Northern Hemisphere.		Southern Hemisphere.	
Wladiwostok	13	Kerguelen	8
Nagasaki	45	Hobart Town	37
Pekin	26	Campbelltown	32
		Queenstown	45
		Chatham Island ...	7

Putting dA for the correction of the difference of R.A. between the Sun and Venus, dD for the correction of the difference of declination, and $d\pi$ for that of the assumed value of the parallax (8″·848) the solution of the equations of condition corresponding to the distances gives—

$dA = +1''{\cdot}181 \ldots dD = +2''{\cdot}225 \ldots d\pi = +0''{\cdot}0397 \pm 0''{\cdot}0418.$

Similarly from the equations corresponding to angles of position there result—

$dA = +1''{\cdot}109 \ldots dD = +0''{\cdot}637 \ldots d\pi = +0''{\cdot}0252 \pm 0''{\cdot}0595.$

Combining these values, the final results become—

$dA = +0^{s}{\cdot}076 \ldots dD = +2''{\cdot}083 \ldots d\pi = +0''{\cdot}035 \pm 0''{\cdot}034,$

and the corrected value of the solar parallax is thus 8″·883. It will be seen that the magnitudes of the probable errors are very large in proportion to the corrections obtained.

BIELA'S COMET IN 1805.—Those who have acquainted themselves with the history of this remarkable comet will remember that at its appearance towards the end of 1805 it was last observed in Europe by Thulis at Marseilles on the evening of December 9, at which time it was at its least distance from the earth, and was moving rapidly southwards. The comet was then visible to the naked eye, and it was known that it would probably continue so for some days, and might attract attention in the other hemisphere. But there was no southern observatory in existence at that time. Prof. Hubbard, in his masterly investigation on the motion of Biela's comet, remarked how greatly observations taken in the southern hemisphere at this appearance might have contributed to the progress of the theory of the comet. Gauss was then applying his methods for the determination of elliptic orbits, or rather of orbits without the assumption of a particular conic section, and it could hardly have happened that with good southern observations the nature of this comet's orbit would not have been detected from the observations of 1805, and the comet might thus have been re-observed in 1812, if not in 1819.

Up to a quite recent date it was not known that the comet had been observed in the other hemisphere, but Prof. Winnecke has discovered (where he does not say) some observations made at the Mauritius by MM. Malavois and Dupeloux on December 14 and 15. They were brought to light while he was inquiring into the periodicity of the comet detected at Strassburg by Dr. Hartwig on September 29, 1880, and he gives an account of them in the last number of the *Vierteljahrsschrift der Astronomischen Gesellschaft*. They are entitled "Observations sur la Comète qui a paru à l'Ile de France dans le cours de frimaire au 14e par M. Malavois et M. Dupeloux." M. Malavois states that he was apprised of the appearance of the comet on the morning of December 14. Four days previously (and therefore the day after it was last seen in Europe) it had been detected by MM. Laprie and Dabadie, the one a censor, the other a professor of the colonial Lycée: they had remarked that it had passed in a very short interval "over the space between the constellations Grus and Pavo, moving almost from north to south." On the evening of December 14 Malavois "avec un excellent sextant à lunettes d'un pied de rayon," measured the distance of the comet from Achernar and Canopus, and the distance between the stars, and Prof. Winnecke has been at the trouble to reduce these observations accurately, and to compare them with Hubbard's elements with the aid of an ephemeris calculated therefrom by Herr Kaufmann. Referring to the above-mentioned periodical for particulars, we may say that Hubbard's orbit is found to place the comet too much to the west by 13′ in right ascension, and in declination one minute to the north. But while giving these differences between calculation and observation, Prof. Winnecke only aims at proving that Biela's comet was recognised in the southern hemisphere, and well observed, considering the means available.

The description of the comet's appearance given by Malavois is worthy of particular remark:—"Cette comète est photosphèrique, c. à d. entourée d'une sphère lumineuse dont le diamètre m'a semblé être en totalité d'environ 45 minutes: mais la partie la plus lumineuse, ou l'auréole vue au commencement du crépuscule du soir n'étoit guère, que de 20 à 25 minutes; on la distinguoit alors très bien, tandis qu'à peine on pouvoit apercevoir les étoiles de 7me grandeur. La comète vue avec une lunette qui grossit seize fois le diamètre des objets m'a paru divisée en deux par une petite band obscure; j'ai jugé son diamètre apparent d'environ une minute, mais les bords m'ont semblé confusément terminés et se foudre avec la lumière nébuleuse; une étoile de 4e à 5e grandeur que je distinguais très bien dans l'auréole à 4 ou 5 minutes de la comète, s'est trouvée dans une position et une distance différente par rapport à cet astre dont le mouvement propre étoit en effet considérable, comme on la voir." Malavois' observations were limited to the evening of December 14, absence preventing his observing it on the following night, and clouds interfering on December 16 and 17; and he adds: "les jours suivans j'ai cessé de l'apercevoir."

Prof. Winnecke draws attention to the remarkable appearance of the comet under a power of 16, in the evidently small telescope, and asks: "Can we recognise in the 'petite bande obscure,' which divided the head into two parts, the commencement of the action which led to the highly important result, that in 1846 and 1852, instead of a single comet, two were observed, and later the comet has been no longer visible as such." In connection with the Mauritius observation it must be remembered that the aspect of the comet was particularly noted on December 8, when it was nearer to the earth than on December 14, by Olbers, Bessel, and Gauss, who agree in their description: on the same evening it was examined and measured by Schroeter with powerful reflecting telescopes at Lilienthal. Neither observer has any reference to the appearance of a division in the head of the comet on that date. Olbers says "it had a small but very distinctly defined nucleus, surrounded by an extensive nebulosity, without any appearance of a tail." The comet was visible to the naked eye with the brightness of a star of the third or fourth magnitude, and could be well seen after the moon had risen. Schroeter noted that without the telescope it appeared nearly as large as the moon: in his 13- and 15-feet reflectors it was apparently much diminished, his measures giving a diameter of only 5½ minutes: the diameter of the brightest part of the nucleus he found to be 4″·05, and that of the whole nucleus 6″·42; if a division had existed at the date of these measures it is hardly probable that it would have been overlooked by Schroeter. At the reappearance of the comet in 1826, and again in 1832, nothing of the kind was remarked. Hubbard, we know, considered that the division of the comet, from whatever cause it might be produced, took place at the end of the year 1844.

GEOGRAPHICAL NOTES

THE hydrographical expedition for the exploration of the mouth of the Obi River has started from St. Petersburg. It consists of four officers of the navy, one astronomer, M. Fuss, and two students of the St. Petersburg University, one of whom is a surgeon and the other a zoologist. Two small steamboats were sent to Perm, on the Kama River, and they will be transported to the Obi.

HERR SIEGFRIED LANGER of Vienna is about to undertake an exploring tour in Arabia under the auspices of the Vienna Geographical Society. His researches will be mainly of a linguistic nature, but scientific research is not excluded from his programme; he has prepared himself for the tour during the last few years at the Vienna University.

THE geographical department of the British Museum during the past year was deprived of the services of its able curator, Mr. R. H. Major, through ill-health, and on his retirement the opportunity was taken to reduce it to a sub-department. If we may judge by the newly published report of the British Museum, this change has not tended to increase activity in geographical matters, and among the most interesting acquisitions of the past year all that can be mentioned seem to be some old plans of towns and the like.

IN the last volume of Consular Reports S. de Zuccato at Venice furnishes an interesting map showing the lines proposed and in course of construction for the completion of the network of railways in Venetia. M. Consul Bernal also contributes a plan of the Havre docks.

IT is announced that the Portuguese travellers, Capello and Joens, are about to publish an account of their expedition under the title of "De Benguella as terras d'Iacca." The work will be

issued in parts, and when complete, will form two volumes, illustrated with engravings.

HERR SCHÖLER, who was sent out by the German African Society, has returned to Zanzibar after founding a station at Kikoma.

THE Italian traveller, Piaggia, returned to Khartum on April 30. It is believed there that he will be appointed governor of the Fashoda district, and that the Austrian, Maruo, will become governor of the province of the Blue Nile.

THE Scientific Commission, recently despatched from Paris, has arrived at Zanzibar on its way to examine M. Paiva's vast concession in the Zambesi region, which it is proposed to develop by means of a company. The Commission is to investigate the resources of the territory, chiefly with regard to the mineral wealth supposed to exist there.

PHYSICAL NOTES

A FEW months ago the phenomenon of the "passive state" of iron was examined by M. L. Varenne, who attributed it to the presence of a film of nitrous acid gas upon the surface of the metal. The question has been recently reinvestigated by M. E. Bibart, who finds reason to doubt M. Varenne's conclusions. M. Bibart states that any oxidising agent aids, and any deoxidising agent hinders, the production of passivity.

IN a long memoir presented to the Académie des Sciences by Edmond and Henri Becquerel some very valuable data are given respecting the fluctuations of underground temperatures during 1880 beneath different surfaces. Their observations extended to a depth of 36 metres. The fluctuations were of less extent beneath herbage than below a bare soil, the maxima and minima being more retarded and of less amplitude in the former case. Another interesting point is the protecting effect of a bed of snow. Though the temperature of the air fell to − 15°, and continued below 0° for long periods, that of the surface of the soil was rarely below − 1°, never below − 1°·5.

ACCORDING to Nies and Winkelmann, who have lately studied the expansion exhibited by bismuth, cast-iron, and other metals during their solidification, the specific gravity of bismuth is between 1·031 and 1·0497 times as great in the liquid as in the solid state; a sample whose (solid) density was 10·2 assumed a density of 10·77 when melted. The ratio of the density in liquid state to that in solid state was greater than unity also for the metals tin and zinc, the ratio for tin being 1·0070, and for zinc 1·002. Our readers will doubtless recall the recent experiments of Mr. Wrightson and Prof. Chandler Roberts in the same direction.

HERR STUCKER concludes from experimental inquiry (*Wied. Ann.* No. 5), that the gases chlorine, bromine, and iodine, in regard to thermal behaviour, form a group by themselves among biatomic gases. The ratio of the kinetic energy of the progressive motion of the molecules to the total energy is different for them from that for the others. In their molecules the atoms seem to have a different reciprocal action. From the behaviour of biatomic gases it is inferred that neither Boltzmann's nor Maxwell's supposition as to the nature of the mobility of atoms in the gaseous molecule has a general validity.

WITH regard to the subject of hot ice, Herr Wüllner describes fresh experiments (*Wied. Ann.* No. 5), and he finds that so long as the thermometer-bulb is wholly surrounded with dry ice its temperature does not reach 0°. If the thermometer rises higher, either the bulb is no longer quite covered with ice, or it is surrounded with water, along with a thicker ice-layer. The author's method was to have the thermometer-bulb first coated with ice in a separate vessel; then introduced into the heating-tube and fixed in a caoutchouc stopper; this tube is connected through a tube and spherical vessel with the air-pump, and with the sphere is surrounded with a cold mixture while the vacuum is produced.

THE subject of double refraction of light in moving frictional liquids has been taken up anew by Herr Kundt (*Wied. Ann.* No. 5), using a method which Maxwell did not succeed with, viz., rotation of a cylinder within another cylinder, and sending a beam of polarised light in axial direction through liquid in the annular space. Herr Kundt got positive results in this way with various liquids. 1. The amount of internal friction of liquids is not a certain measurement of the occurrence of double refraction in motion; liquids with small friction giving considerable refraction, and *vice versâ*. 2. The liquids which, with small internal friction, prove doubly refractive, belong to the so-called colloids (gelatine, gum, collodion) or the oils. Solutions of crystalloids did not give the phenomenon by the method described. 3. The double refraction did not markedly affect the rotation of the plane of polarisation in the circularly polarising liquids (but the strongest refraction, it is to be noted, produced a difference of only about half a wave in penetrating a pretty long column of liquid). 4. In collodion-solutions the axes of the double refraction do not lie in the azimuths required by theory. The anomaly was not accounted for. Herr Kundt further offers some general remarks on the relations between the elastic properties of liquids, their coefficients of friction, and the double refraction developed in them.

IT has been hitherto supposed that light directly reflected from a diffraction-grating has the same state of polarisation as light passing through the same plate unruled, or reflected from its smooth surface. Herr Fröhlich now finds, with a very finely-ruled grating, that it is not so. The proof and numerical amount of the difference are indicated in *Wied. Ann.* No. 5.

IN the cold of last winter M. Damien (*Journ. de Phys.*, May investigated the indices of refraction of water under 0° (*i.e.* in surfusion) down to − 8°. He measured the indices corresponding to the three hydrogen lines by the prism method. Starting with a temperature of + 20°, he first confirmed M. Jamin's observation that the passage through the maximum of density does not at all disturb the course of the indices, and he further found that the indices continue to increase below zero, though the density diminishes. The variations of the indices are very small. M. Damien hopes, next winter, to apply the interferential method. (The use of freezing mixtures does not present such favourable conditions as the very slow cooling of the atmosphere.)

RECENT researches by Herren Sohncke and Wangerin on Newton's rings (*Wied. Ann.* Nos. 3 and 4) appear to require a considerable change of ideas as to this phenomenon, and more especially as to the place where interference occurs. The starting-point was an experiment in which the rings produced by a beam of parallel sodium light falling at an angle on a horizontal plate above a plane convex lens were examined with a microscope inclined at the same angle, and capable of being moved horizontally as well as in the direction of its axis. The microscope was first so placed that one part of a dark ring was as sharply defined as possible; the instrument being then moved along to another ring, or another part of the same ring, it was found necessary to move it axially, higher or lower, to get the maximum definition for that part; indicating that the rings do not lie in a horizontal plane, but in some other position. The amounts of axial displacement for different parts of the ring-system were carefully noted. For details of the results we must refer to the original, merely noting, *inter alia*, that the places of interference in the plane of incidence going through the centre of the rings seem to lie in a straight line rising towards the side whence the light comes. In a central plane at right angles to that of incidence, all the places are at the same depth. Herr Sohncke undertook the experimental part in this investigation, while Herr Wangerin has worked out the theory of the phenomena.

ACCORDING to experiments by Herr Kundt (*Wied. Ann.* No. 4), the common surface-tension between liquid and gas decreases considerably with increasing pressure of gas in the case of alcohol, ether, alcoholic solution of calcium-chloride, sulphide of carbon, chloroform, and water. The decrease is greater at low pressures than at high. For a given liquid it varies with the nature of the gas compressed. With alcohol, ether, and alcoholic chloride of calcium solution, air causes a greater decrease of the capillary constant than hydrogen. The decrease is so great with some liquids (*e.g.* ether in air) that probably, with pressures reached without much difficulty, the surface-tension is *nil*, the liquid passing at ordinary temperature into the Cagniard de la Tour state. (The author's experiments were concluded before he knew of Cailletet's experiment, in which a mixture of five vols. of CO_2 and one vol. of air is compressed at a low temperature till the meniscus of CO_2 disappears, and the Cagniard de la Tour state is reached.)

THE ratio of intensity of the two sodium lines has been estimated by Herr Dietrich (*Wied. Ann.* No. 4) using apparatus of great dispersion with a Vierordt double slit giving one spectrum above another, and allowing of displacement, so that one