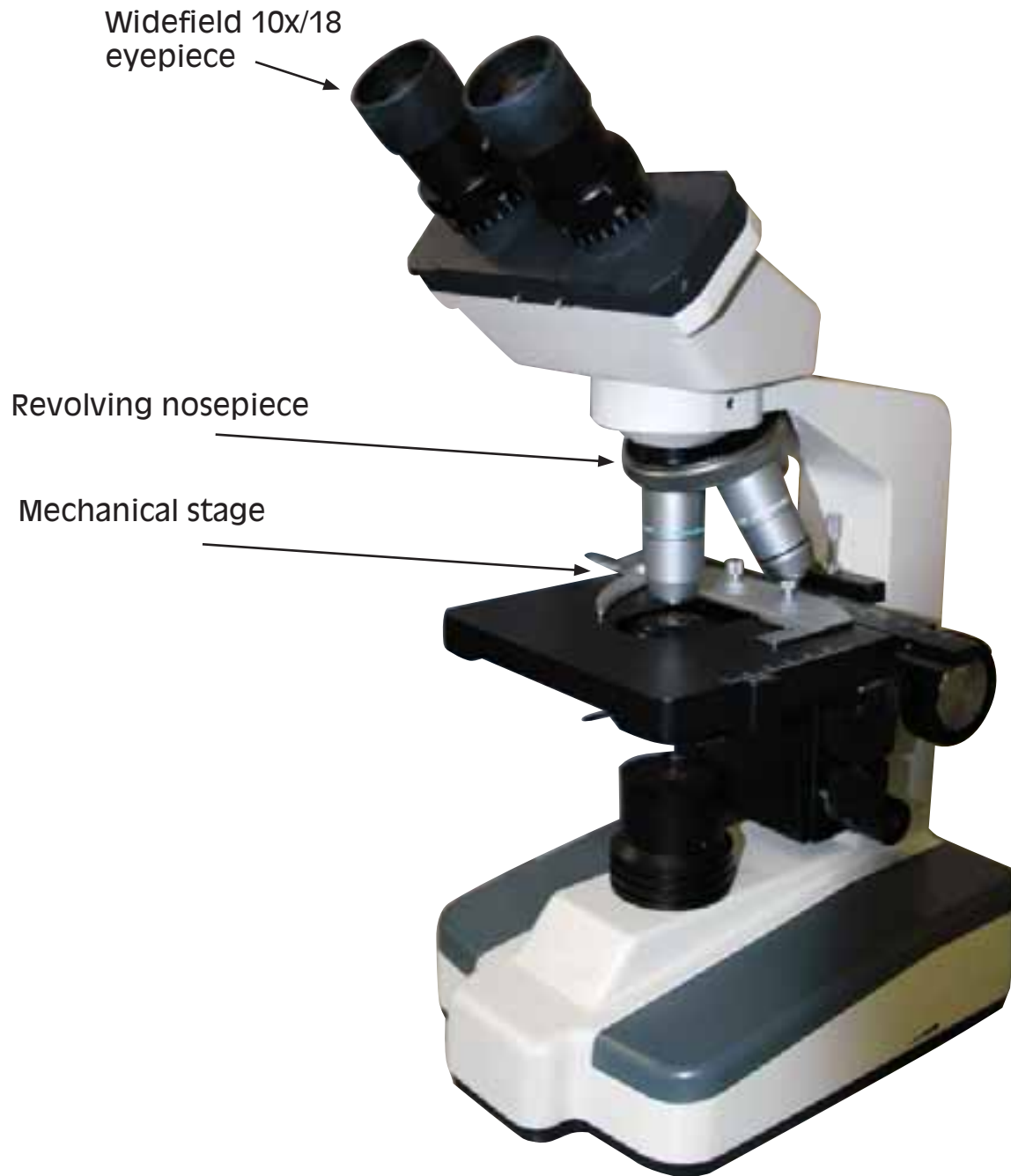


# LED Cordless Microscope



*Mann Lake Ltd.*  
*800-880-7694*

A new standard of precision optics, highly engineered mechanics and very rugged construction, all at little more cost than a budget microscope. Objective turret (nosepiece) is in reverse position to permit easier changing and positioning of specimen slides. College grade objective lenses. Cordless led illumination system provides optimum image brightness, completely heat free. 100,000-Hour rated led life.

## **OPTICAL SYSTEM**

- Widefield 10x eyepieces with pointer. Accepts optional #965-160 eyepiece reticle.
- 45° inclined binocular viewing head rotates 360° for easy sharing by more than one student.
- DIN standard 4x (0.10 N.A.), 10x (0.25 N.A.), 40xR (0.65 N.A.) and 100xR (1.25 N.A.) objectives are achromatic, parfocalled, parcentered and color-coded.
- Quad objective turret, reverse position, ball-bearing mounted for smooth, precise magnification changes.

## **LLUMINATION**

- LED light rated up to 50,000 hours life, illumination equal to a 20 watt tungsten bulb, totally heat free.
- Rechargeable AA nickel metal hydride batteries can be recharged up to 1000 times, each 8 hour charge providing up too 50 hours operation, total of 40-50,000 hours use from each set of 3.
- Included recharger shuts off when batteries are fully charged, indicator light turns from red to green.
- Eliminates danger of overcharging and shortening battery life, and the need of expensive recharger stations. Microscope can be used during recharging, or recharger can remain plugged in for conventional use.
- Rheostat light intensity control.

## **FOCUSING**

- Coaxial low position coarse and fine focusing controls.
- Stage moves up or down, eyepiece and body remain fixed.
- Safety rack stop prevents damage to slides and objective lenses.

## **STAGE**

- Large 135mm x 135mm (5-1/4 in. x 5-1/4 in.) stage, with professional quality, low profile mechanical specimen holder, low-position coaxial x-y controls.
- 1.25 N.A. Abbe condenser with rack and Pinion focusing mount, iris diaphragm, swing-out filter holder, with built in neutral filter.

## **FRAME**

- Rugged cast metal, gray enamel finish. Height 360mm (14-1/8 in.) Net wt. 3.1 kgs (6.8 lbs)

## **WARRANTY**

- Lifetime limited warranty, excluding bulb and batteries

# Nosema Disease Diagnosis

Collect 10-25 bees from the entrance of the hive. In poor weather, the sample can be taken from under the cover or the outside of the cluster. It is important that your sample is older bees since bees less than 8 days old have not had time to be infected.

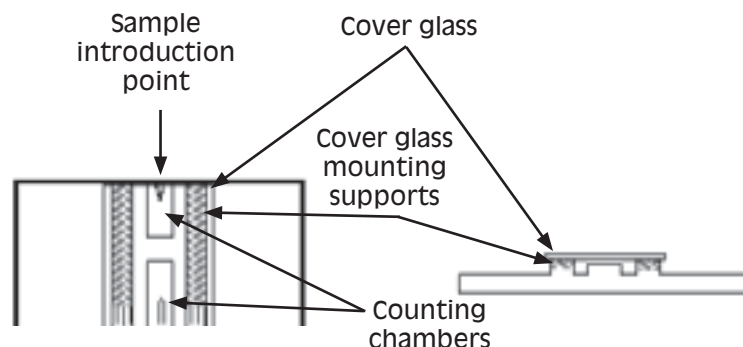
To estimate the overall infection for a yard, collect a number of bees from the entrance of several hives, a total sampling of 100 bees.

Place the bees in the freezer to immobilize them.

To prepare the counting chamber the mirror-like polished surface is carefully cleaned with lens paper. The coverslip is also cleaned. Coverslips for counting chambers are specially made and are thicker than those for conventional microscopy, since they must be heavy enough to overcome the surface tension of a drop of liquid. The coverslip is placed over the counting surface prior to putting on the cell suspension.

Once the bees are immobilized, remove the abdomen from each bee. Grind the abdomens with a mortar and pestle or place them in a zipper bag and crush with a rolling pin. Add 1 ml of distilled water per abdomen and mix well.

The suspension is introduced into one of the V-shaped wells with a pipet. The area under the coverslip fills by capillary action. Enough liquid should be introduced so that the mirrored surface is just covered. Allow the suspension to settle for a few minutes, the charged counting chamber is then placed on the microscope stage and the counting grid is brought into focus at 40x objective.

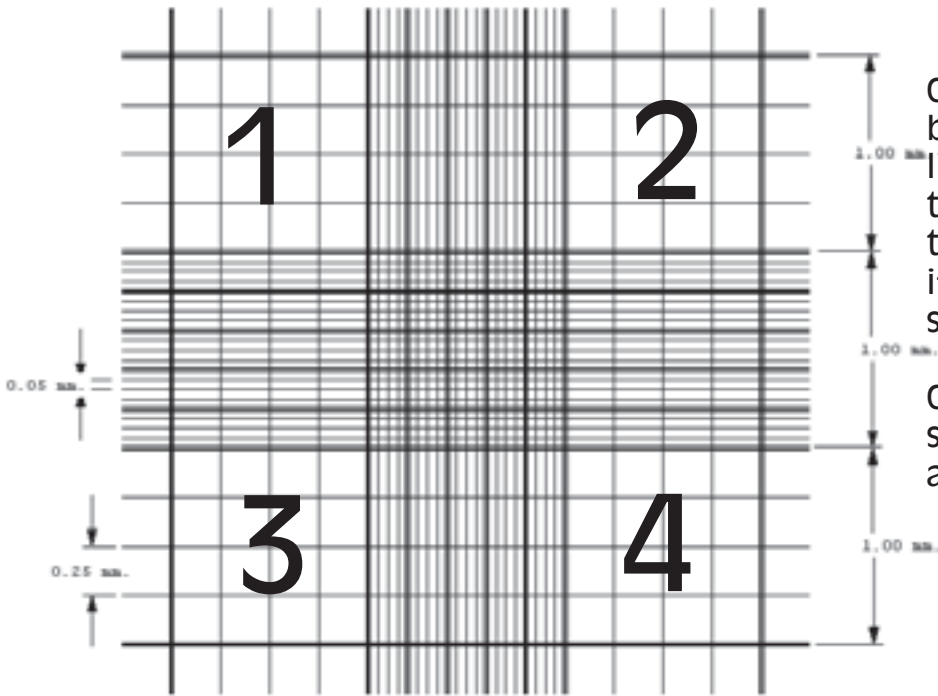


Cell Depth: 0.100mm +/- 2% (1/10mm)

Volume: 0.1 Microliter

Ruling Pattern: Improved Neubauer, 1/400 Square mm

Rulings cover 9 square millimeters. Boundary lines of the Neubauer ruling are the center lines of the groups of three. The central square millimeter is ruled into 25 groups of 16 small squares, each group separated by triple lines, the middle one of which is the boundary. The ruled surface is 0.10mm below the cover glass, so that the volume over each of the 16 small squares is .00025 cubic mm.



Count all the spores in the block bounded by the double lines. Score spores that cross the double lines if they are on the upper or right side but not if they are on the lower or left side.

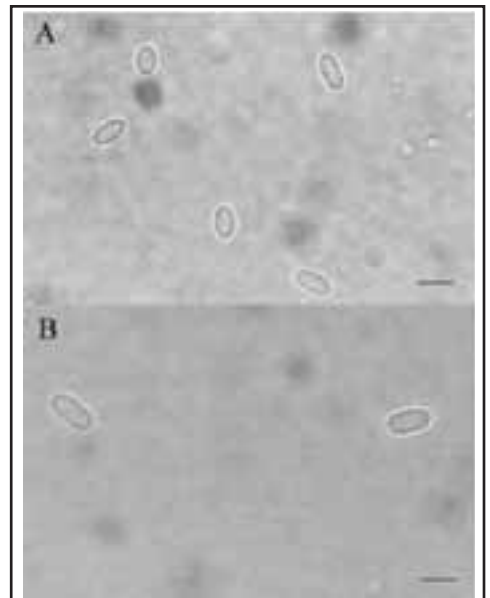
Count at least 4 blocks of 16 squares to obtain a good average.

Given that each small square in the chamber is 0.05 x 0.05 x 0.1mm, the total volume is 0.00025 mm<sup>3</sup>, that is 1/4,000 of 1 mm<sup>3</sup>. Determine the average number of spores per square and multiply that number by 4,000 to obtain the number of spores per cubic millimeter. To determine the number per cubic centimeter (milliliter), multiply the number per cubic millimeter by 1,000. If you started with the equivalent of 1 ml of water for each bee abdomen, you can use the equation below to determine the number of spores per bee, which is equal to the number of spores per cubic centimeter:

$$\frac{(\text{total number of spores counted})(4 \times 10^6)}{\text{total number of squares counted } (4 \times 16)}$$

or simplified

$$\frac{(\text{total number of spores counted}) 4,000,000}{(\text{total number of squares counted}) 64}$$



**Figure 1.** Spores of *Nosema ceranae* (A) and *Nosema apis* (B) in light microscopy squash preparations. Bar = 5 μm (from Fries, 2006, *Journal of Apicultural Research* 45(3):230–233).

To clean the counting chamber: After completing the count, remove the cover glass and clean the counting chamber with water or a mild cleaning solution (10% solution of bleach). Dry the counting chamber with a soft cloth or wipe, or rinse with acetone.



Counting Slide

- RL-200 LED Cordless Microscope.....\$595.00
- RL-215 Microscope Carrying Case.....\$ 95.00
- RL-220 Counting Slide.....\$150.00

As always, FREE telephone support from Mann Lake!