

MICROSCOPE SET



INSTRUCTIONS

WARNING!

ONLY FOR USE BY CHILDREN OVER 10 YEARS OLD. THIS TOY CONTAINS FUNCTIONAL SHARP NEEDLE, ALSO FUNCTIONAL SHARP EDGE ON SCALPEL AND SLICER. THESE TOYS ARE NOT SAFETY PROTECTIVE DEVICES. TO BE USED SOLELY UNDER THE STRICT SUPERVISION OF ADULTS THAT HAVE STUDIED THE PRECAUTIONS GIVEN IN THE EXPERIMENTAL SET.

CAUTION!

CONTAINS SOME CHEMICALS WHICH ARE CLASSIFIED AS SAFETY HAZARD. READ THE INSTRUCTIONS BEFORE USE, FOLLOW THEM AND KEEP THEM FOR REFERENCE. DO NOT ALLOW CHEMICALS TO COME INTO CONTACT WITH ANY PART OF THE BODY, PARTICULARLY THE MOUTH AND EYES. KEEP SMALL CHILDREN AND ANIMALS AWAY FROM EXPERIMENTS. STORE THE MICROSCOPE SET OUT OF REACH OF SMALL CHILDREN.

ADVICE FOR SUPERVISING ADULTS

- Read and follow the instructions, the safety rules and the first aid information. Keep them for reference.
- The incorrect use of chemicals can cause injury and damage to health. Only carry out those preparations which are listed in the instructions.
- This Microscope Set is for use only by children over 10 years old.
- Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which preparations are suitable and safe for them. The instructions should enable supervisors to assess any preparation to establish its suitability for a particular child.
- The supervising adult should discuss the warnings and safety information with the children before commencing the preparations. Particular attention should be paid to the safe handling of the materials in the bottles (i.e. the dyeing solution), also the functionally sharp point on the needle and the functionally sharp edges on the scalpel and slicer.
- The area surrounding the experiment should be kept clear of any obstructions and away from the storage of food. It should be well lit, ventilated and close to a water supply. A solid table with a heat-resistant top should be provided.
- A separate tin or bucket should be used for the disposal of solid waste materials. Any wasted solution should be poured down a drain but never into a sink.
- To be used solely under the strict supervision of adults that have studied the precautions given in the experimental set.

EXPLANATION OF BOTTLES

EOSIN

Powder : To be mixed with water.
Examples for use: For observation of the stems and roots of plants, also observation of blood and muscle cells.

WARNING: Do not swallow. In case of accident. Call a Poison center or doctor immediately. Keep away from young children.

METHYLENE BLUE

Powder: To be mixed with water.
Examples for use: For observation of: Cellular tissue of plant's leaf, blade, and stem; mushrooms, molds, and bacteria; blood and muscle cells.

WARNING: Harmful Do not swallow. In case of accident. Call a Poison center or doctor immediately. Keep away from young children.

SODIUM CHLORIDE (SALT)

Please refer to last page for usage.

SHRIMPS EGGS: Please refer to later detailed explanation.

IMPORTANT TELEPHONE NUMBERS

To be completed by an adult before using the kit.

Poison Center:	
Hospital:	
Fire Department:	
Doctor:	

SAFETY INFORMATION

General First Aid Information

- In case of eye contact: Wash the eye with plenty of water, holding the eye open if necessary. Seek immediate medical advice.
- If swallowed: Wash the mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.
- In case of inhalation - Move person to fresh air.
- In case of skin contact and burns: Wash affected area with plenty of water for 5 minutes.
- In case of a cut: Wash the cut with antiseptic solution (if not available, use clean water). Then put on a bandage. In case of any serious injury, you should get first aid treatment and inform a doctor as soon as possible.

In case of doubt seek medical advice without delay. Take the material together with the container with you. In case of injury, always seek medical advice.

SAFETY RULES

- Do read these instructions before use, follow them and keep them for reference.
- Do keep young children and animals, and those who are not wearing eye protection away from the experimental area.
- Do always wear eye protection.
- Do store microscope sets out of reach of young children.
- Do clean all equipment after use.
- Do wash hands after carrying out preparations.
- Do not use any equipment which has not been supplied with the set.
- Do not eat, drink or smoke in the experimental area.
- Do not allow chemicals to come into contact with the eyes or mouth.
- Do not put foodstuffs in used container. Dispose of immediately.
- Do make sure that all containers are fully closed and properly stored after use.

CAUTION FOR HANDLING

- 1) The vital part of the microscope is the lens. Therefore, sufficient care must be taken in handling the lens. If the lens gets dirty or dusty; wipe the lens surface with a clean lens tissue or soft cotton cloth. Do not rub the lens with a finger or dirty cloth, etc.
- 2) After the microscope set is used, it should be covered with a cloth and be put back into the box for screening from dust.
- 3) Microscope should be stored in a moisture free place. Moisture buildup on the light will cause a reduction in light intensity.
- 4) When a microscope is not used for a long period of time, remove the light source batteries.

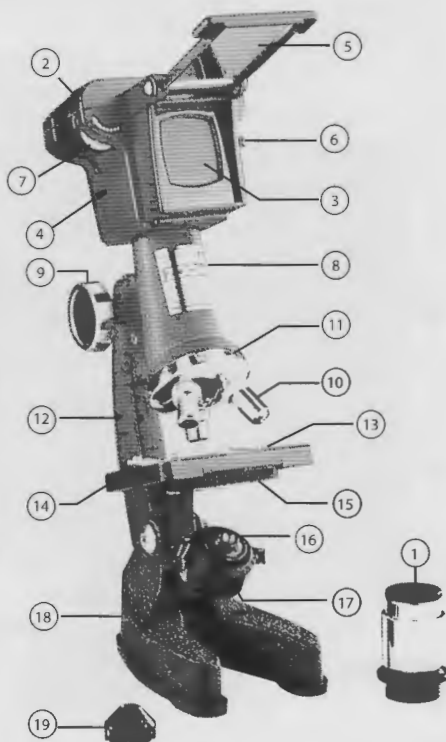
INTRODUCTION TO A MICROSCOPIC WORLD

In this world there is an abundance of living things. Some are large enough to be seen with our own eyes, but a lot of others are so minute that millions can be squeezed on the head of a pin. Of course these tiny organisms can only be seen through a microscope.

The microscope was invented many years ago. Since then it has opened a wider field of research, involving many things as fascinating and as beautiful as you can imagine. Today, from the most elementary study of biology to the highly specialized fields of physiology, some form of microscope has to be used for the students to understand better the elaborate, complicated forms of either living organisms or static materials, which make up our living environment.

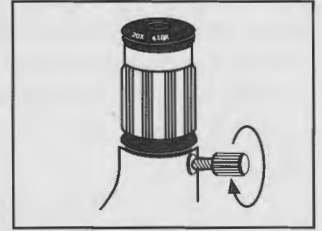
Your microscope will be either a source of fun for a long-time hobby or an opening door to advanced knowledge in various fields of science. We hope you will enjoy using it.

- 1 Eyepiece
- 2 Film Holder
- 3 Viewer Screen
- 4 Viewer Head
- 5 Reflecting Mirror
- 6 Shutter Lever
- 7 Film winder
- 8 Body Tube
- 9 Focusing Knob (HANDLE)
- 10 Objective Lens
- 11 Revolving Turret
- 12 Arm
- 13 Clip
- 14 Stage
- 15 Color Filter
- 16 Illuminator Lamp
- 17 Mirror
- 18 Base (BATTERY CASE)
- 19 Condenser Lens Cap

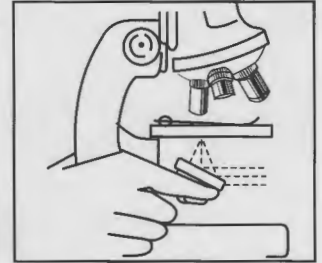


INSTRUCTIONS FOR USE OF MICROSCOPE

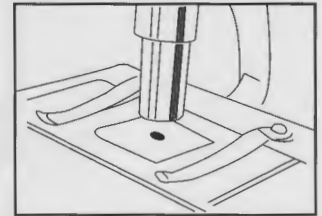
- 1 Insert Zoom eyepiece into the bodytube of microscope and tighten the screw at the back of the tube. If the viewer head is already in place, remove it by loosening the screw (refer to "USE OF THE VIEWER")



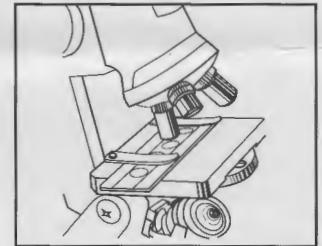
- 2 Tilt the arm of the microscope and adjust the position of the mirror so that the light is reflected through the stage hole. When the light can be seen through the eyepiece, the microscope is ready for observation.



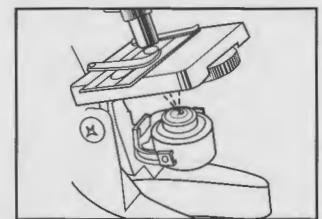
- 3 Put the prepared slide on the stage and fix it in place with the clips.



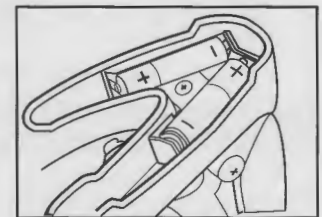
- 4 Now decide which magnification to use. The longer the length of the objective lens, the greater is the magnification. Usually observation begins with a low setting.



- 5 If you want to change magnification, turn the revolving turret until you feel a click.



- 6 Turn the focusing knob to lower the lens before touching the slide. Look through the eyepiece. Turn the knob in the other direction until the image comes into focus.



- 7 If the light is insufficient, or if the sight is not clear at a high magnification, turn the illuminator lamp. Light will be emitted automatically to enable observation.

- 8 The light source lamp is enabled with 2 'AA'(LR6) batteries being put inside the base as illustrated.

ZOOM MODELS:

The figure 10X ↔ 20X is indicated on the top of the Zoom eyepiece.

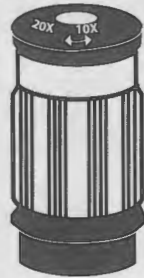
By rotating the silver knurled ring in clockwise direction, the eyepiece power will zoom to 20X. Conversely, if you rotate counterclockwise, the power will zoom to 10X.

Assuming that you are using an objective turret of 10X. With the eyepiece at 10X, the magnification power of the combination becomes $10 \times 10 = 100$.

The object you see is enlarged 100 times.

If you rotate the zoom eyepiece to 20X, you now have a combination of $10 \times 20 = 200$.

ZOOM EYEPIECE
10x-20x



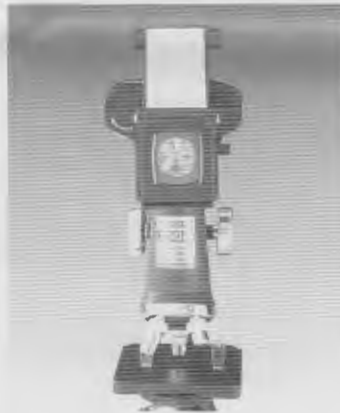
HOW TO USE AS A PROJECTION DEVICE

Take the viewer screen out of the viewer head and face it toward white paper or a white wall then you can see projected image. When you project the image, please do it in the dark room. You can see a clear image projected approximately one meter distance.



USE OF THE VIEWER

- 1 Loosen the screw under the eyepiece in counterclockwise direction. Replace the eyepiece with the viewer and tighten the screw. To increase the brightness of the image, cover the Illuminator Lamp with Condenser Lens Cap (provided in the set).



NEVER USE THE CONDENSER LENS CAP WHEN YOU ARE

LOOKING THROUGH THE EYEPIECE. Insert the plastic viewer screen into the slot on top and lift the reflective mirror (as shown in the picture above).

- 2 Carefully put prepared slide on the stage and beneath the clips. Adjust the positions of the slide and the illuminator such that the largest amount of light goes through the stage hole onto the objective lens. While moving the body tube by the focusing knob, look at the viewer screen to check for a clear projection of the sample. If the image on the screen is too dark, adjust the light source lamp, which should not be turned over 180° .
- 3 Observation of the sample can be made without interruption for about an hour, due to the life time of battery. When the microscope is not used, turn off the illuminator lamp by flipping the mirror side upward.

HOW TO USE THE DRAWING DEVICE

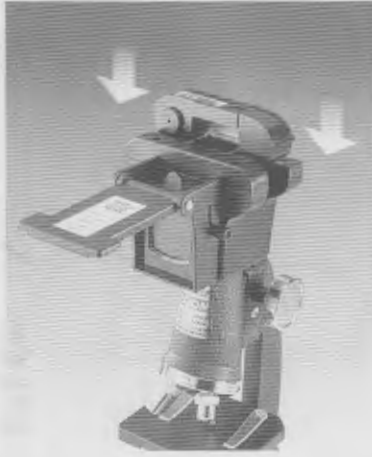
- 1 Adjust the arm to upright position. After the image has been projected on the screen, eliminate the light in the room.
- 2 Pull out the plastic viewer screen, and place a piece of white paper horizontally in front of the base of the microscope. Position the reflecting mirror as shown in the picture. Adjust the focusing knob until a satisfactory image is projected. Trace the projected image with the help of a pencil.

The size of projected image is about 70 mm dia.



HOW TO TAKE THE MICROPHOTO

- 1 Follow through the procedures of "USE OF THE VIEWER" on previous page.
- 2 Without the condenser lens cap on the light source lamp, turn the focusing knob slowly until a clear image is projected on the viewer screen.
- 3 In the direction of the arrows in the picture insert the 110 film pack into the film holder as shown.



Without the condenser lens cap on the light source lamp, turn the focusing knob slowly until a clear image is projected on the viewer screen.

In the direction of the arrow mark on the film holder, turn the film winder to wind up the film. You will see the arrow mark and film number by means of a small rectangular window on the 110 film pack

←←← 1 • 1 • 1 • 1 • 2 • 2 • 2 • 2

Set the inner 2 figures out of the 4 figures in the rectangular window.

- 4 Hold the microscope base with left hand and lift the shutter lever and release. Good results can be obtained only with the correct exposure time. Since the required time depends on the amount of light, color, magnification, density of specimen and film speed, there is no specific time. However, testing on exposure time was done in our lab, using slides of varying densities; and the best results lies within range of 0.5-1.5 sec.
- 5 Write the item's name, magnification and other reference on the prepared slides. These information will become useful when you take photographs next time.

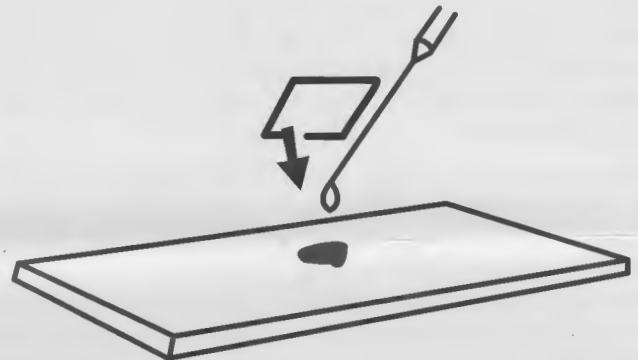
HOW TO MAKE A PREPARED SLIDE

If the given sample is not thin and transparent, it cannot be observed by the microscope as the light from the reflector or the light source does not pass through it. Fibres, pollen, wool, or salt can be observed easily and cover glass is optional. Clear samples are stained first with a drop or two drops of methylene blue, Eosin or other dyeing solutions available on the market. (Note: These are dyeing solutions and therefore could cause staining of clothing, carpets, and fabrics. Special care should be taken when handling these solutions.)

Also please read page 1 again "EXPLANATION OF BOTTLES", about the safety information associated with these solutions.)

1) Temporary mount

Wipe the slide and cover glass clean. Thin sample with a razor blade or the micro-slicer (Note: This process should be under an adult's supervision. The blade is very sharp and has to be handled with extreme caution. Please refer to following section for use of micro-slicer). Pick up thinned sample with tweezers and put it on the centre part of the glass slide. Put one drop of water on the sample with a dissecting needle, or if the sample is clear, use one drop of the above mentioned dyeing solutions (Note: The needle has a sharp point so handle with extreme caution) and then gently put on cover glass. Avoid to trap any air bubbles. Remove any excess water or dyeing solution with blotting paper. Now it is ready for observation. (Remember to wash your hands after doing the preparation and remember to dispose the dyeing solutions according to the instructions given on page 1 "ADVICE FOR SUPERVISING ADULTS")



2) Permanent mount

Wipe the slide and cover glass clean as above (Temporary Mount). Proceed as above. However before covering the slide with the cover glass, add a few drops of gum media (not included in the set- available from store) or Canada balsam solution or transparent adhesive glue with a dissecting needle to the slide. Push down on the cover glass with tweezers to fix it in place and leave to dry for about a day.

HOW TO USE THE MICRO-SLICER

Put the specimen which you want to cut for study into the holes of the micro-slicer (Note: the micro-slicer contains a sharp edge so handle with extreme caution). Revolve the blade. Then you can get thin slices of the specimen.

RAISING A FAMILY OF BRINE SHRIMPS (NOT FOUND IN ALL SETS)

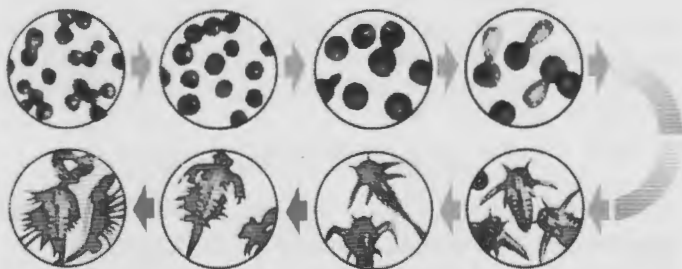
It is relatively easy to rear a batch of brine shrimps in the home laboratory. The tiny crustaceans are excellent specimens for the microscope studies, being similar in many ways to their bigger relatives, the lobsters, crabs, and crayfish. Furthermore, the brine shrimps enrich the diet of aquarium dwellers.

What makes the brine shrimp easy to raise is that its eggs hatch in a relatively short time, from twenty-four to forty-eight hours. The eggs are sold dried in small bottles or vials. Dried eggs remain alive for five years or more if they are stored in a cool dry place. Almost every aquarium shop carries a supply of the dried eggs of the brine shrimp.

In order to hatch eggs, first of all float them in a container of sea water. If sea water is unavailable, prepare a brine solution by adding two teaspoons of table salt to a quart of water.

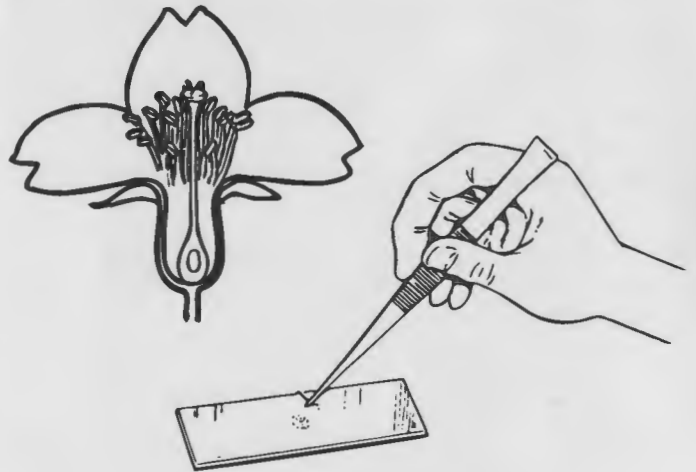
Sprinkle some brine shrimp eggs over salt solution and allow it to stand at room temperature (70 - 80 F / 21-26 C) for a day or two. The eggs will hatch into the nauplius larvae which is the early life stage of most crustaceans. To bring the larvae to maturity, transfer a small number to another container, for if they are left to fend for themselves in the original culture they will begin to suffer from lack of oxygen and die off shortly.

Prepare some fresh brine solution and add a small quantity of yeast to serve as food for the developing larvae. With a pipette, transfer some of the new culture and allow them to grow to maturity. Examination of the culture at frequent intervals will reveal the entire life cycle of the brine shrimp, *Artemia salina*. Be sure to observe the dried eggs, hatching eggs, nauplius larvae, and the mature shrimp. When brine shrimps are fed to aquarium dwellers, they should be strained out of the brine solution with a piece of fine meshed cloth. It is wise to wash the brine shrimp with fresh water before introducing them to the aquarium as the sudden increase in salt content may be harmful to fish.



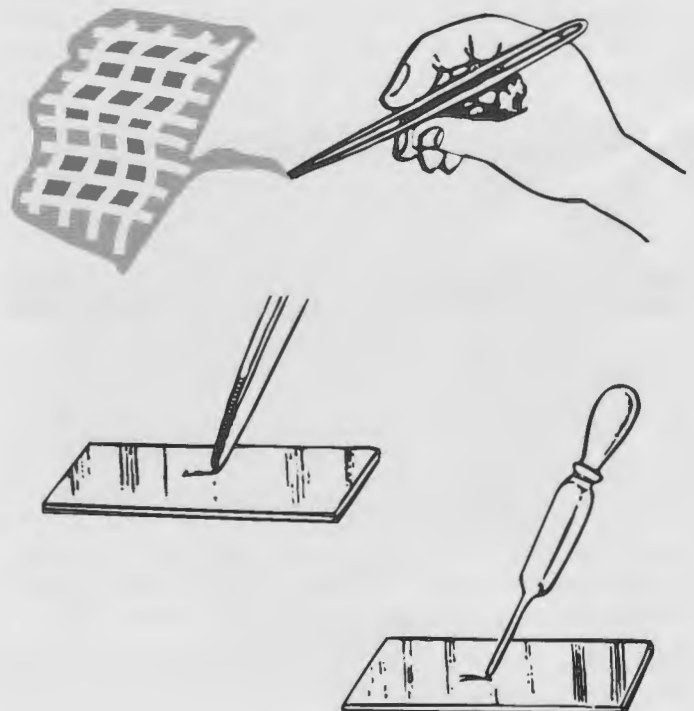
OBSERVATION OF POLLEN

With a pair of tweezers, take out a piece of filament from the flower. Slightly shake the filament such that a little amount of pollen fall onto the slide (too much pollen will make observation difficult). At last, you may want to put on the glass cover.



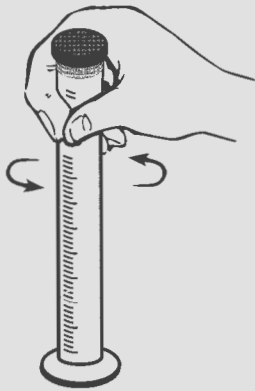
OBSERVATION OF FIBROUS TISSUE

Try to get a piece of worn fabric or a piece of thread. If the piece of fabric is torn or run, you may see some threads on its edge. Take a closer look. You will discover that each piece of thread can be separated into small pieces, which are called "filaments" or "fibres". Place a small quantity of fibres on a blank slide and drip one drop of water on it with the point of a pipette. You can put on the cover glass and observe under the microscope.

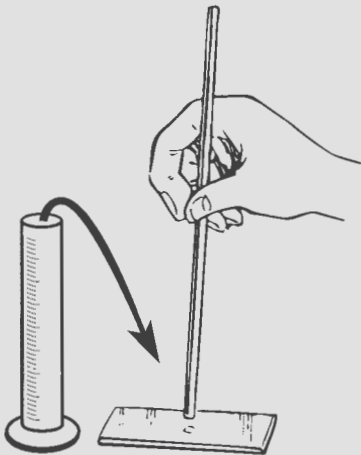


OBSERVATION OF SALTS

- 1 Fill a cylinder with warm water until the water level reaches $\frac{1}{4}$ of its height. Dissolve salt into the water. Add more salt until the salt does not dissolve anymore. Swirl the cylinder constantly while dissolving the salt.



- 2 With a small stick or a pipette, take out a small amount of salt water and drip it on a blank slide. Do not over drip.



- 3 Observe how crystals are gradually formed while viewing through the microscope.

OBSERVATION OF STARCH

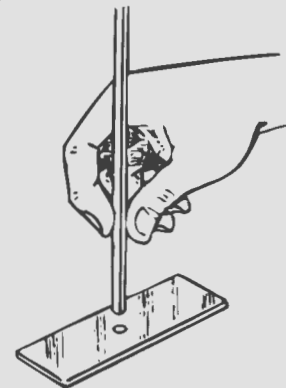
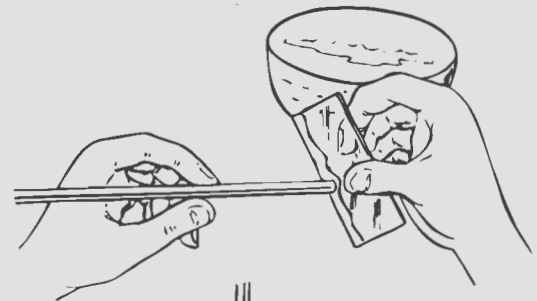
- 1 Ask your parents to cut a thoroughly washed potato into 2 pieces.



- 2 Rub the cut surface of the potato with a blank slide as it is illustrated below, until white liquid is formed on the surface of the glass.



- 3 With a stick or a pipette, take a small amount of this white liquid from the slide and paste a very little amount on the center of the blank slide. Make sure the stick is absolutely clean.



Cover the sample with a cover glass before observation under the microscope.