## Design Criteria for an RMS Approved Microscope for Secondary Schools

(1) An inclined monocular or binocular viewing head via a prism (lower or higher cost alternatives) allowing the stage to remain horizontal.

(2) Removable 10x eyepiece (allowing insertion/addition of a digital camera).

(3) An illuminating system built into the base of the instrument, incorporating an LED light source powered by rechargeable batteries, and provided with a mains adapter such that the microscope can be used with or without connection to the mains.

(4) Three objective lenses set in a revolving turret or nosepiece with magnification and numerical aperture (NA) values:
4x/0.1 NA; 10x/0.25 NA; 20x/0.40 NA
This set provides a good range of NA (resolution), total magnification (40 – 200x) and field of view (approximately 4mm – 1mm).
Note: this range includes a 20x/0.45 NA objective rather than the 40x/0.65 NA objective normally fitted. The 100x/1.3 NA oil immersion objective is similarly excluded, though both could be available as optional extras.

(5) A plain stage with slide-clips, avoiding both the cost of a mechanical stage and the potential damage to the objectives with which it is likely to come into contact on rotation of the nosepiece.

(6) A condenser lens in a fixed position below the stage, i.e. with no facility for mis-adjustment. The condenser must fill with light the whole field of view of the 5x objective and also provide a sufficiently wide cone of light for the 20x objective.

(7) A rotating aperture/filter disc fixed to the underside of the stage at a distance such that the diaphragms (see (8) below) lie approximately in the first focal plane of the condenser lens.

(8) (a) 2 diaphragms of different sizes (to limit the angle of the cone of light from the condenser and to achieve, for each objective, near-optimum conditions for resolution and contrast).
(b) A central 'dark ground' stop which blocks the light which (in bright field) normally passes from the condenser directly into the objective, but which allows the light scattered from the specimen to enter the objective.
(c) A polarising filter (polariser) to be used in conjunction with an analyser (see (9) below).

(9) Incorporation of a slider below the inclination-prism with an in/out polarising filter (analyser) to be used in conjunction with the polariser (see (8)(c) above)


**Figure 5:** *The head of a mosquito larva in bright field (a) and dark field (b). Notice that the fine hairs projecting from the head, which scatter light only weakly, are clearly visible in dark field against the black background. [Field of view 2mm]*

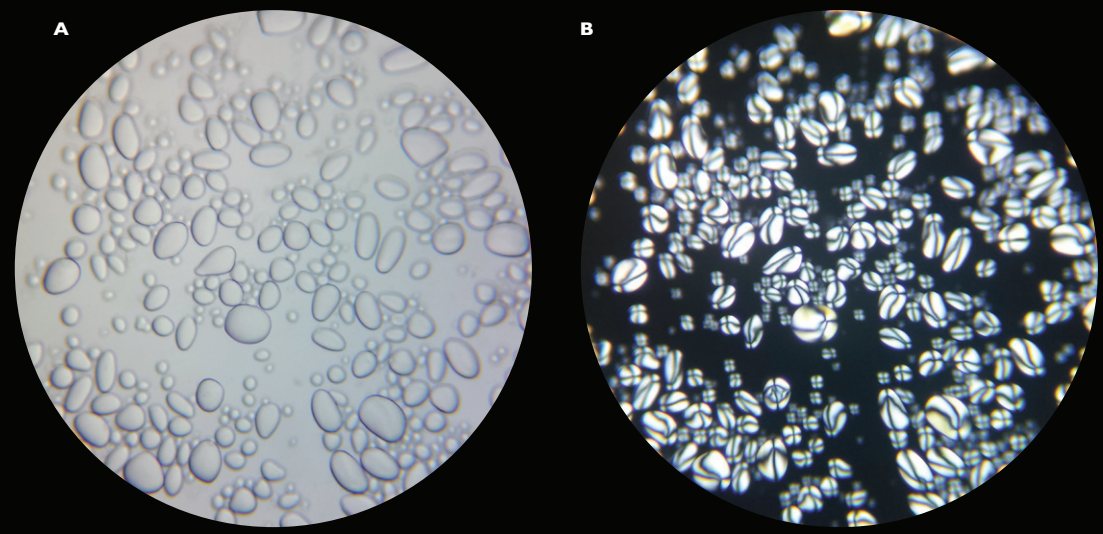


**Figure 6:** *Potato starch grains, (a) in bright field, showing little contrast, and in (b) the polarised-light image ('between crossed polars'), which reveals the optical properties of the arrangement of the starch molecules. [Field of view 1mm]*