THE MOTION PICTURE IN MEDICAL EDUCATION

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GRATEFUL ACKNOWLEDGMENT IS HEREWITH ACCORDED TO THE MANY PHYSICIANS AND SCIENTISTS WHOSE CONTRIBUTIONS ARE INCLUDED IN THIS MOTION PICTURE.

This is the mitral valve of a dog's heart. Although you probably recognize it, the chances are that [...] this particular film before, you have not seen the action of the valve from the inside. In the presentation to follow, a variety of shots have been taken from complete film productions in different fields of medical science. They have been assembled in order to demonstrate the special qualities of a motion picture which make it a unique medium for teaching many subjects.
It is hoped that this presentation will act as a stimulus to greater use of the many excellent teaching films now available.
This particular sequence showing heart function was selected for inclusion because it illustrates a situation in which the motion picture can demonstrate this material to a large audience better than any other method.
An animated diagram - one of the important teaching devices of the motion picture - is used at the beginning of the same film on the mitral valve to explain the basic set-up of the experiment. The left side of a dog's heart has been completely bypassed while the right side continues to function. A pump drives the blood, oxygenated in the left lung only, through the cannula in the femoral artery to the lower limbs and retrograde through the aorta to the upper part of the body, back down the arch thus keeping the aortic valve closed.
A diagram before each section orients the observer.
In this view, the auricular side of the mitral valve is seen, and as saline is washed into the ventricle, one sees the aortic cusp billowing up from the right side and furnishing about three-fourth of the closure.
The camera is thus able by photographing the mechanical heart to reveal certain aspects of the dynamics of the mitral area.

In cinemicrography of lymph vessels in the mesentery of the rat, function may be observed microscopically. These spontaneous contractions of the vascular wall are due to contractile elements above the valves.

Here is the same scene in phase microscopy. The lymph is propelled by the peristaltic action. When the vessels relax, the minute valves close and prevent it from flowing back.
Dark field illumination shows the contraction of the vascular wall and the play of the valves particularly well.

The fluoroscope provides yet another tool for the study of physiology. With the development of new techniques and photographic apparatus, the moving image on the screen may now be recorded safely. By making repetitive prints, these may be used for unlimited future study as well as demonstration to many doctors at the same time. No other medium can portray and teach such phenomena to a large group together.
These scenes show the movement of a bolus and its propulsion into the esophagus. The action of the soft palate, the glottis, and other structures in the region of the pharynx can be studied in these revealing films. A wide variation possible in normal swallowing is illustrated by this demonstration of a beer-drinker emptying a full glass in a few seconds.

This film excerpt shows a typical laboratory set-up used as an introduction to mammalian experiments in physiology…
BLUNT DISSECTION
A prescribed method for placing a cannula in the femoral vein of a cat is shown with generous use of close-up enabling the students to follow the technique in detail.
FEMORAL V.
2% PROCAINE
Thus all students will approach their own laboratory experiments with the same background of experience, a background gained from observation of the method the professor wants them to follow.
VENOUS CANNULA
The acquisition of manual dexterity and technical skill can come only from an individual carrying out such experiments himself. However, where a demonstration is performed first by the professor, film has definite advantages. It brings the details to all in the classroom. It assures that the proper technique will be shown each time and that a successful outcome to the experiment will occur. And last but not least, it saves laboratory animals.

As an exhibit in pharmacology, we take advantage here of the split-screen technique to correlate heart action with a simultaneous electrocardiographic recording. An overdose of digitalis is given and we see its progressive effects on the heart. A lengthened PR interval accompanies evident changes in the character of the beat and idioventricular rhythms take over.

NORMAL
ACETYLCHOLINE
The split-screen technique is again used by the pharmacologist in observing the effect of various drugs on intestinal motility. By placing the picture of a normal gut …
EPINEPHRINE
… above that of another after administration of various drugs, a comparison of peristaltic action is shown.
NEOSTIGMINE

Such direct visual comparisons can convey more than words in a text, and show the student what to expect from his own experiments.

33rd DAY

The complicated process of embryology can be pictured in a text book only by static illustrations, but the animated diagram can integrate the stages of development and provide a smooth flow of movement.

From the embryology of the eye comes …

34th DAY

…this sequence on the development of the lens. Here the accompanying narration of the film describes…

35th DAY

…how the columnar cells in the posterior portion of the vesicle are seen steadily growing longer…

36th DAY

…and gradually obliterating the lumen. These are the primary lens fibers.

37th DAY

In the audiovisual concept…

38th DAY

…of education…

39th DAY

…teaching is achieved…

40th DAY

..by simultaneous impact on eye and ear.

41st DAY

Thus by associating verbal symbols with visual…

44th DAY

…the student is also learning nomenclature.

47th DAY

For example, we return here to the script as the second stage in development of the lens begins…

7th WEEK

…once a roughly spherical shape is achieved. In the region of the equator, some of the cuboidal cells elongate to form the first secondary fibers. They are thick at the equator but…

EPITHELIAL CELLS AND PRIMARY FIBERS ARE REMOVED TO SHOW SECONDARY FIBERS.

… taper as they grow towards the front and back of the lens. This picture explains that because they can't become thin enough at the ends to meet other fiber ends at a single point, a linear suture results.

This film uses photomicrographs interspersed at intervals to document the section shown in the diagrams.

PAROTID GLAND

SUPERIOR CERVICAL GANGLION

In the teaching of anatomy, diagrams and animation likewise find their place.

T1

T2
As part of a presentation on the autonomic nervous system, the innervation of the salivary glands is discussed. The sub maxillary gland is shown to be innervated by both parasympathetic fibers (blue-dotted lines) and sympathetic fibers (red lines).
SUBMAXILLARY GLAND
SEROUS CELLS
MUCOUS CELLS
Mucous and serous cells of the gland are stimulated by both types of fibers: sympathetic stimulation produces a scanty, viscous saliva and parasympathetic stimulation leads to a thinner watery saliva.
VASCULAR SUPPLY
It is pointed out that vasomotor components may well have additional effects on the quality of the secretion.
VASOCONSTRICTOR
VASODILATOR

Histology can become a dynamic course of study when living cells and tissue cultures are photographed by time-lapse photography so that the action taking place over hours or days is compressed into seconds on the screen.
With Wright's stain, the polymorphonuclear neutrophilic leukocyte presents this characteristic appearance. Here the details of form and movement of an actual living cell of the same type are shown. Since such processes cannot be seen under normal conditions at normal speed, the motion picture alone, by taking successive pictures at regularly spaced intervals, can record important changes in morphology and physiology. These records over periods of time are not only teaching aids but may be invaluable in cancer study and research.

When normal histology merges into pathology, a study of disease processes may be recorded also by cinemicrography. Here we are watching normal circulation in the omentum of a rhesus monkey. A Y-shaped venule is on the left. An arteriole is on the right. The flow is so fast that no individual red cells can be seen and the vessel lining is smooth and clean.
We now turn to photomicrography of an omentum of a monkey infected with knowlesi malaria*, some of the earliest pictures of mammalian disease ever made through a microscope. This is a picture of what is popularly known as "sludge blood" which sloshes back and forth as the heart fails to keep it going.*
This scene shows large clumps indicating hemoconcentration and a continuous loss of plasma. Severe anemia may be noted here and white cells line the walls of the venule. The fat cells are far apart indicating frank edema.

The autopsy is a focal point of importance to the pathologist. This sequence is part of the section on the examination of the cranial cavity. The frontal lobes are depressed with the left hand as the anterior attachment of the falx cerebri *is cut from the* crista galli. *The first nerve is reflected back off the cribriform plate and the optic nerves are cut. Leaving stumps for tying, the internal carotid arteries are cut.*
Incising the tentorium cerebelli *on either side permits the cerebellum and brain stem to be rotated backward. This technique, in which we are shown a detailed demonstration of the removal of the brain, is but one part of the total autopsy recorded for teaching.*

The bacteriologist uses motion pictures to follow and demonstrate processes such as growth and spread of organisms. Through the microscope, Escherichia coli *are observed. In a dark field picture we see normal cells, short plump rods with strong spontaneous movement.*
PENICILLIN G
If penicillin is added to the nutrient solution, a partial inhibition of movement appears. After one hour, we find definitely elongated rods with diminished motility. After three hours, comb-like distensions of the cell body appear which are even more marked one hour later.
We can watch the development of bacterial colonies in a solid nutrient medium particularly well by time-lapse photography. These normal colonies are photographs speeded up 250 times. In the presence of penicillin, cell division is largely depressed. Many changes characteristic of the effect of various antibiotics can be observed in this manner and give a clue to the mode of action of these drugs as well as indications for the concentration which will have most effect.

An anatomist has made a unique photographic record of ovulation in a rat. The periovarial sac has here been opened. The ovary is on the far left and an ovum, stained with methylene blue, has already reached the entrance to the oviduct whose fimbriated end extends down into the periovarial space.
In this scene, with transillumination, we're going to watch the actual process of ovulation. The follicular membrane on the surface of the ovary is becoming thin, and here we see its rupture. Follicular fluid now flows out.
And this is followed by some of the granulosa cells which, like the ovum, have taken up the blue stain. Finally, the ovum emerges, enclosed in a number of layers of follicular cells. The released egg is not carried by ciliary activity toward the ostium. Here it is transported into the fimbriated end of the oviduct by ciliary and muscular movements.

In teaching methods of physical diagnosis, as in cancer detection, the film can demonstrate clearly and accurately the manual skill which an instructor wishes his students to learn. Palpation of the breast is shown here with the patient in a supine position. The flat of the hand enables the examiner to feel as much of the breast as possible at one time. Fingertip palpation may be helpful in the discovery of small masses. The examination should cover the nipple and the areola and extend outwardly to include all quadrants of the breast. Palpation should be gentle but thorough and an established pattern of examination should be followed. All these points have been clearly visualized.

In the study of orthopedics, the approach to various regions of the body has been documented on film using both diagram and dissection. This sequence shows the surgical approach to the hip joint. The incision has been deepened to the muscle layer and the lateral femoral cutaneous nerve has been identified and retracted.
At this point, the objectives are reviewed in diagram-form. The various muscles are identified, the underlying bone structure is visualized, and structures around the joint are described. Depicting the anatomy of the region in this manner allows for clear and slow definition of the principles underlying the procedure.

In surgical procedures, schematic diagrams also visualize for the student, portions of an operation which are difficult if not impossible for the camera to see. Here for instance, during

an operation for mitral stenosis, the steps in performing a finger fracture of the valve are illustrated. The right index finger has been inserted into the opening made in the auricular appendix. It approaches and engages the stenotic opening of the valve. The finger is moved in an anterolateral direction. On completion of the unilateral commissurotomy, it plunges through the valve until the middle joint fills the orifice, creating a linear fracture of the stenotic opening. As the finger is withdrawn, the assistant pulls the purse-string suture tight and ties it.
The same procedure is followed and illustrated in live action by the surgeon, although the finger obviously cannot be seen inside the heart. The tip of the finger is now engaged in the valve. Using the maneuver previously illustrated, the opening is enlarged and the commissurotomy is done.
Diagrammatic explanation of such procedures adds greatly to the value of many surgical films.

Endoscopic photography has been made possible by the development of specially designed photographic equipment. In skilled hands, bronchoscopic motion pictures has been made of a wild variety of pathologic conditions found on examination. This shot is of a patient with an adenoma of the left lower lobe bronchus.
The soft tumor is seen moving back and forth with respiration.

Multiple papillomata were observed in this patient. One papilloma is seen on a vocal cord and as the point of critical focus is carried deeper, another larger growth in the trachea is evident. Not only are pictures such as these invaluable aids to the study of clinical conditions but they also save lengthy periods of observation by students, distressing to the patient and difficult under best conditions.

This patient has severe bronchial asthma. Note the tremendous collapse of the trachea, carina and both main bronchi during cough or expiration. As the scope advances down the bronchus, the film shows dramatically how the posterior walls of the trachea and bronchi are pushed anteriorly during expiration.

What you have seen represents a few of the subject areas in which excellent teaching films exist. They are available from many sources including the library of the American Medical Association. Yearly, requests for these come from nearly every medical school in the country and the total number of films so used continues to mount steadily.
In addition, the complete files of the AMA today contain records of many hundreds of teaching films.

MEASURING THE EFFECTIVENESS OF SOUND PICTURES AS TEACHING AIDS
BY VARNEY C. ARNSPIGER, Ph. D.

CHAPTER XII
AN EXPERIMENTAL COMPARISON OF THE METHODS OF ORAL AND FILM INSTRUCTION IN THE FIELD OF HEALTH EDUCATION
CAROLYN HOEFER AND EDNA KEITH
THE PROBLEM

VARIOUS EXPERIMENTS HAVE BEEN CONDUCTED TO EVALUATE THE MOTION PICTURE IN THE FIELD OF EDUCATION BUT THESE HAVE BEEN IN SUCH SUBJECTS AS GEOGRAPHY, HISTORY, ETC., WHERE THESE METHODS OF…

Research and experience have established the effectiveness of films used for teaching selected information and concepts.

TECHNICAL REPORT – SDC 269-7-13
RELATIVE EFFECTIVENESS OF INSTRUCTION BY:
FILMS EXCLUSIVELY
FILMS PLUS STUDY GUIDES
STANDARD LECTURE METHODS

PRINCIPLES OF SCIENTIFIC TEACHING FILM PRODUCTION
WITH SPECIAL REFERENCE TO THE MEDICAL FILM

AN EXPERIMENT ON THE TEACHING VALUE OF A SCIENTIFIC FILM
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As one of many media which are part of the science of communications, the motion picture takes its place in the medical curriculum of today.

1st YEAR PHYSIOLOGY
3.00 PM TODAY
MOTION PICTURE
"KIDNEY FUNCTION"

FOR FURTHER INFORMATION CONCERNING THE AVAILABILITY OF MEDICAL TEACHING FILMS, WRITE TO THE AMERICAN ASSOCIATION.

THE END
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Transcript: Inès Bailly