 23OBJ040PAPDRY

1 1,535.00 1,535.00

600 OBJ HC PL APO 40X OIL

No : 23OBJ040PAPOIL

1 4,546.40 4,546.40

700 OBJ HC PL FL 63X OIL

No : 23OBJ063PLFOIL

1 1,867.50 1,867.50

800 Hardware Installation Service

Aperio image capture (hardware) implementation

single location per day. Required for hardware

purchases. Can be applied for up to 2 hardware

devices per location per day.

No : 9IMPSCAN1

1 4,398.90 4,398.90

900 User Training (User Site)

User Training (at user site)

Per day up to 10 people. Includes shipping of training

2 4,400.00 8,800.00

SEND REMITTANCE TO:

Leica Microsystems Inc. FEIN# 22-2701363

14008 Collections Center Drive

Chicago, IL 60693

Email: quotes@lbsimaging.com

Mike Dark

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2015 SW 16TH AVE

GAINESVILLE FL

32608

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Leica Microsystems Inc

1700 Leider Lane

Buffalo Grove, IL 60089

Leica Biosystems and Leica Microsystems are part of Leica Microsystems Inc.

Phone: 844-534-2262

Fax: 847-236-3009

Confidential: For customer's internal use only

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ISR Kerry Hinton (7605391154)

Item Description Qty Unit Price Discount Total

USD USD

equipment and materials and travel expenses for
Leica employee.

No : 9TRAIN1

Total : **198,894.70**

Estimated – Freight and Handling Charges : Ground
transport

+505.92

Grand Total : 199,400.62

Payment terms : 30 days net

Shipping terms : FOB SHIPPING

PT PREPAY & ADD

Validity : 06/02/17 to 08/01/17

BT0001309151

Leica standard sales terms and conditions apply. The full text can be found at <http://www.leicamicrosystems.com/company/salestermsandconditions>

then select USA OR by calling our Customer Service

Department at 8445342262

to request a copy.

Please Submit PO's to Leica Microsystems, Inc. and reference this quotation # when ordering PLEASE FAX

ORDER TO 7605391167

or email:quotes@lbsimaging.com.

Leica Microsystems

NOTES ABOUT QUOTATION: The quote above lists optional items, including a 200 slide loader (to increase throughput) and a fluorescence module. However, those are not included in the stated Grand Total; they are included for future expansion capabilities.

Appendix B: Sample images from different magnifications, including full size blowups

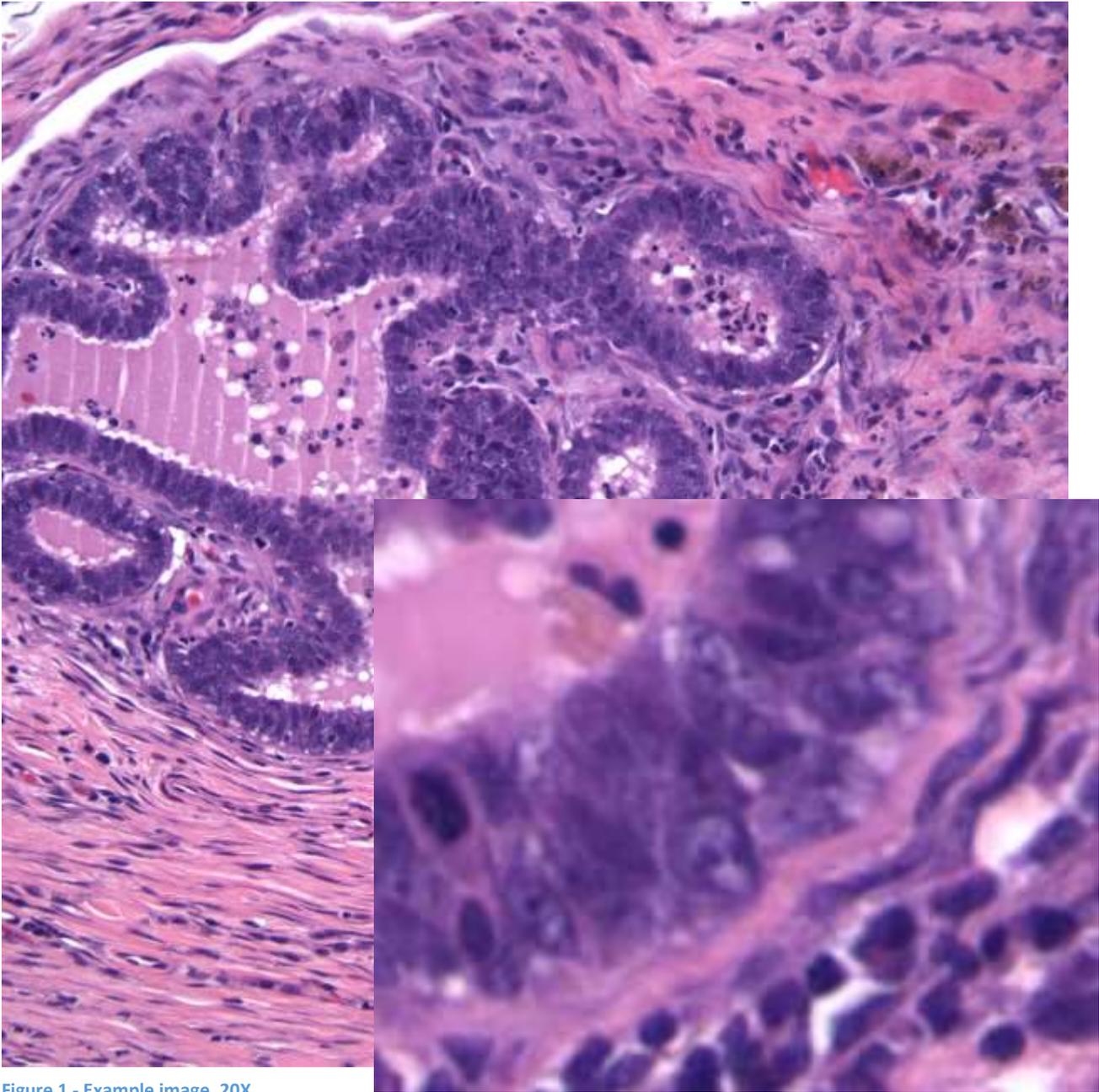


Figure 1 - Example image, 20X

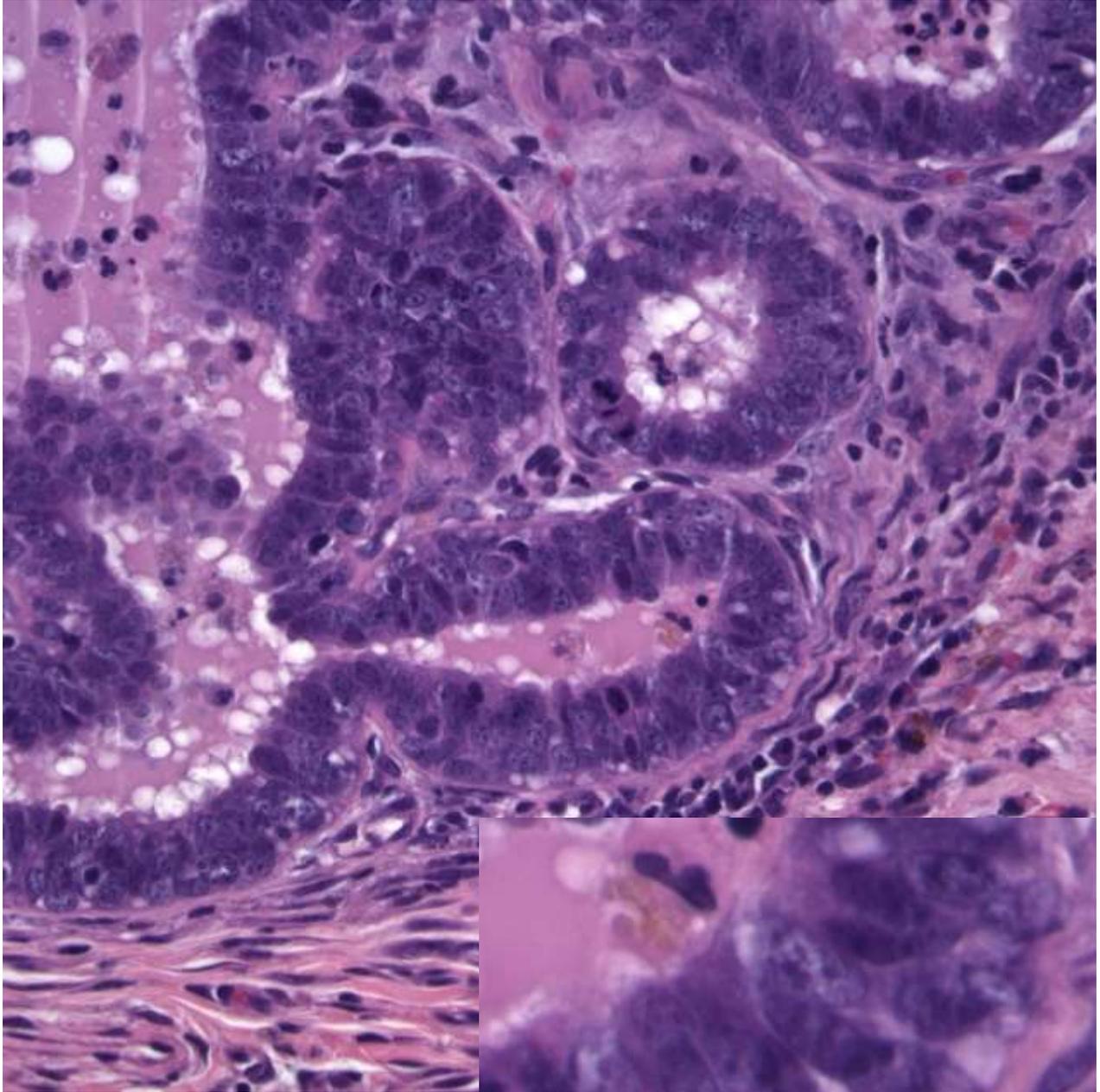
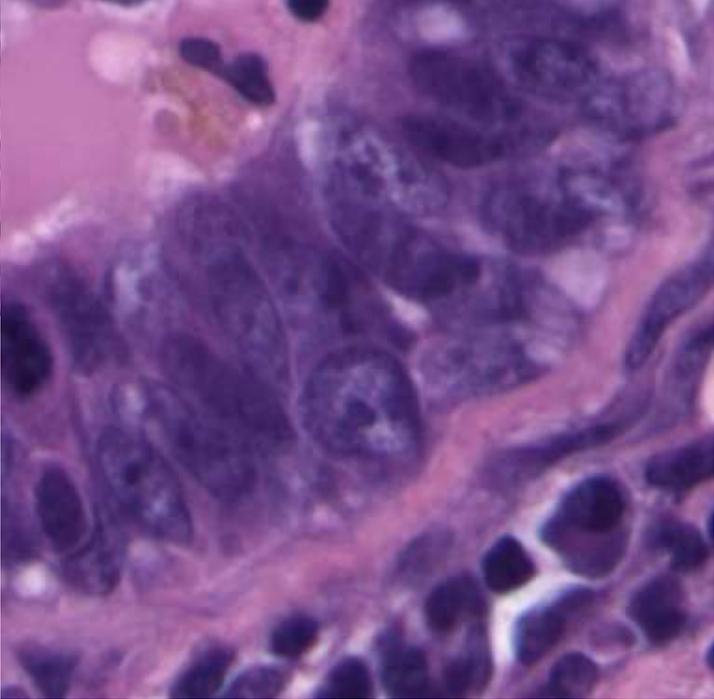


Figure 2 - Example image, 40X



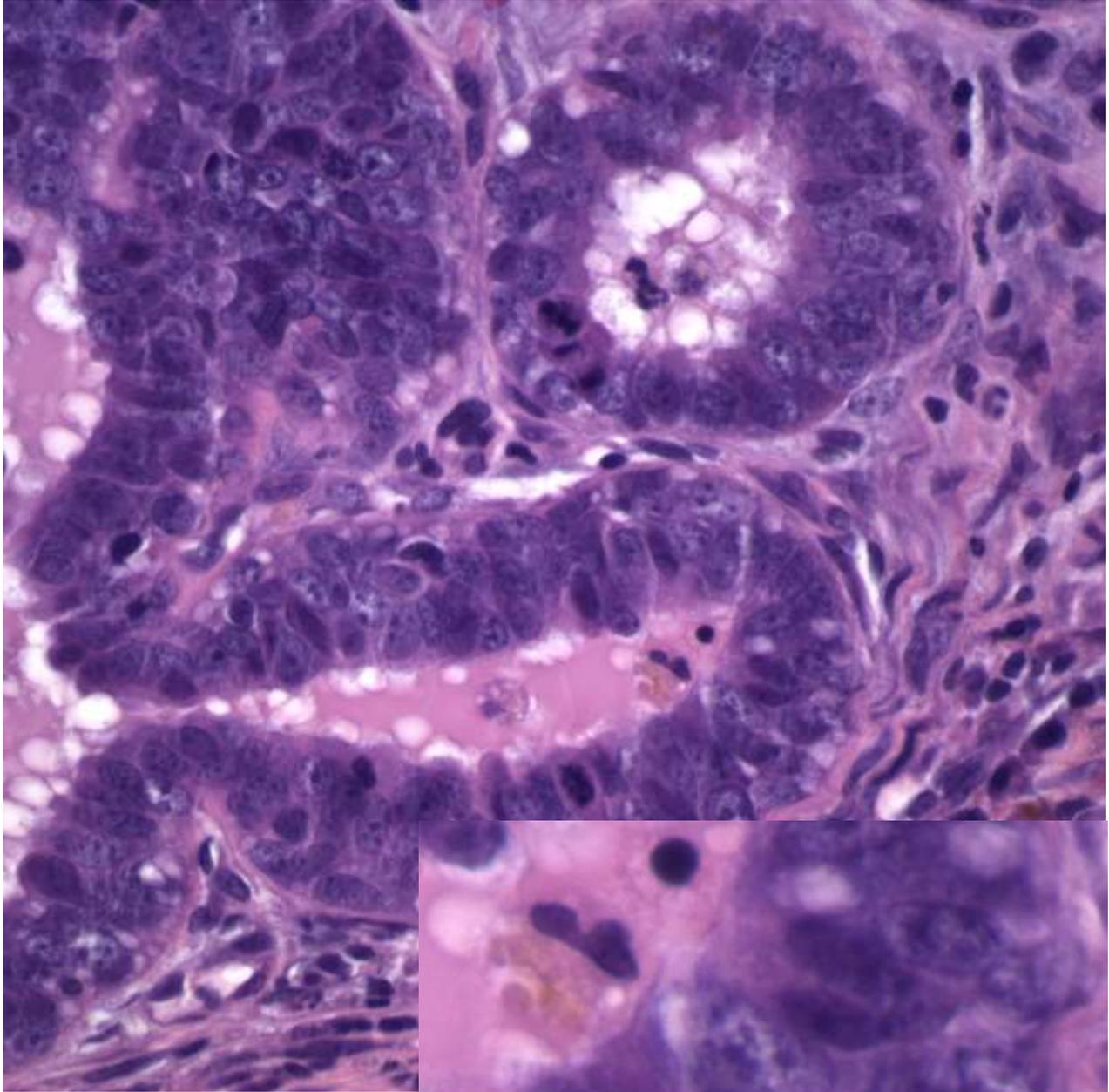
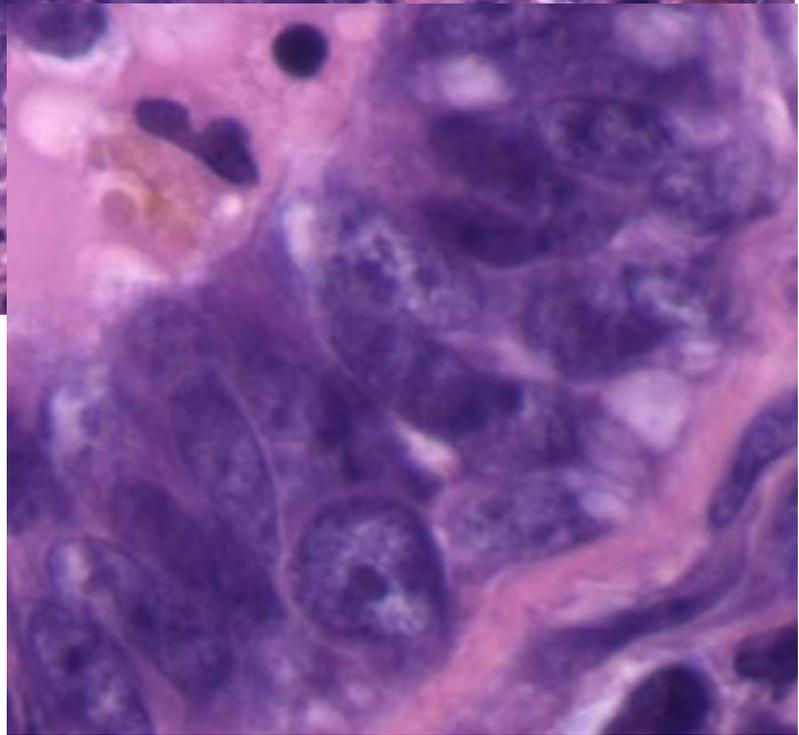


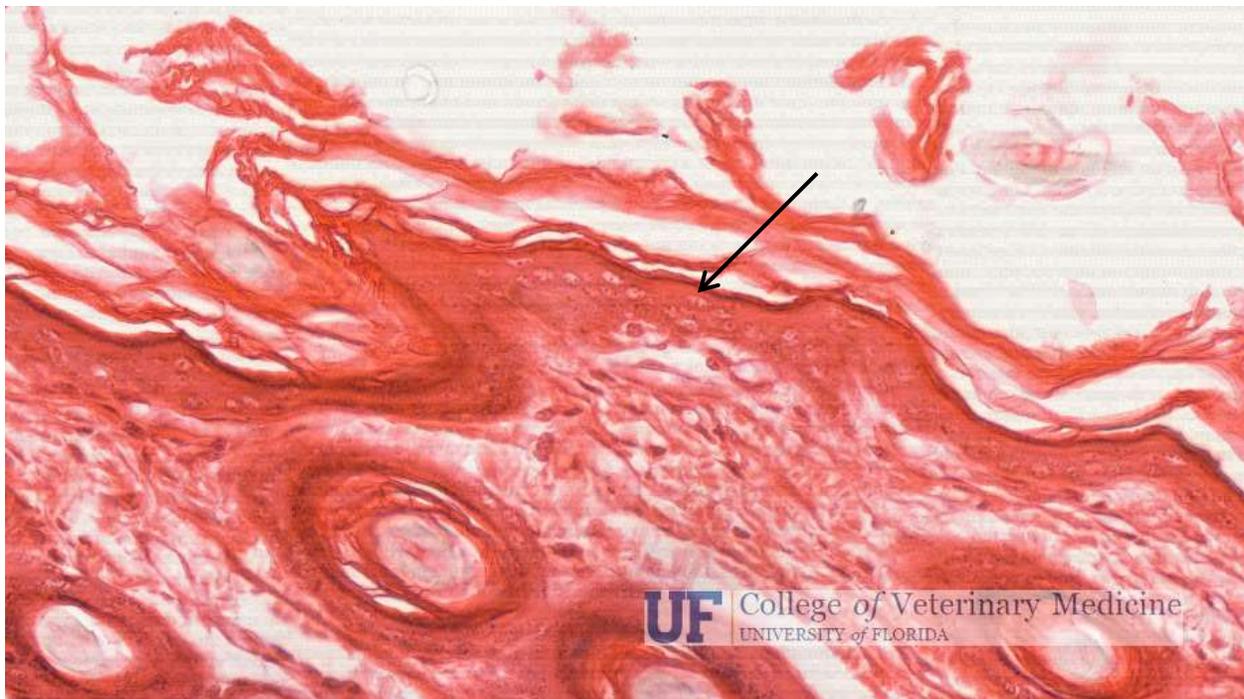
Figure 3 - Example image, 63X



Appendix C – Sample images from the current scanner



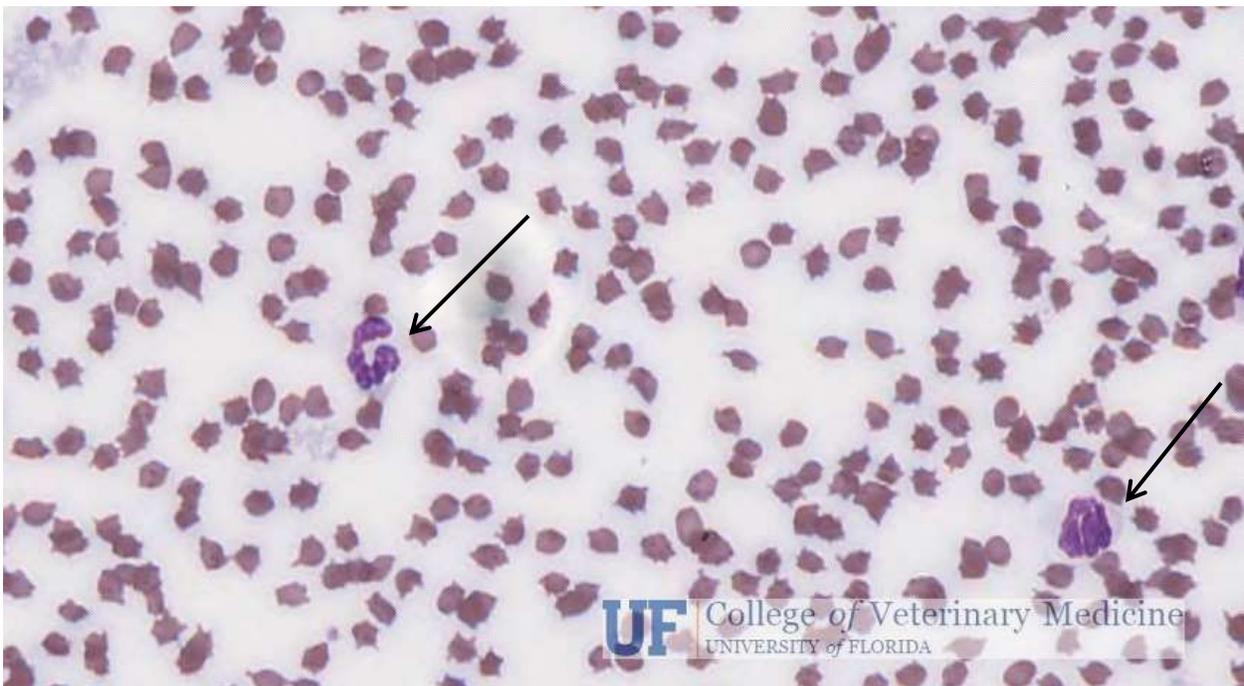
Slide Overview – the following images are from the area of the dot.



20X – At this magnification (which has the best optical quality with the current system, as it is the natural magnification of the objective), details of the epidermis (arrow) are almost impossible to make out.



40X – This magnification, achieved using an optical doubler, sacrifices some image quality for increased magnification. Even with the increased magnification, it is difficult to make out details of the epithelial cells (see arrow).



40X Blood Smear – Notice the lack of detail in the cytoplasm of the neutrophils (arrows). Higher magnification would allow students to appreciate intracellular bacteria.