objective of his telescope, discovered a small binuclear, planetary nebula. Its position for 1880 is R. A. 21h. 2m. 11.8s, Dec. 47° 22.2′ N.

Washington, December 23, 1880. W. C. W.

SWIFT'S COMET.

The following are two more positions of this comet. These were obtained by the aid of a ring micrometer. Nov. 20, 1880, R. A. 1h. 6m. 24s. : Dec. +54° 22′ 39″ : Time is 10h. 49.1m. Washington *m. t.* Dec. 5, 1880, R. A. 4h. 7m. 49.2s. : Dec.+48° 30′ 10″ Time is 9h. 49m. Washington *m. t.* I have also an observation of position for Nov. 7, which has not been reduced as I have not yet managed to find the position of a fifth magnitude star, to which the comet's position was referred. The star's position will soon be obtained.

Nashville, Tenn., Dec. 21, 1880. E. E. BARNARD.

NEW COMPANION TO ζ FORNACIS.

Sir John Herschel entered this as No. 2161, of his Fifth Catalogue of Double Stars, by reason of a distant eleventh magnitude which he detected, at an estimated distance of 45″, in the direction of 169 4°. This star was measured by me in 1879 in connection with a series of observations of a class of stars given in "Smyth's Bedford Catalogue." Since then, in repeating the measure of the Herschel Star, I have discovered a much nearer component, which fairly entitles the large star to be classed as double. The new star is very faint, and a rather difficult object with the 18½-inch refractor of the Dearborn Observatory. This, however, is partly due to its low altitude in this latitude, it being 25° south of the Equator. The mean result of my measures of these companions on four nights is :—

A and B	P=144.4°	D=11.53″	1880.93
A and C	157.0°	48.85″	1880.68

I have estimated the new companion as thirteenth magnitude. This, it will be remembered, is in the Struve scale of magnitudes, which would make it very much smaller than Herschel's twentieth magnitude.

The place of the principal star for 1880 is :—

R A. 2h. 44m. 33s.
Decl. —25° 3″

S. W. BURNHAM.

CHICAGO, Ills., December 21, 1880.

To the Editor of SCIENCE :

Professor Winchell, in the last number of "SCIENCE," refers to what he supposes "to be some errors in the dates in the list of minor planets discovered by the late Professor Watson," viz. :

(133) Cyrene, discovered Aug. 14, 1873, *Am. Jour. Sci.* III., VI., 296.
(174) Phaedra, " " 8, 1877, " " " III., XIV., 325.
(175) Andromache, " Sept. 2, 1877, " " " III., XIV., 325.

In correcting these supposed errors Prof. Winchell has fallen into more grievous ones.

Owing to a misprint in the *Astronomische Nachrichten* I was led to record the date of the discovery of (133) as August 26 ; it should be August 16, vid. *Astron. Nach.* 82,241 *Am. Jour. Sci.* III., VI., 296.

(174) Phaedra was discovered September 2, 1877, vid. *Am. Jour. Sci.* III., XIV., 325. This date is given September 3 in *Circ. Berl. Jahr.* No. 76. September 2 is undoubtedly the correct date. The object discovered August 8 turned out to be (141) Lumen, vid. III., XIV., 429, *Circ. Berl. Jahr.* No. 76.

(175) Andromache was discovered October 1, 1877, vid. *Astron. Nach.* 91-127 ; also *Circ. Berl. Jahr.* No. 81. The object called (175) in *Am. Jour. Sci.* III., XIV., 325 was really (174) Phaedra, as is explained in *Circ. Berl. Jahr.* No. 81. AARON N. SKINNER.

U. S. NAVAL OBSERVATORY,
WASHINGTON, D. C., Dec. 22, 1880.

BOTANY.

PILOSITY AS A TERATOLOGICAL PHENOMENON.—Hitherto teratologists have considered undue pilosity, or the adventitous production of hair in plants, as a matter of minor importance, but M. Ed. Heckel, in a recent note to the French Academy, (*Comptes Rendus*, xci., p. 349), insists that there are certain phases of this sort of change in plants which have a higher significance than that of a simple variation. He proposes to divide the phenomenon into the following three categories :

(1.) *Physiological Pilosity*, which includes the formation of hairs, or the increase in number of these, on the parts of plants where they are normally present, or even entirely wanting. Such cases are oftenest seen when plants change their habitat from a wet to a dry soil. This sort of physiological adaptation takes place within quite narrow limits ; and it varies from glabrousness to pilosity unaccompanied by any alteration of specific characters.

(2.) *Teratological Pilosity*, which begins at the moment the specific habit is altered, and acquires its maximum when the modifications are profound enough to suggest the idea of a new species. A large number of conditions capable of producing nutritive troubles in plants may give rise to this peculiar phenomenon, which M. Heckel proposes to introduce into teratological literature under the distinctive term of "Deforming Pilosity" (*Pilosisme deformant*).

(3.) *Pilosity due to the Sting of Insects or to Organic Variations*, which is clearly distinguished from the former in being very localized (e. g. certain galls, the filaments of *Verbascum* with aborted anthers, etc.,) and which cannot change the habit of the species.

Of changes due to *deforming pilosity*, M. Heckel gives two prominent examples which he has studied, *Lilium Martagon*, L., and *Genista aspalathoides*, Lam. The alterations in the last named plant are so profound that its monstrous state has even been described by De Candolle as a species, under the name of *G. Lobelii;* while by Morris it has been regarded as a marked variety, and named by him var. *confertior*.

MICROSCOPY.

The remarks of the "Fellow of the Royal Microscopical Society," who so ably advises *The English Mechanic* on Microscopy , on the faulty construction of many forms of "Student's" microscopes, is well timed.

In regard to the system of getting as much as possible for the money, he says : "It is just this petty economy in the original outlay on a practical stand that cramps the student when he has acquired some manipulative dexterity. Dealers and manufacturers are, of course, driven to supply what is recommended by the 'authorities.' The continued refrain of 'cheapness, cheapness,' brings down the construction of the microscope until it has become (in far too many instances) the baldest tube, stage, mirror, objective, and eyepiece with which it is possible to view a speck of saliva on a slip of glass. This perpetual reduction of the finish and design of the microscope tends to exclude all the better opticians from supplying students' microscopes, for they cannot do justice to themselves when the price is to be cut down as it has been during the last few years. The consequence is that an enormous number of common French or German instruments has been imported into this country and America ; students have been 'set up' with these things, to discover later on, when they have become experienced enough to judge of such matters, that they have no market value except as lumber.

The severe competition, lately, has been mainly confined to the production of *low-priced* microscopes, *not* the production of an *efficient* instrument at a moderate cost ; the consequence appears to have been that manufacturers whose appliances are about equal to the task of making gas-fittings have been induced to enter the competition ; a model of stand has been placed before them which they have copied 'more or less ;' at any rate, the

market has been glutted with what appears to be lacquered brass-work."

This is well expressed, and needs but one word in addition, as to the remedy: On this point we advise the microscopist to recur to the good, but old-fashioned plan, of gradually building up his microscope and its accessories. Let his money accumulate until he can purchase a first-class stand of a reliable maker, the adjustments of which will be reliable, and arranged to receive all necessary accessories as they are added. With such a base of operation, he will have nothing to retract, and every step will be one of progress.

In justice to some makers in America, it must be admitted that they have produced, recently, some moderately-priced instruments which are well finished; but there are also some students' microscopes, on the market, carelessly made, badly constructed, and unfit for scientific work.

As to objectives the writer in the *Eng. Mech.*, above referred to, says: "Large firms abroad, who are not opticians at all, and whose appliances are suited to the production of bull's-eye lenses, &c., have been induced to 'take up' with the microscope, and thus thousands of things called objectives have been floated that are a disgrace to microscopy. Here and there an advertiser of microscopes obtains these things, patches on some trumpery adapter that conceals the original make, and disposes of the wares as 'our own first-class manufacture;' the unwary student finds out how he has been imposed upon only when experience has taught him the meaning of good optical appliances, among which those he is unhappily possessed of take no rank whatever."

We have no doubt the writer has good reason for making this exposure of the tricks of opticians. The practice of importing objectives and, after remounting, passing them off as "*our own first-class manufacture*," is not confined to Europe. When in London, on one occasion, we were shown a written order from a well-known American objective maker, for a quantity of objectives, to be used for this very purpose.

It is certainly a disgraceful state of things that a microscopist, who purchases an objective of a reputable maker, should receive a glass manufactured by an inferior house, whose prices are probably 50 per cent less.

Purchasers of microscopes and objectives in the United States, who endeavor to steer a course between exorbitant charges and inferior workmanship, have need of much caution, and if inexperienced, should not rely on their own judgment.

The number of microscopists in this country appears to be on the increase if we may draw conclusions from the statement of a maker, who asserts that he has orders in hand which will keep him employed for four months.

PHYSIOLOGY.

Mr. Simon H. Gage has just been appointed Assistant Professor of Physiology, and Lecturer on Microscopical Technology in Cornell University. While a student in the Natural History course at that institution, Mr. Gage acted as laboratory assistant, and since his graduation, in 1877, has been Instructor in Microscopy and Practical Physiology. He has published several papers, mostly microscopical, some of which have been copied into European Journals. In addition to the supervision of other laboratory work, Mr. Gage gives practical lectures upon Microscopical Technology, in all its branches, and upon Microscopy in relation to Medical Jurisprudence. His deserved appointment will not only strengthen the general Natural History instruction, but greatly aid Professor Wilder's efforts to provide preliminary medical education.

The following list of the published papers of Mr. Gage will give some idea of his scientific activity, and indicate his special line of research:

1. Plaster of Paris as an Injecting Mass.—*American Naturalist*, November, 1878, pp. 717–724.
2. Notes on the Cayuga Lake Star Gazer.—*Cornell Review*, November, 1878, pp. 91–94.
3. The Ampulla of Vater and the Pancreatic Ducts in the Domestic Cat, Felis Domestica.—*The American Quarterly Microscopical Journal*, January, 1879. pp. 123-131, and April, 169–180.
4. Laboratory Notes in Microscopy.—*Am. Q. M. Jour.* Vol. I., pp. 71, 160, 166. Part of these were copied in the *Journal of the Royal Microscopical Society*, of London, 1879, p. 191. and also in the *American Journal of Microscopy and Popular Science*, 1879, p. 176.
5. The Inter-Articular Ligament of the Head of the Ribs in the Cat.—*Proc. of the Am. Association for the Advancement of Science*, Saratoga Meeting, 1879, pp. 421–424.
6. A New Method of Demonstrating the Thoracic Duct in Animals.—*Proc. A. A. A. S.*, 1879, p. 425.
7. An Apparatus for Photographing Natural History Objects in a Horizontal Position. Read before the A. A. A. S., at Saratoga, and published by title in the proceedings for 1879, p. 489.
8. Preparation of Ranvier's Picro-Carmine.—*American Monthly Microscopical Journal*, 1880, pp. 22-23. Copied in the *Jour. of the Royal Mic. Soc. of London*, 1880. pp. 501–502.
9. Permanent Microscopical Preparations of Amphibian Blood. Read at the Boston Meeting of the A. A. A. S., and published in the *American Naturalist*, October, 1880, pp. 752–753.
10. Permanent Microscopical Preparations of Plasmodium. Read at the Boston Meeting of the A. A. A. S., and published in the *Am. M. Mic. Jour.*, October, 1880, pp. 173–174.
11. A supplement to the article on calcareous crystals in Amphibia, by Professor Bolton, of Trinity College. This supplement was prepared at his request, and published with his paper in the *Proc. of the A. A. A. S.*, 1879, p. 418.

Finally Dr. Wilder and Mr. Gage have been preparing a laboratory manual for the last two years, which will be published next fall.

For an opinion as to the value of the laboratory notes, etc., mentioned above, see the Proceedings of the New York Microscopical Society, as published in the *Am. Jour. of Mic. and Pop. Science*. Feb., 1880, p. 51.

CHEMICAL NOTES.

ULMIC MATERIALS PRODUCED BY THE ACTION OF ACIDS UPON SUGAR.—The formulæ ascribed by Mulder to the ulmic products which had been dried at from 140° to 165° before being submitted to combustion are not admissible, since, at temperatures above 100°, these bodies lose a notable quantity of volatile matter, and in particular of formic acid. The ulmic substances obtained by the action of dilute sulphuric acid upon sugar, and which may be called sacchulmine, appear in the form of minute yellowish brown globules. On treatment with a cold aqueous solution of caustic potassa, sacchulmine gives off an acid principle derived from the action of sulphuric acid upon glucose. The ulmic matter (sacchulmine), insoluble in cold alkaline liquids, is derived directly from saccharose. In the ulmification of sugar there is evolved a considerable quantity of volatile acids, especially formic acid.—F. SESTINI.—*Gazzetta Chimica Italiana.*

THE DIFFUSION AND THE PHYSIOLOGICAL CONDITION OF COPPER IN THE ANIMAL ORGANISM.—Prof Giovanni Bizio has attempted to prove that his father, Bartolomeo Bizio, was the original discoverer of the normal occurrence of copper in the animal economy.

CHEMICAL CONSTITUTION OF MILK.—Caseine is not a homogeneous albuminoid, but a mixture of albumen and protalb-bodies which appear as transition stages in peptonisation. In the milk globules has been found an albumenoid which constitutes the serum. In the curd are met with an albuminous body identical with the stromæi alb-compound of the globules, a body which Danilewsky and Radenhausen name orroproteine and two series of peptones. Hence it is no longer proper, in milk-analysis, to speak of caseine and albumen, but rather of albuminates.—DR. N. GERBER.—*Correspondenz-Blatt.*

OCCURANCE OF COPPER.—Dr. W. Hadelich has detected and determined copper in the soil of a churchyard, and in portions of exhumed bodies.

SIMPLE METHOD OF OBSERVING THE PHENOMENA OF DIFFRACTION.—The rays reflected by a heliostat are concentrated by two lenses. In the focus is placed a diaphragm with a very small aperture, and the luminous glass is received on a screen. In this glass are placed the bodies whose shadows are to be studied.—V. D. Vorak.