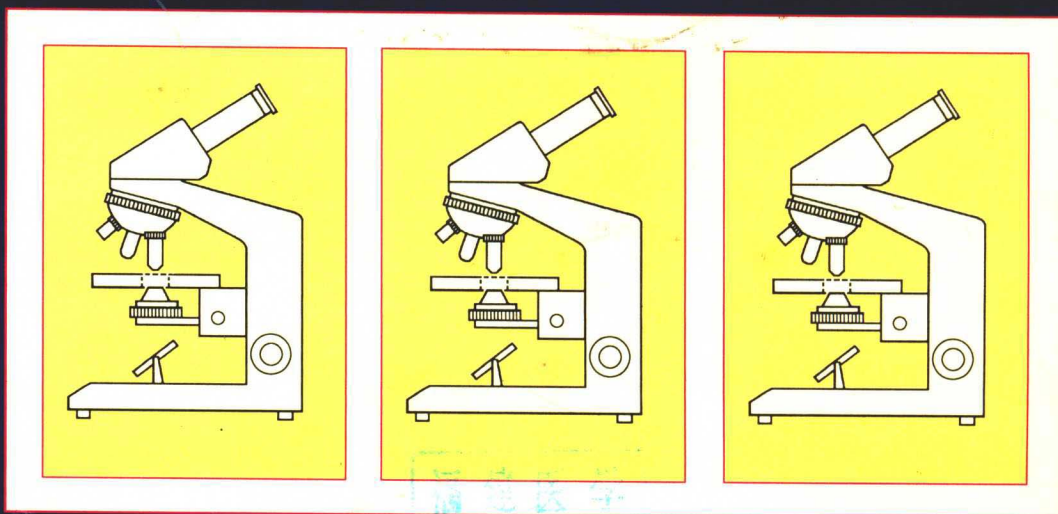


Basic malaria microscopy



Part II. Tutor's Guide



World Health Organization
Geneva

Basic malaria microscopy

PART II

Tutor'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 makes them 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 Asian and Western Pacific Regions of the World Health Organization, and the project was conceived by Dr McWilson Warren, former Team Leader of WHO's Inter-regional 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*.

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Introduction

This Tutor's Guide is designed primarily to help those responsible for training health workers and laboratory personnel in malaria microscopy. Some parts of it should be useful even to the most experienced teachers. The style of writing has been kept simple, to avoid misunderstanding and to facilitate translation into any local language.

It is essential that you read the Learner's Guide (Part I of the training module) before planning your training programme, rather than reading only the Unit that relates to your next teaching session.

This Introduction will help you to understand the role of tutor and facilitator in this training system and explain why the Learner's Guide is designed the way it is.

For whom is this training module intended?

The module is intended for health workers who are responsible for diagnosing malaria by the microscopic examination of blood films to detect the presence of malaria parasites and to determine their species. It can be used equally well for basic training and for refresher training.

Educational level of learners

The appropriate educational or entry level of learners will depend upon a number of factors. Experience in many parts of the world has shown that health workers from a wide range of educational backgrounds can be accepted for training in this subject. However, if the entry level is relatively low, the period of training may need to be extended: it may well take longer to train someone with only 8 years of schooling than someone with 12 years. On average, it should be possible to teach the contents of this module in about 5 weeks.

Apart from education requirements, it is equally important that learners:

- are able to read, comprehend and write simple English (or the language into which the module is translated);
- can systematically follow a set of written instructions;
- have good hearing and eyesight;
- can tell the difference between, and name, the two colours red and blue;
- are sympathetic to the health problems of the community;
- indicate willingness, on completion of the course, to work with members of the community, especially those who are sick.

This list is not necessarily complete: for example, another requirement might be willingness to work for long periods in rural areas far from home.

Often, you and your colleagues will be unable to interview candidates directly. It then becomes particularly important, when writing to those who will select learners for the course, to indicate the most suitable type of person.

How is the training designed and what is its content?

The training module is intended to facilitate the teaching of all the individual tasks involved in basic malaria microscopy to health workers and laboratory personnel. The principal objectives of the training are listed in the Introduction to the Learner's Guide. *Please stop and read these now.*

This training system differs from others in that it deals with each step of the diagnostic routine in the correct sequence. For example, learners are taught how to clean and wrap slides before learning how to make blood films on these slides. In other words, the learners acquire, step by step, all the knowledge and skills they need for the tasks involved in malaria microscopy.

This type of training may be referred to as *performance-based* or *competency-based*. When carried out properly, it is highly effective. It is also very economical: training is kept as short as possible, yet participants learn all they need to perform the required tasks competently. This saves time, money and resources.

At the beginning of each Learning Unit in the Learner's Guide is a list of the learning objectives. Learning objectives summarize the knowledge, skills and attitudes that each learner should have acquired by the end of that Unit. You and your colleagues must satisfy yourselves that each learner has achieved the stated objectives before proceeding to the next Learning Unit. (Methods of evaluating progress are described later.)

While it is more convenient to have all the learners working together, or in small groups, on each Learning Unit, this programme allows the slower learners to work through each Unit at their own pace. However, careful planning is essential if the brighter participants are not to become bored.

Who runs the course?

You and your colleagues are responsible for organizing and running the course. The Learner's and Tutor's Guides will do much to help you, but the final results will depend upon your efforts. This may be the first time that you have organized and run such a course, or you may be an experienced teacher: in either case, the importance of using the Learner's Guide and the Tutor's Guide together as you proceed through the Learning Units is stressed.

Who helps you in the course?

Your job will be easier, and your teaching more effective, if you have one or more persons to help you. These assistants, who should have working experience of malaria microscopy, are called *facilitators*. You can then divide learners into small groups of perhaps two to four, and allocate one facilitator to each

group. The greater interaction this allows between the learners and the facilitators results in better learning and understanding.

As overall manager of the training programme, you will be responsible for designing the timetable, explaining the learning tasks to the learners and facilitators, and giving learners and facilitators whatever help they need. Do not worry if the facilitators are not trained as teachers; their task is to explain or demonstrate a particular activity and to watch learners perform it. They must also be able to admit to learners when there is something that they do not know and be prepared to refer the question or problem to you. Impress on your facilitators that no one person can be expected to know everything about a particular subject. There is no shame in saying "I do not know, but I will find out for you".

Many problems can be avoided by giving your facilitators plenty of time to read the Learner's Guide and discuss with you any part of it that may need clarification. It would be a good idea for you and the facilitators to go through the module together; you could then test their knowledge by asking them appropriate questions.

Remember, there are many methods of malaria microscopy. This training module describes, and attempts to standardize, well-tried methods that have been widely used in many parts of the world.

Why provide a Learner's Guide?

Providing learners with a full set of notes ensures that:

- all learners have exactly the same set of notes, and thus avoid unnecessary note-taking during lessons;
- you and the facilitators can refer to any part of the Learner's Guide knowing that all learners can find the right page quickly;
- learners can spend more time reading the notes, and therefore have a greater chance of understanding them, because there is no need to write up notes taken during class;
- there is no chance of learners making errors in note-taking;
- after the course, each learner can take home a set of notes that will be a helpful reference in his or her daily work.

How is the course run?

This subject is dealt with on pages 7–9 of the Learner's Guide: *please stop and read these now.*

As stated in the Learner's Guide, classroom presentations should be kept to a minimum. Demonstrations and role-play involving the learners, practical sessions, field visits and discussion groups are all much more effective ways of teaching.

Learners who are actively involved learn more and learn better than those who must simply sit and listen to a single person talking for long periods of time.

How will you know whether it was a good course?

Judging whether or not the course was a good one is difficult and involves answering the following questions:

- *How well did the group learn?*

This may be determined by evaluating the learners' performance as they work through the Learning Units and again at the end of the training. A further evaluation of how well they have retained their knowledge, skills and competence may be necessary 10–12 months later.

- *How did the learners view the training?*

Learners' answers to this question will yield valuable information on how useful they find this type of training, especially if they provide a short evaluation during the course and a longer one at the end. (A suitable questionnaire is provided in Annex 5.) Frankness can be encouraged by allowing learners to make their responses anonymously.

Feedback provided during the course allows you to assess how well your training is being received and to make any improvements that seem necessary. Feedback received at the end of the course will help you to improve future programmes. If you have prepared the course carefully, feedback is likely to be favourable, which is rewarding both for you and for the facilitators.

Whatever the government policy may be regarding the award of a certificate of competence, some record of attendance and level of competence reached by each learner should be kept so that details may be checked later.

Use of the Tutor's and Learner's Guides

The Tutor's and Learner's Guides may be used together (and with the suggested audiovisual aids) for basic group training and for in-service training. The Learner's Guide alone may be used for refresher training, or by individuals for reference.

The way in which you and your facilitators should make use of the Guides and the audiovisual aids will become apparent as you work through the training module.

Learners will follow the group training activities using the Learner's Guide plus whatever other materials you provide them with.

Training facilities

A number of basic facilities and equipment must be organized before training can begin. In some countries these are readily available but in others you may need to improvise or to modify existing equipment. Bear in mind that there may be long intervals between ordering supplies and getting them delivered, but do not delay training unnecessarily because you do not have the best equipment.

Ideally, two rooms should be available for training. One of these can be used for group discussions and for the overhead and slide projectors. Chairs and small tables or desks will be needed for this room.

The second room will be used as a laboratory. Ideally, the laboratory should be air-conditioned and well lit, and have ample cupboard and shelf space. There should be a reliable electricity supply with several outlets, running water and at least one sink, a firm bench or tables about 75 cm high, and a chair of adjustable height for each learner. Space on a wall should be available for a black- or white-board. In practice, you may have no running water, little if any electricity, few tables, and chairs or stools of fixed height. Whatever the conditions, do your best to ensure that the learners are as comfortable as is possible in the circumstances: you may be surprised how much you can achieve even with relatively few facilities.

Teaching equipment

For teaching sessions and group discussions, the following items should ideally be available:

- Overhead projector.
- Projector for 35 mm slides, preferably with automatic slide feeder.
- Screen for slide projection (a white sheet is an adequate substitute, but the white-board is unsuitable because it will reflect projected light).
- Flipcharts — one for each small group of learners — of the type shown in Annex 1. Supplies of “butcher’s paper” or “newsprint” are usually cheap and readily available.
- Large blackboard or white-board.
- Chalks for blackboard or marker pens for white-board, in a selection of colours.
- Acetate sheets for overhead projector (or used and washed X-ray plates).
- Coloured marker pens for acetate sheets (including some permanent markers for diagrams you may wish to keep).

If the room cannot be darkened for the projection of 35 mm slides you may need to construct a daylight viewing box with rear projection screen. Annex 2 gives directions for the construction of a suitable box. You may find that you can manage with only the overhead projector. Many trainers prefer the overhead projector to the black- or white-board, since they can continue to face their audience while illustrating what they are saying.

A white-board constructed with a metal sheet beneath the white surface allows the use of magnetic visual aids, such as illustrations of the erythrocytic cycle of the malaria parasite, during discussion sessions.

Glassware, chemicals and reagents

You probably have most, if not all, of what you need for the training course available to you in the laboratory where you do your own routine work. A full list of the minimum requirements is provided in Annex 3.

Learners’ equipment

The equipment listed below should be provided for each learner. Where supplies have to be ordered, this should be done well in advance of the course; many items are difficult to obtain at short notice.

- Copy of the Learner's Guide.
- Microscope. Try to determine the type of microscope that trainees will use when they return to their places of work: there is little point in training them to use microscopes that use artificial light if they will later have to work with natural light. It may be possible for trainees to bring with them the microscopes that they will use in their work, but it is preferable to provide microscopes that can be used with both artificial and natural light.
- Notebook. This should be used only for occasional notes or instructions; as explained earlier, there should normally be no need for notes to be taken during training sessions.
- Ballpoint pen.
- Set of pencils (medium-hard graphite, plus red, blue, brown and black) for drawing diagrams of suspected parasites during practical sessions.
- Pencil sharpener
- Eraser.
- Ruler.
- Set of reference slides with Giemsa-stained thick and thin blood films, containing the species of malaria parasite each trainee is most likely to see in routine work. Normally, the species would be *Plasmodium falciparum*, *P. vivax* and *P. malariae*, although *P. ovale* is being seen increasingly, both in Africa and in the rest of the world. Unfortunately, good specimens of *P. malariae* and *P. ovale* are difficult to obtain. (Note that, under normal tropical conditions, these reference slides will have a shelf-life of only about 6 months.)
- Set (about 25–30) of Giemsa-stained thick and thin blood films for use in practice sessions. These should show the species of malaria parasite that are common in the area where trainees will be working, at different stages and in various densities. (Collecting these slides will require a lot of time and effort, but is ultimately worth while; practical sessions will proceed much more smoothly if facilitators know exactly what each learner is examining.)

Syllabus and timetable

The syllabus

The contents list of the Learner's Guide represents the syllabus — the list of subjects to be covered — for the training course. Planning the course is made easier by the division of each Learning Unit into a number of subunits or main topics. Go through each of the Learning Units in turn; for each subunit calculate how much time you will need to devote to it and decide what kind of learning activity would be most suitable for the topic. For example, you will find that Learning Unit 1 — Malaria, the disease — has six learning objectives and is divided into three main sections, dealing with different aspects of the disease. If you consider that one or more of the learning objectives could best be achieved through group discussion, with interaction between you, the facilitators and the learners, you should then decide what other materials you might need to reinforce the learning. It might be valuable to show a film or some slides of patients with malaria to illustrate the effects of the disease.

The following is a list of the various learning activities that you might consider using:

- *Group discussion*

Once participants get used to group discussions, the two-way exchange of information between them and the facilitators makes this a very effective

learning activity. People share their knowledge and experiences with the rest of the group and stimulate each other's thoughts on the subject in hand.

- *Practical work*

Practical work usually takes place in the laboratory or other suitable location. Its purpose is to give learners the opportunity to practise the procedures involved in malaria microscopy. The more practice they have, the more competence they will acquire in making and interpreting slides.

- *Field work*

Work performed in the field, in conditions as close as possible to those that trainees will meet later in their jobs, is a very effective learning activity.

- *Demonstrations, role-plays and films*

These three activities are designed to reinforce the learning process. A film might be a good way to show learners what a particular place looks like without your having to take them there. Introducing learners to the appearance of a malaria parasite under the microscope might easily be achieved in a demonstration. Role-play can be used for training in various aspects of work, such as approaching patients for blood samples, with the learners acting the parts of those involved in the situation.

Evaluation

Evaluation is assessment of the level of *skill, competence* and *knowledge* that learners have achieved in a particular area. Methods of evaluation are discussed later. Evaluation of the course, and of you and the facilitators, by the learners is also important, and will provide feedback that will help you to improve the training course.

The timetable

Once you have calculated the amount of time that needs to be spent on each subunit, all the various learning activities must be fitted into the framework of the training programme. The duration of the programme may be something over which you have little control; for instance, you may be told to limit the programme to 5 weeks because of shortage of funds, even though you have calculated that it should ideally be spread over 6 weeks. You and the facilitators will then need to spend time reorganizing the timetable so that all the learning activities can be fitted into the time available.

Table 1 shows a simple method of allocating time to each of the Learning Units. However, it represents just one approach to the problem and is intended only as a guide that may be of help to you in organizing your training programme. It cannot take account of all the factors that may influence your planning, such as the length of your normal working week, the need for you to divide your time between the training course and your routine work, or the fact that there are public holidays during the course.

In planning the timetable, remember to allow time for evaluation both during and after the course, and for the "hidden" activities, such as tidying of the laboratory, completion of records, travel time for field work, etc.

A suggested timetable for a 5-week training course is shown in Table 2, but again is provided only as a guide. It is based on a 7-hour working day and