in ; the few boxes I have are filled with earth and living plants. My ethnological collections are very extensive indeed ; I have literally cleared all the houses, and I have the best collection of the stone implements of New Guinea ever seen, of every kind and description. I have also the ornaments used when dancing and when engaged in war, paddles for their canoes, &c., &c. I procured dresses of various patterns, some petticoats made of human hair, others of grass, both of the natural colour and dyed ; stone implements, finished and unfinished ; painted and carved skulls, stuffed human heads, arrows pointed with bone, artistically worked, and the cement used in fixing the points. I am very anxious to show you everything, and see your surprise at the beauty of my collection, as you can so well appreciate it. I hope my plan of the Fly River will be correct. I have noted mile by mile, and every day I landed I recorded the nature of the soil, &c. I hope the Government, Committee, and subscribers to the Expedition will be satisfied with the confidence they placed in me, and, more so, when I have time to publish my notes *in extenso*. I have investigated science in all its various branches, more especially anthropology. The presence of the great bird of paradise (*Paradisea apoda*, Linn.) in the centre of New Guinea, but at the same time in almost the same latitude as Aru Island, is of the greatest importance after what Lesson has asserted, and which has been denied by Wallace. I have got specimens in every stage of plumage, and of both sexes, and I have no doubt it is the *P. apoda*, and not the *P. papuana*. It is, nevertheless, much smaller than all the specimens I have seen in the British Museum, and in the collections of Mr. Beccari and Mr. Cockerell, and if with this distinction, when compared, any other difference may be perceptible, then it will probably prove to be a new species. For the present I believe it to be the *Paradisea apoda*. I have two beautiful male birds in full plumage, and also of the *P. raggiana*. I hope the Committee will be pleased with the short report I have sent, but at the same time must ask them to suspend their judgment of all that I have done until they receive a more extended and minuter account of the expedition from me." [Mr. D'Albertis concludes his letter with a few lines addressed to Mrs. Bennett, in which he says] : "I am in good health and spirits, and remember your kindness, for I bought bananas, when I was starving, with the red worsted ribbons adorned with pearl shells you gave me to traffic with the natives. I also enjoyed the large plum cake for a month, and finished it in the true centre of New Guinea, and wished I had another. The flag was the admiration of the natives of Moatta, and I bore in remembrance the ladies who presented it to me."

P. L. S.

OUR ASTRONOMICAL COLUMN

THE NEW STAR IN CYGNUS.—It is stated by Prof. Littrow (*Bulletin International*, December 12) that this star, which on December 1 appeared of about the same brightness as at the time of discovery on November 24, was of the fourth magnitude on December 2, and two days later had descended to the fifth.

Comparisons with neighbouring stars, using the magnitudes of the "Durchmusterung" on December 13, showed that the estimate we gave last week was somewhat too low, being doubtless influenced by the unfavourable conditions on the previous night ; the star was found to be 5·8—6·0, but as before, without trace of colour.

The following position for 1876·0 will be rather closer than the one given last week, R.A. 21h. 36m. 50·41s., N.P.D. 47° 43′ 21″·5, to which correspond annual precession in R.A. + 2·361s., in N.P.D. − 16″·27. We give M. Cornu's spectroscopic results in another column.

REMARKABLE STAR SPECTRUM.—D'Arrest, writing in November, 1873, refers to the spectrum of the star XX. 1396, of Weisse's second catalogue from Bessel's zone observations ; he says "sein Spectrum ist das *merkwürdigste unter einigen tausenden*, die ich bislang untersucht habe," and thinks the star may eventually prove to be variable. Has this object been examined by any British spectroscopist? It was observed by Bessel as an eighth magnitude, October 26, 1823, and his position reduced to 1877·0 is in R.A. 20h. 43m. 24·2s., N.P.D. 67° 27′ 36″.

THE MINOR PLANET, No. 169.—This last discovered member of the group of small planets which was detected at Paris on September 28, has been named "Zelia." M. Leverrier's *Bulletin* of December 12, contains ample materials for the determination of its orbit.

NEWCOMB'S CORRECTIONS TO HANSEN'S LUNAR TABLES.—Part III. of papers published by the United States Commission on the transit of Venus, just received, contains an important investigation, by Prof. Newcomb, of the corrections required by Hansen's lunar tables, for the purpose of rendering the lunar ephemeris available for accurate determination of the longitudes of stations not telegraphically connected with well-ascertained positions.

Remarking that determinations of longitudes from moon culminations have been found by experience to be subject to constant errors which there is difficulty in allowing for, Prof. Newcomb refers to its having been a part of the policy of the American Commission to depend rather upon occultations. An occultation of a star is a sudden phenomenon, and the time at which it occurs can be fixed by observation within a small fraction of a second ; wherefore, if the ephemeris of the moon is exact and her figure a perfect circle, the longitude could be determined from such observations with a similar degree of precision. The inequalities of the lunar contour form a source of error that it is impossible to avoid, but may be considered to be eliminated from the mean of a large number of observations, and the star's position admitting of being fixed by the meridian instruments with any required exactness, there remain only the errors of the lunar ephemeris to be diminished as far as practicable, and it is the object of Prof. Newcomb's paper to reduce these errors to a minimum.

The material principally relied upon is the series of meridian observations of the moon at Greenwich and Washington from 1862 to 1874, but in order to verify the most striking and unexpected result of the investigation, the comparison of Hansen's tables with the Greenwich observations during the twelve years 1847-1858 has also been utilised. The result alluded to is the irregularity in the moon's longitude represented by

$$1''.50 \sin (56°.8 + 13°.124137t)$$

where t is reckoned in days from Greenwich mean noon of 1850, January 0. The period of this inequality is 27·4304 days.

Prof. Newcomb remarks that "it would perhaps be premature to introduce so purely empirical a term as this into lunar tables for permanent use," but in the particular case to which his researches apply, where it is requisite to obtain the corrections of the tables with all possible accuracy for a limited period only, he considers the evidence in favour of the existence of the inequality sufficiently strong to justify its introduction. He further observes that the only apparent cause for this term is "the attraction of some one of the planets."

Prof. Newcomb finds some support to a correction of the tabular longitude of node, as already suggested by Hansen in the *Darlegung* in connection with his discussion of ancient eclipses. The entire corrections to the moon's longitude given by his investigation are given at p. 37, supplemented by auxiliary tables for facilitating the calculation of the corrections required by the tables as published, the arguments in which extend from 1850 to 1890.

It will be remembered that Prof. Newcomb communicated his principal result to the Royal Astronomical Society last summer (see "Monthly Notices," vol. xxxvi. p. 358).

PROF. FÖRSTER'S SCIENTIFIC LECTURES.—Under the title *Sammlung wissenschaftlicher Vorträge*, there has lately appeared a series of seven lectures on astronomical subjects by the director of the Royal Observatory at Berlin. It includes an address on "The Astronomy of Antiquity and the Middle Ages in Relation to Modern Development," notices of Copernicus and Kepler and their works, &c.

CHEMICAL NOTES

VARIATIONS IN THE CRITICAL POINT OF CARBON DIOXIDE IN MINERALS, AND DEDUCTIONS FROM THESE AND OTHER FACTS.—Mr. W. N. Hartley has continued his experiments on this subject, and gives in a paper read lately before the Chemical Society further conclusions as to the existence of the expansible fluids in mineral cavities. He concludes it to be carbon dioxide from the spectrum produced by the electric spark in a tube containing such gas as was liberated by the decomposition of the minerals; the turbidity produced by crushing quartz under baryta water (Vogelsang and Geissler, 1869); the rate of expansion of the liquid in sapphire compared with that of carbon dioxide (Sorby and Butler, 1869) and the determinations of the critical point made by himself in 1875-76. To determine the critical point he uses small thermometers made specially for the purpose, one having a range from − 20 to 140° F., the other graduated to register tenths of a degree from 25° to 33° C. The following table shows all the variations noticed in the critical point of carbon dioxide existing in various minerals :—

	Critical point.
Topaz	28° C.
Topaz	28° C. and 26°·5
Topaz	27°·55
Tourmaline	27°·27
Tourmaline	26°·9
Sapphire	between 30°·5 and 31°
Sapphire	between 25·5° and 26°
Sapphire	29°·5
Rock crystal	30°·95
Rock crystal	30°·95
Rock crystal	32°·5
Rock crystal	33°·7
Rock crystal	39°
Rock crystal	30°·95
Beryl	30°·92

He discusses, from his conclusions, certain ideas with regard to the formation of diamonds, and believes that it is difficult to suppose that they are entirely formed by a process in which unoxidised forms of carbon are intermediate products, otherwise they would occur not unfrequently in the neighbourhood of coal formations. The theory that diamonds are produced by reducing agents on carbon dioxide very highly compressed and acted on at temperatures much above its critical point, introduces a condition of things highly suggestive of further speculation, and of experiments subject to conditions under which no chemical reactions have ever been made in the laboratory.

THERMO-CHEMICAL RESEARCHES.—Julius Thomsen has found in some recent investigations that gold presents allotropic modifications according to the nature of the solutions from which it is obtained, and the reagent with which it is precipitated. The modifications he has examined are gold precipitated from solution of the chloride and bromide respectively by sulphurous acid, and that precipitated from the sub-chloride, sub-bromide, and sub-iodide. These modifications differ in the amount of heat evolved by each in similar reactions. As the energy shown by the gold precipitated from solution of the chloride by sulphurous acid is less than in the other cases, this amount is taken as the standard. The energy of the gold precipitated from the bromide is greater by 3·200 heat units, and that precipitated from the sub-chloride, sub-iodide, or sub-bromide by 4·700 heat units per atom.

THEINE IN TEA.—As the amount of theine varies in various kinds of tea (according to different analyses) from one to six per cent., the question naturally arises whether the quality of tea does not depend upon the amount of theine it contains. Some time ago M. Claus arrived at the conclusion that the inferior kinds of tea contain altogether more theine than the higher, pointing out especially that the cheapest, the so-called brick-tea used in Mongolia and Siberia, and prepared from all kinds of refuse as dead leaves, stalks, &c., contains far more theine (3·3 to 3·6 per cent.) than the higher qualities (1·0 to 1·3 per cent.). M. Markovnikoff, of Moscow, now arrives at different results. Having made a series of analyses of one kind of tea by the various analytical methods used until now, for ascertaining their comparative values, he proves the deficiency of most of these methods. Ether, for instance, extracts but one-third of the whole amount of theine, and benzole, one-fourth. Using, then, a more perfect method, and analysing six kinds of tea, selected from the highest and from the lowest qualities, he arrives at the result that the amount of theine in them varies but very little, from 2·08 to 2·44, and that it regularly increases, with one exception, with the quality of tea, whilst the amount of ash given by each kind regularly decreases from 6·1 to 5·7 per cent. The differences being, however, very small, M. Markovnikoff supposes that the quality of tea does not depend, or depends very little, upon the amount of theine, and far more upon the quantity of tannic acid and aromatic oils it contains, but that on the whole the teas made from younger leaves contain more theine than those made from older leaves.

INFLUENCE OF PRESSURE ON COMBUSTION.—Some interesting observations have been recently made by M. Wartha, on the influence of pressure on combustion. He observed the burning of six stearine candles in free air, and in an iron case under a pressure of 1·95 atmospheres. They burned under this pressure with a flame 9 to 12 cm. long, and gave much smoke; their luminous power diminished, while the flame assumed a yellowish-red colour. The decrease of weight after one hour of burning was found to be less than in burning in free air. This last result is opposed to the observations of Frankland, who has affirmed that the consumption of the burning material of a candle, or the like, is not perceptibly dependent on the pressure of the medium in which the combustion occurs. It is supposed that the difference of pressure in Frankland's experiments (on Mont Blanc and at Chamounix) was not sufficiently great to give a distinct difference in consumption of the burning matter. M. Wartha further put a candle to burn under an air-pump receiver, with special apertures, and, with increasing rarefaction, the flame was seen to enlarge, and its luminous power to diminish. At a pressure of 90 mm., the greatest rarefaction produced, the luminous power was quite gone, and the flame, which had now assumed threefold size, appeared to consist of three parts, an inner bluish-green cone with a violet sheath, and a weakly violet mantle. The diminution of the luminous power in this case M. Wartha explains by the fact that under less pressure less of the products of combustion are separated in the form of soot.

BIOLOGICAL NOTES

THE AMERICAN BISONS.—An important quarto memoir on the living and extinct Bisons of America, from the pen of Mr. J. A. Allen, has just been issued from the University Press of Cambridge, Massachusetts. It is illustrated by twelve plates and a map of North America, in which the distribution of the bison