Microscopist "Complex Monogram, B":
probably the Reverend John Bramhall, 1809 – 1889

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"B"

Many Victorian makers and owners marked their microscope slides with identifying monograms, which ranged in style from simple letters-in-a-row to complex overlays of intertwined letters and curlicues, serifs, etc. Extreme examples of the latter are shown in Figure 1. Yet even monograms that initially appear to be undecipherable may be interpreted through a few basic "rules". A key to monograms is that the predominant letter is the first letter of the owner's last name. The initial of the last name is generally placed in the center of the monogram. Mirror images are often used to create symmetry.

The monograms marked "B1a" and "B1b" in Figure 1 are clearly comprised of the letter "B". Evidence provided below suggests that the stem of the "B" is not merely a curlicued affectation, but is the letter "J". Monograms "B1a" and "B1b" are found on slides with the same labels and other shared characteristics, and were undoubtedly marks of the same person (Figure 2).

Monogram "B2" also contains a central "B", with a "J" alongside, suggesting that the owner of this monogram also had the initials J.B. (Figure 1). Evidence is presented in this essay that monogram "B2" was used by John Bramhall.

The overall similarities between monogram "B2" and "B1a/b" – the same letters, the mirror imaging, the curlicues, and the same shield device – suggest that they are variations used by the same person. In addition, there are similarities between the microscope slides labeled with monograms "B2" and "B1a/b", such as the use of paired labels (which may have been custom-made, as these patterns have been identified only on "B1" and "B2" slides) and the dating of almost all slides (few microscopists did this). We consider it likely that microscope slides labeled by "B1" were also property of John Bramhall.

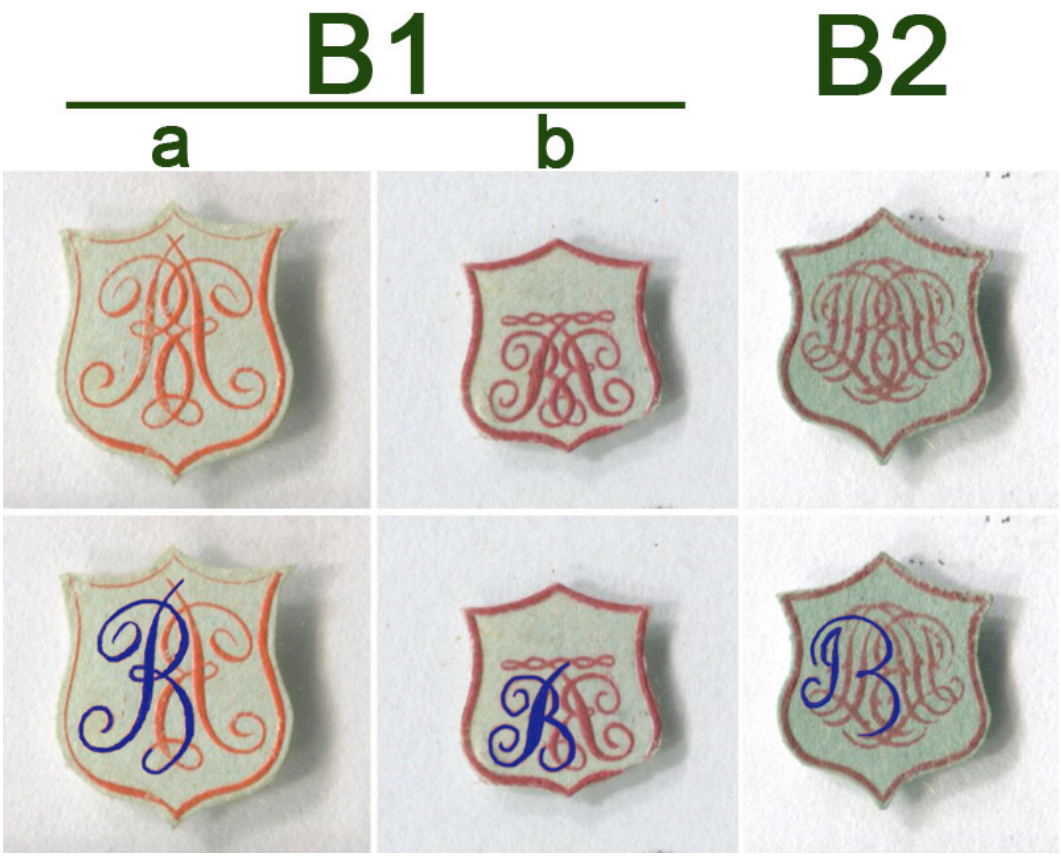

Figure 1. *Monograms and interpretations. Labels with monograms "B1a" and "B1b" are found on microscope slides that have identical label styles, and are undoubtedly from the same person. The stylistic similarities between the three monograms suggest that they were all used by the same person. All three monograms contain a recognizable letter "B", which is centrally located and most likely indicates the last name. The letter "B" is ordinarily drawn with symmetry, with a similar loop on top and bottom. Instead, the bottom loop of "B" in these monograms is separate from the vertical stem, suggesting a separate significance to the shape of the stem. The stem has a curl at the bottom, thereby resembling a "J".*

Figure 2. *Examples of English microscope slides with the labels and monograms of microscopists "B1" (top row) and "B2" (lower row). Slides without monograms are not uncommon. Although there are few apparent similarities between the handwriting on "B1" and "B2" labels, there are often enormous differences in writing styles on slides with the same monogram. The slides in this figure show several such examples. Additional handwriting variations are highlighted in Figure 3. While both "B1" and "B2" put dates on slides, the listed years are not necessarily accurate (see Figure 4). This indicates that labels on some slides were applied quite some time after their production. Thus, the two label and monogram styles may represent two periods of one microscopist's life.*

Figure 3. *Examples of slides with monogram "B1", yet their labels have very different handwriting styles. Compare the letter "F" in the left pair, letter "S" in the central pair, and "L" in the right pair. The variations within "B1" slides indicates that handwriting differences between "B1" and "B2" slides need not signify that they were owned by different people.*

Figure 4. *A strew of Triceratium brightwellii diatoms, labeled by "B1". The label is dated 1858, although this diatom was not given this species name until 1860. This indicates that the label was added after the actual date of production had been forgotten. It is, therefore, possible that other dates on "B1" slides are not accurate and/or "B1" labels were attached many years after the slides were produced.*

Connecting "B" with John Bramhall

A large microscope slide collection of parasitic arthropods was recently located, which included several dozen slides with "B2" monograms and labels. Among these was a "B2" slide of a tick ("*Ixodes*") from an Indian bullock (Figure 5). Also written on the slide is the word "*Pygidia*". A second slide in this collection, with a different type of label, is of a tick from a tiger, also labeled "*Pygidia*". Pygidia (singular pygidium) are sensory organs of fleas, which were frequently used in Victorian times as test objects, to evaluate the resolving power of microscope lenses. However, ticks do not possess pygidia, nor do they have analogous organs. We were able to locate only two references in which organs of ticks were called pygidia, both of which were written in 1877 by Reverend John Bramhall of Terrington St. John, Norfolk.

Figure 5. *Two microscope slides from the same extensive collection, holding ticks from an Indian bullock and a tiger. Both slides emphasize the pygidia. The slide on the left has labels by microscopist "B2". During Victorian times, ticks were often called "ixodes". That name is currently a genus name, as in the Lyme disease vectors Ixodes scapularis and Ixodes ricinus, and all ticks fall into the Order Ixodida.*

The first known use of "*pygidia*" in reference to ticks was published by Reverend John Bramhall in *Hardwicke's Science-Gossip* in January, 1877. Notably, Bramhall specifically described pygidia of ticks from Indian bullocks and tigers:

"***A word about the 'pygidium'*** *- That old well-known 'test', the pygidium of the flea, is one of the first objects a young microscopist desires to possess, and a very curious apparatus it is. I shall be thankful to any one learned in such matters who will tell me what is supposed to be its use to its proprietor. I cannot find it mentioned in any work on insects in my possession. But the flea is not the only possessor of a pygidium, though it certainly is A1 in that line; nor is it always*

single, or to be looked for in the same position. Generally it is to be found in pairs at the extremity of the abdomen; but not always, for ***in the Ixodes of the tiger and Indian bullock we find two on the underside of the abdomen, nearer the upper than the lower end****. The Chrysopa perta and vulgaris have pygidia in the usual locality; and, I believe, several other insects have the same, but I cannot recall their names. Perhaps the most uncommon pygidia are those of the Agrion pulehellum, a very interesting insect in many points. Like all dragon-flies, it is a voracious feeder, and devours all it can catch in the insect line daily. It possesses a powerful set of jaws for breaking up its prey, and gastric teeth, well suited for 'grinding the bones to make its bread,' like the giant of our nursery days, save that he preferred Englishmen to English insects. The ovipositor has a formidable set of jaws, something like those of the Sirex, and its pygidia are large and mammiform, quite at the extremity of the abdomen. Its wings are also worth studying. In short, I know no insect possessing more points of interest, and strongly recommend it to the notice of those who take a pleasure in such things. If asked where it is to be had, I may say that it is not in any list of objects that I have seen. My specimens of Agrion pulehellum and Chrysopa are by Mr. Enoch* (sic)*, of 30, Russell Road, Seven Sisters' Road, N., who has, I believe, a good supply of both. But, if the want be made known, others possibly may be found able to supply them – John Bramhall*".

Two months later, this was followed by the only other known publication on tick pygidia:

"*The Pygidium - Allow me to correct an error. I stated in my paper on the Pygidium (p. 15), that I had found a pair on the* ***Ixodes of the tiger and Indian bullock****. Further examination with a higher power convinces me that these* ***are not Pygidia but spiracles*** *– John Bramhall*."

The aforementioned slide collection contains several other specimens that were described by Bramhall (Figure 6). He wrote to the Quekett Microscopical Club in March, 1877, in reference to an article from C.F. George on a bat-associated tick named *Argas fischerii* (now *Carios vespertilionis*):

"*I was much interested in Mr. George's paper and illustrations of the 'Blyborough Tick,' and have no doubt about its connection with the Bat. In 1875 I found, in a seat in my church, one of these creatures in company with two genuine Bat bugs. Another tick was brought to me, having been taken from the shawl of a lady who sat in the same seat; indeed, this led to my examination of the seat, which for some time had been constantly covered with the excrements of bats. In order to put an end to this nuisance, our churchwardens took up a portion of the lead on the roof above the seat, and, in a very small space, took out from between the lead and boards of roof no less than 287 bats of various kinds - large, small, and eared, I believe. Unfortunately I was from home at the time, and all the ' vermin' were destroyed - a fact which greatly vexed me when I heard of it, as no doubt I should have obtained a large quantity of both ticks and bugs. The shape of the creature, together with the markings, and form, and locality of the spiracles, make me sure it is the same as those found by Mr. George at Blyborough. I marked mine 'Ixodes of Bat,' but shall alter it to Argas Fischerii, as that seems to be its true appellation. Some years ago a friend gave me a small 'parasite of bat,' which I take to be a young Argas. I believe he took it off the bat. It has only six legs, and the shape of the body is rather different to the adult insect. I expect the fourth pair of legs would be produced from the shoulders, and so fill up the circularity of the body. This one is mounted, after soaking in turpentine only, and shows the caeca perfectly. I rather spoiled those I found by too much liq. pot., as all the contents of the body are gone; still, it is a beautifully marked skin, and shows the spiracles. The flea of the bat is worth mounting, and so is the bug, which is a delicate form of our detested enemy the B. flat. I can see very little difference between the pigeon bug and the B. flat, though I am told there is a difference. What is the best work on Ticks?*"

Figure 6. *Slides by "B2" with specimens described by John Bramhall in 1877. He noted that he had previously labeled a slide "as 'Ixodes of Bat', but shall alter it to Argas Fischerii, as that seems to be its true appellation". Bramhall described that he had mounted an Argas fischerii which "shows the caeca perfectly". He also wrote of mounting bat fleas, bat bugs and pigeon bugs. Bat bugs and pigeon bugs are relatives of the human bedbug.*

In summary: John Bramhall is the only person known to have discussed pygidia of ticks/ixodes. He wrote of bat ticks, fleas and bugs, and of pigeon bugs. All of those specimens were described by him in the context of microscopy. Microscope slides by mounter "B2" were identified that match Bramhall's descriptions of those parasitic arthropods. The monogram of "B2" is comprised of the letters "J" and "B", with "B" central and dominant, indicating it to be the initial of the last name. Based upon this evidence, we hypothesize that mounter "B2" was John Bramhall. Due to the similarities between "B1" and "B2", we think it is likely that Bramhall was also "B1".

John Bramhall

John Bramhall was born December 5, 1809, in Westminster (now part of London), the child of Thomas and Sophia Bramhall. John attended Exeter College at Oxford University, graduating in 1834 with a B.A. in Literature and Humanities. He was made an Anglican deacon in 1837, and a priest in 1838. Bramhall apparently served as a minister in Avening, Gloucestershire, being recorded as living in that town on the 1841 census, in the household of his aunt, Frances Clutterbuck. Bramhall was appointed Vicar of Terrington St. John, Norfolk, in 1843, and remained at that post until the early 1880s. He also served as Justice of the Peace from 1852, and Rural Dean from 1865.

Bramhall married Clara Gilchrist in August, 1841, in Middlesex (London). According to census records, they did not have any children.

The first record of Bramhall's interest in microscopy is a request for diatom samples, published in *Hardwicke's Science-Gossip*, in 1868, "*Wanted in exchange, or by purchase, Eupodiscus Rogersii, Glyphodiscus stellatus, Brightwellia elaborata, B. Johnsoni, B. coronata, and Heterodictyon splendidum. - Address, Rev. J. Bramhall, St. John's Vicarage, King's Lynn*". He posted another request for diatoms in 1870, "*Wanted, in exchange or otherwise, Valves of Aulaeodiscus Kittoni, with more than four rays, or processes, and A. Comberi, with more than three ducts*". A third request, from 1876, "*Wanted - Slides of Stauroneis spicula and Schizonema cruciger, in exchange for well mounted Slides of Diatoms from Subpeat, Troy. New Hampshire, U.S.A.*".

His other microscopy exchange offers involved attempts to trade lenses. In 1872, "*For exchange or otherwise, an excellent English 1/8-in.object glass of 120 degrees angular aperture, in perfect condition. - Apply to the Rev. J. Bramhall, St. John's Vicarage, near Lynn, Norfolk*". He appears to have advertised the same lens in 1875, "*For exchange or otherwise, a first class 1/8 Object Glass, by Thomas Ross, especially selected for the late owner*". Another lens was offered in 1876, "*For exchange or otherwise, a 4-in object-glass by Ross, and an Achromatic Condenser, in perfect order*".

Bramhall created a stir in microscope circles in 1876, with the publicizing of his invention that came to be called the "Bramhall Oblique Illuminator". This simple device consisted of a platform on which to place a microscope slide, with an inset mirror placed approximately 1/8 inch (2-3 mm) below the surface (Figure 7). In use, light focused by a bull's-eye condenser would be shone at a sharp angle, reflecting off the mirror, then off or through the specimen on the slide. This was especially useful for oblique lighting of diatoms, as a means to emphasize their structures.

The famed diatomist Frederick Kitton raved about Bramhall's Oblique Illuminator to the Royal Microscopical Society, "*I have much pleasure in calling the attention of those interested in the resolution of the striae on the finely lined forms of Diatomaceae to a simple form of apparatus invented by the Rev. _ Bramhall, of Lynn, which after a careful trial I am able to say is superior to anything I have hitherto had the opportunity of trying. This illuminator in its simplest form consists of a disk of silvered glass about one inch in diameter, mounted in a wood or brass fitting similar to a selenite stage; the disk should be sunk in it about one eighth of an inch. Mr. Bramhall informs me that with sunlight it resolves striae far better than any other mode of illumination. My own experience has only been with the ordinary micro lamp; this requires to be elevated from three to four inches above the stage, and the light, after passing through the large bull's-eye condenser, should impinge on a smaller one placed close to the stage, the height of the lamp from the surface of the condenser of course regulating the obliquity of the reflected ray. The performance of the reflector is improved if, instead of being constructed of silvered glass, a disk of speculum metal is substituted, and in place of the supplementary stage the reflector should be mounted on an adapter fitting into the sub-stage of the microscope; by this means the distance from the lower surface of the slide can be regulated. This illuminator can also be used in place of the 'Spot Lens' with the lower powers, but a short tube to slide on the objective is necessary to prevent the reflexion from the upper surface slide passing into the objective. I find that the tube attached to the Lieberkuhn (the reflecting portion being detached) answers very well. Careful adjustment of the objective is necessary, and the object should be perfectly parallel with the stage of the microscope*". Kitton also wrote in *Hardwicke's Science-Gossip*, "*The utility of a more or less oblique pencil of light has long been recognized by those who use the higher power of the microscope. The instruments contrived for obtaining this have been various, and many of them very complicated and expensive, and, so far as my own*

experience goes, none of them have produced a more effective oblique ray than can be obtained by a mirror on a separate stand, or the lamp placed at an angle with the axis of the microscope. The Rev. J. Bramhall, of Lynn, has called my attention to the following arrangement, and asks if it is new, which, so far as I am aware, it is .. The objectives with which the illuminator was tested were a 1/8 of Baker's, made many years ago, but a very good glass, and a 'Beneche No. 7', using the following objects as tests:—Navicula rhomboides, N. cuspidata. N. peregrina, N. rostellum, Synedra robusta, Nitzschia sigmoidea, N. sigma (the finely-marked variety called by Möller N. curvula), and Lepidocyrtis curvicollis. The 1/8 resolved the transverse striae of N. rhomboides, which it had not done before; the longitudinal striae on N. cuspidata shown very sharp and distinct, as were also the transverse striae on costae of N. peregrina and S. robusta. The beautiful curved striae on N. rostellum were better shown than I have ever before seen them. N. sigmoidea - The striae resolved with as much ease as those on Pleurosigma angulatum with a 1/4. N. sigma as difficult as N. rhomboides. The 'Beneche' resolved N. sigmoidea, N. rostellum. N. peregrina, and S. robusta. The podura scale was shown well, but not better than by a less oblique ray. The mirror would probably be more effective if mounted so as to slide up or down in the substage tube; but this, of course, would be more expensive. It is desirable that the cover should not be attached to the slide with the usual black varnish, but with 'dammar', or some similar transparent cement". Kitton also noted that the C. Baker optical works was manufacturing and selling Bramhall's Illuminators (Figure 8).

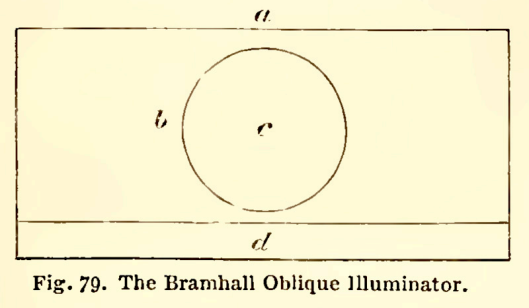

Fig. 79. The Bramhall Oblique Illuminator.

Figure 7. *The diagram of a Bramhall's Illuminator that accompanied Frederick Kitton's 1876 'Hardwicke's Science-Gossip' article. Kitton wrote, "The subjoined diagram will enable any one possessing the slightest mechanical ability to manufacture one of these illuminators without difficulty, a is a piece of wood 3 1/4 inches in length, 1 1/2 inch in breadth, and 3/16 of an inch thick; the central perforation b is 3/4 of an inch in diameter, in which is placed a silvered disk of glass or metal, c, the face of which should be not less than 1/8 of an inch below the upper surface of the wood, d, a ledge for the slide to rest against. We will now describe the method of using it, premising that a light of considerable obliquity is required. The wooden stage, with its mirror, is placed on the stage of the microscope, and the lamp elevated some 3 or 4 inches above it, and a beam of light condensed upon the mirror by means of a 'bull's-eye'. I need scarcely observe that the obliquity of the reflected beam depends upon the angle at which the ray impinges on the mirror*".

Figure 8. *An 1878 advertisement from Baker. At that time, they were selling Bramhall's Oblique Illuminators for 7 shillings 6 pence.*

Bramhall subsequently wrote to *Hardwicke's Science-Gossip*, "*Mr. Kitton, one of our first authorities on all that concerns diatoms, has been pleased to express his approbation of this invention, and to name it after its inventor. I can confirm all that he has said of its resolving power. Whatever an object-glass is capable of doing, I believe it will enable it to do. In addition to the tests named by Mr. Kitton, I may add, that with a Siebert's No. 7 immersion, and the A eyepiece, I have by the aid of the Illuminator resolved the following, which I consider the most difficult tests in their class. Pleurosigma Macrum, Navicula Crassinervis, Frustulia Saxonica, and Amphipleura Pellucida. The only test that has so far beaten me is Stauroneis Spicula, and of that I have 'glimpsed' the markings. Before I found out this method of illuminating, I could never really resolve any of the more difficult tests, not even Navicula Rhomboides, in spite of achromatic condenser, spot lens, prisms, and stops of various kinds, but by its aid, that old difficulty N. Rhomboides, dry or in balsam, is as easy as P. Angulatum was of old. The illuminator is made in two forms. The one, represented in Mr. Kitton's paper, does for such microscopes as have no sub-stage; the other, and the best, fits the sub-stage, rising and falling by aid of the rackwork. I use a silvered glass mirror of ¾ inch in diameter, and a polished metal disc of about an inch, which fit the same holder. On the whole, I prefer the metal; the chief merits of the invention are its simplicity, efficiency, and cheapness. I use only sunlight or clear daylight, but believe it will work equally well with the lamp. Nothing can be more easy than its use. Throw the light on to the object more or less obliquely, as that particular object requires, and regulate the reflector beneath, as experience alone can determine. I hope my brother microscopists will have as much success in the use of this illuminator as I have had, and I am sure they will be satisfied. - John Bramhall, St. John's Vicarage, near Lynn".*

William K. Bridgman further modified Bramhall's device, creating a finely-adjustable substage mechanism that afforded precise control of the mirror for directing oblique light (Figure 9). He wrote in the *Journal of the Quekett Microscopical Club*, in 1876, "*Having for several years past been endeavouring to obtain a controlling command over the obliquity of an illuminating pencil*

of light by means of a metallic speculum, placed between the condenser and the object, I was altogether unsuccessful until the advent of the 'Bramhall' reflector, which, by suggesting the substitution of a small bull's-eye lens in the place of the ordinary hemispherical condenser, gave a new turn to the direction of the investigation, which has resulted in a complete success. The Bramhall arrangement consists of a reflecting surface placed beneath and within a very short distance of the object; whilst the light, being thrown down as for an opaque substance, first passes through the glass slip, and is then reflected upwards, so as to produce a transparent illumination of great obliquity. There are, however, several very important drawbacks in addition to the difficulty of adjustment, and the very limited range of action, which restricts its use to a comparatively small class of objects, and of these, to only a small proportion of such as are mounted in the ordinary way; yet, all who have once seen the marvellous sharpness and force with which the most difficult diatom tests can be displayed, must be quite ready to admit the principle to be very far in advance of all other modes of illumination, making it highly desirable that it should form the basis of some other special arrangement, that would not only be equally effective, but be easily managed, and free from its other objections, at the same time extending alike superiority of effect to all other classes of objects, and equally applicable under all the common conditions of ordinary mountings - properties that are now claimed for the present arrangement".

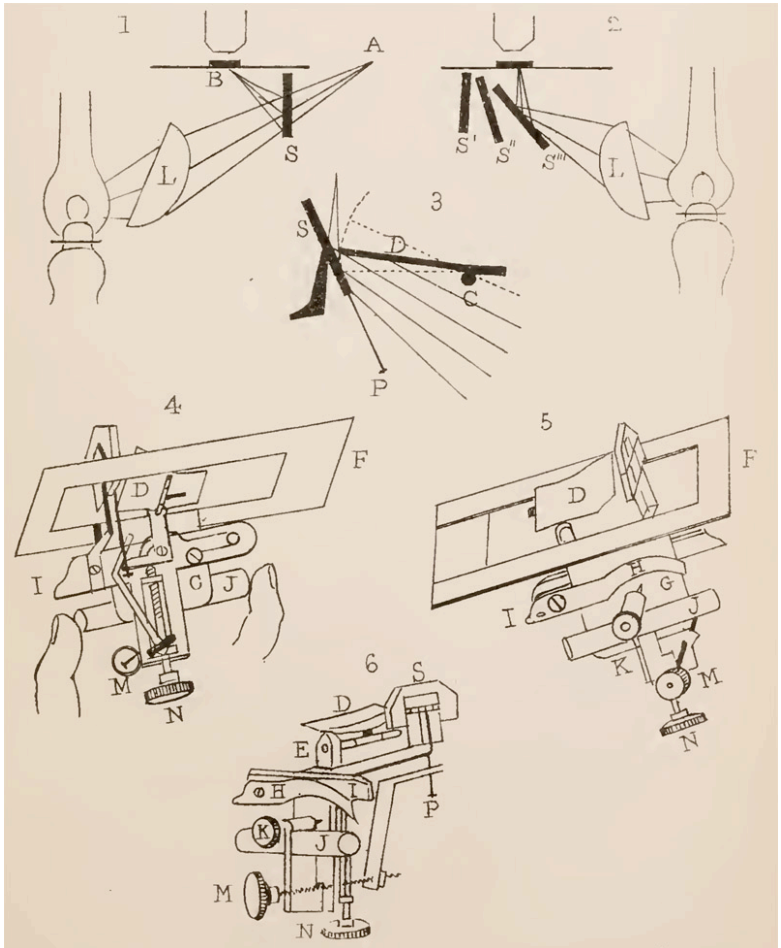

Figure 9. *Diagrams that accompanied W.K. Bridgman's variation on the Bramhall's Illuminator, as described in the Journal of the Quekett Microscopical Club, 1876. Bridgman's device held a mirror below the microscope's stage, and permitted fine adjustment of the mirror to precisely control the angle at which oblique light may be shone upon an object.*

Controversy quickly arose as others claimed prior invention of the Bramhall Illuminator. Since Baker was marketing Bramhall's device, substantial money was at stake.

The Royal Microscopical Society's *Monthly Microscopical Journal* reported, in 1876, "*Dr. R.H. Ward has sent us the following note, contributed by him to the December number of the 'American Naturalist', and as it bears upon a question as to priority of invention, it will doubtless interest our readers: 'At the Indianapolis meeting of the American Association for the Advancement of Science, in August, 1871, P.H. Van der Weyde, of New York, described a contrivance, believed to be new, for oblique illumination of transparent objects. It was designed chiefly to facilitate the resolution of lined or dotted objects, and consisted of a plane mirror lying beneath the object-slide and parallel to it, from which mirror light, condensed upon it from above by means of a bull's-eye condenser, would be reflected back at the same angle through the object and into the objective. These illuminators were shown in successful operation at the meeting, working best with moderately high powers, and were freely distributed among the members present. They were briefly described in the 'American Naturalist' for September, 1871, being there estimated as 'a little expedient of great practical convenience'. Ever since that time the present writer, among others, has used them habitually, shown them freely, and not unfrequently given them away. The mirror may be either of silvered glass or of polished metal. In some cases the object-slide may lie directly upon it while it rests upon the stage; but frequently the object-slide is best elevated slightly above it. The mirror is most conveniently made of the size of a slide (3 x 1), and furnished with glass strips at the ends to support the slide at any required height; but it may be made smaller, say one inch square or round, and sunken in a brass or wooden stageplate, or for stands having a sub-stage of any kind it may be made of suitable size and supported from the sub-stage and adjusted for height in the same manner as the achromatic condenser. It has the advantage of great ease of manipulation and applicability to any stand, and the drawback of being liable to be interfered with by the presence on the slide of such obstructions as paper covers or opaque cells or rings of varnish. Within a few months past it has been brought forward by Rev. John Bramhall, of Lynn, England; its previous use and publication having either escaped the notice or slipped from the memory of himself as well as of the distinguished microscopist who has indorsed it and proposed to name it after him*".

Kitton then responded, "*The oblique illuminator, which I proposed to name after my friend the Rev. J. Bramhall, was, I know, a new thing, so far as he is concerned. On discovering the effective performance of a reflector parallel to the slide, he at once wrote to me to ask my opinion of its value, and also to ask whether it was new. I made a rough trial, and found, with every disadvantage, it resolved striae with ease, that had formerly taken me some time to bring out; and as I was not aware that this method of illumination had previously been described, I wrote a short description of it for 'Science-Gossip' and this Journal, calling it the 'Bramhall Illuminator'. On June 30, 1876, I received a letter from the Secretary of the Microscopical Department of the Providence Franklin Society (Mr. John Peirce), in which he tells me that 'Mr. Norman Mason, of Providence, R.I., accidentally discovered some time ago identically the same thing as you describe as 'Bramhall's Oblique Illuminator'. He was endeavouring to find a piece of plate glass of uniform thickness. He used pieces of broken mirrors, strewed with Lycopodium, for the purpose of focussing, and was astonished at the illumination. He afterwards made use of this illumination for diatoms, and found, as you state, that the distance of the mirror from the object made quite a difference. Yours respectfully, John Peirce'. On July 10, 1876, I received a letter from my friend Professor H.L. Smith, of Hobart College, N.Y., from which I quote the following remarks: 'I have just noticed your account of Mr. Bramhall's oblique light illuminator. It is an old dodge over here. I have one, made over ten years ago; a piece of looking-glass plate*

with a ledge'. It thus appears that this method of illumination has had several discoverers. It seems to have been known in New York five or six years before Mr. Van der Weyde of that city described it in August 1871, as probably a new contrivance; Mr. Mason, of Providence, discovered it 'some time ago' (this may mean six or seven years); and lastly, Mr. Bramhall 'discovers' the same thing about twelve months ago. But leaving the discoverer out of the question, it is the best and easiest plan for the resolution of striae I am acquainted with".

Bramhall wrote in 1877, "*Allow me to say, in answer to the concluding paragraph of Dr. Ward's letter on Mr. Van der Weyde's claim to the invention, which goes by the name of the Bramhall Oblique Illuminator, that, so far as I am concerned, it is original, as I had never heard of Mr. Van der Weyde, or of that other American microscopist who claims to have used the same form more than ten years ago. I believe I may say the same on behalf of Mr. Kitton*".

The editor of The American Journal of Microscopy appears to have put an end to the controversy with this 1877 editorial, "*The Bramhall Illuminator – This little piece of apparatus, which was fully described in a former number, is receiving great favor in England, many of the microscopists there declaring that by its means they are enabled to resolve objects which were previously entirely beyond their reach. It seems, however, to have been known to several American microscopists, some of whom now lay claim to the honor of inventing it, while one microscopist of note, who had employed it some ten years ago, considers it of very little value. It seems to us, however, that if there is any great merit in the device, the only person to whom the microscopic public owe thanks for it, is Mr. Bramhall. The other inventors have taken no pains to give it to their fellows, or to have it manufactured and placed in market. Mr. Bramhall promptly handed it to a well-known microscope maker, and rendered it accessible, in its best condition, to every one. He then published a description, with figures, in a journal of large circulation, and so told almost every one interested, just where they might get it. The simultaneous invention of a particular device by several different persons is nothing unusual. Neither is it uncommon for an invention which in its earlier form was rude, inefficient or inconvenient, to be brought forward at a subsequent period and be generally accepted. In one sense there is nothing new under the sun; in a higher and better sense, every day sees something new. The invention of the nose-piece is generally attributed to Mr. Brookes; it is called by his name, and he gets the credit of having invented and introduced it, and justly so. But we had in our possession, a short time ago, a London microscope, made about the close of the last century, which possessed a very elaborately constructed nose-piece! We have now before us a book which was published nearly two hundred years ago, in which there is an engraving and description of a binocular microscope. In the same work there are figures of telescopes, or, rather, opera glasses, in which the distance of the two tubes from each other can be regulated to suit the distance at which the eyes of the observer are placed apart - just as we find in the modern binocular microscope. But all this does not detract one iota from the credit of the men who have given us the modern binocular. In order to have the credit of an invention, the inventor must not only present it in a usable form, but he must so publish it that other workers can avail themselves of its advantages. This Mr. Bramhall has done, and this the others left undone*".

As Francis Darwin said in another context, "*In science, the credit goes to the man who convinces the world, not to whom the idea first occurs*".

John Bramhall was elected to membership of the Quekett Microscopical Club on May 25, 1877. He remained on the rolls through 1880.

Bramhall also published several brief hints on methods for preparing microscope slides and, in 1870, a letter on the pseudoscorpion, *Chelifer*, and on pheasants, "*Chelifers - Allow me to say a word on behalf of the much-maligned chelifer, which has been described by a writer in your periodical as of a most quarrelsome and sanguinary disposition. I have kept numbers of Chelifer*

cancroides together for several months; and though I have constantly watched them, I never saw a quarrel or even an attempt at one; on the contrary, they seemed to be on the very best terms, and very polite and well behaved. I wish also to mention a curious fact in natural history which has come under my notice, and of which I believe there have been many instances recorded. A neighbour of mine had a pair of silver pheasants, male and female; last year the male bird died, and since then the female has assumed the complete plumage of the male, and appears, I presume from the greater amount of plumage, to have increased in size. This bird is now to be seen at Levell's Hall, Terrington St. Clement, near Lynn.—John Bramhall, St. John's Vicarage."

In addition to microscopy, Bramhall had strong interests in apple growing and archery. He appears to have been a member of the British Pomological Society, and may have developed a new apple variety. He was noted to be an expert target archer, and was deeply involved with promotion of that sport.

Bramhall's wife, Clara, died in 1886. They were then living in Eastbourne, Sussex, implying that John had retired from his Norfolk ministry by that time. John died on November 1, 1889, at home in Eastbourne. His estate was left to his half-brother William and one "*May Kingsford of Sunbury-on-Thames*", of unknown connection.

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