

NOTES.

Holtzapffel's Microscope.

By EDWARD M. NELSON.

As Holtzapffel's Microscope, in which there are several original details, is little known, a short account of it may be of interest. On reference to fig. 16, it will be at once seen that the foot is similar to that of Cornelius Varley's Microscope,* inasmuch as it is a screw-clamp for attachment to the edge of a table, a form evidently suggested by the stand of Wollaston's camera lucida. The main stem, which is a cylindrical rod with a groove in it, is joined to the foot by a kind of universal ball-joint (not ball-and-socket). A mirror slides on this rod, and it is stated that the back of this mirror is flat polished brass, so that monochromatic light may be reflected by it. On the top of the rod is the lens-(Wollaston doublet) holder (fig. 17); this, instead of fitting in a V-groove, slides between three studs, of which *a* and *b* are fixed and *c* loose; *c* is acted on by a spring so as to keep the slide pressed against *a* and *b*. This lens-holder is moved by the milled head *d*; but in place of a rack-and-pinion gear, there is a steel tape which takes a round turn round the pinion, an end being fixed to each end of the lens-holder; the screw *e* is for the purpose of keeping this tape taut. A similar mechanical device was, twenty years afterwards, used by Ladd,† who fitted a steel chain with a turn round a pinion for the coarse adjustment of his Microscope.

The milled head *f* is for the purpose of rotating the lens-holder

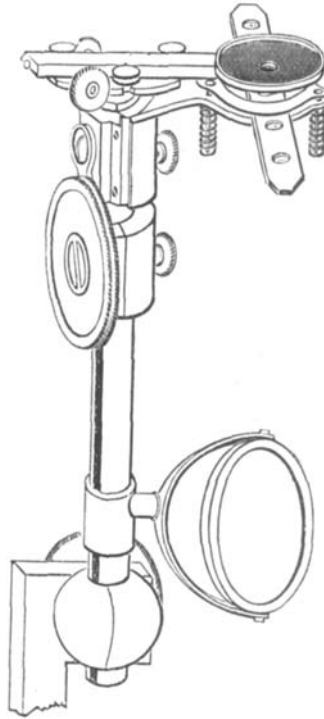


FIG. 16.

* Journ. R.M.S., 1900, p. 283, fig. 70.

† Exhibited at the Great Exhibition, 1851. This movement is said to have been applied to the Microscope many years previously by Mr. Julius Page.

on the top of the pillar ; this gives the lens a transverse motion in arc across the object. The idea, in those days, was to move the lens over the object, so that when infusoria were being examined they might not be disturbed by the movement of the stage.

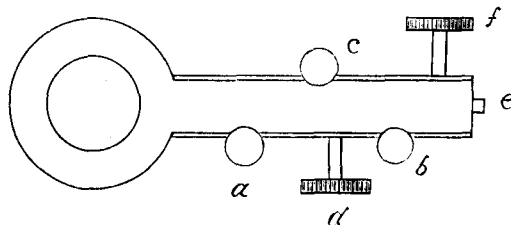


FIG. 17.

This Microscope is a stage-focusser ; a rough adjustment is obtained by sliding the mechanism on the rod by the hand, and then clamping it by a pinching screw, after the manner employed in many old Microscopes, J. Cuff's for example. The mechanical adjustment is by means of an excentric strap on the head of the pinion, in fact, similar to the coarse adjustment on the Plössl Microscope lately presented to the Society by Sir Ford North, the difference being that, while the Plössl has a crank-pin and a connecting-rod, Holtzapffel's has an excentric.

The lenses were supplied by Andrew Pritchard.

The date of this Microscope is 1830, and in it we find four original devices:—(1) The clamp-foot ; predating that of Varley's in 1831. (2) The polished brass monochromatic mirror. (3) The focussing movement by an excentric, which differs from and predates the somewhat analogous device of Plössl. (4) The extension movement of the lens-holder by a steel tape and pinion.

*A Bibliography of Works (dated not later than 1700) dealing
with the Microscope and other Optical Subjects.*

By EDWARD M. NELSON.

Acta Eruditorum. (Leipsic, 1686.)

Alhazen (1100): Thesaurus Opticæ. (Translated from Arabic, Basil. 1572.)

Aquilonius Franciscus : Optica.

Bacon, Roger : Opus Majus Pt. V. De perspectiva. (1268.)

Barrow, Dr. Isaac : Lectiones Opticæ. (1669.)

Bartholinus, Erasmus : Experimenta Crystalli Islandici. (Hagæ Comit. 1669.)

Bayer, John : Uranometria. (1603.)

Bettinus, Marius : De Apiariis novissimis.

- Bonnani, Philip: *Micrographia Curiosa*. (Rome, 1691.) Observations circa viventia. (1698.)
- Borellus, Petrus: *De vero Telescopii inventore*.* (Hagæ Comitum, 1655.) *Historiarum et Observationum*. (Paris, 1657.)
- Boyle, Robert: *Experiments and Considerations touching Colours*. (Lond. 1663.)
- Brahé, Tycho: *Astronomica Instaurata Mechanica*. (1598.)
- Butterfield: *Phil. Trans.* (1677.)
- Camerarius, Philip: *De Horis succisivis*.
- Campani-Alimenis, Matteo: *Horologium*. (1678.)
- Carlo di Napoli: *Nuove Inventioni di tubi ottici*. (Rome, 1686.)
- Cassegrain, N.: *Journal des Sçavans*. (1672.)
- Cassini, Giovanni Domenico: discovers three satellites of Saturn. (1672-84.)
- Chérubin d'Orléans (François Laserré): *La Dioptrique Oculaire*. (1671.) *La vision parfaite*. (1677.)
- Clutius, Augerius: *De Hemerobio sive Ephemero Insecto*. (Amsterdam, 1634.)
- Dechales, Claudius Franciscus Milliet: *Mundum Mathematicum*. (2nd ed. 1690.)
- Dee, John: Preface to Sir Henry Billingsley's *Euclid*. (1570.)
- Descartes, René: 'La Dioptrique' in 'Essais Philosophiques.' (Leyden, 1637.)
- Digby, Sir Kenelm: *de Natura corporum*. (Circa 1645.)
- Digges, Leonard: *Pantometrica*. (1571. 2nd ed. 1591.)
- Digges, Thomas: *Stratoticus*. (1579.)
- Divini, Eustachio: *Phil. Trans.* (1668.)
- Dominis, Antonio de: *De Radiis Visus et Lucis*. (1611.)
- Elsholt: *Miscell. Acad. Nat. curiosa*. (1678-9.)
- Fabri, Honorato: *De Coloribus; Synopsis Optica*. (Lugd. 1667.)
- Fontana, Franciscus: *Novæ Observationes Cœlestium et Terrestrium rerum*. (Naples, 1646.)
- Forest, Nicholas: *De Florilegio Mathematico*.
- Fracastoro, Hieronymo: *Homocentrica*. (Venice, 1535.)
- Fuchsius, Samuel: *De Ophthalmoscopia*.
- Galileo Galilei: *Nuncius Sidereus*. (Venice, 1610.) *Saggiatore*. (Romæ, 1623.)
- Gascoigne, William: invents the Screw Micrometer. (1639.)
- Gassendi, Petri: *Mercurius in Sole visus*. (1632.) *Institutio Astronomica*. (Londini, 1653.)
- Gemma Frisius, Cornelius†: *Cosmocritica*. (Circa 1530.)
- Giornale de Letterati I. (1668.)
- Goedaert, J.: *Metamorphosis et Historia Naturalis Insectorum*. (Medioburgi, 1662.)
- Gray, Stephen: *Phil. Trans.* (1696.)

* Probably the earliest work on Microscopical Objects.

† Inventor of the Ring Dial (1534), a form of Astrolabe.

Gregory, David: *Catoptricae et Dioptricae Sphaericae Elementa*. (1695.)

Gregory, James: *Optica promota*. (1663.)

Grew, Nehemiah: *The Anatomy of Vegetables* (London, 1672), and other botanical works. (1673-82.)

Grimaldi: *Physico-Mathesis de Lumine, Coloribus et Iride*. (Bononia, 1665.)

Grindl ab Ach, Johannes Franciscus: *Micrographia Nova*. (Norimb. 1687.)

Harriot, Thomas: examines Spots on the Sun through a Telescope. (July 1609.)

Harris: *Lexicon technicum*. (1704.)

Harsdorffer, George Philip: *In delitiis Mathematicis*.

Hartsoeker: *Essay de Dioptrique*. (Paris, 1694.)

Hevelius, John: *Selenographia*. (Gedani, 1647.)

Hire, De la: *Traité des differens accidens de la veüe*. *Mem. de Math. et Phys. Ann.* (Paris, 1694.)

Hooke, Robert: *Micrographia*. (1665.) *Microscopium*. (Lond. 1678.)

Horrocks, Jeremiah: *Venus in sole visa*. (1639.) J. Horroccii opera posthuma. (Lond. 1672.)

Huygens, Christiaan: *Systema Saturnium*. (Hagæ, 1659.) *Astroscopia compendiaria*. (Hagæ, 1684.) *Traité de la Lumière*. (1690.) *Dioptrica*.—*De vitris figurandis*. (Leyden, 1703.)

Kepler, John: *Astronomiæ pars Optica*. (1604.) *Astronomia Nova*. (Prague, 1609.) *Dioptrice*. (Augsburg, 1611.)

Kircher, Athanasius: *Ars Magna Lucis et Umbrae in Mundo*. (Rome, 1646.) *Mundus Subterraneus*. (Amstelodami, 1665.)

Kolhansi, John Christopher: *Tractus Opticarum et Novarum Curiositatum*.

Kunckelius, John: *Ars vitraria*.

Langenmantell, Ambrosius: *Miscellanea curiosa*. (1689.)

Lanis, Franciscus Tertius de: *Magisterium Naturæ et Artis*.

Leeuwenhoek, Antony van: *Opera Omnia*. (Lugduni et Delphis Batavorum, 1687-1719.) Translated from Dutch and Latin by Samuel Hoole. (London, 1798-1807.)

Leibnitz, Gottfried Wilhelm: *The Principle of Optics, Catoptrics and Dioptrics, one and the same*. (Leipsic, 1682.)

Maignan, Emanuel: *Perspectivum Horarium*.

Malpighi, Marcellus: *Anatome plantarum*. (Londini, 1675.) *Opera Omnia*, etc. (Lond. 1686.)

Manzini: *L'occhiale all'occhio*. (Bologna, 1660.)

Marius, Simon: *Nuncius Jovialis*. (1614.)

Maurolicus: *Theoremata Lucis et Umbrae et Diaphanorum partes*. (1575.)

Menage: *Origini della Lingua Italiana*. (Geneva, 1685.)

Merritt, Christopher: translates the *Ars vitraria* of Antonio Neri. (1662.)

- Mersenne, Père Marin: *Catoptrics*. (1651.)
 Miscell. Curiosa. *Langenmantell*. (1689.)
 Molyneux, William: *A Treatise of Dioptrics*. (Lond. 1692.)
 Monconys: *Journal des voyages de Monsieur de Monconys*.
 (Lyon, 1665.)
 Mouffet, Thomas: *Insectorum sive Minimorum*. (Londini, 1634.)
Theater of Insects. (London, 1658.)
 Neri, Antonio: *Ars vitraria*. v. Merritt.
 Newton, Isaac: *Principia*. (Cambridge, 1686.) *Optics*. (1704.)
Phil. Trans.
 Porta, Giambattista della: *Magia Naturalis*. (1569.) *De refractione*. (1593.)
 Power, Dr. Henry: *Experimental Philosophy*.* (1664.)
 Ptolemy, Claudius (140): *Almagest*. (Translation, Venice, 1515.)
 Recorde, Robert: *Pathway to Knowledge*. (London, 1551.)
 Redi, Francesco: *Experienze intorno*. (Firenze, 1668.) *Experimenta circa generationem Insectorum*. (Amstelodami, 1671.)
Opusculorum. (Amstelodami, 1686.)
 Regius, Henricus: *Fundamentum Physicæ*.
 Rheita, Antonius Maria Schyrlæus de: *Oculus Enoch et Eliæ*.
 (Antwerp, 1645.)
 Riccioli, Giovanni Battista: *Almagestum Novum*.
 Roemer, Ole: discovers *Velocity of Light*. (1676.)
 Scheiner, Christopher: *Oculus et Rosa ursina*. (1630.)
 Schott, Gaspar: *Magia Universalis*. (Herbipol. 1657.) *Technica Curiosa*. (Herbipol. 1687.)
 Schrader, Friedrich: *De Microscopiorum usu*. (Gotting. 1681.)
 Sirturus: *Telescopium sive ars perspicendi etc.* (Francof. 1618.)
 Snell, Willebrord: Discovers law of Refraction. (Circa 1621.)
 Stellutus, Franciscus: *Apiarium ex frontispiciis etc.* (Romæ, 1625.)
 Sturm, Johann Christoph: *Collegium Experimentale sive Curiosum*. (Norimb. 1676.)
 Swammerdam, Johannes: *Histoire générale des Insectes*.
 (Utrecht, 1685.)
 Traber, Zacharias: *Nervus Opticus*. (Vienna, 1675.)
 Vitellio (1260): *Thesaurus Opticæ*. (Norimb. 1535.)
 Vopiscus, Fortunatus Plembius: *Ophthalmographia*.
 Voss, Isaac: *De lucis Natura et Proprietate*. (Amsterdam, 1662.) *Responsio ad Objectiones etc.* (Hagæ Com. 1663.)
 Willis, Thomas: *De Anima brutorum et De Fermentatione*.
 (Amsterdam, 1682.)
 Zahn, John: *Oculus Artificialis*. (Herbip. 1685. 2nd ed. Norimb. 1702.)
 Zucchi, Nicholas: *De Optica philosophia*. (Lugd. 1652.)

* The earliest English work on the Microscope.