or Amber as a Gem," has been published by Messrs. Sampson Low, Marston and Co., Ltd. The volume brings together many facts of interest concerning the origin and decorative uses of amber.

THE determination of the density of a gas has, till comparatively recently, been regarded as an operation of great difficulty, requiring elaborate apparatus and a large quantity of material. In the course of his researches on argon and helium, however, Prof. Ramsay has shown that it is possible by direct weighing to arrive at a reasonably accurate result upon as small a quantity as thirty cubic centimetres. In two recent numbers of the *Comptes rendus* are two contributions to this subject by M. Th. Schlœsing, jun., in which he gives a most ingenious method of measuring the density of a gas, based upon the balancing of two columns of the gases in a U-tube. Two vertical tubes about one metre in length communicate at their lower ends by a three-way tap; in one is placed an easily absorbable gas of known density, such as carbon dioxide, and in the other the gas under examination. On allowing the columns to communicate through the tap, a state of equilibrium between the gas, carbon dioxide, and air is set up after about four minutes, and the level of the invisible surfaces of separation then determined by absorbing the carbon dioxide with potash. In order to reduce the unavoidable diffusion of the gases, very narrow tubes were taken (1·6 mm. to 2·7 mm. in diameter), with the resulting advantage of reducing the quantity necessary for a determination. In the second paper data are given for nitrogen, oxygen, and methane, from which it would appear that an accuracy of 1/1000 is obtainable upon five to seven cubic centimetres of gas. With hydrogen only was there a failure, the mutual diffusion of the two gases being too rapid to allow of equilibrium being set up. There can be no doubt that the method will admit of many useful applications.

THE additions to the Zoological Society's Gardens during the past week include a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mr. Robert O'Callaghan; a Horned Lizard (*Phrynosoma cornutum*) from California, presented by Mr. Charles Iseard; three Shaw's Gerbilles (*Gerbillus shawi*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

A PROBABLE NEW STAR.—In Circular No. 45 from the Wolsingham Observatory, dated February 14, the Rev. T. E. Espin states that an eighth-magnitude red star not in B.D. was found the previous night, its place being R.A. 7h. 12m. 16s., Decl. + 32° 19′ (1855).

NEW PHOTOGRAPHS OF NEBULÆ.—With a reflector having the extraordinary ratio of 1 metre aperture to 3 metres focal length, M. A. Rabourdin has taken some remarkable photographs of several nebulæ at the Meudon Observatory, and he gives a detailed account of them in *Comptes rendus* for January 31. On the ring nebula in Lyra he made three exposures—of twenty, thirty-five and fifty-five minutes. "These three plates," he remarks, "show that for this annular nebula the nebulosity of the interior increases with the time of exposure, whilst the total diameter increases very little. The final result is an elliptical nebula in place of the annular one taken with the short exposure. The photographs also show very plainly a star at the centre of the ring, which is, moreover, visible to the eye in the telescope; but neither the drawings of Herschel in 1833, Lord Rosse in 1844, nor that of Trouvelot in 1873, give any indication of it. Hence this would tend to show a comparatively recent change."

With an exposure of fifty minutes on the planetary nebula in Aquarius, a photograph was obtained showing two protuberances diametrically opposite, which would lead one to suppose that the central globe is surrounded by a diffuse belt analogous to Saturn's ring.

A photograph of the nebula in Andromeda, with only one hour exposure, is said to exhibit as much detail as those previously obtained with four times the exposure; and the nebula is so extensive, that it was quite impossible to photograph the whole region on one single plate.

A photograph of the nebula in Triangula shows that it is a beautiful spiral one.

The region of the Pleiades was also photographed, giving one hour exposure, with Alcyone in the centre of the plate. Even with this comparatively short exposure, MM. Henry have discovered nebulæ absolutely invisible in the telescope, enriching this region still more with two other new nebulæ surrounding Atlas and Pleione. This photograph also shows more than the beautiful chart of the Pleiades taken by MM. Henry, and exhibits additional streams of nebulous matter which apparently bind together certain stars of this group.

CARBON IN THE CHROMOSPHERE.—That carbon existed in the solar spectrum itself was at one time a matter of doubt, but its existence was established long ago by the early researches of Sir Norman Lockyer. Now, with the aid of the 40-inch telescope of the Yerkes Observatory, Prof. Hale has observed the presence of carbon in the chromosphere, and his paper on this subject is to be found in the December number of the *Astrophysical Journal*. The observations were made last September, and the green fluting near *b* was distinctly seen as a bright reversal in the chromosphere. M. Deslandres, who was visiting the observatory at the time, had no difficulty in seeing the lines, and they have since been observed by Profs. Runge and Keeler.

These results are interesting, in the light of the fact that the photographs of the total eclipse of 1896 show a decided influence of the prominences on the corona, and the examination of the corona itself at the last eclipse, for the presence of carbon might possibly have led to fruitful results.

PARALLAX OF SIRIUS.—In the *Monthly Notices* for January, Dr. Gill discusses a series of observations for the parallax of Sirius, made by him in 1888-89 with the Cape heliometer. The comparison stars used were both of 8·7 magnitude; one, which he denotes by γ, being 4310″ distant, and the other, δ, 4536″ away from Sirius, with respective position angles of 279°·17 and 101°·26.

From these observations he deduces a value of 0″·370 ± 0″·0097, which is in remarkably close agreement with his well-known result of 0″·370 ± 0″·009 from his 1881-83 observations.

Dr. Gill states that by this method of measurement it was possible to determine parallaxes so small as 1/50 of a second with some confidence—a degree of accuracy not previously attained in astronomical researches of any kind. He therefore thinks we may regard the parallax of Sirius as now satisfactorily determined, and that the corrections depending on a parallax of 0″·37 might with advantage be introduced in the apparent places of Sirius given in the national ephemerides.

WE note with pleasure that Mr. A. C. D. Crommelin, in the *Monthly Notices* for January, continues his paper which appeared in the December number, on the "Ephemeris for physical observations of Jupiter, 1898." We had been so long accustomed to seeing the late Dr. Marth's name attached to these and similar tables for the moon and other planets, that it was doubtful who would volunteer to fill his place; but we are glad to find that one so able as Mr. Crommelin has undertaken this task.

THE ATOMIC WEIGHTS OF NICKEL AND COBALT.

THE determination of the atomic weights of nickel and cobalt has attracted a considerable amount of attention during the last few years, the numbers obtained by different workers exhibiting relatively startling variations. Thus, including only the four most recent results, the values for cobalt vary between 58·78 (Hempel and Thiele, 1895) and 60·12 (Schützenberger, 1892). Similar variations observed for nickel by Krüss, led him to the conclusion that this metal contained a new element, to which he gave the name of "gnomium"; but recent work has not tended to confirm this view. In the *Proceedings* of the American Academy of Arts and Sciences for November and December last, are two important contributions to this subject, by Richards and Cushman and

Richards and Baxter respectively, giving the results of analyses of the bromides of nickel and cobalt; which show in a decisive manner that properly purified nickel and cobalt are homogeneous substances. After stating the advantages pertaining to the use of the bromides, for the sublimation and bottling of which a highly ingenious apparatus is described, they show how two totally distinct methods of purification, starting from metals of different origin, lead to a bromide of the same composition.

For nickel bromide the material was obtained from two sources—the "pure" nickel of commerce, and Mond nickel prepared by the carbon monoxide process. The steps for the purification of the first of these included fractional precipitation as sulphide, then as hydroxide, conversion of this through the bromide into the violet crystalline ammonia compound $NiBr_2.6NH_3$, and this, after several recrystallisations, converted through the oxide into spongy nickel. For the Mond nickel, in which a little iron was practically the only impurity, the same process was adopted, except that to remove alkalis the hydroxide was converted into sulphate and the latter subjected to electrolysis several times. After conversion into bromide, these were analysed, and for the final analyses further purification was attempted by repeated deposition by electrolysis. All three samples gave identical results, 58 69, for the atomic weight of nickel (O = 16).

The cobalt was purified with equal care, the cobalt bromide being obtained by two distinct methods of purification, the one through potassium-cobalt nitrite, and the other through a cobalt-amine, and these again purified by a combination of both processes. The results of the three series were practically identical, the atomic weight of cobalt being 58·99 (O = 16).

While recognising that data obtained from one compound only are not sufficient to finally settle the atomic weights of these metals, the authors conclude that if "gnomium" exists, it must have an atomic weight about equal to that of nickel and cobalt; and hence, that the wide variations observed in the results of other experimenters cannot be considered a valid argument in favour of the late Prof. Krüss's doubtful discovery.

CRATER LAKE, OREGON.

THE Mazamas of the State of Oregon are no ancient tribe of redskins, but the members of a very active and most praiseworthy mountaineering club in the city of Portland. The President in his last annual address observed: "Within two years the name *Mazama* has been heard throughout the world, and to-day it stands as a synonym for all that is unique, progressive and inspiring in mountaineering societies"; and even if the European Alpine clubs hesitate to accept this statement in its entirety, all must agree that the second number of the publication entitled *Mazama* justifies the "guid conceit" the members of that lively club have of themselves. As no American University commands respect without a rousing "yell," so no mountaineering club can organise excursions without a "cheer," and this is the Mazamas':—

"Three cheers for the mountaineers,
'Rah! 'rah! rah!
Nesika klatawa sahele
Ma-za-ma."

The obscurest line is Chinook jargon for "We go up." Led with such a slogan, the Oregon Highlanders have carried many peaks by storm, and have opened to the public much of the grand mountain scenery of the Cascade Range. Part 2 of *Mazama* is devoted to the remarkable natural feature known as Crater Lake, to which the club made an excursion in 1896. The description is not a piece of amateur geography, but a solid description put together out of reports by the first scientific authorities.

Crater Lake is situated nearly in 43° N. and 122° W. It may be reached from several stations on the railway between Portland, Oregon, and San Francisco, by roads, usually bad, and as yet there is no house of any kind near its shore. Leaving the Southern Pacific Railway at Midford, one may reach it by 85 miles of road up the Rogue River valley. From Ashland a road of 95 miles must be traversed; but the best road—one which is practicable for bicycles—is from Ager, Cal., past the deserted Fort Klamath, a distance of 116 miles. The whole country is covered with dense coniferous forest. In approaching the lake, there is a steep climb for about three miles; then the forest-clad mountain slope gives place to a nearly level plateau, carpeted in autumn with flowers, across which one walks a few hundred yards with nothing to see, until suddenly a precipice of 900 feet yawns at one's very feet, and deep below the dazzling blue water of Crater Lake spreads far and wide. The weird grandeur of the scene accounts to the full for the superstitious awe with which the Indians of the district regard the lake.

Crater Lake may have been discovered in 1847, but the first authentic account of its existence came from a composite party of prospectors in 1853. A party of Californian gold-seekers crossed secretly into Oregon to search for a mythical lost digging of fabulous richness, and for as long a time as provisions lasted they were followed by a party of Oregonians who could not be shaken off. The rivals united at last, and, continuing the search for gold together, came upon Crater Lake, which they named "Deep Blue Lake," or "Lake Mystery." The next recorded visits were in 1862, 1865, and 1869. From that time its fame began to spread, but it was not geologically examined by experts until 1883. In 1885 a party of the United States Geological Survey, under Captain Dutton, was detailed to sound the lake and make a topographical survey of its surroundings; and a detailed contour map was constructed.

The roughly circular lake, from four to six miles in diameter, is without outlet, and without tributaries; the upper edge of the

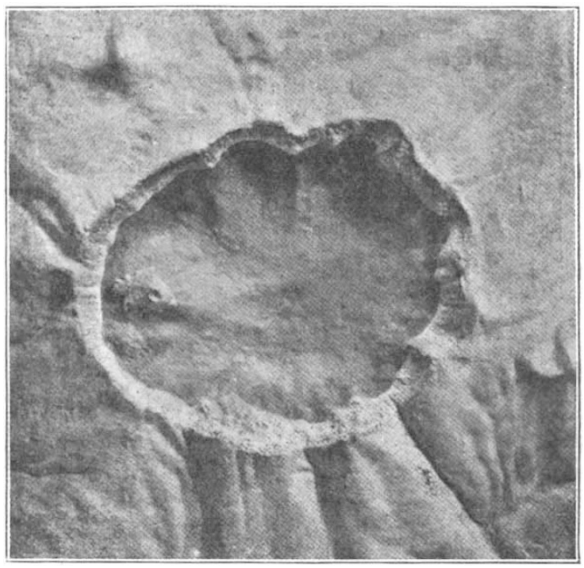

FIG. 1.—Photograph of a relief model of Crater Lake.

rim is a water-parting, from which streams radiate down the slopes towards the sea through deep cut valleys. The outer slopes have a gradient of from 10° to 15°, and are richly wooded. The inner slopes are precipitous, and allow of a descent being made to the water only at one or two points. The water-level stands 6239 feet above sea-level, and the crest of the rim varies from 520 to 1989 feet higher. The greatest depth ascertained in the lake is 2008 feet. A relief model of the lake and its surroundings has been constructed, and shows a remarkable similarity to the larger ring-craters of the moon. One island of some size rises in the lake in the form of a cinder-cone, bearing a well-marked crater on its summit. It goes by the name of Wizard Island, and a fantastically weathered islet is named the Phantom Ship.

A description of the geology of the region is given by Mr. J. S. Diller. The rim is composed entirely of lava streams and beds of volcanic conglomerate dipping away from the lake. At one point, however, there is a remarkable lava-flow, which appears to have run down the inner slope.

The lavas of the rim are mainly andesites forming the earlier flows, but rhyolites associated with pumice occur among the later. There is no basalt on the rim, but basalts occur on the outer slopes several miles from the lake, being related to cinder cones adnate to the central crater. Numerous andesite