

## **The Cary-Gould-Porter optical businesses**

**William Cary, 1759 - 1825**

**John Cary, 1754 - 1835**

**George Cary, ca. 1788 - 1859**

**John Cary, Jr., 1791 - 1852**

**Charles Gould, ca. 1786 - 1849**

**Henry Gould, ca. 1796 - 1856**

**Charlotte Hyde Gould, ca. 1797 - 1865**

**Henry Porter, ca. 1832 - 1902**

by Brian Stevenson. Kentucky, USA

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<http://microscopist.net> and on Facebook at <https://www.facebook.com/microscopist.net>

The names of Cary, Gould and Porter are intertwined in microscopy, a succession of apprentices and/or relatives who maintained a London microscope-making business for well over 100 years. For the historian, the two centuries that have elapsed between the beginnings of the Cary company have brought many inaccuracies into the record, both in print and on the internet. For example, many sources report that William Cary died in 1835, rather than 1825. Those may have been attempts to reconcile William's lifespan with the famous microscopes that bore his name, which became popular in the mid-1820s. The *Billings Microscope Collection* catalogue erroneously states that William Cary was succeeded by Charles Gould under the name of Gould and Porter. Another inaccuracy was an intentional misrepresentation for advertising, in which Henry Porter claimed that he learned his trade with William Cary. Porter was actually born 7 years after Cary's death.

By far, the most common inaccuracy is the assertion that Charles Gould was William Cary's apprentice when he invented the famous "Cary" (or "Cary-Gould") box-mounted portable microscope. While Gould was quite likely Cary's apprentice at some point, Gould was a master craftsman and well into his 30s when that microscope was first produced. Charles managed the business after Cary died in 1825, and appears to have held that position even before Cary's death. Notably, a large number of contemporary sources described microscopes produced at the Cary shop to be Gould's inventions.

Two examples of Charles Gould's box-mounted microscope are shown in Figures 1 and 2. Additional pictures of microscopes, accessories, other scientific instruments, etc. that are associated with Cary, Gould, and related makers are shown throughout this essay.



**Figure 1.** A ca. 1828 example of the original, small, box-mounted microscope designed by Charles Gould.



*Figure 2. A ca. 1835 example of a later, larger version of the Gould microscope.*





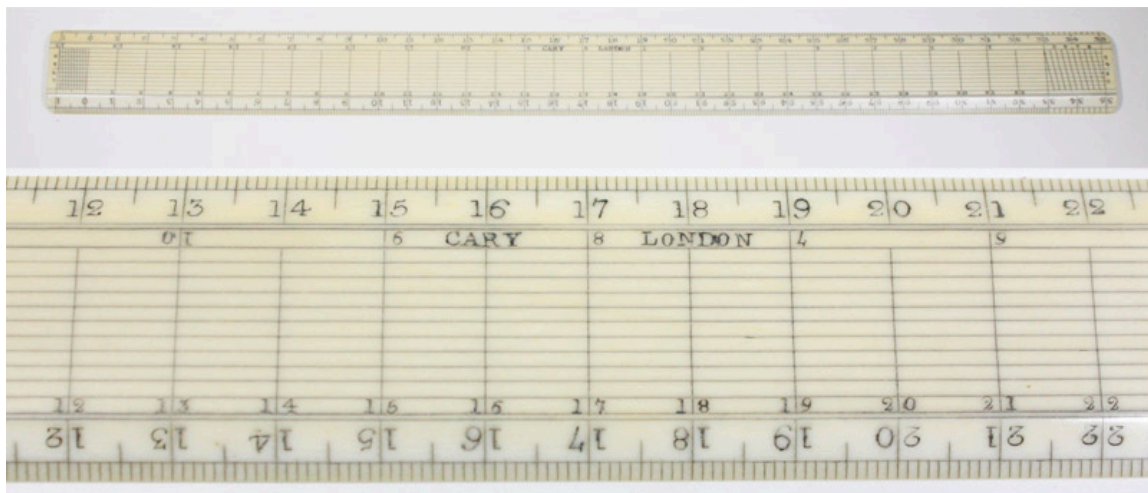
**Figure 3.** A different type of microscope from the W. Cary shop. Image from an internet auction site.



**Figure 4.** A telescope produced by W. Cary, that was owned by American explorer Meriwether Lewis (1774-1809). Image from [http://www.lewisandclarkexhibit.org/shared/specimen\\_window\\_fs.html?0](http://www.lewisandclarkexhibit.org/shared/specimen_window_fs.html?0), used herein for nonprofit, educational purposes.



**Figure 5.** An ivory prospect glass, made by Cary. Palm-sized, low-power telescopes such as this were popular for observing/spying on other attendees of a theater, party, etc. Image from an internet auction.



**Figure 6.** An ivory ruler.



**Figure 7.** A pair of eyeglasses and case, by Cary. The 181 Strand address dates these spectacles as being made after 1828.

**William Cary** was the youngest of four sons of George and Mary Cary. His eldest brother, George (ca. 1853-1830), later operated a haberdashery. The second brother, **John Cary**, became a mapmaker. John and William also operated a joint venture to make globes (see Figure 32 at the end of this essay). The third brother, Francis (ca. 1756-1836), became an engraver, and lived in Chelsea.

William served an apprenticeship as a maker of philosophical instruments (i.e. scientific equipment) with Jesse Ramsden (1735-1800). Ramsden was a highly regarded instrument maker. Some examples of his work are shown in Figure 31, at the end of this essay. Through Ramsden, Cary would have learned considerable skill in working with brass, glass and other materials.

William established his independent business ca. 1785, at 182 Strand. He produced a wide range of scientific instruments and was well known for his quality workmanship. The *Dictionary of National Biography* especially noted that, "He constructed for Dr. Wollaston in 1791 a transit circle - the first made in England - two feet in diameter and provided with microscopes for reading off. In 1805 he sent to Moscow a transit-instrument described and figured in Pearson's 'Practical Astronomy', for the safety of which Bonaparte provided in 1812 by a special order. A circle of 41 centimetres, ordered from Cary by Feer about 1790, is still preserved at the Zurich observatory. He was, besides, the maker of the 2 1/2-foot altitude and azimuth instrument with which Bessel began his observations at Konigsberg, and of numerous excellent sextants, microscopes, reflecting and refracting telescopes, &c." William was a charter member of the Astronomical Society, and produced monthly meteorological reports for *The Gentleman's Magazine*. Brother John's mapmaking shop was next door, at 181 Strand. Globes produced by William and John are marked "181 Strand". George's hat shop was nearby, at 63 Strand.

The January, 1820 issue of *The Gentleman's Magazine* reported, "The houses numbered 181 and 182 Strand, occupied respectively by the brothers John and William Cary, were completely

destroyed by fire on Monday, January 17th, 1820". The Carys then moved their businesses to 86 St. James Street.

The 1823 *Kent's Original London Directory* listed "Cary Wm. optician, 277, Strand". The 1825 list of members of the Royal Astronomical Society also gave William's address as 277 Strand. However, *Kent's* listed "Cary John, optician, 182, Strand", as well as "Cary John, engraver & mapseller, 86, St. James's-street". The 277 Strand shop appears to have closed after William's death.

William Cary died as a moderately wealthy man on November 16, 1825. In his will he left "To three brothers John Cary, George Cary and Francis Cary £1000 each. To Mrs. Penelope White, of Queen Street, Southwark, £500, and to her children, John White, Susanna White and Penelope Dare £200 each. To wife Elizabeth £500 a year for life. Residue to said three brothers for life equally and then to George Cary and John Cary, sons of brother John Cary". The significance of Penelope White and her children is not apparent. The properties on the Strand were rented, and so not mentioned in the will.

Nephews **George Cary** and **John Cary Jr.** continued to operate the optical and scientific instrument business at 182 Strand. They retained the business name "*William Cary*" for some time. George and John Jr. do not appear to have produced optical instruments. All accounts indicate that **Charles Gould** was the manager and head machinist for the Cary business. This would have been a logical arrangement, since Gould was an experienced optician, whereas the Carys were map- and globe-makers, who would have had very little practical knowledge of glass- or brasswork. In 1828, the William Cary business moved next door, to 181 Strand, possibly merging with John Cary Sr.'s mapmaking operation. An 1830 publication described the optician's business as "*J. Cary*". Upon John Cary Sr.'s death in 1835, he left the 181 Strand lease to sons George and John Jr. The 1841 *Kelly's Directory* referred to the optical business as "*William Cary*", suggesting that the boys returned to their uncle's name. The business remained at 181 Strand for many decades and through several ownership changes.

On June 10, 1826, *The London Mechanics' Register* announced "*Mr. C. Gould's Patent Portable Compound Microscope*" (Figure 8). That pronouncement implies that the microscope had only recently been released. The juxtaposition of William Cary's death and Gould announcing this microscope under his own name suggests that Gould was enjoying an increased degree of freedom with the business. Indeed, many contemporary reports describe microscopes and other instruments as being "*Gould's*", and simply mention Cary as the place to meet Mr. Gould and acquire his inventions.

The magazine described the instrument, "*The extreme portability of Mr. Gould's Microscope, which is enclosed in a case measuring only four inches by three, and its great magnifying power, recommend it strongly to the attention of the naturalist, mineralogist, and botanist, as it has sufficient powers to discover the most minute animalculae and seed-vessels, and has also the uses of the single, compound, opaque, and aquatic microscopes. Its construction obviates the want of light when a high magnifying power is used with the compound body, and it may be carried in the pocket without the slightest inconvenience. Mr. Gould's pocket microscope is made and sold by Mr. Cary, of No. 182, Strand, and its various parts are correctly represented in the frontispiece to the present number. An interesting pamphlet, from which we shall probably select a few extracts, has been recently published by Mr. Cary, illustrative of the wonders which the microscope unfolds to the view of man, and containing clear and explicit directions for collecting microscopic objects, and of preparing them for examination*".

The "*pamphlet*" quickly became a 50+ page hardbacked book. Gould apparently modified it several times within a few years, issuing the sixth edition in 1829 (Figures 10-12). A pdf of that book may be downloaded from <http://microscopist.net>. The first few pages describe how to assemble and use this microscope. Three lenses were provided, for use individually or in combination with each other, either as a simple microscope or in conjunction with the compound body. Accessories were also described, including a live box, "*slides filled with curious objects*",



stage forceps, dissecting knife and forceps. Gould instructed that the end of the forceps includes a spoon, "for taking up a single drop of water."

## THE LONDON MECHANICS' REGISTER.

"Why has not Man a microscopic eye?  
"For this plain reason—Man is not a fly."

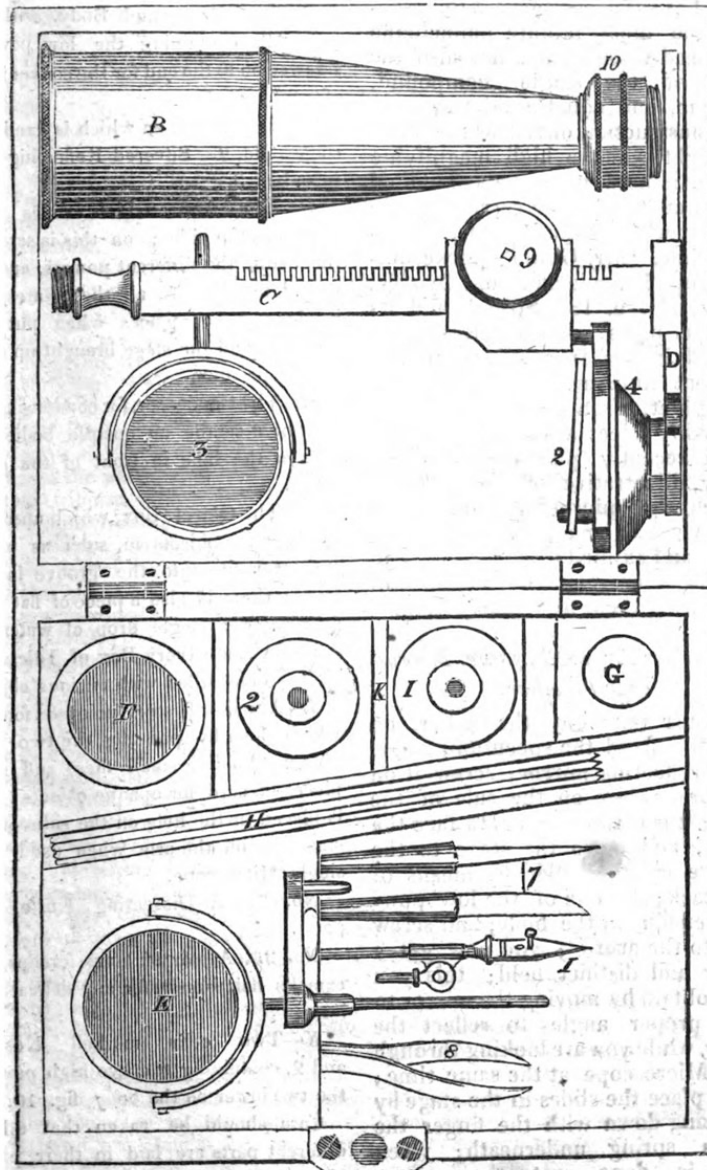
POPE.

No. 91.]

SATURDAY, JUNE 10, 1826.

[Price 3d.

MR. C. GOULD'S PATENT PORTABLE COMPOUND MICROSCOPE.



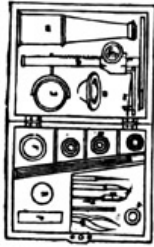
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Figure 8. Front page of *The Mechanic's Register*, 1826, announcing Charles Gould's new microscope.



A. 1840, Palmer (London)



**MICROSCOPES, &c.**

Gould's Improved Compound Microscope, in case, with apparatus, complete, £1. 15s.

This Microscope is recommended to the naturalist, mineralogist, and botanist, for its extreme portability and high magnifying power, being sufficient to discover the most minute animalculæ, seed vessels, &c. It has also the uses of the single, compound, opaque, and aquatic Microscopes.

Fig. 263.

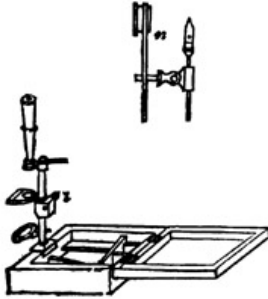


Fig. 254. Gould's Microscope as set up for use.

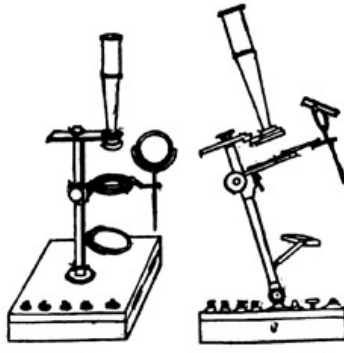


Fig. 265. Larger Improved Compound Microscope, containing in addition to the above, condenser & silver speculum for opaque objects, £3. 3s.  
Fig. 266. Third-size ditto, with joint for the convenience of slanting the Microscope, containing condenser and 2 silver speculums, £5. 6s.

B. 1848, Pike (New York)

Gould's Improved Pocket Compound Microscope.—(Fig. 754. next page) —The extreme portability and great magni-

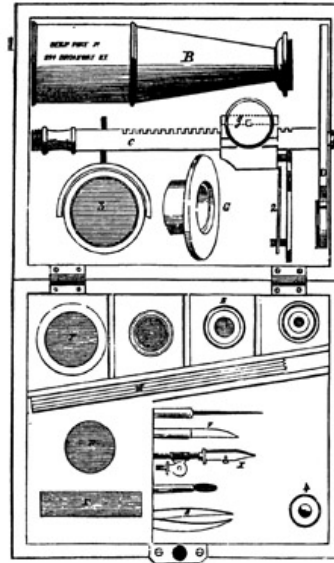


Fig. 754.

C. 1847, Hewitson (Newcastle-upon-Tyne)

**MICROSCOPES.**

|   |                  |
|---|------------------|
| Single Microscopes . . . . .  | 1s. 6d. to 0 5 0 |
| Flower and Insect Ditto . . . . .   | 2 0 to 0 7 6     |
| Beetle Microscopes in Case . . . . .  | 0 12 6           |
| Single Botanical Ditto, 3 Powers, in case . . . . .   | 0 12 6           |
| Gould's Improved Compound Microscope, in mahogany case, with apparatus complete . . . . .   | 1 15 0           |
| Ditto, Larger Size, containing, in addition to the above, Condenser and Silver Speculum for Opaque Objects . . . . .  | 3 5 0            |
| Martin's Improved Microscope, with apparatus in mahogany case, complete . . . . .   | 2 12 6           |
| Ditto, Second Size, with additional apparatus . . . . .   | 3 10 0           |
| Ditto, Third Size, very superior, with Rack-work Adjustment, 6 Powers, Condenser, Microscopic Objects in Ivory Sliders, Hand Microscope, Live Box, &c., &c. . . . . | 5 5 0            |
| Pyramid Microscope, in mahogany case, with drawer for apparatus, Live Box, Frog Plate, &c. . . . .  | 6 6 0            |

**LARGER MICROSCOPES, WITH ACROMATIC OBJECT GLASSES, MADE TO ORDER.**

|  |                  |
|--|------------------|
| Linen and Cloth Microscopes . . . . .                    | 3s. 6d. to 0 4 6 |
| 3 Magnifying Lenses, in Horn or Tortoise-shell . . . . . | 3 6 ,, 0 10 6    |
| 2 Ditto, similarly mounted . . . . .                     | 2 0 ,, 0 6 6     |
| Solar Microscopes, from . . . . .                        | £5 5 0 ,, 21 0 0 |

Every Variety of Optical, Mathematical and Philosophical Instrument made to Order, Repaired, and accurately Adjusted.

N. B. Every Instrument made on the Premises and Warranted.

D. 1854, Bland and Long (London)

**COMPOUND MICROSCOPES.**

|  |                    |
|--|--------------------|
| GOULD'S Improved Compound Microscope, in case, with Apparatus complete . . . . .   | 1 15 0             |
| GOULD'S larger Compound Microscope, with condenser and silver speculum for opaque objects . . . . .  | 3 3 0              |
| Ditto, with jointed stand, condenser, and speculum . . . . .   | 5 5 0              |
| Improved Compound Microscope, with vertical body, sliding eye-piece, rackwork adjustment, spring stage, concave mirror, six powers, reflector, hand magnifier, animalculæ box, glass and ivory disc, 24 objects, and other necessary Apparatus; forming a very complete instrument . . . . . | 2 10 0             |
| Small Compound Microscope, with silvered glass, reflector powers, &c., in case . . . . .   | from 12s. to 1 5 0 |

Figure 9. In addition to the W. Cary shop, numerous other scientific instrument dealers sold Gould microscopes. Illustrated are excerpts from catalogues by (A) Edward Palmer, 1840, (B) Benjamin Pike, 1848 catalogue, (C) John Hewitson, 1847, (D) Bland and Long, 1854. Note that Hewitson states that he manufactured all the instruments he sold. I have owned a Gould-style microscope signed by Cox (London), and Turner's 'The Great Age of the Microscope' includes specimens signed by Bate (London), Banks (London), Harris (London), Cutts (London), Dolland (London) and Duncan (Aberdeen). Unsigned microscopes are still very abundant.

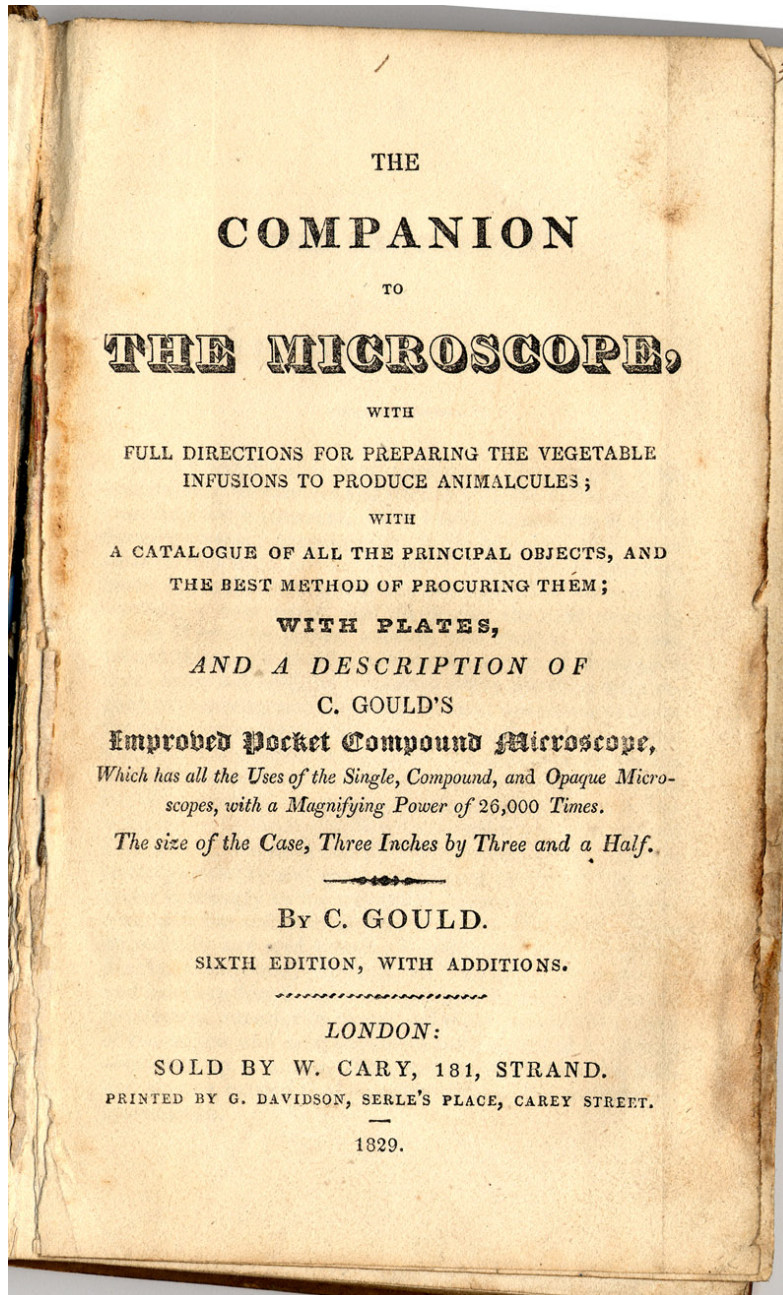


Figure 10. Front page of the 1829, sixth edition of Charles Gould's "The Companion to the Microscope". A pdf of the complete book can be downloaded from <http://microscopist.net/CGouldBook.pdf>



**Figure 11.** Accessories that accompanied the microscope shown in Figure 1 at the time of acquisition, and were listed by Gould as accompanying the microscopes he produced. Clockwise from top left: live box, stage mount for the live box, steel-pointed stage forceps, brass forceps with spoon at one end, a dissecting needle with ivory handle, and a brush made of fine hairs inserted into the end of a feather shaft. Originally, a small knife with a handle like that of the needle would also have been included.



A GENERAL LIST  
OF THE  
**PRINCIPAL OBJECTS**

*Which afford the highest Entertainment and Instruction*

BY  
**THE MICROSCOPE.**

THESE objects may be divided into the following Classes,  
viz. :—

I.—Such as have their whole Body, Form, and Parts magnified and exhibited in one Microscopic View; as—

- ✓ The Louse.
- ✓ The Flea.
- ✓ The Bug.
- ✓ The Mite.
- The Eels in Paste, Vinegar, &c.
- The Animalcules in Fluids.
- Very small Flies and Insects of all sorts.
- The smallest kinds of Plants, Mosses, Mouldiness, &c.

II.—The small Parts of Animals; viz. :—

- The Hair of the Head, Horse-hair, Mouse-hair, Hogs' Bristles, &c.
- The Human Cuticle, or Scarf-skin.
- The Papillæ Pyramidales in the Skin.
- The Fibrillæ of Muscles, Nerves, &c.
- The Ramification of Arteries and Veins.
- The Lymphæducts, Lacteals, and other fine Vessels.
- The Blood, &c.
- The Circulation of the Blood in the Fins of Fishes, the Tails of Tadpoles, and of Water-newts, the best of all.
- ✓ The Nails and Hoofs cut into thin Slices.
- The Plumulæ or Plumage of Feathers.
- ✓ The Pith of a Feather cut transversely.
- The Colours and Tints of Feathers, Eggs, &c. of Fowls.
- The Eggs of all kinds of Insects.
- ✓ The Antennæ or Feelers of Gnats, &c.
- ✓ The Eyes of all Insects, Shell-fish, &c.
- The beautiful Head of a Flesh-fly.
- The Annuli, or Rings, on the Bodies of Insects.
- The Wings of Gnats, Flies, &c.
- The Wings of Scarabæi, or Beetles.
- The Wings of Butterflies, Moths, &c.
- ✓ The Sting of a Bee, Wasp, Hornet, &c.
- ✓ The Eyes of Spiders.
- ✓ The Exuvix, or cast Skins of Spiders.
- ✓ The Apparatus in the Mouths of Spiders.
- ✓ The spiral Proboscis in Butterflies, &c.
- The Teeth in the Mouth of a Snail.
- The Eyes on the Horns of Snails.
- Young Spiders, Caterpillars, &c. just hatched.
- The Web of Spiders, Caterpillars, Silk-worms, &c.
- The Chrysalides, or Cases, of Insects.
- The Thecæ of Moths, Cados-Worms, &c.
- ✓ The Scales of Fishes, Serpents, &c.
- ✓ The Scales of Eels, in particular.
- The transparent Fins of Fishes and Eels.
- The Spiculæ, or Prickles, of Seal-skins.
- The Ovarium, or Sperm, of Fishes.
- The minute Sorts of Shell-fish.
- The fimbriated Parts of Crabs, Lobsters, &c.
- The Excrements of Scollops, &c.

III.—The Third Class of Microscopic Objects are of the Vegetable Kind:—

- The Plantule in the Fruit, or Kernel.
- The Corpuscles of the two Lobes macerated.
- The Orifices of Air-vessels in the Roots and Branches.
- The Orifices of the Sap-vessels in ditto.
- The Cortex or Bark of Trees in general.
- The vesicular Substance of Cork in particular.
- The ligneous Fibres in the internal Bark.
- The spiral Fibres of the Vessels in a Vine-leaf.
- The web-like Warp and Wool in rotten Wood.
- The Pith of Elder, and other like Plants.
- The transverse Section of Kex, Bramble, &c.
- The transverse Section of the Root of Fern, &c.
- The Involucra, or covering of Gems or Buds of Trees.
- The aromatic Balls on Leaves of Sage, Thyme, Mint, &c.
- The catenary Pearls on Sowthistle Leaves, &c.
- The Pellicle, or thin Skin of macerated Leaves.
- The Papillæ and Pores in the Pellicle of Houseleek.
- The Particles of the Parenchyma of macerated Leaves.
- The Ramification of Vessels in ditto.
- The Duplicature of Vessels in ditto.
- The transparent Blades of Grass, Corn, &c.
- The Stings of Nettles, and their Juice or Liquor.
- The unguiculated Tenters, or Hooks of Clivers, &c.
- The Stamina on the young Shoots of Filbert-trees.
- The Lanugo, or Down, on the Leaves of Plants.
- The small Flowers of Plants in general.
- The Colours of the Petala or Leaves.
- The Farina or Dust on the Stamina.
- The Style, Matrix, &c. in the Attire of the Flowers
- The succulent pulpy part of the Fruit.
- The small Seeds of Plants in general.
- The Seeds of Fern, Hart's tongue, &c. in particular.
- The Seeds on the Stems of Mushrooms.
- The whole of Sea Plants of every kind.
- The Variety in the Surface of Corallines.
- The Particular Texture of Sponge.
- The minutest Shells of every sort.

IV.—The Fourth Class of Objects proper for the Microscope are of a Miscellaneous nature, the principal of which here follow :—

- The Edge of a Razor, Penknife, &c.
- The Point of a Needle, Pin, &c.
- The polished Surface of Metals.
- The Print, or Writing, on Paper.
- The Substance of Paper itself.
- The Contexture of Linen, Cloth, &c.
- The finest sorts of Sand.
- The Particles of different kinds of Earth.
- The various coloured Particles of Mundick.
- The Surface and Substance of Ores and Metals.
- The Efflorescences of sparry Exudations.
- The Salts of Sea-water evaporated.
- The Salts of Vegetable Lixivia.
- The Salts of animal Substances.
- The Salts of Crystals of all Metals.
- The Crystallization of Salts.
- The Parts of the smallest Flakes of Snow.
- The hexagonal Cups of White Frost.
- The frosty Vegetation on Glass Windows.
- The Effervescence betwixt Acids and Alkalies.
- The ignited Particles in striking Fire.
- The Ashes of burnt Paper, Linen, &c.
- The Teeth of fine Files, Rasps, &c.
- The Threads on the finest Screws.
- The Smallest Microscopic Glasses themselves.

A great variety of Slides, filled with curious and interesting objects, may be had in sets, from 2s. 6d. to 12s.

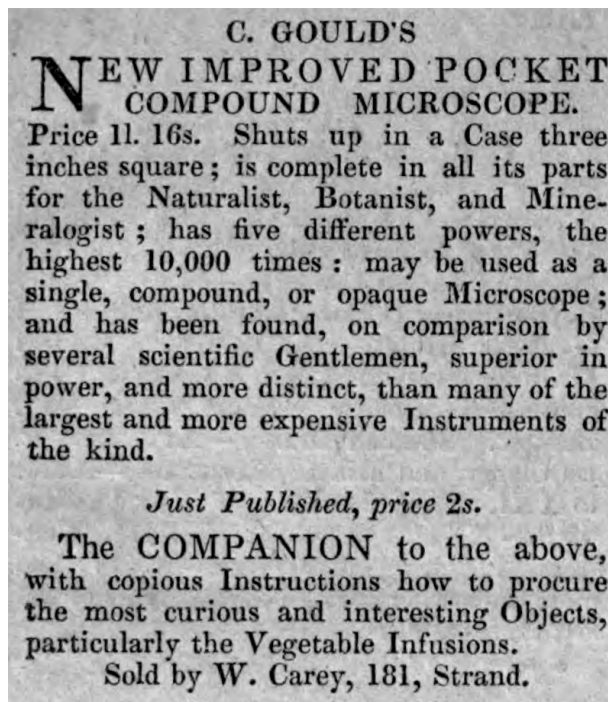
**Figure 12.** Charles Gould's list of objects for the microscope, from the 1829, 6th edition of his *Companion to the Microscope*. This list predates Andrew Pritchard's famous list of objects by almost a decade.



The bulk of Gould's 1829 book is dedicated to descriptions of specimens that may be obtained for viewing, and how to prepare them. To quote Gould from the preface: "*Many persons who have purchased Microscopes, after entertaining themselves and friends with the slides that accompany the instrument, have found themselves at a loss for new objects; consequently, it has been laid aside, as of little further use: but no invention is capable of affording more entertainment and instruction than this instrument, opening a new world, and displaying the most extensive scenes of creative power, wisdom, and design. It is presumed this small treatise will be the means of showing a more extended field, as it contains every direction with regard to procuring and applying the most interesting subjects for examination by the Microscope: also the method of producing those wonderful objects of the minute creation, the animalcules of vegetable infusions. It comprises, likewise, a list of upwards of two hundred different objects, and a Description of C. Gould's New Improved Pocket Compound Microscope, the most complete Microscope made*".

It is particularly noteworthy that Gould's list predates Andrew Pritchard's more famous *A List of Two Thousand Microscopic Objects* by nearly a decade.

Additional information on Gould's microscopes and his companion books can be found at <http://www.microscope-antiques.com/carysmall.html> and <http://www.microscope-antiques.com/gouldsbooks.html>

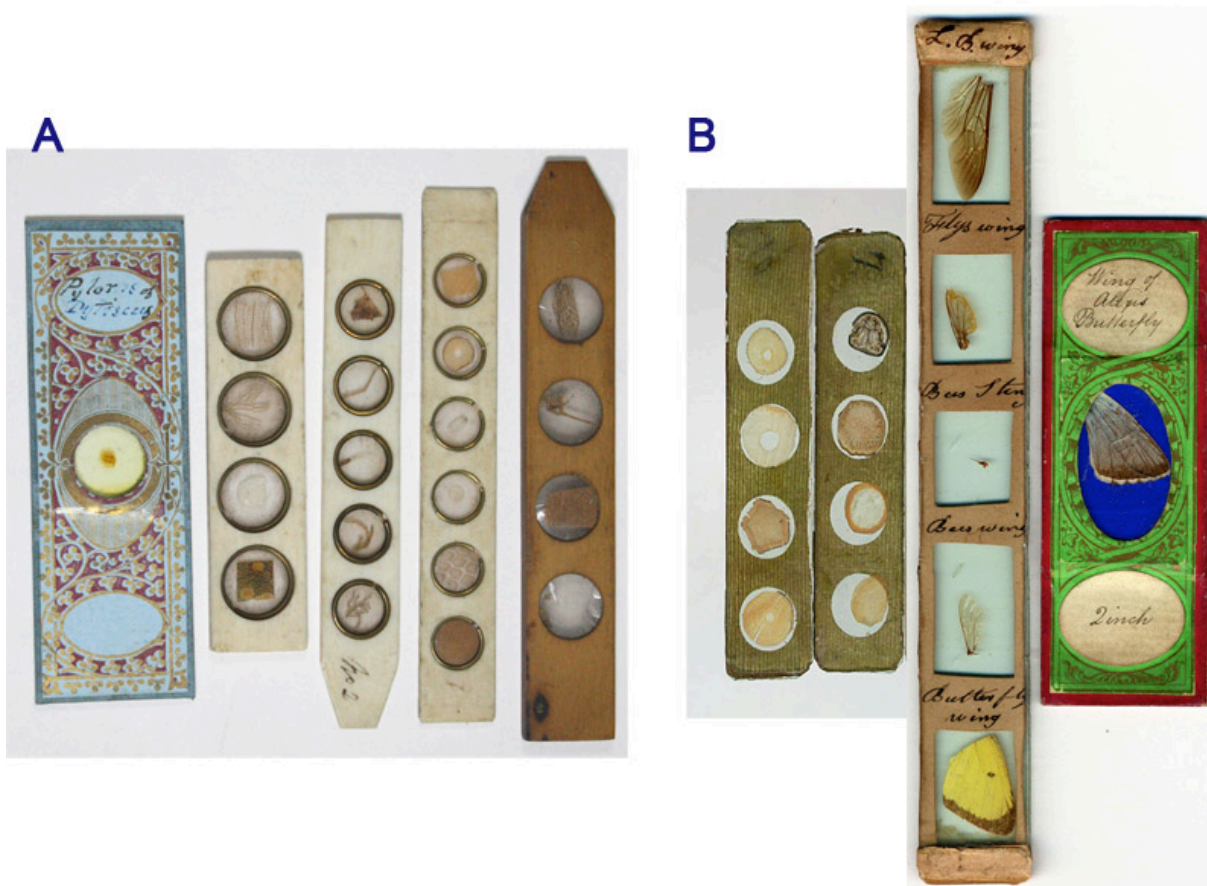


**Figure 13.** An 1828 advertisement for Gould's microscope and companion book. From *'Thermometer and Pyrometer'*, by T.S. Traill.

Contemporary accounts credit Charles Gould with several advances in the preparation of objects for the microscope. At the beginning of the 1820s, sliders made of ivory or wood were the most common method for mounting specimens (Figure 14A). Thin slices of translucent mica were used to hold specimens. Imperfections in the mica mineral, and unevenness of slices, limited resolution of objects. Glass is optically far superior to mica, and came into greater use during the 1820s.

The 1829, sixth edition of Gould's book described a new method for making microscope slides from two pieces of glass and some paper. "*Take two slips of glass about the size of ivory slides;*

then get a piece of writing paper, with holes, of the same size; wet one side of the paper with gum-water, and lay the glass upon it, suffering it to dry; then place your objects in the holes, wet the other side in the same manner, and lay on the other glass". Examples of such slides are shown in Figure 14B.



**Figure 14.** One of Charles Gould's contributions to microscope slide-making. **(A)** Prior to the 1820s, microscope slides/sliders were made of ivory, bone or wood, which held specimens dry-mounted between two mica discs. **(B)** A method attributed to Gould, using two glass slides, with a thick paper spacer glued between. Specimens were held within circles, squares, etc. cut out of the spacer. A disadvantage of this method was that the thick top glass precluded use of high-powered lenses for detailed microscopy. This, and similar techniques such as Darker's method (see Figure 16), appear to have been used primarily for woods and other large specimens, and fell into disuse within a few decades, as thin glass cover slips became more common. For size comparisons, RMS standard 1x3 inch slides are shown in each panel, which were made by (A) John T. Norman and (B) Edmund Wheeler.

Thomas Gill, writing in 1830, attributed Gould with developing another novel method of specimen mounting. This was the precursor of a technique that is still in common use today: fastening of a cover slip to a glass slide, with a specimen held between. In Gould's case, the cover slips were made of thin sheets of mica. As a final touch, Gould glued paper over the top of slide, protecting and helping to adhere the cover slip (Figure 15). That feature was commonly used by slide-makers for the next half-century. Quoting Gill, "Mr. C. Gould's mode of mounting microscopic objects, to be viewed under highly magnifying powers. - Mr. Gould furnished us with some of the scales or feathers from the wing of a butterfly, properly mounted for viewing under a power of the twentieth of an inch focus, or even higher; and which, as it is a very convenient method, and readily practised, we think deserving of being made known. The feathers being placed in the centre of a slip of crown glass, one and a half inches long, and half

an inch wide, are covered with a slip of very thin talc or mica, which is cemented at each end upon the glass slip, by means of a solution of gum-arabic in water, to which a little pure acetic acid is added; and the talc is itself covered and defended from injury, excepting in that part of it which is necessarily left open in order to view the objects, by being covered with a piece of thin paper, the size of the glass slip, and having a circular aperture in its centre, a quarter of an inch in diameter, and which paper is also cemented by gum-water. There is quite sufficient space upon this covering paper to receive in writing the name of the object inclosed, together with a number or other mark of reference to it, and its thickness preserves the talc from being injured, although it is not so great as to present any impediment to the employment of highly magnifying powers in viewing the objects”.



**Figure 15.** Another contribution of Charles Gould to the evolution of microscope slide-making. **(A)** The four small slides on the left were made according to what Thomas Gill described as “Mr. C. Gould’s Mode” of slide making. The specimens were dry-mounted between a mica cover slip and a glass slide. Paper was glued on top, to help hold down the cover slip and prevent it from being dislodged. The torn paper on the damaged slide reveals the mica cover slip. The top red-papered slide with the printed label was retailed by Andrew Pritchard (it is part of a set that was acquired in a case that is embossed with Pritchard’s name and address). The two slides with pale green papers with star prints were produced by professional slide-maker James W. Bond. The lower, small slide is an early test slide of butterfly scales, possibly retailed by Cary. A later, balsam-mounted 1x3 inch slide by Bond is shown for size comparison. **(B)** An enlarged, oblique view of the damaged J.W. Bond slide. All of these slides have paper coverings on the top only, as Gill described for Gould’s technique. Cut edges of the glass slides were left rough.

Gould provided a step in the evolution of another mounting technique (Figure 16). Thomas Gill, in 1828, wrote, “On an improved Apparatus or Slider for viewing the Animalcules in water under the Microscope. - The Editor has formerly described an apparatus consisting of two slips of glass cemented together, with a piece of card laid between them, and having a gap or notch cut in one side of it, to form a kind of cell, into which cell, water, containing animalcules in it, being placed, the water was held in the cell by the capillary attraction, and was thus prevented from falling out, when the slider was laid horizontally on the stage of the microscope. The Editor, some time since, furnished Mr. Gould, at Mr. Carey’s, the optician in the Strand, with one of these sliders, and which he immediately adopted in his microscopic apparatus. He has since, however, laid aside the interposed card, and now merely cements the two slips of glass together, by heating them, and coating them with sealing wax, excepting a gap or cavity in one side of each, in the middle of the slip; and then again heating them, he joins them together, thus forming a cavity which holds a thinner stratum of water than when the card was interposed. This is a great improvement on the original method; and when one of the glass slips is only the



*twentieth or thirtieth part of an inch in thickness, as is the case with some of the Editor's making for his own use, it forms an exceedingly commodious cell for this purpose. Mr. Gould clears out the water by means of a slip of paper introduced between the two glass slips".*

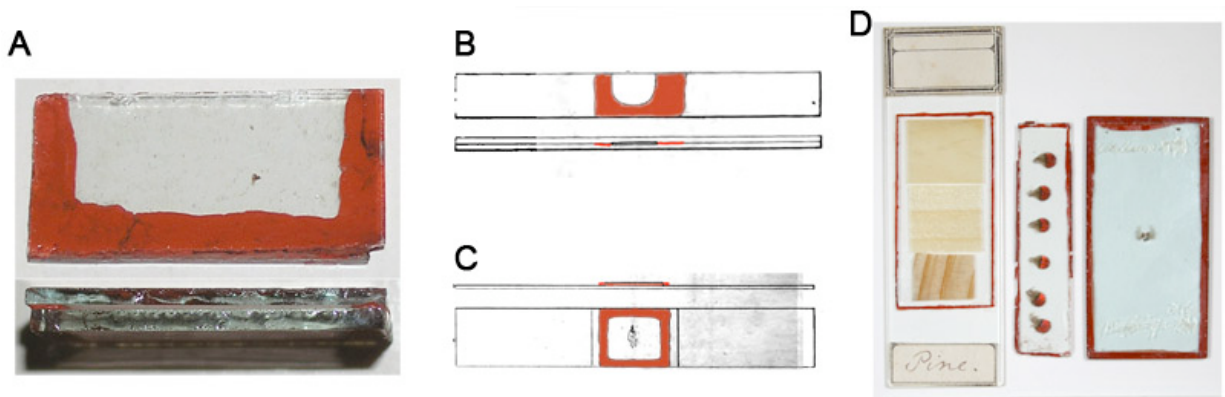
Gould again modified the wax-sealed fluid slide by using a large piece of glass for the bottom and for the top, a small, thin glass the size of a cover slip. Gill described, "Mr. C. Gould's slider for viewing animalcules in water. - We have, in our last volume .. described Mr. Gould's mode of forming these useful sliders; but as example is sometimes better than precept, so we give in (Figure 16B), a front and edge view of one of them, of about the size he usually makes them. The boundaries of the sealing-wax, which he applies on the inner surfaces of both slips of glass, when heated sufficiently to melt it .. Instead of employing two slips of glass, the full length of the slider, it is sufficient, and particularly in using a covering one of very thin plate glass, that it be merely long enough to cover the cell, formed near one of the edges of the slider, and as indicated by the dotted lines in that figure".

Gill changed that slide-making style by sealing the specimen-holding well with wax on all four sides. Specimens were placed within this well, then a thin cover slip was laid across the top (Figure 16C). Gill wrote, in 1829, "*The Editor's pond or shallow cistern for viewing animalcules, &c. in water. - We also embrace the present opportunity of showing the form of this very useful and readily formed pond, and which we have so often had occasion to mention in the course of giving these articles on the microscope. (Figure 16C) shows a slip of glass, near the middle of which, when heated over the flame of a lamp or candle, two cross lines have been drawn with a stick of sealing-wax formed into a point, and also two others along the edges of the slip, to meet the two cross ones, and thus forming the four sides of the pond. The sealing-wax is applied so thinly, that the pond is exceedingly shallow, and yet it allows of the motions of the animalcules in it, when covered with a very thin plate of glass or talc, as shown in the figure. The chief advantage of this over Mr. Gould's slider consists in the great facility of wiping the parts clean after each experiment has been made with it".*

Since Gill's modification of Gould's method permitted a simple method of adhering a cover slip to a slide, it would have been a small, logical step to adapt it to making more permanent mounts. Dry objects, such as wood and bone sections or feathers, would be most appropriate, since there are no problems of leakage or evaporation through the sealing wax (Figure 16D). John Quekett credited that advance to William H. Darker. Although Andrew Pritchard is often given credit nowadays, based upon the description of the sealing wax technique in his 1847 *Microscopic Objects* and attachment of his name to some of those slides, Pritchard never claimed to have invented it nor did any contemporary microscopist link Pritchard's name to the method.

Another variation of Gould's sealed trough method was developed by James Holland. That modification was similar to Gill's with a square well in the center of a glass slide but Holland formed his wells with "*white lead, ground in drying linseed oil*". A specimen, in a mixture of alcohol and water, was placed in the well, which was then permanently sealed with a cover slip and lead-oil paint. Gill stated, "*that although it is upwards of a fortnight since he prepared this, and two other similar objects, no visible escape of the fluid is perceptible!*" and "*We are glad to add, that, after the test of three months, it is still in a perfect state; and we may therefore hope, that its durable preservation is insured. We also learn that Mr. C. Gould has adopted this excellent method, with a similar success, and can therefore confidently recommend its application to all similar cases, or where we would wish to preserve delicate objects in a convenient state, as nearly like their natural one as may be, and in which state only can we expect to see the beautiful and minute ramifications of the blood-vessels, &c., extended over the various parts, and other minutiae; but which, in the drying of such objects, usually shrink up, and become obliterated*". This was the forerunner of the fluid mounts that were later produced by Alexander Hett and other professionals.





**Figure 16.** Further contributions by Charles Gould to development of microscope slide-making techniques. **(A)** Gould developed a simple trough for viewing specimens in water, consisting of two glass slides sealed together on three sides. Fluids were retained in the thin cavity by capillary action, permitting the slide to be laid horizontally on the microscope. Shown are side and top views of a surviving Gould trough. Actual size is approximately 1 inch (2 1/2 cm) wide. **(B)** A modification by Gould, with a small specimen holding space formed between two larger glass slides. **(C)** Thomas Gill then modified Gould's pattern, by instead forming a square well of wax in the center of a slide, which can hold a small "pond" of water and specimens. A cover slip was then placed over the specimen, suspended by the wax. **(D)** Logical extensions of Gill's method, producing permanent slides with two glass slips held together by wax. John Quekett attributed this method to William Hill Darker. The left slide, of pine wood sections, is a standard 1x3 inches. Based upon the engraved handwriting and fine finish, the right slide was probably made by Darker. The makers of the pine wood and hummingbird feathers are not known. The black and white, 1829 drawings shown as panels B and C were color-enhanced to emphasize the location of the wax. Panel A is adapted, with permission, from <http://www.microscope-antiques.com/carysmall.html>.

While the water troughs of Gould and others allowed fascinating views of live organisms in water, the microscopist would often be frustrated when specimens swam out of the field of view. Manually moving the trough on the microscope's stage would be jerky, plus the trough might fall off the stage. Gould remedied that problem by developing what may have been the first x-y moveable microscope stage (Figure 17). A rotating knob on either side of the stage allowed the microscopist to adjust the stage either left-right or up-down with ease. In that each hand controlled only one knob, a user could easily track an organism as it traveled around the miniature aquarium. Gill described "Mr. Gould's adjusting stage for the Microscope" thusly, "Mr. Gould, at Mr. Carey's, optician, in the Strand, has recently constructed an adjusting stage for the microscope, by which the observer has it in his power to follow the motions of an animalcula in water with great facility. He has effected this improvement in the following manner: Upon the flat plate, composing the usual adjusting stage, two flat bars of brass are screwed, one in front of, and the other behind, the circular cell in the middle of the stage; the inner sides of these bars are bevelled, so as to receive the dove-tailed edges of another flat plate within them, which is made to slide across the stage towards either side, as may be required, by the action of a pinion with a milledhead underneath it, and which pinion works into a toothed rack, formed upon the inner edge of the second plate; the pinion having a cylindrical neck or pivot close to it, which turns in a cylindrical hole, made in the right hand side of the stage to receive it; and the pinion is kept in its place by the shoulder of the stem of the milled-head being pressed against the under side of the stage, by a central binding screw in the milled-head, as usual: the milledhead itself being fitted upon a squared part of the axis of the pinion. Upon the second plate two other similar bevelled bars are also screwed, one upon each side of it, and, consequently, at right-angles to the two first mentioned ones; within these, the dove-tailed edges of a third flat plate also move backwards and forwards, by means of a second pinion, acting in a toothed rack, formed upon the left side of that plate; the pinion turning in a hole made in the left hand side of

*the second plate, and being mounted with a milled-head underneath it, in the same manner as that first described. The middle parts of both the moveable plates are removed, so as not to impede the light from passing up from the illuminating mirror or speculum placed underneath; and the objects being supported upon a slip of flat glass, or in a concave one, as usual, their motions can be most conveniently followed, by the observer taking the two adjusting milled-heads of the stage, one between the thumb and fore-finger of each hand, and thus turning either or both of them, as may be required. The milled-head of the pinion, which, by working into a rack mounted into, or formed at the back of, the pillar or stem supporting the microscope, serves to adjust the foci of the different lenses, being also within convenient reach of the right hand, so that the whole adjustment is entirely under the control of the observer, who will find it a most valuable assistant in his microscopic investigations. The whole forms an exceedingly neat combination of parts, and reflects much credit both upon the inventor of it, and upon the workman who has executed it."*



**Figure 17.** An example of a Cary microscope with Gould's adjusting stage. Adapted, with permission, from <http://www.microscope-antiques.com/carymech.html>

Robert Brown, in 1827, described a phenomenon that came to be known as “Brownian motion”, wherein microscopic objects suspended in water can be observed to be jostled about by collisions with the water molecules. The cause was long in debate among scientists, and was not identified for several decades afterward. An anecdote related by Thomas Carpenter in July, 1829, indicates that Charles Gould was among the curious, “I called in at the shop of Mr. Cary, optician, in the Strand, where I was informed by Mr. Gould, that some persons being of opinion that the motion of the molecules, discovered and described by Mr. R. Brown, of the British Museum, was either occasioned by the action of the breath of the party examining them under the microscope, or by the watery particles evaporating. In order to ascertain the fact, he had

*placed some exceedingly minute particles' of gamboge in a fluid, which he secured hermetically, between a slice of talc, and a glass slip, so that they could neither be affected by the breath nor the atmosphere. At the time I observed these particles, they were in a constant motion of attraction and repulsion; and Mr. Gould informed me, they had then been between the glass and talc for seven days previous to my observing them. The lens under which I viewed them, was the thirtieth of an inch focus".* Carpenter's story also indicates that, by that time, Gould was making fluid-filled microscope slides which were permanent to some extent.

Gould described another microscopic phenomenon, in 1833, *"Having occasion to prepare some of the scales from different fish for the microscope, in viewing one as an opaque object, in a drop of water, I observed a very curious phenomenon ; which was, a number of minute shining particles in motion, moving in all directions, appearing and disappearing, and when on the surface reflecting the most brilliant prismatic colours, producing a beautiful microscopic effect. I have examined them with various forms of the microscope, particularly under a fine achromatic belonging to Mr. Joinville; and they have every appearance of animalcula. Several of my microscopic friends who have seen them are of the same opinion, particularly the above gentleman, who has paid great attention to microscopic pursuits. Whether they are living animalcula or not, I am at a loss to determine, and must leave it for the investigation of our microscopic friends. The readiest way of examining them is as follows: Take a single scale from any fish (say a fresh herring); put it on a flat piece of glass, and cover it with a drop of pure water; press the scale to make it lie flat on the glass; place it under the microscope with a piece of black paper, or the black ivory stage-piece of the microscope, as it must be viewed as a perfect opaque object, or the effect is not seen: by means of a condenser throw a strong light upon it from a lamp or candle; and you will observe a multitude of minute bodies in motion on the scale; but they are much more visible in that part of the drop of water which the scale does not occupy, forming a most beautiful and interesting microscopic object"*.

All aspects of Cary microscopes were well regarded. Gill wrote, in 1829, *"On Mr. Gould's Microscopic Lenses, of high powers - The Editor had an opportunity lately afforded him at Mr. Thomas Carpenter's, by Mr. Gould, of judging of the magnifying powers of several of these lenses, in a comparison with those of his own Varley's microscope, and found that the highest exceeded his of the sixtieth of an inch focus; being, perhaps, equal to the eightieth of an inch. Of their value in respect to distinctness, he was not able to judge, they not being mounted sufficiently accurately to test them. Mr. Gould stated, that he should be able to sell them at very moderate prices"*.

William Wollaston (1766-1828) invented the "Wollaston Doublet" for the simple microscope in 1812. This eyepiece consists of two plano-convex lenses, with their plane sides towards the object, and the lens of shortest focal length next the object. That arrangement was capable of far greater resolution than the single lens eyepiece. An improved version of the Wollaston doublet was published shortly after the inventor's death, in 1829. Gould promptly integrated this advance into his microscopes. Gill described, in 1830, *"The late Dr. Wollaston's Microscopic Doublet - We are now able to congratulate our microscopic readers on this very superior instrument being afforded at only one fourth of the price hitherto charged for it. Mr. C. Gould, at Mr. J. Cary's, the celebrated optician in the Strand, has just put into our hands one of these instruments, in order that we might be able to prove its powers with the most difficult test objects. And, accordingly, we have placed under it the long-notched, or cleft scales of the brassica butterfly, and also those of the podura, with a doublet of about the twentieth of an inch compound focus, and another of about the thirtieth of an inch focus, and never have we viewed those objects with greater distinctness, or under more favourable circumstances! The facility of using this microscope, is likewise a considerable recommendation in its favour; as the proper management of the light, an object of the greatest importance, is now readily acquired; and its nice adjustment for the focal distance is effected by means of a finely threaded screw. We have no doubt that this superior instrument will now become a favorite with the microscopic part of the public, and greatly contribute in extending the use of that invaluable aid to our limited vision, the microscope. This instrument possesses the power of exhibiting the minute bodies with*

extreme distinctness; and which, as Dr. Wollaston justly observes, in his description of it in the *Philosophical Transactions*, 'is absolutely necessary for an original examination of unknown objects'. Its great portability is also no small recommendation in its favour, as it is inclosed in a neat mahogany box, which is only two inches in depth, two and a half inches wide, and three and a half inches long; and can therefore be conveniently carried in the pocket". Also notable in this statement is the naming of the optician's business as "J. Cary", implying that William Cary's brother had re-named the shop.

An advertisement in September of 1829 described a very large projection microscope, "C. GOULD'S IMPROVED LUCERNAL MICROSCOPE. This Instrument is admirably calculated for viewing large or small objects, particularly insects, the field being capable of taking in, at one view, entire, moths, butterflies, beetles, &c. By this instrument that superb insect the curculio, or diamond beetle, is magnified to 19 inches, shewing its variegated brilliancy in the highest perfection. The entomologist, may examine any rare insect without injury, and the mineralogist will be afforded the means of viewing the beauties of his cabinets in a unique and splendid manner. A microscope of this description has long been a desideratum; such instruments have, hitherto, been both expensive and complicated; this one is with confidence offered to the public, and will be duly appreciated. Its prominent qualities are, splendid effects united with great facility in its management. Made and sold by W. Cary, 181, Strand, price 2£ 18s. to 3£. 13s. 6d".

**SOLAR MICROSCOPE SUPERSEDED.**  
*Stanley's Rooms, No. 21, Old Bond Street.*  
**E**XHIBITION of a Magnificent HYDRO-OXYGEN MICROSCOPE, rivalling in its effects, the most brilliant Solar Light. By this splendid Instrument is shown, amongst many beautiful and interesting objects, a DROP of WATER magnified 800,000 Times, and occupying a surface of 132 Square Feet, in which are seen thousands of Living Creatures; producing a grand and interesting spectacle of the Wonders of the Microscopic World. With various other interesting Optical Instruments.  
 This Instrument has been made under the direction of Mr. Cooper, and of Mr. Cary, Optician, 181, Strand.  
 Hours of Exhibition, from 12 till 5. Admittance, 1s.

STANLEY'S ROOMS, 21, OLD BOND STREET, Piccadilly.  
**E**XHIBITION of the ORIGINAL HYDRO-OXYGEN MICROSCOPE,  
 which was visited by upwards of 60,000 persons during the last Season, is now RE-OPENED, with INCREASED MAGNIFYING POWERS, and upon a much larger Scale.  
 By this Splendid Instrument various beautiful Objects are shown, magnified from 10,000 to upwards of 2,000,000 times, and occupying a surface of 200 Square Feet, among which are separate Drops of Water, in which are seen thousands of living Creatures, producing a grand and interesting spectacle of the Wonders of the Microscopic World.  
 N.B. To show the extraordinary power of this Instrument, the FLEA is magnified to TWENTY FEET!  
 This Instrument has been made under the direction of Mr. COOPER, and Mr. CARY, Optician, 181, Strand.  
 Hours of Exhibition from 12 till 5. Admittance, 1s.

**Figure 18.** 1833 Advertisements for Cooper and Cary's projection microscope.

Gould's optical prowess enabled the first public displays with a projection microscope using artificial light. This occurred on February 18, 1833, as a joint venture between John T. Cooper and John Cary.

From the *Microscopic Journal*, "As microscopic research is for the most part an amusement rather than a profession, it cannot be a matter of surprise that many resort to it as a means of intellectual pastime, which is sure to terminate in beneficial results .. The first and most important attempt to develop to the public gaze the microscope on a large scale, was made by Mr. Carpenter, of Regent street, who for many years exhibited a solar microscope, for the gratification of the public. The uncertainty, however, of the weather, and state of atmosphere generally, in this country, and more especially in the metropolis, was the great obstacle to this exhibition. This difficulty, at first sight insurmountable, was at length overcome by Mr. J. T. Cooper, who had for many years applied for private purposes, the oxy-hydrogen gases projected on lime, (known generally as the oxy-hydrogen light) as a means of illustrating in his laboratory and lectures, many of the important facts connected with light. At a meeting of a few scientific friends to witness the results of some experiments with this light, at Mr. Cooper's laboratory, then at the Aldersgate street School of Medicine (twelve years since) Mr. Cooper and Mr. John Carey, of the Strand, feeling assured of the principle and stability of the application, proposed to apply this substitute for the solar rays to the illustration of microscopic power, and accordingly arrangements were made, and a microscope constructed, adapted expressly to the peculiar nature of the light, which, as is well known, differs in many respects from that received from the sun. The first microscope (an experimental one) was opened in the



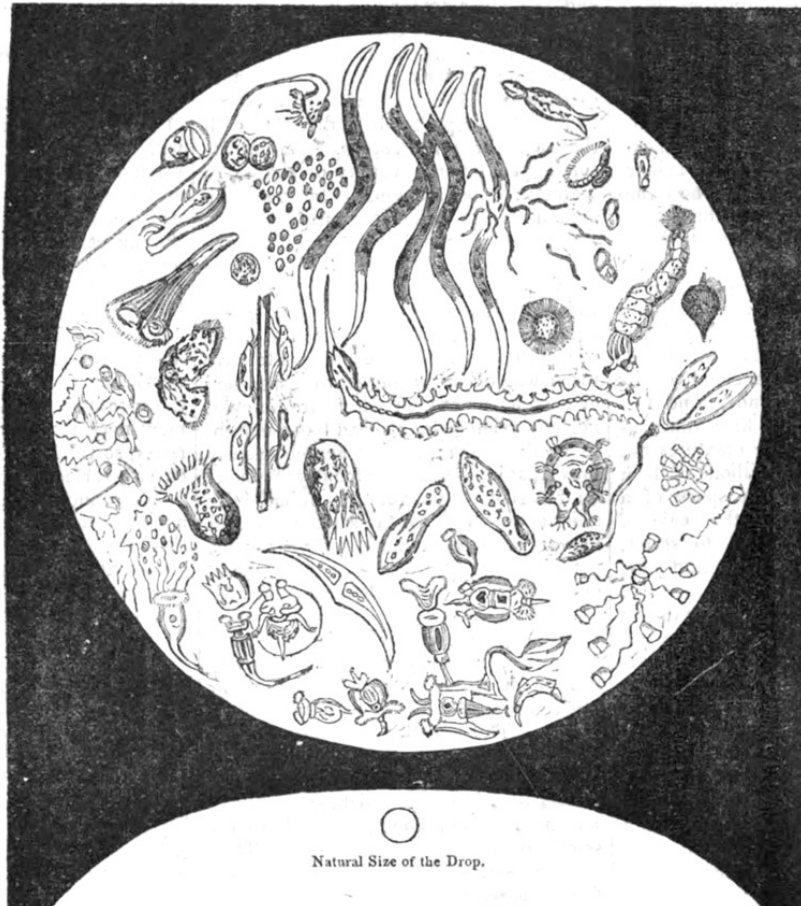
*Strand in the year 1832, nearly opposite the end of Norfolk- street; this spot was selected on account of the contiguity to Mr. Carey's workshops, as a matter of convenience only. When by dint of much time and experimental application, Messrs. Cooper and Carey had accomplished their labours to their satisfaction, the scientific public it will be remembered, were invited to attend at 21, Old Bond-street, on 18th of February, 1833, to witness the first public exhibition of the kind ever presented, in which the oxy-hydrogen light was made to perform all that had been hitherto effected with direct solar light; and it is but justice to those gentlemen to affirm, that this exhibition was considered to be, both by scientific men and the public at large, not only most creditable to the labours of the projectors, but the most interesting and important that had ever been offered to the public, and which could not fail to attract the attention of persons in every age, rank, and station in life; - but possessing the noble aim of enlarging the views of the multitude, by drawing their attention to the wonderful and beautiful adaptations of nature to secure her end. No exhibition was for a period better attended than was this; others in the course of a short time sprang up in various parts of the metropolis and the provinces, and two are even daily exhibited at the galleries of Practical Science in London, forming the leading attraction, and exciting the general interest and amusement of those who visit these institutions".*

*From The Young Mechanic, "Beautiful Experiments on the Hydro-oxygen Microscope. - We were yesterday admitted at Stanley's, No. 21, Old Bond street, to a private view of one of the most extraordinary exhibitions we ever remember; it is denominated the hydro-oxygen microscope, and is an application of the light employed by Lieut. Drummond on the trigonometrical survey to microscopic purposes. A stream of oxygen gas, and another of hydrogen gas, (the chief constituents of water) are brought into union, and projected in an ignited state upon a mass of lime, producing a light of intense brilliancy, which, passing through a lens, throws the images of objects magnified from 10,000 to 500,000 times, in the manner of a solar microscope, upon a disk of 14 feet diameter. The inanimate objects consisted of fragments of insects' wings, of fuci, sea-weed, woods, hair, &c; all the minute external properties of which were shown upon an exaggerated scale. A few hairs of an infant appeared like tubes of two inches in diameter. A small portion of the human pericardium exhibited the courses of the arteries and veins. The penetrating nature of the light revealed the interior confirmation of the fleas and spiders in the object glasses. The sting of a bee was a monstrous barbed weapon, four feet long. The lancets of the horse-fly were sabres about two feet in length. The next curious part of the exhibition consisted of the small animalcules in a drop of water, some of which are seen preying upon each other. Some skeleton larvae were from their diaphanous texture, beautifully developed, exhibiting even the vesicle of air which enables them to rise or descend in the water; and some of the worms found in stagnant ditches, the natural size of which is a thread, appeared like the largest sized boa-constrictor. It is in short, an exhibition worthy to engage the attention of natural philosophers of the highest class, as well as of the merely curious. The instrument is constructed under the superintendence of Mr. Cooper, professor of chemistry, and Mr. Cary, the optician. The former gentleman attends and explains, very clearly and scientifically the different objects. The exhibition was crowded with company, including persons of rank and science, Lord Sidmouth Lord Dover, Mr. Faraday, Mr. Babbage, Professor Buckland, &c. - London Times*

*From The Tourist, "perhaps, the most astonishing view of these animals, and of the wonders of the microscopic world in general, is presented by a recent improvement in the solar microscope - we refer to Mr. Gould's instrument constructed under the direction of Mr. Cooper and Mr. Carey, the optician, - the extraordinary effect of which is daily exhibited at No. 287 Strand. It acts on the general principle of the solar microscope, but is supplied with an artificial and most brilliant light, produced by the mixture of hydrogen and oxygen gases on lime. The writer had recently an opportunity of witnessing the effect of this extraordinary instrument, and, without describing in detail the beauties of the horrors which it brought to light from the invisible world, (in doing which he would be obliged to draw very largely on the faith of his readers,) he may give some general idea of the spectacle, by stating that the instrument magnifies three hundred*

*thousand times, so that a drop of water appears to cover a surface of a hundred square feet! We cannot but anticipate some important accessions to physical science from this extraordinary instrument, and we confidently recommend it to the notice of our readers as a source of much instruction and amusement”.*

### MICROSCOPIC VIEW OF A DROP OF WATER.



**Figure 19.** Illustration that accompanied an 1833 article which described the Cooper-Cary-Gould projection microscope. From 'The Tourist'.

# CARY'S GLOBES,

Celestial and Terrestrial,

ARE MADE BY

G. & J. CARY, 86, ST. JAMES'S STREET, & 181, STRAND,  
Near Norfolk Street, London,

OF THE FOLLOWING SIZES:—

21 Inch—18 Inch—15 Inch—12 Inch—9 Inch—6 Inch—and  $3\frac{1}{2}$  Inch Diameter;

AT THE PRICES AFFIXED TO EACH PATTERN.

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Black Frames.

|         |        |    |    |   |
|---------|--------|----|----|---|
| 21 Inch | .....£ | 11 | 11 | 0 |
| 18 Do.  | .....  | 9  | 0  | 0 |
| 15 Do.  | .....  | 6  | 16 | 6 |
| 12 Do.  | .....  | 3  | 18 | 6 |
| 9 Do.   | .....  | 3  | 3  | 0 |
| 6 Do.   | .....  | 2  | 12 | 6 |

No. 2.



Mahogany.

|         |        |    |    |   |
|---------|--------|----|----|---|
| 21 Inch | .....£ | 15 | 15 | 0 |
| 18 Do.  | .....  | 13 | 13 | 0 |
| 15 Do.  | .....  | 10 | 10 | 0 |
| 12 Do.  | .....  | 5  | 15 | 0 |
| 9 Do.   | .....  | 4  | 12 | 0 |
| 6 Do.   | .....  | 3  | 18 | 0 |

No. 3.



Mahogany.

|         |            |    |    |   |
|---------|------------|----|----|---|
| 21 Inch | .....£     | 15 | 15 | 0 |
| 18 Do.  | .....      | 13 | 13 | 0 |
| 15 Do.  | .....      | 10 | 10 | 0 |
| 12 Do.  | .....      | 6  | 0  | 0 |
| 12 Do.  | chair high | 6  | 11 | 0 |

No. 4.



Mahogany,  
very elegant.

|         |        |    |    |   |
|---------|--------|----|----|---|
| 21 Inch | .....£ | 19 | 19 | 0 |
| 18 Do.  | .....  | 17 | 17 | 0 |
| 15 Do.  | .....  | 12 | 12 | 0 |

No. 5.



Mahogany, reeded Pattern,  
very elegant.

|         |        |    |    |   |
|---------|--------|----|----|---|
| 21 Inch | .....£ | 19 | 19 | 0 |
| 18 Do.  | .....  | 17 | 17 | 0 |
| 15 Do.  | .....  | 12 | 12 | 0 |

No. 6.



In Satin Wood,  
very elegant.

|         |        |    |    |   |
|---------|--------|----|----|---|
| 21 Inch | .....£ | 22 | 0  | 0 |
| 18 Do.  | .....  | 19 | 0  | 0 |
| 15 Do.  | .....  | 13 | 13 | 0 |

The small size,  $3\frac{1}{2}$  inch, in Shagreen Cases, 1*l.* 8*s.*; mounted on Stands, 2*l.* 2*s.*

\* \* In addition to the above, Messrs. CARY publish Addison's 36-inch Globes, patronized by his late Majesty. Prices in neat Mahogany Frames, 60 Guineas per Pair; in Atlas Frames, 50 Guineas per Pair. May be had singly.

The Proprietors, grateful for the extensive Patronage with which the Public have honoured their Globes, beg to observe that they have, at a very considerable expense, materially corrected the whole of the Plates, and have availed themselves of the Voyages and Travels of COOK, VANCOUVER, DE LA PEROUSE, PARK, CLARKE and LEWIS, HUMBOLDT, FLINDERS, ELPHINSTONE, and the Discoveries of Captains ROSS, PARRY, and FRANKLIN, towards the North Pole, and Major DENHAM in the Interior of Africa, which have enabled them to make many very important Additions and Alterations. The utmost pains have been taken to render their Globes both exact and elegant, and they flatter themselves that they exhibit every improvement to the present time.

Lately published,

## A TREATISE ON THE USE OF THE GLOBES,

Extracted from the Lectures of the late Mr. FERGUSON, F.R.S.

Price 2*s.* 6*d.*

*Figure 20.* An 1841 advertisement from George and John (junior) Cary. They and their father, John, were map- and globemakers by training. It is logical that they would have left day-to-day operations of the optical works to experienced craftsmen and managers such as Charles and Henry Gould.

As noted above, John Cary Sr. died in 1835, leaving his businesses to sons John Jr. and George.

On March 18, 1840, **Henry Gould** testified in court regarding a disagreement over payment. He stated that he had been "*foreman to Mr. Cary*" in September, 1835. Thus, by the mid-1830s, both Charles and Henry Gould were instrumental in running the Cary operation.

The first nationwide census of Great Britain took place in 1841. From that source, we learn that 181 Strand was occupied by Charles Gould (50 years old, "*Shopman*"), Emma Gould (35 years old), Henry Gould (40 years old, "*Shopman*"), **Charlotte Gould** (40 years old), Emma Gould (1 year old) and Ellen Cook (25 years old). The 1841 census takers were instructed to round off people's ages, so the exact ages of many of the occupants are not known. Other censuses and marriage and birth records indicate that Henry and Charlotte Gould were husband and wife, and the 1 year old Emma was their daughter. The marriage record of Henry and Charlotte states that Charles was his father. Charles Gould's 1849 death record states that he was then 63 years old, giving him a birth year of ca. 1786 and an age of 55 in 1841. The 1851 census recorded that Henry was then 55 years old, so the two censuses give him a birth year in the range of 1796 to 1801. Either some of these records are very wrong, Charles got an extremely early start at parenthood, or Charles was not Henry's biological father. Noting that Henry named his daughter "Emma", the elder Emma who lived at 181 Strand may have been his sister.

The two owners of business lived elsewhere. John Cary, Jr. (50 years old, "*Optician*") lived with his wife, two children and three servants in Hanover Square. George Cary (50 years old, "*Globemaker*") lived with two servants in St. James Square.

Charles Gould continued through the years to publish his microscopy book, although he broadened the covered topics. The 1848, 15th edition was 70 pages long and entitled *The Companion to the Compound, Achromatic, and Oxy-hydrogen Microscopes: With a Catalogue and Description of All the New and Most Interesting Objects; the Best Method of Procuring and Mounting Them in Canada Balsam, for the Microscope; and of Preparing Vegetable Infusions to Produce Animalcules; with Plates; Together with an Account of a Simple Apparatus for Examining the Phenomena of Chemical Action, and Polarized Light, Under the Microscope; and a List of All the Most Popular Objects that Polarize.*

Charles Gould died on September 15, 1849, from cholera. He was reported to have been 63 years old.





**Figure 21.** A Society of Arts-style microscope from Cary. The base is engraved "Cary", and so likely dates from either before Charlotte Gould and Henry Porter renamed the business ca. 1859, or after Porter returned the name to "Cary" ca. 1876. Accessories included with the instrument in its mahogany case were polarizing lenses, live box, stage forceps and "bull's eye" condenser.

The 1851 census reported that 181 Strand contained household head Henry Gould, wife Charlotte and daughter Emma, a visiting relative of Charlotte's, plus two "servants": Thomas Porter (age 39) and **Henry Porter** (age 21). Henry Porter was later to become owner of the optical business, so it is likely that both men were business employees, rather than domestic servants. At the time of the 1841 census, Henry Porter had lived in nearby Stanhope Street with an optician named Frederick Porter. Frederick was recorded as being only 9 years older than Henry, so may have been a brother. Porter's marriage record stated that his father, James Porter, was also an optician.

When John Cary, Jr. died in 1852, his will offered his half of the optical business for sale to brother George. George's will, written in 1858, does not mention the optician's business or 181 Strand, indicating that he had divested his interest. It appears that Henry Gould purchased the entire business, probably concluding the transaction in 1856. The firm had continued William Cary's tradition of publishing local meteorological records in *The Gentleman's Magazine and Historical Record*, under the name of "W. Cary". That changed with the report for July, 1856,

which was submitted by "H. Gould, late W. Cary, 181 Strand". However, the business continued to be called "Cary" through at least 1861 (Figure 22).

A. 1857

**CARY'S IMPROVED POCKET TOURIST'S TELESCOPE.**

(See 'Murray's Handbook.')

Just published, 16th Edition,

**GOULD'S COMPANION TO THE MICROSCOPE.**

Revised and Improved.

CARY, Mathematical and Optical Instrument Maker to the Admiralty and Royal Military College, &c. &c., 181, Strand.

B. 1861

**CARY'S IMPROVED POCKET TOURIST'S TELESCOPE.**

(See 'Murray's Handbook.')

Manufacturer of all descriptions of Mathematical, Surveying, and Optical Instruments, for the use of Naval and Military Officers, &c. Also the Binocular Reconnoitring Field Glass, so highly spoken of by officers and other gentlemen; price, with best sling-case, 5*l.* 5*s.* Cary's improved Achromatic Microscope, with two sets of choice lenses, capable of defusing the severe test objects, 16*l.* 16*s.* and 18*l.* 18*s.* Travelling Spectacles of all kinds.

Mathematical and Optical Instrument Maker to the Admiralty, Royal Military College, Sandhurst, Christ's Hospital, and East India College, Agra, &c.

181, STRAND, LONDON.

Established upwards of a Century.

**Figure 22.** Advertisements that indicate retention of the Cary name even after the Goulds had acquired the business.

Henry Gould edited further editions of Charles' book. The title of the 1853, 16th edition was modified to *C. Gould's Companion to the Compound, Achromatic, and Oxy-hydrogen Microscopes*.

Henry Gould died on December 22, 1856. The January 24 - February 21, 1857 meteorological report in *The Gentleman's Magazine and Historical Record* was issued from "The Royal Observatory, Greenwich", but authorship by "H. Gould, late W. Cary" resumed with the next issue of the magazine. The practice of submitting reports under Henry's name continued through 1868.

Around 1863, partial ownership of the business was acquired by Henry Porter. Charlotte Gould was listed as being an "optician" in the 1861 census, and so was the likely owner at that time. Charlotte and Henry styled the shop "Gould & Porter" (Figures 23 and 24). The 1861 census listed both owners families as inhabitants of 181 Strand: Charlotte and Emma Gould, and Henry Porter, his recent wife Fanny and their two infant sons. Also included were "optician's foreman" William Stratten (age 76) and domestic servant Sarah Warren. This was the first census to list a domestic servant at 181 Strand, and probably reflects the occupants' enhanced financial status.

# GOULD & PORTER'S (LATE CARY)

*Established upwards of a Century,*

## IMPROVED STUDENT'S AND EDUCATIONAL MICROSCOPE

(this Instrument has been pronounced the best Microscope of the price yet introduced), with 3 sets of excellent Achromatic Powers, etc., in case complete .....£4 4s.

Ditto, ditto, with Rectangular Mechanical Stage Motion .....£6 6s.

Magic Lanterns, and Dissolving Views of all kinds for Christmas.

Mathematical, Surveying, and Optical Instrument Makers to the Admiralty, R. M. College, Sandhurst, Christ's Hospital; and Opticians to the Royal London Ophthalmic Hospital, 181, STRAND, LONDON.

Catalogue sent free on application.

Figure 23. An 1863 advertisement, from the *Intellectual Observer*. The "upwards of a century" remark presumably refers to William Cary's beginnings ca. 1785.



Figure 24. A drafting set from Gould & Porter, dating from between 1863 and 1874. From the very beginning, the Cary-Gould-Porter businesses manufactured a variety of scientific and engineering instruments.



A comic story published in 1866 indicated that, at least for a certain class of people, the Cary optical business was well known, and that it was common knowledge that the business had recently undergone a name change. *Mr. Honeybun's Proposals: Love at First Sight in a Brompton Omnibus* began with the blunt "I had just been to Cary's to have a new right eye fitted to my spectacles", not needing to explain "Cary's". The protagonist, Mr. Honeybun, took a business card from the optician's. He then met a lady on the bus, and through a series of events, ended up escorting her to her house. Nearing the home, she saw her brother approaching, and realizing that she did not know her escort's name, asked for it. In reply, Honeybun passed her what he thought was his calling card but was, instead, the business card from the optical shop. The lady then introduced him as "Mr. Cary". The following ensued when Honeybun asked her to stop calling him by that name, "I beg your pardon. Really I thought .. ' She took a card from her pocket and read, 'Cary. No, Gould and Porter, late Cary, I see Mr. Gould - Porter - no, Gould. I'm sorry Mr. Gould, but you should allow me to call you Cary still. I told Gregory it was Cary, and it will appear so strange' ".

Charlotte Gould died in early 1865. Nonetheless, the company continued to be called "Gould & Porter" through at least 1874 (Figure 25). Possibly, Porter could not afford to buy out Charlotte's heirs for sole possession of the business. Henry Porter appears to have become sole owner by 1876 (Figure 26).

TO TOURISTS, &c.

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## Cary's Improved Binocular FIELD GLASSES.

In the new metal (Aluminium), weighing only a few ounces, from £6 10s.  
Also, the

**NEW POCKET ANEROID BAROMETER,**

Specially made for travelers. Thermometers, Compasses, etc., for sale.  
Also, their *IMPROVED STUDENT'S MICROSCOPE*,  
the best and cheapest made.

**GOULD & PORTER,**

Successors to Cary, - - 181 STRAND, LONDON,

**OPTICAL & MATHEMATICAL INSTRUMENT MAKERS,**

(BY SPECIAL APPOINTMENT), to the War Office, Admiralty, Trinity House, King's College, Royal Military College, Sandhurst, Christ's Hospital, Royal Geographical Society, Royal London Ophthalmic Hospital, and the Swedish and Norwegian Governments.

ESTABLISHED UPWARD OF A CENTURY.

*Figure 25. An 1874 advertisement for Gould & Porter, from Morford's Short-trip Guide to Europe. The firm continued to use the name "Gould and Porter" even though partner Charlotte Gould had died in 1865.*

## CARY'S IMPROVED POCKET TELESCOPE,

Three-and-a-half-inches long; price from 25s. Also special pattern Binocular Field Glasses for Tourists, extra high power, from 21s. to £6 6s., and in Aluminium from £5 5s. to £16 16s. Watch Aneroid Barometers for measuring Altitude of Mountains, &c., from £3 18s. 6d. Pedometer for measuring Walking Distances, from £2 2s.

H. PORTER,

APPRENTICE AND SUCCESSOR TO THE LATE W. CARY,

Optician by Appointment to the Admiralty, War Office, Trinity House, Royal Military College, Sandhurst  
Royal Geographical Society, &c.; and Optician to the Royal London Ophthalmic Hospital.

181, STRAND, LONDON.

ESTABLISHED OVER A CENTURY.

*Figure 26. Henry Porter appears to have acquired sole proprietorship by the time of this 1876 advertisement. While Porter was indeed successor to William Cary, he was born several years after Cary died, and could not have actually been apprentice to that man. However, Porter was correct in a sense, as the business was called "W. Cary" at the time he apprenticed.*



HENRY PORTER,

40 YEARS WITH AND SUCCESSOR TO

W. CARY,

Optician and Mathematical Instrument Maker,

By Special Appointment to the Admiralty, Royal London Ophthalmic Hospital,  
Royal Geographical Society, Trinity House, &c.

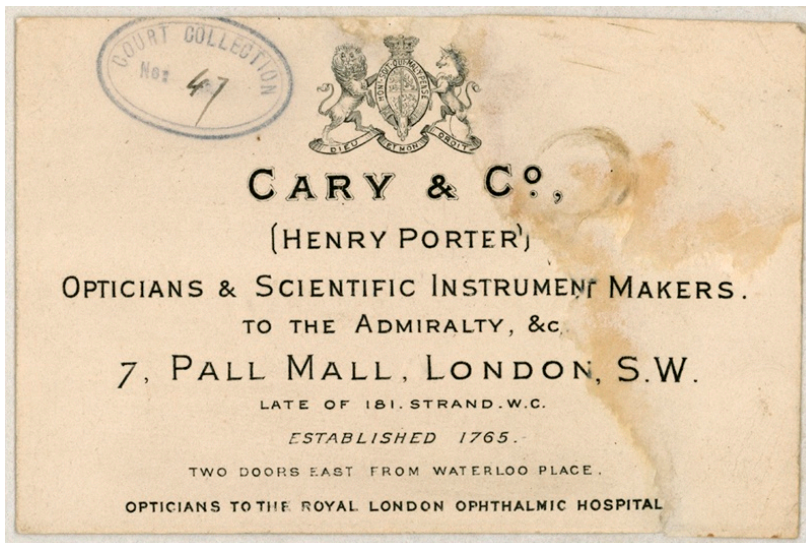
181, STRAND, W.C.

*Figure 27. An 1885 advertisement.*

Henry, Fanny and their six children were the only occupants of 181 Strand during the 1871 census. Coincidentally, Grace Darker, daughter of the highly-regarded scientific instrument maker William H. Darker, was a domestic servant in the chemist's shop next door. The 1871 and 1881 censuses noted the number of people employed by businessmen. Porter's operation appears to have been very streamlined during this period, since the 1871 census recorded that his sole employee was a messenger, and in 1881 employed his son, Sidney and one messenger. Nonetheless, the business continued to produce well-regarded instruments, as evidenced by the numerous contracts described in advertisements.

Porter moved his business to 7 Pall Mall during the 1890s. Henry died on January 18, 1902, leaving the business to sons Sydney and Clement. The company's reputation for excellence continued, with Cary, Porter, Ltd. winning a Silver Medal at the 1904 St. Louis International Exposition. They continued to operate for several more years, supplying all manners of optical and scientific instruments (Figure 29). By 1921, Cary Porter had moved to 22 Charing Cross Road and Vale Terrace, Hermitage Road, Finsbury Park. *Nineteenth-Century Scientific Instruments and their Makers* cites a letter dated October 24, 1931 that referred to "the late firm of Cary Porter", implying that the business had ceased to exist by that date.





*Figure 28. A trade card from Henry Porter / Cary. The business moved from 181 Strand to 7 Pall Mall during the 1890s.*

CARY'S Travelling Sets of Surveying Instruments,  
specially made for the Royal Geographical Society.

# CARY, PORTER, LIMITED

**7, Pall Mall, S.W.**  
(Late of 181, Strand.) (Established over 140 Years.)

CONSISTING OF  
Theodolites, Sextants, Artificial Horizons, Barometers  
(Mercurial and Aneroid), Astronomical Telescopes, Plane  
Tables, Binoculars, Compasses, &c., &c.

**COMPLETE OUTFITS** FOR THE EXPLORER, NAVIGATOR,  
SURVEYOR AND ENGINEER, &c.

**OPTICIANS & SCIENTIFIC INSTRUMENT MAKERS**  
TO THE  
Admiralty, War Office, India Office, and other Government Offices ;

ALSO  
Makers to most  
OF THE  
Foreign Governments

The "Cary" Instruments  
were supplied to the  
Nansen Polar Expedition,  
1892; Jackson-Harmsworth  
North Polar Expedition,  
1894; the Baldwin Polar  
Expedition, 1901; the  
Borchgrevink Antarctic  
Expedition, 1898; the  
"Discovery" Antarctic  
Expedition, 1901, and  
Relief Expedition, 1902.

**COLD MEDALS  
AND  
HIGHEST AWARDS**



Only Makers of Reeves Patent Endless Tangents, as above.

Figure 29. A 1906 advertisement. At that time, the business was operated by Henry Porter's sons, Sydney and Clement.



Figure 30. Circa 1916 compass by Cary. Images from an internet auction site.



**Figure 31.** Scientific apparatus produced by Jesse Ramsden, with whom William Cary served his apprenticeship. Left to right: refracting telescope (from <http://www.hps.cam.ac.uk/whipple/explore/astronomy/twotelescopes/>); sextant (from <http://www.mhs.ox.ac.uk/sis25/image.php?id=45>); theodolite (from <http://www.ramsden.info/Ramsden/Ramsdens/JesseRamsden.htm>).



**Figure 32.** Two globes made by John and William Cary, dated 1799 (left) and 1825 (right). Image from an internet auction site.





**Figure 33.** Circa 1800 map of Africa, by John Cary.

### **Acknowledgements**

My thanks to the collectors who generously contributed pictures and shared information.

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