## Objectives 主旨

* + - 1. Obtain an epithelial cell sample from buccal cavity

從口腔分離表皮細胞

* + - 1. Learn the basic techniques of cell staining

學習基本細胞染色法

* + - 1. Observe a cell sample under a light microscope at magnification of 400X

使用光學顯微鏡以400X放大倍數觀察細胞

## Precautions 注意事項

1. Wear gloves when handling cell sample

處理細胞樣本時應戴上手套

1. Button up the laboratory coat during the experiment

請在實驗進行期間扣上實驗袍的全部鈕扣

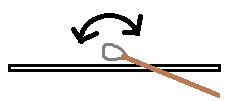
## Procedure 步驟

1. **Prepare Your Cell Sample 準備細胞樣本**
2. Use a cotton swab to gently scrape the internal surface of your buccal cavity several times in order to obtain an epithelial cell sample.

用棉花棒在口腔內側的表面輕刮數下，以取得口腔表皮細胞樣本。

1. Transfer the sample from the cotton swab to the center of a slide surface.

把樣本抹在載玻片中間。

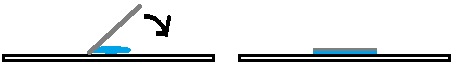


1. Add a drop of methylene blue on the surface of the sample.

在樣本位置滴一滴亞甲藍染劑。

1. Gently cover the sample with a coverslip at a ∠45° inclination angle, being careful to avoid trapping any air bubble underneath.

在樣本上以45度角小心輕放蓋玻片，盡量避免產生氣泡。



If necessary, remove any excess solution using a paper towel.

如有過量液體溢出，可用紙巾輕輕吸去多餘的液體。

1. **Operation of Microscope顯微鏡的操作**

***Points to note****:*

*Adjust the* coarse *focus knob before the fine focus knob, use the objective lens of low magnifying power before the one of high magnifying power.*

***重點****: 先粗調，後微調; 由低倍鏡上高倍鏡*

1. Connect the microscope to power supply and press the power switch from “○” to “I”.

將顯微鏡接上電源，並按開關至“I”。

1. Lower the stage to the lowest limit by rotating the coarse focus knob.  
   轉動粗調節器令載物台降到最低。



1. Bring the objective lens with the lowest magnifying power to the optical path by rotating the nosepiece (facing down vertically).

旋轉物鏡盤將最小放大倍數的物鏡對準光源（必須垂直向下）。





Magnifying Power   
of Objective Lens  
物鏡放大倍數

1. Place your sample on the stage carefully and mount the sample with the specimen holder. Ensure that the coverslip and sample slide are be facing upward.

將載玻片小心放在載物台上，利用載物台的標本夾將載玻片固定。注意蓋玻片及載玻片應朝上。



1. Use the x- and y-axis motion knobs to adjust the position of the sample until it aligns with the objective lens.

使用載物台的X- 及Y-軸旋鈕，將樣本位置調整至物鏡的正下方。

1. To set focus for a clear view, you might adjust the width of the eyepieces.

根據個人眼距，可調整目鏡間距直至雙眼視野一致。

1. First, ensure that you are starting with the objective lens of the lowest magnifying power (4X).

開始時，確定先從最低倍數 (4X) 的物鏡觀察樣本。

1. Rotate the coarse focus to get the rough outline of the cell.

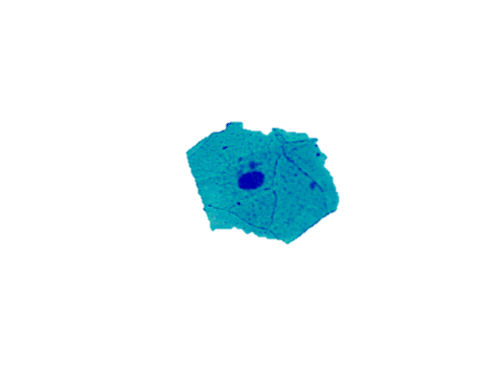
轉動粗調節器直至得到細胞輪廓影像。



Rough Outline  
粗略輪廓

1. Rotate the fine focus knob gradually until the observed image becomes sharp and clear.

慢慢轉動微調節器直至影像清晰。

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Sharp and Clear Image

清晰影像

1. Switch to the objective lens of higher magnifying power (i.e. 10X) by rotating the nosepiece. Rotate the fine focus knob gradually until the observed image becomes sharp and clear.

旋轉物鏡盤以選用更高放大倍數 (如10X) 的物鏡。稍微轉動微調節器直到圖像變得清晰。

1. Repeat “step 10” until the magnification equals to 400X.

重複「步驟10」直到該放大率等於400X。

|  |  |  |
| --- | --- | --- |
| **Magnification**  **放大率** | **=** | Magnifying Power of Eyepiece 目鏡放大倍數 |
| × |
| Magnifying Power of Objective lens 物鏡放大倍數 |

## Parts of Light Microscope 光學顯微鏡部件



Fine Focus Knob  
微調節器

Coarse Focus Knob  
粗調節器

Specimen Holder  
標本夾



Magnifying Power   
of Eyepieces  
目鏡放大倍數

**Eyepieces目鏡**



Magnifying Power   
of Objective Lens  
物鏡放大倍數

**Objective Lens  
物鏡**



Brightness Control  
光度調節

Focus Knob粗/微調節器

Objective Lens物鏡

Stage載物台

Nosepiece物鏡盤

Specimen Holder標本夾

Eyepieces目鏡

Stage Motion Knob  
X-/Y-軸旋鈕

Power Switch開關

Eyepiece Tube Screw  
目鏡頭固定螺絲

*Reference: Nikon Eclipse E100 Instruction manual*