Journal of the Royal Microscopical Society

CONTAINING ITS TRANSACTIONS AND PROCEEDINGS

AND

A SUMMARY OF CURRENT RESEARCHES RELATING TO

ZOOLOGY AND BOTANY

(principally Invertebrata and Cryptogamia)

MICROSCOPY, &c.

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Minimis partibus, per totum Naturæ campum, certitudo omnis innititur quas qui fugit pariter Naturam fugit.—*Linnæus.*

FOR THE YEAR

1902

TO BE OBTAINED AT THE SOCIETY'S ROOMS,

20 HANOVER SQUARE, LONDON, W.;

OF MESSRS. WILLIAMS & NORGATE; AND OF MESSRS. DULAU & CO.

MICROSCOPY.

A. Instruments, Accessories, &c.*

(1) Stands.

Beck's Imperial Microscope.—This instrument has been designed for critical work of the most advanced type. At the same time it is compact, and does not stand too high from the table to be comfortably used in a vertical position. In its complete form it is provided with coarse focussing adjustment, double speed fine adjustment with graduated head, full size eye-pieces, rack-and-pinion focussing draw-tube, graduated, additional sliding draw-tube, graduated clamp to joint, graduated concentric rotating stage, rack-and-pinion movement to rotating stage, centring screws to stage, graduated vertical and horizontal stage motion, coarse focussing sub-stage adjustment, fine focussing sub-stage adjustment, centring sub-stage adjustment, swinging and sliding mirror.

The stand is made upon two models; the English tripod foot, and the Continental base and pillar. In the English or tripod model there is a splay between the front feet of 8½ in., and 9 in. from front to back. A long lever clamp is provided to fix the Microscope at any inclination, and the latter is limited in its motion in the exact horizontal and vertical positions. The Continental model stand is unusually large and steady; the base measures 6¾ in. in length by 4½ in. in width, and is provided with a similar clamp to the joint. The limb of the Microscope is pierced with a square hole and clamp screw, in which an illuminator for opaque objects may be held.

The body-tube of the Microscope is 2 in. in diameter, and 3·6 in. long, but with the nose and draw-tubes in their closed position it measures 140 mm. or 5½ in. The nose-piece and draw-tubes may be removed, and a photographic lens mounted in the centre of this short and large diameter-tube allows of the use of a wide angle for low-power photomicrographic work. The draw-tube is provided with a rack-and-pinion adjustment, and has a ring fitting at its lower extremity, which carries the object-glass screw-thread. An additional sliding draw-tube is supplied, and both are graduated in millimetres; a total extension of tube with the two draw-tubes of 260 mm. is obtained. The diameter of the tube is that of the No. 4 largest Royal Microscopical Society's standard gauge, 1·41 in., and an adapter is supplied to take the No. 1 size, ·917 in. Low-power and orthoscopic eye-pieces may be made of the full size, which give a much larger field of view than can be attained with the small size eye-piece. A small size body, with sliding graduated draw-tube with a range of length of 140 mm. to 200 mm., is supplied to the simpler forms of the instrument.

The coarse focussing adjustment is by means of a spiral rack-and-

* This subdivision contains (1) Stands; (2) Eye-pieces and Objectives; (3) Illuminating and other Apparatus; (4) Photomicrography; (5) Microscopical Optics and Manipulation; (6) Miscellaneous.

pinion movement, actuated by large milled heads, the slide being a most substantial dovetail cradle. When at its highest point the nose-

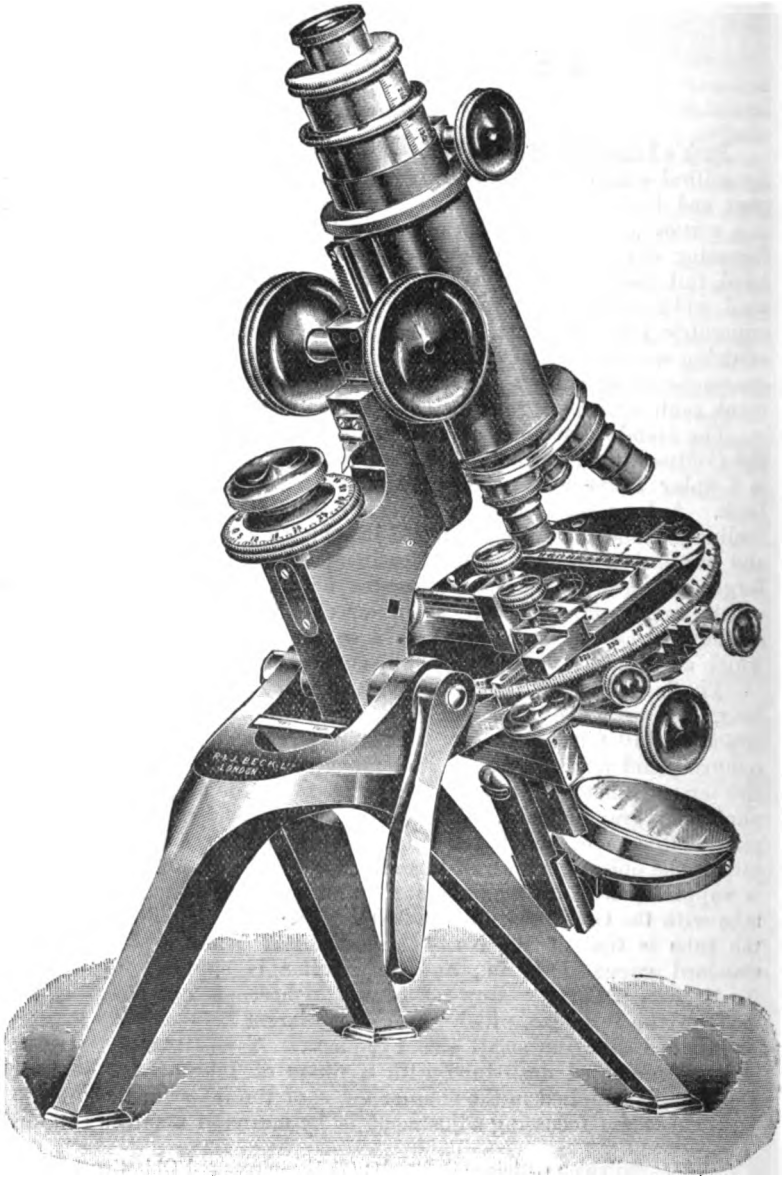

FIG. 18.

piece of the Microscope is 4·1 in. from the stage. The fine focussing adjustment is upon a new patented method invented by Mr. Ashe. A strong lever moves the cradle, which carries the body of the Microscope by means of a block which is a projecting portion of the cradle. The cradle slides in a fitting in the limb with a spring acting upon the upper side of the projection, which drives it on to the lever. The lever is moved by a steel screw with milled head; this screw works through an outer screw which is provided with a large graduated milled head, read by a folding indicator.

One screw has a comparatively coarse thread, and when revolved raises the body a distance of $\frac{1}{60}$th of an inch in a complete revolution. The other screw has a fine thread, and when revolved carries the former screw with it, moving the body only $\frac{1}{300}$th of an inch in a complete revolution. At any moment either milled head may be used, giving a moderately fine adjustment for such powers as $\frac{1}{4}$-in. or $\frac{1}{6}$, or a very fine movement for $\frac{1}{12}$ or higher powers. The convenience of such an arrangement can scarcely be overstated.

A slow motion fine enough for focussing the highest powers is most troublesome for moderate-power lenses.

The Stage.—In the complete model of the instrument the stage is circular, 5 inches in diameter, with a graduated circle divided in degrees and moved by a rack-and-pinion, which may be thrown out of gear. Centring screws are provided to adjust the centre of rotation. A mechanical rack-and-pinion top stage works upon its surface by two milled heads having a horizontal motion of 2½ in. and a vertical motion of 1½ in. This is so designed that during its whole travel it does not come in contact with the substage condenser. Graduated finder-divisions are provided to both motions for recording and finding again individual points of an object, and for rough measurement purposes. When these are used the centring screws should be unscrewed to their full extent in order that the divisions should always indicate the same position. A folding stop for Maltwood's finder and folding springs are carried by the mechanical stage. Even with the mechanical stage *in situ*, except in its extreme positions of travel, a complete rotation of the stage can be obtained.

The mechanical stage can be entirely removed, leaving the stage free for large culture plates or dishes. Spring clips are provided for use with the plain stage.

The simpler models of the instrument are provided with a large square top, 4½ in. by 4½ in., with a removable mechanical stage, having a horizontal travel of 2 in. and a vertical travel of 1⅛ in.

The substage is made to the Royal Microscopical Standard size, 1·527 in. It has coarse adjustment by spiral rack-and-pinion, and a lever and micrometer-screw fine adjustment. It has two centring screws in directions at right angles. The substage itself has no swinging-out motion, but a mount may be supplied carrying the condenser, in which the diaphragms and the optical portion swing out.

The mirror is flat on one side and concave on the other. It is 2½ in. in diameter, and is swung on a fitting which slides up and down on a dovetailed bar. This bar is held in the optic axis by a spring stop, but may be swung to one side or the other if desired.

The Binocular.—A special form of the Imperial Microscope is made with a binocular body, in which the limb of the instrument is somewhat lengthened to give extra length of fitting for the body, or a binocular body interchangeable with the ordinary body may be supplied

Baker's Portable Diagnostic Microscope.—This instrument, which in 1896 was described in this *Journal*, has now been made of "magnalium" by Messrs. C. Baker, and was exhibited by Mr. Curties at the October Meeting, 1901. This Microscope was originally designed by Surgeon-Major Ronald Ross for the special use of officers in the Indian Army Medical Department for the diagnosis of malarial fever. It is

FIG. 19.

fitted with a spiral pinion and rack coarse adjustment, a direct-acting screw fine adjustment, a draw-tube, which when extended gives a tube length of 6¾ in. (170 mm.), a sliding tube to carry a substage condenser, and plane and concave mirrors. Its weight is 14 oz. (397 grams). When folded the instrument measures 7 by 3 by 2¾ (178 by 76 by 70 mm.), but when open the spread of the tripod is 6½ by 6 (165 by 152 mm.). "Magnalium," an alloy of aluminium and manganese, is a tougher and much more useful metal than aluminium, though it possesses a specific gravity of only 2·5.

Seibert's Travelling Microscope.*—In this Microscope the designer has tried to reduce the weight to a minimum, and yet to adapt the instru-

* Zeitschr. f. angew. Mikr., vii. (1901) pp. 141–3 (2 figs.).