sacred book of the Chinese, the "Chou-king," which was collected in the sixth century before our era by Confucius from the remnants of still earlier works, refers to a tribe south of the Chinese frontier as the Giao-chi, which means "toes spread out," or "far apart," a term which points to a wide separation between the great toe and the others. This curious distinctive racial mark exists to-day, notwithstanding the lapse of time and the social revolutions of twenty-five or thir'y centuries amongst the Annamites. We might therefore adopt the native distinctions as stated by Abbé Launay *en bloc*, and call the whole region Annam, with sub-divisions Tonquin and Cochin-China; or, making a sacrifice of strict accuracy to long habit, we mighl call the whole Cochin-China, with sub-divisions Tonquin and Annam. But it is probably as hopeless at present to expect strict uniformity in these names as it is to expect it in the orthography of Tonquin, although uniformity even in doing wrong would be better here than the present confusion.

AT the meeting of the Dutch Geographical Society on April 18, Mr. Robidée Van der Aa delivered a lecture on "Papuans and Melanesians, and their Relation to the Malay-Polynesian Race." Succinctly stated, the opinions expressed in the lecture were these:—The opinion once prevailed that the Papuans were the autocthones of the Malayan Archipelago, but that they were conquered by the Malays. There is, however, no support for this supposition, since in the interior of none of the Sunda Islands has a tribe been found bearing any resemblance to the Papuans. Since the researches and discoveries of Miklucho-Maclay we may not consider their hair or their dark skin as a decisive distinction with regard to other tribes. Moreover, it is now stated that their language is related to the Malayan tongue; there are still many customs and usages found amongst them similar to those met with among Malays. From all this Mr. Van der Aa concludes that the Papuans are one of five families, all of which have descended from one "insular race," and were separated from each other at an early date.

THOUGH nothing was said at the Dutch Geographical Society on April 18 about the expedition undertaken to the West Indies by Prof. Martin and Prof. Suringar, we now learn that they left Curaçoa in March. The former, accompanied by Mr. Van de Poel, arrived at Paramaribo and intended to make an excursion to the "Boven Suriname" on March 30; the latter intends to go to Venezuela, and after that to some of the Windward Islands, viz. St. Martin's, St. Eustathius, and Saba.

WE take from the Annual Report of the Russian Geographical Society the following figures giving the average temperatures for twenty-two months at the Sagastyr Polar Station at the mouth of the Lena. The following figures are on the Centigrade scale, and the first of them gives the average of the corresponding month for the year 1882–1883, while the second is the average of the same month for the year 1883–1884:—September, 0°·1 and 0°·6; October, −15°·1 and 14°·1; November, −27°·9 and −25°·7; December, −33°·5 and −33°·3; January, −37°·2 and −35°·8; February, −41°·3 and −34°·0; March, −31°·5 and −35°·2; April, −20°·7 and −21°·8; May, −8°·1 and −9°·7; June, 0°·9 and −0°·2; July, 5°·1; August, 3°·8. Average of the first year. −17°·1; of the second (incomplete), −16°·7. As seen, both years are closely similar; the exceedingly low temperatures of February, 1883, are most remarkable, the average of the month being only −41°·3, and the lowest temperature observed having been −52°·3 for the first year and −48°·0 during the second. The auroras were also less frequent, and the magnetic perturbances feebler. The number of hours during which auroras were observed is seen from the following figures:—September, 13 hours in 1882–1883, and 23 hours in 1883–1884; October, 87 and 69; November, 179 and 83; December, 191 and 178; January, 194 and 151; February, 197 and 126; March, 137 and 118; April, 10 and 8; none in May to August. Total for the first year, 1008; for the second, 756.

IT results from the same report that the delta of the Lena extends, by nearly one-half a degree, further north than on our best maps. The northern cape of the Danube (Dounay) Island is under 73° 55′ north latitude. This determination does not correspond with the Vega map, where Sagastyr, being under 73° 21′, the northern extremity of the island is under 73° 27′, and the course of the Vega in this longitude is under 74° 8′. At any rate, M. Yurgens has been compelled to go for twenty miles north of Sagastyr before reaching the extremity of the Dounay Island.

SOME EXPERIMENTS ON THE VISCOSITY OF ICE

THAT ice will change its form under the influence of pressure is exemplified at large in glaciers, and may be illustrated by experiments in the laboratory. How far this is due to a true viscosity, and how far to a rearrangement of the particles by melting and regelation, is a question the discussion of which among physicists has been of long continuance, though there there may now perhaps be some signs of permanent yielding under the influence of continuous pressure.

In the first volume of NATURE (p. 534) Mr. Wm. Matthews describes experiments (1870) in which planks of ice, supported at each end, but free in the middle, become permanently bent. In the first of these experiments the plank was 6 inches wide, 2⅝ inches thick, and supported by bearers 6 feet apart. The temperature of the air was above the freezing-point of water. The plank bent rapidly, so that the total deflection was 7 inches in about as many hours. "At its lowest point it appeared bent at a sharp angle, and was rigid in its altered form." Its lower surface showed minute fissures. In a second experiment a plank of somewhat similar dimensions (1⅞ inch thick, 6¼ to 6½ inches wide, 6 feet between the supports) became permanently bent. The amount of deflection was 3⅝ for the upper surface and 3⅛ for the lower surface. The time was 64½ hours. The temperature "never rose above the freezing-point"; but the fact that the thermometer registered 29°·5 F. one morning at 9·30 a.m., and 30° F. the next morning at the same time, would lead us to suppose that the midday temperature was not far from the freezing-point. Similar experiments were subsequently carried out (1871) by Prof. Tyndall, in Switzerland, and are mentioned in NATURE (vol. iv. p. 447).

In NATURE, vol. vi. p. 396, Mr. John Aitken describes experiments in which weighted shillings were caused to sink into blocks of ice. But when the block of ice was previously cooled to about 1° below the freezing-point, a shilling weighted with 90 lbs. and left for three and a half hours, "was found not to have entered in the slightest degree into the ice." Subsequently, in 1873 (NATURE, vol. vii. p. 287), Mr. Aitken described experiments which showed that ice bends the more readily the more air-bubbles it contains. "Temperature," he says, "seemed to have some influence on the rate of bending of these beams, but this point was difficult to determine on account of the different beams bending at different rates at the same temperature; but, so far as could be ascertained from the experiments, the beams bent slower the lower the temperature. The lowest temperature used in these experiments was rather more than 3° F. below freezing."

In 1875 Prof. Pfaff described in *Poggendorff's Annalen* (civ. p. 169, reported in NATURE, vol. xii. p. 317) a carefully conducted experiment in which a paralellopiped of ice 52 cm. long, 2·5 cm. wide, and 1·3 cm. thick, was supported in such a way that 5 mm. at each end rested on the bearers. This was left for seven days, from February 8 to February 15, the temperature varying between −12° and −3·5° C. The total bend was 11·5 mm. That is to say, to translate these measurements into inches for the sake of comparison with the other results, in a bar 20 inches in length between the supports, 1 inch in width, and ½ inch in thickness; the total bending was a little over ·45 of an inch. When the temperature rose to slightly under 0° C. the bending increased, and amounted to 9 mm. (·34 inches) in 24 hours. Other experiments are described by Prof. Pfaff in the same paper, and the general conclusion to which he is led is, "that even the smallest pressure is sufficient to dislocate ice-particles if it act continuously, and if the temperature of the ice and its surroundings be near the melting point."

In the current volume of NATURE (p. 329) there is a report of a paper recently read before the Royal Society by Mr. Coutts Trotter (to whom I am indebted for references on this subject) "On some physical properties of ice, &c.," in which were described some experiments on the shearing of ice, carried out in a glacier grotto at a nearly uniform temperature of about 0° C. In that report we learn that in the paper itself "reasons are given for supposing that the range of temperature through which ice is sensibly viscous is small."

So far as I know no experiments on the viscosity of ice at very low temperatures have been recorded. It is the object of the present communication to describe some such experiments which I have recently conducted, through the kindness and courtesy of Messrs. J. S. Fry and Sons, of Bristol, in the snow chamber of the refrigerator, at their well-known Cocoa Works.

In this chamber the air, which has been previously condensed and cooled, is allowed to deposit, in the form of snow, the moisture which it can no longer retain owing to the great diminution of temperature due to expansion. George Punter, whose business it is to look after this snow chamber, rendered the most intelligent assistance in preparing the bars of ice, and in conducting the experiments. In this mode of experimentation the great variation of temperature, namely, between $-30°$ C., when the engines are stopped in the evening, and $-12°$ C., as a maximum when they begin work in the morning is an unavoidable drawback. Still, I think that the experiments, although they give uniformly negative results, are worth putting on record.

Experiment 1.—A cylinder of ice was cast with a diameter of 3 inches. Over it was hung, as in the well-known Bottomley experiment (NATURE, vol. v. p. 185), a wire loaded with a total weight of 5 lbs. It was left in the freezing-chamber $6\frac{1}{2}$ hours. No dent was traceable on the surface of the cylinder.

Experiment 2.—With a similar cylinder and wire the load was increased to 10 lbs. and the time to 8 hours, with like negative results.

Experiment 3.—With a similar cylinder and wire the load was further increased to 14 lbs. and the time to $17\frac{1}{2}$ hours, with the same result or absence of result. This experiment would seem to show that the ice refused to yield to a pressure of 20 to 30 atmospheres, or probably more, applied in this way and for this time.

Experiment 4.—A bar of ice $1\frac{1}{2}$ inches thick, $2\frac{1}{2}$ inches wide, and supported on bearers $13\frac{1}{2}$ inches apart, was left in the chamber from 12 noon on Monday until 12 noon on Saturday. It showed no sign of bending under its own weight.

Experiment 5.—A similar bar similarly supported was weighted in the middle with 7 lbs., and left for the same time. No sign of bending.

Experiment 6.—A similar bar similarly supported was weighted with 18 lbs., and left for the same time. There was no bending perceptible to the eye; but, on removing the apparatus, the bar broke with the jar occasioned by setting it down somewhat carelessly, so that no exact measurement was taken.

Experiment 7.—A bar of the same length and width, but thinner, tapering somewhat from $\frac{7}{8}$ to $\frac{3}{8}$ of an inch in thickness, was weighted with 7 lbs., to which, during the last two days, seven additional pounds were added, and left for the same time. No bending by measurement.

Such negative results are just what one would expect on theoretical grounds, and as an inference from previous experiments conducted at temperatures nearer the melting-point. But it is well not to rely on theory or on inference where direct experiment is practicable.

The matter, then, would appear to stand at present somewhat thus. The visco ity of ice, due to whatever cause, is—

(1) At temperatures at and above the melting-point...considerable.
(2) ,, ,, below but near ,, ,, ...much less.
(3) ,, ,, between $-3°\cdot5$ C. and $-12°$ C....very slight.
(4) ,, ,, below $-12°$ C. ... ...*nil*.

What seems now to be wanted is an experimental determination of the lower temperature-limit of viscosity, which would appear to lie somewhere between $-12°$C. and $-3°\cdot5$ C., but probably nearer the latter temperature.

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BEN NEVIS

AT the meeting of the Royal Society of Edinburgh held on Monday last, Mr. John Murray, Vice-President, in the chair, Mr. R. T. Omond, Superintendent of the Meteorological Observatory on Ben Nevis, delivered, at the request of the Council, an address on two years' residence and work there. Mr. Omond, at the outset, recalled the advantages which Ben Nevis presented as a high-level meteorological station, the services of Mr. Clement S. Wragge, and the chief steps that led up to the erection and equipment of the existing permanent observatory. Glancing at some of their daily experiences during last summer and autumn, he mentioned that some 3000 or 4000 tourists climbed the mountain—sometimes at least 100 in a single afternoon. Since the middle of October, however, not more than half a dozen strangers had ventured up. Some came for information; others were disappointed at finding they could not be fed as well as sheltered; others came to spend the night, but were disappointed at finding they could not do so. Most of the visitors, however, were satisfied, though a little astonished, by the explanation that the building on Ben Nevis was primarily a scientific observatory, and not a hotel. Storms of exceptional and terrific violence were described. Beautiful optical phenomena that had been witnessed, and the comparative scarcity of animal life on the mountain, were next alluded to. Rainbows are seldom seen. Thunderstorms are very rare. The temperatures during winter are not so low as many people think—10° F. is about the lowest recorded as yet, and the ordinary winter temperatures ran from 15° to 25°. Observing that much must yet be done in the work of the discussion and interpretation of the observations made on Ben Nevis, before the observations could be safely used, he proceeded to state some of the more interesting points which Mr. Buchan had already succeeded in approximately establishing: (1) The normal or average temperature and barometric pressure for each month, and the normal differences between these averages and those at sea-level. (2) The daily variation of temperature and pressure during each month. (3) The daily variation in the average velocity of the wind—this being shown to be greater at night than during the day, exactly the reverse of what holds good at sea-level. (4) Variations in the direction of the winds as compared with those prevalent over Scotland at any given time. A comparison of the Ben Nevis winds with those at low-level stations sometimes shows that both are part of one system, whether cyclonic or anti-cyclonic; but the direction is almost always different, and in the case of cyclonic storms, coming from the west. The observed differences in direction seem to give an indication as to whether the storm centre is to pass to the north or south of Ben Nevis. If this point can be definitely made out, it will obviously be of immense value in forecasting weather. (5) The hygrometric observations indicate that the atmosphere on the Ben shows that during ordinary weather a state of persistent saturation, usually accompanied by fog or mist, prevails; but occasionally a sudden and extraordinary drought sets in, the temperature rises, and the sky clears, not merely of fog, but often of every vestige of cloud, and at the same time the valleys and lower hills are often shrouded in mist, showing that this dryness coming from above is not able to penetrate right down to the sea-level. The thorough investigation of these phenomena is one of the most important pieces of work connected with the Observatory, and may be expected to throw great light on the question of atmospheric circulation. (7) The rainfall of Ben Nevis is greatly in excess of what several theories of the distribution of rain led them to expect—a result possibly due to the great vertical movements of the atmosphere indicated by the hygrometric indications referred to above. Though there are many high-level stations in different parts of the world, none, perhaps, are so favourably situated as Ben Nevis for the investigation of what he had explained is the present great problem in meteorology, namely, the vertical movements of the atmosphere. If the Scottish Meteorological Society were possessed of sufficient funds to establish a completely-equipped observatory at the foot of Ben Nevis as well as on the summit, he was convinced that the science of meteorology would advance far more in a few years than it would by a generation of ordinary work with low-level stations alone.

SUNLIGHT AND THE EARTH'S ATMOSPHERE[1]

THERE is, we may remember, a passage in which Plato inquires what would be the thoughts of a man who, having lived from infancy under the roof of a cavern, where the light outside was inferred only by its shadows, was brought for the first time into the full splendors of the sun.

We may have enjoyed the metaphor without thinking that it has any physical application to ourselves who appear to have no roof over our heads, and to see the sun's face daily; while the fact is that if we do not see that we have a roof over our heads in our atmosphere, and do not think of it as one, it is because it seems so transparent and colourless.

Now, I wish to ask your attention to-night to considerations in some degree novel, which appear to me to show that it is not transparent as it appears, and that this seeming colourlessness is a sort of delusion of our senses, owing to which we have never

[1] Lecture delivered at the Royal Institution, April 17, 1885, by S. P. Langley. Communicated by the author.