student of geography can obtain the latest geographical information.

DR. A. B. MEYER, of the Royal Zoological Museum at Dresden, has sent us a description of two new birds of paradise from New Guinea. (*Abh. u. Ber. d. K. Zool. u. Anthr.-Ethn. Mus. zu Dresden*, 1894-95, No. 5). One of the birds, shown in its natural size in one of the two coloured plates which illustrate the paper, possesses remarkable characteristics in the form and colour of its plumage, and in the arrangement of two very long feathers which stretch out from the head to about twice the length of the body of the bird. This bird has been named *Pteridophora alberti*, in honour of King Albert of Saxony, and the second one described and figured by Dr. Meyer has been called *Parotia carolee*, after Queen Caroline.

THE seventh volume of the *Proceedings* of the Royal Society of Victoria has reached us. The volume contains twenty-eight papers, many of them illustrated with plates, communicated to the Society during 1894. With two or three exceptions, the papers belong to the domain of natural science. Among the contributions we notice one on Tasmanian earthworms, by Prof. Baldwin Spencer, and a note, by the same author, on two new forms of marsupials obtained in Central Australia, during the visit of the Horn Scientific Expedition to the Macdonnell Ranges. The geology of Castlemaine is described by Mr. T. S. Hall, and geological notes on the country between Strahan and Lake St. Clair, Tasmania, are contributed by Messrs. Graham Officer, L. Balfour, and E. G. Hogg. The older tertiary rocks of Maude, and the palæontology of the older tertiary of Victoria, form the subjects of two separate papers, and a catalogue of non-calcareous sponges collected in the neighbourhood of Port Phillip Heads is given by Prof. A. Dendy. Mention must also be made of a paper, by Mr. R. H. Mathews, on rock paintings and carvings figured by the Aborigines of New South Wales, in caves and rock shelters; and also of one in which Mr. E. F. J. Love gives the results of observations with Kater's invariable pendulum, made at Sydney. The object of this investigation was to throw some additional light on the question of the difference between the values of g at Melbourne and Sydney. A comparison of the results obtained by the United States Coast Survey officers at Sydney in 1883, with those found by Mr. Baracchi at Melbourne in 1893, has shown that a pendulum beating seconds approximately should lose 8.58 vibrations per day, if transferred from Melbourne to Sydney. Lieut. Elblein found, however, by swinging three of von Sterneck's pendulums at the two places, that the loss was 13.48 vibrations per day. Mr. Love comes to the conclusion that the difference between the vibration numbers at Melbourne and Sydney is 12.2 per day.

THE additions to the Zoological Society's Gardens during the past week include a Sand Badger (*Meles aukuma*) from Japan, presented by Mr. Frederick Ringer; two Polar Bears (*Ursus maritanus*, ♂ ♀) from the Arctic Regions, presented by Mr. John J. Hughes; a Spotted Hyæna (*Hyæna crocuta*, jv.), a Viceriferous Sea Eagle (*Haliaeetus vocifer*), a Black Kite (*Milvus migrans*), from East Africa, presented by Mr. T. E. C. Remington; a Black-backed Piping Crow (*Gymnorhina tibicen*) from Australia, presented by Mr. J. D. Haggard; a Raven (*Corvus corax*) British, presented by Mr. W. Hillary; a Puff Adder (*Vipera arietans*) from East Africa, presented by Dr. A. Donaldson Smith; a Chimpanzee (*Anthropopithecus troglodytes*, ♀) from West Africa, a Common Marmoset (*Hapale jacchus*) from South-east Brazil, deposited; a Purple-breasted Lory (*Eos riceniata*) from Moluccas, a Blue-faced Honey-eater (*Entomyza cyanotis*) from Australia, purchased.

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OUR ASTRONOMICAL COLUMN.

THE MOON AND ATMOSPHERIC WAVES.—Lunar atmospheric waves, or air-tides, as they might be called, can, according to M. Bouquet de la Grye, be distinctly traced in the records of barometric pressure collected at insular stations or stations situated close to the sea, where there are no powerful local disturbances to obscure them. In a contribution to the *Annuaire du Bureau des Longitudes*, he reproduces curves of atmospheric pressure traced at Brest, St. Helena, Cape Horn, Batavia, and Singapore, which distinctly show a regular ebb and flow twice a day in accordance with the position of the moon. The amplitude depends upon the declination of the moon and upon its distance from the earth, and also upon the latitude of the place of observation. The maximum amplitude at Brest is about a quarter of an inch of water, which means a fiftieth of an inch of mercury, a small oscillation indeed, but one which is well within our limits of accurate measurement. At Batavia the maximum heights are half an hour after the passage of the moon through the upper or lower meridian. But the retardation is almost imperceptible in other places. This is probably due to the extreme mobility of the upper strata of the atmosphere, and contrasts with the great retardation experienced by the ocean tides. M. Bouquet de la Grye points out the striking analogy between the ocean tide, with an amplitude of 1 m. under the equator, in an ocean having a mean depth of 5000 m., and the atmospheric tide of 2 mm. of water in a sea of air the weight of which represents 10,000 mm. of water.

STELLAR PHOTOGRAPHY.—A remarkable illustration of the value of photography in astronomical researches is afforded by a recent comparison of one of Dr. Max Wolf's well-known photographs with the same part of the sky as seen with the 36-inch refractor of the Lick Observatory. Prof. Schaeberle finds that an enlarged photograph of the region about Algol, taken with an exposure of five hours, certainly shows stars down to mag. 16.5, assuming that stars of the 17th mag. are at the limit of vision of the telescope. Making due allowance for the loss of detail in the process of enlarging, "it appears probable that practically every isolated star visible at Mount Hamilton can be photographed by Dr. Wolf, at or near sea-level, with his comparatively small telescope." (*Astronomical Journal*, No. 338). The telescope employed by Dr. Wolf has a Voigtlander lens of six inches aperture.

STANDARD TIME IN AUSTRALIA.—The resolution as regards Australian standard time, adopted at Melbourne last October (see p. 278), has come into effect. Queensland, New South Wales, Victoria, and Tasmania are now all using the time of the meridian 150° E., that is, ten hours before Greenwich. Queensland was the first of the Australian colonies to take action, and there the new time came into force on the first day of this year. Mr. H. C. Russell, of Sydney Observatory, has sent us a copy of the Act which established the mean time of the meridian 150° E. of Greenwich as the standard time in New South Wales, on and after February 1. He says that "South Australia has adopted the time of the ninth hour before Greenwich."

NOVA AURIGÆ.—Notwithstanding the enormous velocities in the line-of-sight recorded by the spectroscope, Nova Aurigæ has given no signs of proper motion, such as can be perceived with the telescope and micrometer. Such, at least, is the result of a comparison of the measurements made in 1894 by Prof. Barnard with those made by the same observer in 1893, and by Mr. Burnham in 1892. (*Ast. Nach.* No. 3279.) The magnitude also remains pretty constant, being 10.5, on the scale adopted at the Lick Observatory. The Nova seems to be too far removed from our system to give any appreciable parallax.

NEW COMPOUNDS OF HYDRAZINE WITH FATTY ACIDS.

COMPOUNDS of several of the more important organic fatty acids with hydrazine, analogous to the aromatic hydrazides previously prepared, have been obtained by Prof. Curtius and his pupils Messrs. Schöfer and Schwan, and an account of them is published in the current issue of the *Journal für Praktische Chemie*. The hydrazides of the monobasic fatty

acids are distinguished from the aromatic analogues by their greater solubility in water. In all cases they are most advantageously prepared by reacting with one equivalent of hydrazine hydrate upon the ester of the acid rather than upon the free acid itself. The esters of dibasic fatty acids react analogously with two equivalents of hydrazine hydrate, producing hydrazides which contain two NHNH groups.

Formic hydrazide, HCO.NHNH_2 , is produced when molecular equivalents of ethyl formate and hydrazine hydrate are mixed, considerable evolution of heat occurring. When the product is allowed to stand in a vacuum for some days large tubular crystals of the pure compound separate. The crystals are transparent, very hygroscopic, and extremely soluble in water, alcohol, ether, chloroform, and benzene. They melt at 54° . Formic hydrazide does not form salts with acids; even dilute acids at once decompose it in the cold with formation of formic acid and a salt of hydrazine. The solution of the crystals in water reduces Fehling's solution and ammoniacal silver nitrate readily at the ordinary temperature. Formic hydrazide forms a crystalline compound with benzaldehyde with considerable rise of temperature and with elimination of water. The crystals of the compound, benzalformyl-hydrazine, $\text{HCO.NH.N:CH.C}_6\text{H}_5$, melt at 134° . When excess of ethyl formate is heated with hydrazine hydrate in a sealed tube to 100° – 130° for some hours, another formic hydrazide, diformyl-hydrazine HCO.NH.NH.CO.H , is produced in the form of brilliant colourless prisms an inch or more in length. In the preparation of this beautiful compound care must be taken to strongly cool the tube during the filling with the two components, as their interaction is otherwise of a dangerously energetic character. The crystals of diformyl-hydrazine are very soluble in water, but difficultly so in alcohol, and practically insoluble in ether. They melt at 159° , and reduce ammoniacal silver solution upon warming. Dilute sulphuric acid decomposes them as readily as those of formic hydrazide into formic acid and hydrazine sulphate.

Acetic hydrazide, $\text{CH}_3\text{CO.NH.NH}_2$, is prepared by warming equivalent quantities of acetic ether and hydrazine hydrate in a sealed tube for a few hours at the temperature of a water-bath. The product rapidly solidifies in a desiccator to a white mass of crystals. The crystals are colourless needles aggregated in leaves, and melt at 62° . They deliquesce rapidly on exposure to moist air, and are also very soluble in cold alcohol. The aqueous solution reacts neutral to litmus, and is readily decomposed into the original component substances by either acids or alkalis. The compound cannot be distilled without decomposition. The solution reduces Fehling's solution very vigorously on warming. Like the formic compound, acetic hydrazide reacts with benzaldehyde to produce an analogous crystalline compound, acetyl-benzal-hydrazine, $\text{CH}_3\text{CONHN:CHC}_6\text{H}_5$.

Oxalic hydrazide, CO.NH.NH_2 , is produced by the action of two molecular equivalents of hydrazine hydrate upon ethyl oxalate. The reaction is a somewhat violent one, and is best moderated by the addition of a little alcohol.

The new compound separates as a white crystalline mass, which is much less soluble in water than the hydrazides of the monobasic acids, and is almost insoluble in alcohol and ether. It is deposited from solution in hot water in very long and thick needles, which decompose at 235° . The solution reduces Fehling's or ammoniacal silver solution much less vigorously than the monobasic compounds. Oxalic hydrazide is much more stable towards acids and alkalis than the last-mentioned substances. The compound may be recrystallised unchanged from dilute sulphuric acid, and concentrated sulphuric and hydrochloric acids only decompose it very slowly. If, however, concentrated hydrochloric acid is allowed to drop upon the powdered substance moistened with water, until the acid is in slight excess, a white crystalline powder is obtained which is found to consist of the hydrochloride of the hydrazide, $\text{CO.NH.NH}_2\text{HCl}$.

Oxalic hydrazide reacts in an interesting manner with nitrous acid (sodium nitrite and glacial acetic acid); an energetic evolution of gas occurs, and a white powder separates. The same white substance may be obtained by acting upon oxalic hydrazide suspended in water with mercuric oxide, and decomposing the mercury compound produced with sulphuretted hydrogen, the filtrate depositing the white powder

upon evaporation. Analysis indicates that the compound probably possesses the constitution,

Succinic hydrazide, $\text{CH}_2\text{CO.NHNH}_2$, is prepared similarly

to oxalic hydrazide, and crystallises in silver-like crystal aggregates which melt at 167° , and which are more soluble in water than the crystals of oxalic hydrazide. Malonic hydrazide,

$\text{CH}_2\text{CONHNH}_2$, is likewise obtained in a similar manner,

the reaction between malonic ether and hydrazine hydrate being very vigorous even in the cold. The crystals melt at 152° . The aqueous solution reduces Fehling's solution, ammoniacal silver solution, and platinic chloride at the ordinary temperature. Both the succinic and malonic hydrazides are as stable towards acids as the oxalic compound, and each yields a hydrochloride with concentrated hydrochloric acid. Both hydrochlorides are obtained in the form of small crystals, and they melt at 203° and 197° respectively with violent evolution of gas. Succinic hydrazide reacts with nitrous acid to form an interesting compound analogous to that of oxalic hydrazide.

Its simplest possible constitution is

Several other more complicated hydrazides are described in the memoir, but the above will afford a sufficiently comprehensive idea of the important addition to our knowledge of the hydrazine compounds which we owe to the labours of Prof. Curtius.

A. E. TUTTON.

THE AURORA OF MARCH 13.

A NUMBER of letters referring to an aurora observed on March 13, have reached us. We select from these communications a few details of value and interest.

Writing from York, Mr. J. Edmund Clark says:—

"I was in a position for observing at 9.10; the display finally ended soon after 10. The latter part was seen, very similarly, at Scarborough, 9.10. Arch, pure white (and so all through) just north of zenith; east end brighter, with well-defined, beak-like apex upon α Coronæ borealis (alt. 17° , az. 13° north of east). Upper edge just grazed ζ and η Ursæ majoris, the lower some 3° below Polaris, a little west of which it became double, the Pleiades lying in the fork, 5° or 10° from the finish at about altitude 20° or 25° , nearly due west. No auroral glow outside, nor later, except as stated. The outer curves, west end, would have met, if continued, in similar "beak" as at east end.

"9.15.¹ Lower edge through β Ursæ minoris, Polaris, and α Persei. Streamers now traversing rapidly from east to west, pointing to magnetic anti-pole; passed from η Ursæ majoris to Polaris in 25 to 30 seconds by watch. Constant succession, as bars of light, for some minutes; then temporary cessation, but later intermittent, until 9.45. These were entirely distinct, as is obvious, from the ordinary far more rapid flickering from horizon to magnetic anti-pole. Three rough positions of stationary forms near the Plough, Auriga, and Jupiter, projected on the B.A. Meteor Star Chart, cross at altitude $68\frac{1}{2}^\circ$, azimuth 35° ($\frac{1}{4}^\circ$ and 6° respectively from the true magnetic anti-pole, for York, at $68\frac{1}{2}^\circ$ and 18°).

"9.25. Streamers, often as curtain-like fringe on lower edge of arch, now less prominent. Others still streaming from east to west in the arch show no perceptible effect as they sweep by these. New set moved slowly westward, about 1° or 2° per minute.

"9.30. Lower edge again as at 9.25. Upper edge had covered Plough; arch double more or less entirely; varies fast; much fainter to east from 9.25.

"9.37. Lower edge through handle of Plough, Capella, 1° north of Mars and $\frac{3}{4}$ on from Mars to horizon. Fringe below now brilliant, but rapid fluctuations.

"9.45. Brilliant short streamers in fringe, from Mars to α Aurigæ, and $\frac{1}{2}$ on to Polaris.

"10.0. All gone but one long faint streamer from 3° to left

¹ If others have thought of recording positions at the exact quarters, some altitudes might be obtained from the four given here.