with special precautions, viz., washing the respired gases, and performing parallel experiments, in which, for the breath I substituted a rapid current of air, and lastly raising the latter to a temperature of 40° C. The result was to prove conclusively my original statement that the decomposition is brought about by a constituent of the respired air, and therefore by its carbonic acid. In performing this experiment it is only necessary to secure the neutrality of the solution; this being done, the development of a full purple color occupies from two to three minutes.

It is evident that this demonstration of the presence of *some* acid body precedes the lime-water test in the logical development of the complete proof of the presence of *carbonic* acid.—*Chemical News.*

THE BEST METHOD OF MOUNTING WHOLE CHICK EMBRYO.*

By DR. CHARLES S. MINOT.

The blastoderm is removed and cleaned in the usual manner, and then floated out on a glass slide, where it remains permanently. It is carefully spread out and allowed to dry until the edges become glued to the slide. It is then treated with a 0.5 per cent osmic acid solution, until a slight browning occurs. Stain with picro-carmine. The next step is particularly important, because it prevents the further darkening by the osmium, which otherwise injures or ruins the specimen. Pour Müller's fluid, or 0.5 per cent chromic acid solution, on the slide, and leave it over night. The next morning the blastoderm is ready for dehydration by alcohol, and mounting in the usual manner in balsam or dammar lac. Embryos prepared in this manner make particulary beautiful specimens.

ON THE ALLEGED DECOMPOSITION OF THE ELEMENTS.†

BY PROF. DEWAR, M.A., F.R.S.

In his remarks Prof. Dewar dealt chiefly with the spectroscopic work from which Mr. Norman Lockyer had drawn conclusions very different from those of Professors Liveing and Dewar, especially concerning the value of evidence on the subject. Prof. Dewar argued that Mr. Lockyer's views regarding the existence of carbon vapor in the corona of the sun would not bear scientific investigation, and that his views regarding the modification of the spectrum of magnesium were equally illusory, and gave no proof of the decomposition of elementary substances. Finally he discussed Mr. Lockyer's theory of "basic lines," and addressed himself to a refutation of the same. The results recorded, he said, strongly confirmed Young's observations, and left little doubt that the few as yet unresolved coincidences either would yield to a higher dispersion, or were merely accidental. It would indeed be strange if amongst all the variety of chemical elements and the still greater variety of vibrations which some of them were capable of taking up, there were no two which could take up vibrations of the same period. They certainly should have supposed that substances like iron and titanium, with such a large number of lines, must each consist of more than one kind of molecule, and that not single lines, but several lines of each, would be found repeated with the spectra of some other chemical elements. The fact that hardly a single coincidence could be established was a strong argument that the materials of iron and titanium, even if they be not homogeneous, were still different from those of other chemical elements. The supposition that the different elements might be resolved into simple constituents and even into a single substance had long been a favorite speculation with chemists; but however probable that hypothesis might appear *a priori*, it must be acknowledged, according to Prof. Dewar, that the facts derived from the most powerful method of analytical investigation yet devised, gave it but scant support.

* Read before the A. A. A. S., Cincinnati, 1881.

† British Association, 1881.

ASTRONOMY.

ELEMENTS AND EPHEMERIS OF COMET (*d*), 1881.—BARNARD.

Mr. S. C. Chandler, Jr., has computed the following elements and ephemeris of Comet (*d*), 1881—Barnard—which are published, by permission of Prof. E. C. Pickering, of Harvard College Observatory. The observations upon which the computation is based are the following: Washington Mean Time being given with the Nashville observation, which was obtained at Vanderbilt University, by Prof. O. H. Landreth, and Cambridge Mean Time with the two others:

							R. A.			Decl.		
		d.	*h.*	*m.*	*s.*		*h.*	*m.*	*s.*	°	′	″
1881.	Sept.	20	7	46		Nashville	13	28	2	+3	47	
		21	7	34	43	Harvard Obs.	13	30	20	4	54	
		25	7	17	52	Harvard Obs.	13	36	29.63	9	6	43.7

The observation of the 20th was received by telegraph, and that of the 21st depends on only two comparisons, taken when the comet was but one degree and a half above the horizon.

ELEMENTS.

T = 1881, September, 14.785. Washington Mean Time.

$$\left.\begin{aligned} \pi &= 271^\circ\ 22' \\ \Omega &= 260^\circ\ 43' \\ i &= 107^\circ\ 27' \end{aligned}\right\}\text{Mean Eq., 1881. 0.}$$

$$\log. q = 9.7053$$

EPHEMERIS.

Wash. midnight, 1881.	R. A. *h.*	*m.*	*s.*	Decl. °	′	Log. *r.*	Log. Δ.	Light
Sept. 29	13	41	36	+13	4	9.7894	0.1350	1.00
Oct. 3	13	45	28	16	26	9.8270	0.1467	.80
7	13	48	40	19	29	9.8648	0.1569	.65
11	13	51	32	22	18	9.9014	0.1628	.52

The light of the comet on September 29 is taken as unity, and in this scale its light at discovery, on September 17, was 1.85. The orbit does not resemble that of any known comet.

The comet is circular, not over one minute of arc in diameter, with a very decided central condensation. Its collective brightness is not more than equivalent to that of an 8½ mag. star. The comet is rapidly decreasing in light, and the moon is advancing, so that observations of it at once are very desirable. So far as is known, positions have been obtained only at Nashville and Cambridge, the early setting of the comet, and clouds, having greatly interfered. Under the circumstances, the orbit cannot be other than a rough one, and considerable latitude for error had better be allowed in searching for it.

MICROSCOPY.

The following method of hardening the spinal cord for microscopic sections has been highly recommended by Dr. M. Debove:

Place the cord in a 4 per cent solution of bichromate of ammonia for three weeks, then in a solution of phenic gum for three days, and for three days more in alcohol. Sections may then be cut with great facility. They should be placed in water to prevent curling. They are then immersed in a saturated solution of picric acid for twenty-four hours, and colored with carmine for about twenty minutes, the picric acid acting as a mordant.—*Archives de Neurologie.*

An era of microtomes appears to be approaching, and numerous are such devices which are advertised by the opticians. Mr. Thomas Taylor of the Agricultural department, Washington, has arranged a new microtome in which all the parts are reduced to their most simple form. Mr. Taylor described his invention as consisting essentially of a thin brass tube about one inch and a half strength by one inch in diameter. A ¼ inch brass tube secured within the large cylinder. This tube enters the bottom where it is secured, and proceeds to within a quarter of an inch of the inside surface of the top. To the outside open end of this tube a rubber tube is attached; the other end of the rubber tube is made to communicate with a freezing mixture composed of finely cut ice and salt in about equal proportions. The pail containing this mixture is placed over and about fifteen inches higher than the section cutter. The object of this arrangement is to fill the brass cylinder with a freezing liquid drained from the pail, and caused by the liquefying salt and ice, the temperature of which is about zero. On filling the cylinder with the liquid any object on the top of the cylinder becomes frozen in a short period and may then be cut to any degree of thickness. In order to preserve the low degree of temperature in the cylinder a second tube is secured in the cylinder to remove air and keep up a constant current of the freezing liquid. This tube enters the bottom of the cylinder, where it is fastened. It projects upwards to within an eighth of an inch of the top and has a diameter of about one-half of the supply tube. This microtome or freezing cylinder in other respects is arranged like other microtomes, such as are used for ether or rhigoline; and the same mathematical accuracy attained in cutting sections,

THE editor of the *American Monthly Microscopical Journal* devotes an article to the selection of microscopes, and expresses his belief that the microscope of the future will be an instrument of quite moderate size, and about the same dimensions as that of the forms used by the German student. We believe this to be a correct view of the microscopist's requirements, if the instrument is employed as often as it should be. The colossal instruments which have been recently constructed show no advance in the manufacture of microscopes, but rather a return to the monstrosities of 100 years ago, when their size was "prodigious," and the display of ornamentation profuse. We once saw the microscope "built" for George III., which was a marvel of the brass finisher's art, as elaborate as a Louis XIV. clock, and probably as useful, as an optical instrument.

We believe the form of microscope which will be accepted as a standard by future microscopists will be the "Stevenson" model. Five years ago we submitted drawings for an inexpensive instrument on this plan, but was met by a variety of objections from opticians.

We now find that two London makers are offering microscopes on this model, the Stevenson form having been modified, so as to considerably reduce the expense. The advantages of this model is very great. *First*, a horizontal stage. *Second*, the comfort of sloping tubes. *Third*, an erected image.

We notice in the new edition of "Carpenter" (page 86) that such an instrument (binoculen) can be sold complete, with objective, for $100, or simplified as a student's microscope (binoculen, with 2 objectives) for $64.

For those who merely practice the refinements of the microscope, such an instrument would present many objections, but for biological studies and ordinary microscopical work, we strongly advocate its use, and desire to find it manufactured in its new and cheaper form by American manufacturers of microscopes.

PROF. ALEXIS A. JULIEN has published a reprint from the Journal of the Amer. Chemical Society of his paper "*On the Examination of Carbon Dioxide in the Fluid Cavities of Topaz.*" He describes two simple and inexpensive apparatus for the microscopical determination of carbonic acid in the cavities of minerals; and a recent study of large numbers of cleavage slices from fifty pebbles of topaz from Minas Geraes, Brazil, has presented facts of some interest hitherto not recorded. In some of the slices many extremely angular, elongated, branching, and even reticulated forms of considerable size and novelty abound. Their outlines are at many points decidedly crystalline, with arms projecting at an angle of about 135 degrees, which seems to indicate that Brewster's generalization, that the cavities were generally "capriciously distributed when the substance of the crystal was in a soft or plastic state," may have been pressed too far. In general, the larger expansions of the cavities are mostly occupied by brine, while their attenuated extremities and fine tubular connections are filled by liquid carbonic acid, occasionally including a bubble due to contraction.

MR. C. M. VORCE has forwarded to us a drawing of the many forms of microscopical life found by him in water from Lake Erie, and used as a water supply for Cleveland City. This appears to be but the first instalment of the subject. He draws and names nearly two hundred specimens.

PRELIMINARY REMARKS ON THE MICROSCOPIC STRUCTURE OF COAL FROM EAST SCOTLAND AND SOUTH WALES, by Prof. Williamson, F. R. S., Owens College.—This subject will not be worked out until ten years, but he described layers of vascular tissue which can be separated layer by layer, while in other cases the charcoal layer on the surface of the coal and the organic structure is not capable of separation, and he stated that charcoal contains a tubular structure, like tissues of ordinary bark. The association of tissues resembles that of Cycadian plants; and referred to the genus *Cordaites* having been proved to belong to this group by M. Renault; the author has made nearly a thousand distinct observations on the structure of coal. Separates ordinary coal with large quantities of mineral charcoal, with macrospores of Lepidendroid plants filled up with myriads of microspores which were certainly not floated to the spots, from the *paraffine coals* which do not contain these large macrospores. He divides coal into "Iso-sporous" coals and "Heterosporous" coals; both abound in *Cordaites*, which form the mineral charcoal.

NOTE ON THE OCCURRENCE OF SELENIUM AND TELLURIUM IN JAPAN, by E. DIVERS, M. D.—The author draws attention to the fact that the presence of these two elements has been observed in Japanese sulphuric acid, and considers it probable that these substances occur in material quantities in Japan.

BREWING IN JAPAN, by R. W. ATKINSON, B.Sc. (LOND.)—The Japanese brewing process is divided into two parts comparable with the malting and brewing processes of beer-making. The mode of preparation and the properties of the diastatic materials are different in the two cases. The Japanese equivalent of malt or "köji" hydrates maltose in addition to cane-sugar, dextrin, and starch, and the ultimate products of its action on starch-paste are dextrose and dextrin, or perhaps dextrose alone. Köji differs from malt in being rendered inactive by heat at a much lower temperature than malt. Köji is prepared as follows: A mixture of steamed rice and water is allowed to remain in shallow tubs at a low temperature (0°–5° C.) until quite liquid; it is then heated, fermentation commences, and continues until nearly all the dextrine first formed is exhausted. This product is now used like yeast, and is added to fresh quantities of steamed rice and water, fermentation proceeding until the percentage of alcohol amounts to about 13 or 14 per cent by weight. After the greater part of the rice added has been used up, the mash is filtered and clarified by standing. The "saké" so produced requires very careful watching, and when summer approaches, or it exhibits signs of putrefactive fermentation, it is then heated in iron vessels; this operation has frequently to be repeated. Analyses of various specimens, fresh and diseased, are given in the paper.