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First swinging 1873

First adjusted stage century before 1870

cle from his pen, published by us last month, he speaks of "his own centering adjustments," not of his own idea of centering. The idea of centering is a very old one, far older than Crouch, or Zentmayer, or Bulloch. It was used at least thirty years ago in Germany, by Brunner, and consequently is not, as Dr. Hunt claims, "exclusively an American invention." But while the idea itself is old, different methods have been devised for carrying it out. Mr. Bulloch devised one plan, Zentmayer an entirely different method, and Mr. Crouch a still different arrangement. Of these Zentmayer's is certainly the least convenient; Mr. Bulloch's is very good, but we think that few persons will use it and Mr. Crouch's long together, without giving the preference to the latter. Upon this point, however, we do not care to obtrude any mere opinions of our own.

It is certainly to be regretted that Dr. Hunt should have put forward such broad and unfounded claims on behalf of a gentleman to whom the microscopists of this country are under deep obligations. Well may Mr. Zentmayer exclaim: "Save me from my friends, and I will take care of my enemies myself!"

Correspondence.

The Editor of the AMERICAN JOURNAL OF MICROSCOPY does not hold himself responsible for opinions or facts stated by correspondents. In this department we accord the widest liberty consistent with proper courtesy.

Mr. W. H. Bulloch's Improvements in Microscope Stands.

Ed. Am. Jour. Microscopy—In the May number of this journal are some remarks headed "A Question of Priority," which seem to justify a more extended consideration of the subject there broached, and also of some other points in the same connection.

The more so does this seem desirable, because it seems that the claims of one of our most ingenious and original manufacturers of stands are entirely overlooked in this, as in many other cases. It is not unfrequently the case that the credit for an improvement is given to the wrong person, merely because he has a more prominent position in the world than the one to whom it is due. My personal knowledge of what Mr. W. H. Bulloch, of Chicago, has been doing for the last few years for the improvement of microscope stands, has induced me to bring a few facts and dates before the readers of this journal, with the hope that they may aid us in giving honor to whom it is due. With this purpose in view, I wrote to Mr. Bulloch immediataly on the receipt of the May number of this journal, requesting him to send me a short account of his improvements for the microscope, with the dates of their introduction.

Having received his reply, together with some photographs of his stands, and a letter from Dr. Ward, written to him, dated May 16th, 1877, in relation to the subject, I proceed to place the matter in as clear a light as possible. In great part I shall quote the substance of Mr. Bulloch's letter. He says: "I for one think Mr. Crouch is rather late in the day to assert that he was the first to make the so-called adjustable concentric stage. He says: 'I may perhaps be permitted to state that my own centering adjustments, * * * were claimed by two American manufacturers,' etc. The question is not, as he puts it 'my own centering adjustment,' as I do not know that any maker has a wish to claim it;* but what is claimed in this country is, that three different makers were making the concentric stages adjustable previous to 1871—R. B. Tolles, J. Zentmayer, and myself—whereas he exhibited his first in December, 1875, five years after they were in common use in this country. I have been making them adjustable since July, 1870; the first one was made for Dr. H. A. Johnson, Ex-President of the Illinois State Microscopical Society. The mechanical stage was centered on a 1-25th objective. I also exhibited at the October meeting of the society (1870) a small stand, and centered it on an objective at the

*[Mr. Bulloch, we think, misunderstands Mr. Crouch's position. Mr. Crouch (at least, so it seems to us) does not claim to be the inventor of the adjustable concentric stage, but of a certain modification of it, which he considers has some points of superiority. So far as the latter point is concerned, opinions will, of course, differ, but the question, whether or not Mr. Crouch is the inventor of the form of concentric stage manufactured by him, is a matter of fact which it ought not to be difficult to settle. As stated elsewhere, adjustable concentric stages are very old. The invention, in some form, must have forced itself upon the first microscopist who intelligently undertook the measurement of angles under the microscope.—ED. A. J. M.]

meeting. It worked with three milled screws working in a ring inside of the main ring, and the stage turned within the inside ring; the stage was made of glass, clamped in a brass frame, so as to be readily replaced if broken."

Accompanying this letter is a cut and a photograph of the stand as made in 1873, and also a photograph showing the latest adjustment for centering the stage. This arrangement is fully equal to any other I have seen, and as to its efficiency, I can speak in the highest terms, as it is attached to my own stand.

Mr. Zentmayer's latest improvement of an adjustable stage is probably quite as good, as far as general design and accurate workmanship is concerned, for it could not be otherwise, coming from the hands of such a man as Mr. Zentmayer; but as Mr. Zentmayer's arrangement requires the use of a screw-driver, I think that Mr. Bulloch has a little the advantage, in that the screws are turned by means of a bit of stiff steel wire inserted through perforations in the screw heads. This adjustment can be attached to a great many stands already made.

With this attachment, and a stage only five inches in diameter, Mr. Bulloch writes that he can obtain 135° of direct light from mirror, while from Mr. Crouch's illustration in the London *Microscopical Journal*, his stands will barely allow of 100°. If any person desires to see this stage of Mr. Bulloch's, I will be glad to have him call at my house, when it will afford me pleasure to exhibit it to him.

In regard to the swinging sub-stage, Mr. Bulloch writes as follows: "There is another question of some importance at the present moment, that is as to the priority of the swinging sub-stage improvement. I made a stand with the above improvement for Dr. Jones, of this city, in 1873. I sent a photograph to Dr. Richardson, of Philadelphia, in 1873, with a request that he would show it to the Philadelphia Microscopical Society, and the instrument was shown to Mr. W. Walmsley in October or November, 1873. I also sent a photograph to Dr. Ward, of Troy, and received an answer in 1873. The sub-stage was centered one-tenth part of an inch above the stage-plate, to allow for thickness of slide. It was worked in the arc of a circle for oblique light; so that I claim to have made this arrangement three years before any other.

"I also claim to be the first to hang the mirror so that it can be used over the stage without the use of a separate stand. It can be used in any direction, back or forward, and on either side. I did not attempt to combine the sub-stage and mirror, as I did not see any advantage, and do not now see anything gained by being able to bring the achromatic condenser over the stage. I mounted the mirror so that it could be used over the stage in the first mentioned stand of Dr. Johnson (1870). Dr. Ward says that Spencer mounted it so in 1871."

It will be seen from this that Mr. Bulloch claims priority for the following improvements:

1. The adjustable stage.
2. The swinging bar carrying sub-stage.
3. The mirror mounted so as to be used above the stage, thus replacing to some extent, if not entirely, the bulls-eye condenser.

In regard to the first, I believe there can be no doubt that Mr. Bulloch was the first to introduce a really practicable plan for centering to high powers. Dr. J. G. Hunt, in the Cincinnati *Medical News*, takes the ground that the concentric adjustable rotating stage was made by Zentmayer sixteen years before any foreign maker conceived the idea. This conclusively gives the credit of the invention to America. The objection to the old concentric stage of Zentmayer, as compared with recent ones, is that it is not readily adjusted, and has no mechanical movements.

As to the second, I quote a portion of Dr. Ward's letter, as follows: "There is no room for dispute as to your work having anticipated Zentmayer's in regard to the stage, but it fell just one short of accomplishing the whole invention which he has made, and which I think will prove popular and successful."

The difference between the two (Bulloch's and Zentmayer's) improvements is simply that in the latter the bar turns through a greater arc and the mirror moves with it, which is not the case with the former. It seems to the writer that it is an advantage to have the two move independently, particularly when the third improvement is made use of.

As to the third improvement, it seems that, as far as known, Mr. Bulloch anticipates all others by at least one year. The first and third of these improvements are on my own stand, which is the second size of Mr. Bulloch's make. The swinging bar is only placed on the largest

stands. The concentric stage is placed upon his $75 monoculars. The cuts and photographs referred to will be placed in charge of the editor of this journal for a short time, so that those who wish can see them.

As already stated in this journal, the swinging bar is claimed by Mr. Gundlach and by Mr. Zentmayer. It is of frequent occurrence that the same improvement is carried out by two men independently, but it is certainly not usual for three men to do the same thing.

From the facts stated, Mr. Bulloch certainly makes good his claims of priority in this case, and it is hoped that he will receive due credit hereafter from all microscopists.

The editor of this journal deserves great credit for giving the utmost freedom to discussions of this character.

ROMYN HITCHCOCK.

8 *Beekman Place, New York.*

Information Wanted.

Ed. Am. Jour. Microscopy—Will some one inform a beginner in vegetable histology, what preparation of sections is necessary, and give a few standard mounting fluids and combinations for making rings for thin cells?

Brief directions for the *early* steps are deficient in many works, and would please others perhaps, as well as the writer, who is a worker in animal histology.

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Spermatozoa of Earthworms.

Ed. Am. Jour. Microscopy—May I ask, through your columns, some one of your readers to tell me how to preserve the spermatozoa of the earthworm in such a way that they may be satisfactorily examined with a high power?

The fact may not be generally known to those interested that the spermatozoa of the earthworm may be easily obtained as follows: During the communication of these hermaphrodite creatures, which act may be observed in gardens and along pathways at early morning, or on damp, foggy days, from May to November, there may be seen, on either individual, near the enlarged rings, by means of which they grasp each other, a whitish mass; this may be removed by a dextrous touch with a pocket knife; examination proves it to be a lively mass of spermatozoa in their proper fluid.

D. S. K.

Our Book Table.

Annual Record of Science and Industry for 1876. Edited by Spencer F. Baird, with the Assistance of Eminent Men of Science. New York: Harper & Brothers.

To give a really good resumé of the progress of Science and Industry, is such a difficult undertaking that severity of criticism in this case is almost barred. In the volume before us, an attempt is made to give a general view of the progress of Astronomy, Meteorology, General Physics, Chemistry, Mineralogy, Geology, Geography, Hydrography, Anthropology, General Zoölogy, Invertebrate Zoölogy, Vertebrate Zoölogy, Botany, Agriculture and Rural Economy, and Industrial Statistics, and the book is divided into two distinct parts—the first consisting of general articles upon the subjects just named, while the second is little else than a sort of scientific scrap-book, made up of clippings or condensed notes from different journals. After a most careful examination, we confess that we find it difficult to form a just estimate of the value of the book. It seems to us to be neither popular enough for the "general reader," nor sufficiently thorough and minute to aid the scientific man (the latter is certainly the case.) Let us take, as a fair illustration of what we mean, the following paragraph from the article by Prof. Barker on Physics: "Schott has examined the character of the crystallizations which are produced in common glass under various conditions, with a view to elucidate the chemical character of glass itself." This sentence certainly gives very little information that is of value to any one. If the writer had given us the results of Schott's examinations, or even a reference to the periodical in which an account of them appears, the space would not have been wasted as it now is, and if his collaborateur, who did the clipping, had made his selections with special references to the topics discussed in the general treatise, the entire book would have had a double value. As it now stands, however, no one is aided by such bald statements, statements which perhaps make the volume appear profound, but which certainly do not add anything to its real value. The second half of the volume consists, as we have said before, of selections from various journals. It contains some paragraphs of great value, and some that are of very little worth. We are apt to laugh at the man of scissors and paste, but it is a fact beyond dispute, that for one man that is competent to make good selections, ten can be found to write well. The selections here are on the whole very good, though now and then we meet with one which exhibits a lack of knowledge and judgment. Thus, at page 383, we are given, as a recent German discovery (we get all our great