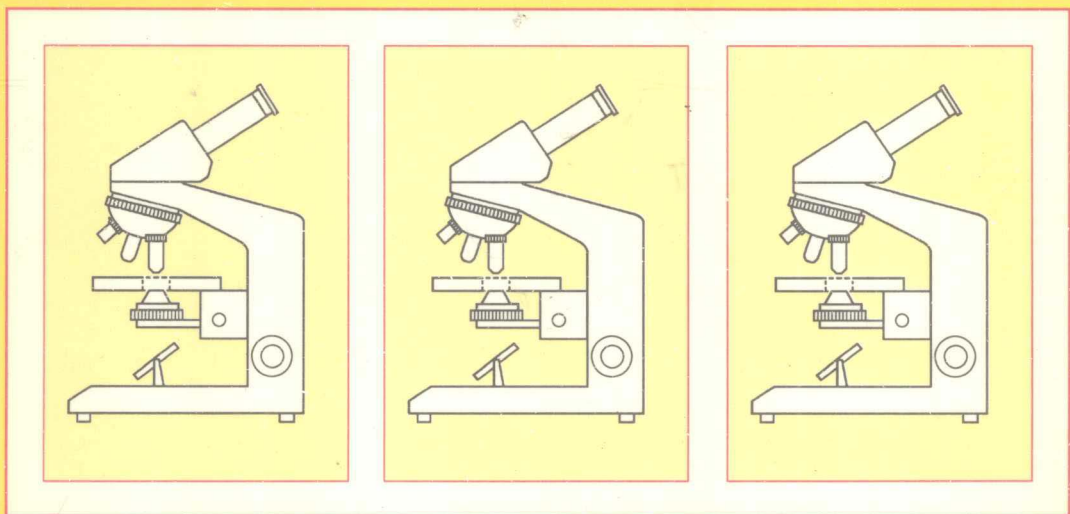


Basic malaria microscopy



Part I. Learner's Guide



World Health Organization
Geneva

Basic malaria microscopy

PART I

Learner's Guide



World Health Organization
Geneva
1991

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Contents: pt. I. Learner's guide — pt. II. Tutor's guide

1.Malaria — diagnosis — laboratory manuals 2.Microscopy — laboratory manuals 3.Teaching materials

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Preface

This training module on basic malaria microscopy is in two separately bound parts. Part I, the Learner's Guide, contains all the technical information that will be needed by trainees in this field. Part II is the Tutor's Guide, which gives extensive advice for those responsible for organizing, running and evaluating training programmes.

The module is one of a series of three¹ to be published by the World Health Organization, each concerned with a different aspect of the control of malaria. It can stand alone as a medium for teaching malaria microscopy to public health and laboratory personnel, or can be used as an integral part of a longer and more comprehensive programme of training in malaria.

In 1988 WHO published *Bench aids for the diagnosis of malaria*, which comprise all the colour plates that appear in the Learner's Guide and much of the core information. These bench aids are published in the form of separate laminated sheets, which are very robust and easy to use at the laboratory bench. While it is not essential to provide these for use during training courses, they are recommended for use by all health workers engaged in routine malaria microscopy.

The need for this module was identified by Member States in the Eastern Mediterranean, South-East Asia and Western Pacific Regions of the World Health Organization, and the project was conceived by Dr McWilson Warren, former Team Leader of WHO's Interregional Secretariat for the Coordination of Malaria Training in Kuala Lumpur, Malaysia. Work on the module was one of the major activities of the Secretariat. The original text was written by Mr John Storey and the colour plates in Part I are taken from watercolour paintings meticulously prepared by Mr Yap Loy Fong.

The text, particularly that of Part II, has been reviewed by numerous individuals and revised by Dr P. F. Beales, Dr C. W. Hays, Dr D. Payne and Mr W. Rooney. Editing of the entire module was undertaken by Professor Michael Colbourne.

WHO wishes to acknowledge the collaboration and financial support provided by the United States Agency for International Development for this and other activities of the Interregional Secretariat for the Coordination of Malaria Training.

¹ Also in preparation: *Basic in vitro tests for antimalarial drugs* and *Entomological field techniques for malaria control*.

Introduction

This Learner's Guide, Part I of the publication *Basic malaria microscopy*, is made up of teaching material on each of the activities involved in diagnosing malaria by microscopy. Together with Part II, the Tutor's Guide, it forms one component — or module — of a series of teaching materials on malaria. The Guide is designed to be used throughout a formal period of training and provides information and instructions in a simple, easily understandable form. It is also intended to be used as a reference after training. Reference materials of this type are sometimes called "job aids". The information contained in this Learner's Guide has been made as complete as possible, which reduces the need for note-taking during lectures, demonstrations and other exercises.

For whom is the Learner's Guide designed?

The Guide is designed for general health service and laboratory personnel who will carry out the activities described.

Objectives

At the end of the training programme based on this Learner's Guide you should have acquired the skill and competence that will enable you to:

- appreciate the importance of malaria as a disease
- recognize the common signs and symptoms of malaria
- record details about patients on the appropriate forms
- make thick and thin films of blood taken from people with suspected malaria
- stain blood films for examination with Giemsa stain
- maintain the microscope in good working order
- use the oil immersion objective and the correct ocular to examine thick and thin blood films, and:
 - recognize the various components of normal blood
 - recognize and measure the density of malaria parasites, and correctly identify their stage and species
- record accurately the results of your examination on the appropriate form
- inform those people responsible for the treatment of malaria patients of your findings
- use the information in this Guide to teach other public health workers to make thick and thin blood films
- submit reports and requests for supplies when necessary.

How this subject will be taught

Facilitators

Facilitators are people who work with the tutor to help you to achieve the objectives outlined above. The tutor has wide experience in malaria

microscopy and is able to help you to solve a wide range of problems. Facilitators will lead discussions and provide general help to individuals and to small groups of learners.

Presentations

Formal presentations of information, in the form of lectures for example, will usually be kept to a minimum and each session will be as short as possible. The information that will be given in such sessions is already contained in this Guide, so there will be very little need for you to take notes. A lecture presentation will usually be combined with a demonstration.

Demonstrations

Demonstrations will either be used to illustrate activities that you will later carry out yourself or consist of looking at specimens and equipment that you need to know about and be able to use.

Practical sessions

There will be as many practical sessions as possible. They are intended to help you to gain as much practical experience as you can in all aspects of malaria microscopy. In some, each facilitator will work with a small group of four or five learners. Because there are only a few learners in each group, the facilitator will be able to give a great deal of attention to each individual: this increases your opportunities to practise and to learn.

Role-play

In a role-play exercise you will be asked to pretend to be a person in a situation that may arise in your job. For example, you may be asked to play the part of a laboratory worker preparing a blood film from a patient suspected of having malaria. Another learner will play the part of the patient. Afterwards, members of the group will discuss what was said and done. Much can be learned from this enjoyable type of exercise.

Small group discussions

In these exercises, a facilitator will lead discussions on particular subjects. These sessions provide good opportunities for you and the other learners to give your opinions, develop your ideas and learn from one another.

Field work and visits to work places

A number of these types of visit may be arranged. They are designed to give practical experience of real-life situations and allow you to learn about the problems you may meet in the course of your daily work.

Evaluation

Evaluation of the learner

The evaluation of individual progress and achievement will be carried out by the tutor, the facilitators and you yourself. It will include:

- *Spot tests*

At regular intervals, a series of “spots” will be set out for you to comment on. The spots may be microscopic specimens or other items linked to what you have learned. They are designed to help you and the tutor assess how well you have mastered the skills and developed the competence to carry out your work.

Correct answers will be supplied after the spot tests and a discussion will take place. This is intended to improve the process of learning and help you to identify those activities in which you need further practice.

- *Multiple-choice quizzes*

In multiple-choice quizzes, each question is provided with a list of possible answers from which you must select the one you think is correct. At the end of these sessions you will not necessarily be given the correct answer to each question, but the tutor will analyse the results to identify topics that were not clearly understood. The tutor may also tell you where you made mistakes and point out areas where you need to improve.

This part of the evaluation is designed to help you and the tutor to assess how well you understand the non-practical aspects of the course. Multiple-choice tests will take place regularly, often during the same session as spot tests.

Evaluation of the training by the learner

By means of a questionnaire, the tutor will ask you, the learner, how you think the training has helped you and how it might be improved. This evaluation will take place at the end of the training period in order to provide as much feedback from the learners as possible. You may sign the questionnaire or not, as you wish, but you should feel completely free to make suggestions for improvements on the part of the tutor and facilitators as well as in the content of the course and the training facilities.

Use of the Learner's Guide

This Learner's Guide consists of instructional materials designed to enable you to achieve the objectives stated earlier. The Guide is divided into chapters called Learning Units. You must acquire the skills and knowledge contained in one Unit before progressing to the next, otherwise you may have difficulty in achieving the objectives of subsequent Learning Units.

Notes

Malaria, the disease

Learning objectives

By the end of this Unit you should:

- recognize the importance of malaria as a disease
- be able to recognize the common clinical signs and symptoms of malaria
- know that some people can have malaria without clinical symptoms
- know that malaria is caused by the presence of parasites in a patient's blood
- know that a female anopheline mosquito can transmit malaria to people
- realize that, to diagnose malaria accurately, you must be able to find and identify parasites in a stained blood film examined under the microscope.

The importance of malaria

Malaria is a serious public health problem in many parts of the world. Attacks of the disease can be very severe and can even lead to death if they remain untreated.

Malaria can be responsible for people spending many days away from school or work and so may affect:

- the amount that they learn at school
- the quantity of food they are able to grow
- the money they can earn.

Malaria is caused by a very small living organism called a parasite, which infects a person's blood. The disease is transmitted from one infected person to another by the bite of a female anopheline mosquito. This can occur only after the parasite has been inside the mosquito for at least a week.

You will learn more about the malaria parasite and how the disease is transmitted in a later Learning Unit.

Clinical signs and symptoms of malaria

In people who have had very few attacks of malaria, the disease is fairly easy to recognize by the presence of one or more of the following clinical signs and symptoms:

- high fever
- headache

- severe chills
- general body pains.

In some cases the following symptoms are also present:

- vomiting
- diarrhoea.

As a learner, you may be confused because these signs and symptoms are also found in other diseases. Further observations are needed for accurate diagnosis.

It is more difficult to diagnose malaria in people who have had several attacks of the disease. This is because their bodies are more used to the disease and so the clinical signs and symptoms are not always present. Similarly, if patients have treated themselves with some medication before you see them, the signs and symptoms may be modified. A patient may have only a mild headache and nothing else, or a very slight fever that causes little discomfort.

How to diagnose malaria

Many people do not know that malaria is caused by a parasite in the blood. The parasite is very small and can be seen only with the aid of a microscope.

Before the parasite can be seen in a patient's blood, a blood film must be made. The dry blood film is then stained with Giemsa stain and examined under the microscope, using the oil immersion objective lens. If stained parasites are seen by the examiner, the patient is confirmed as having malaria.

You should therefore understand that the only correct way to diagnose a case of malaria is by examining the patient's stained blood film with a microscope. This is a highly skilled job. The following Units of this Learner's Guide will take you through the steps necessary to acquire the skills you need.

Cleaning and storing microscope slides

Learning objectives

By the end of this Unit you should be able to:

- describe how microscope slides for blood films are correctly cleaned, wrapped and stored
- distinguish slides that are suitable for making blood films from those that are not
- demonstrate how to wash, dry, wrap and store slides for blood films.

Cleaning slides

Microscope slides are usually supplied in boxes of 50 or 72. They may be described on the box as “washed” or “pre-cleaned”, but they will still need to be properly washed, dried and wrapped. It is not possible to make good quality blood films on dirty microscope slides. Blood films made on dirty or greasy slides will wash off easily during staining. It is therefore best to discard slides that:

- have an iridescent bloom or appear white or opaque
- are not properly cleaned
- are old, with surface scratches or chipped edges.

In order to clean slides you will need:

- a large plastic basin
- gauze or cotton wool
- a good quality detergent (powder or liquid)
- 2–4 clean, dry, lint-free cotton cloths
- clean water.

New slides

All new slides should be washed with detergent and clean water. After being soaked for between 30 minutes and 1 hour, the slides should be rinsed under running tap water or in several changes of clean water. Each slide should be individually wiped dry and polished with the clean, dry, lint-free cloths.

Cleaned slides should be handled only by the edges to avoid finger marks or grease being deposited on the surfaces.

Used slides

Used, dirty slides should be soaked for a day or two in water containing detergent. (Warm water should be used whenever possible.) After soaking, the