The same may be said of the Pacific in its eastern part, where alone the trades are regular. In the Western Pacific, as well as in the Western Indian Ocean, I admit that air from the northern hemisphere reaches to the equator and somewhat beyond in January, but not that this tends to give the equator a lower temperature in this month than in July. According to Dove, the mean temperature of 10° N. in January is 77°·2; of 10° S. in July, 76°·1.

So far as the temperature of the equator is concerned, the southern is the dominant hemisphere, and the equator is certainly cooled by winds coming from the south. If the equator is not everywhere warmer in January than in July, this is caused by the rainy season, which on the equator, and even a few degrees north of it, generally coincides with the southern summer. Where the rains are not very heavy, as, for example, on the Isle of St. Thomas, West Africa, we have: January, 78° 3; July, 75°·7; at Padang, Sumatra, where the rains are exceedingly heavy all the year, there is scarcely any difference at all between the months. Somewhat to the south of the equator, where to the difference in the nearness of the sun is added a much greater height above the horizon in January, we have—

	Jan.	July.	Rainy Season.
Amboina, Molucca Islands, 4° S.	80·9	77·4	May to August.
Batavia, Java, 6° S.... ...	77·7	78·8	December to February.
Pernambuco, Brazil, 8° S.	80·6	75·0	April to July.

so, by the first-rate observations of Batavia, it is established that, so far as 6° S., January is 1°·1 colder than July, because the former is very rainy, while the latter has little rain. Even to 9° lat. N., July is colder than January, if the former has much more rain, so for example—

Island of Fernando Po, W. Africa, 4° N.	79·9	76·5	March to November.
Gondokoro, Upper Nile, 5° N.	81·3	75·7	April to August.
Freetown, W. Africa, 8½° N.	80·4	77·0	June to October.

Thus, in the lowest latitudes of the northern hemisphere, we find differences amounting to 5°·6, while in the southern greater differences than 1°·1 are not known, which may, to a certain degree, be ascribed to the nearness of the sun in January.

I think I have proved that, as to what we call the temperature of the air (really that of the lowest stratum), it is, on the equator and a few degrees north and south from it, far more influenced by the yearly distribution of clouds and rain than by the different amount of heat received from the sun. The result would be different if we knew the temperature of the whole stratum of air. The heating of the upper surface of the clouds by the sun, and especially the heat liberated in the condensation of water must give to the higher strata a superior temperature than that they had in the dry season; in other words, the decrease of temperature with elevation is much slower during the rains than in the dry season, as was shown for India by Mr. Blanford. This is true for other regions, and where the sky is cloudy and rains abundant in the greater part of the year, the temperature of the whole air may yet be higher than in drier climates, where the soil and the lower stratum of air are hotter.

I do not agree with Mr. Croll in what he states at the end of his letter as to the effect of winds in cooling the equatorial regions and rendering them habitable, as they would be too hot for man without the cool air brought from the temperate regions. I think Mr. Croll has enormously over-stated the effects of winds on the temperature of the equator. The extent of the tropical zone is so great, its temperature so very near to that of the equator, the winds which blow across it so gentle, that I consider the effect of the winds from the temperate regions in directly cooling the temperature of the equator to be nearly imperceptible. The following is a good illustration:—Nowhere is the winter temperature so low near the tropics as in Southern China, for example, in January, Canton, 55°·6, Victoria, Hong-Kong, 59°·2. Yet Saigon, in Cochin China, but 11° to the south of Hong-Kong, and subjected to the full force of the north-east monsoon from the China seas, has a January temperature above 77°. Clearly the thermal effect even of the cold winter monsoon is scarcely perceptible farther south.

I consider water to be the only direct cause of the mildness and uniformity of equatorial temperatures, and this in three ways—(1) by the great heat-capacity of water; (2) by the clouds which interpose a screen between the sun and the surface of the earth; (3) by the evaporation of rain water by the soil and plants.

The first cause is especially powerful on the ocean, while the two latter act especially on land, even very far from the sea. If it was not for the clouds and evaporation, how could we explain, for example, the absence of great heat (hottest month, 78°·6) at Iquitos, on the Amazons, 4° S., and more than 1,000 miles from the Atlantic, where the winds are generally weak?

As to the winds, I admit of their effect in this case; but (1) in causing ocean-currents, and thus removing the heated water from the equator; (2) in spreading the cold air from over the cold currents over a greater distance. The latter is the cause of the low temperature in the equatorial regions of the Eastern Atlantic and Eastern Pacific.

Where the sky is clear and humidity and rains deficient, very high temperatures of the air are attained, even at a great distance from the equator (10°–30°) and this notwithstanding winds of considerable force blowing from cooler regions. So, for example, the north winds blowing in the summer in the Sahara, and coming from the cooler Mediterranean, are certainly stronger than the trades of the ocean and yet do not prevent the desert from attaining a higher temperature than known in any equatorial region.

In the same number of NATURE you committed an error by giving the dates of freezing of the Neva in *old style*. The dates in *new style* are: Mean day of freezing, November 25, earliest October 28 (1805), latest (not quite certain), January 9 (1711), next latest December 26 (1826); mean day of opening, April 21, earliest, March 18 (1822), latest, May 12 (1810); number of days open, 218, least, 172 (1852), greatest, 279 (1822).

A. WOEIKOF

Sékpaleruaya 8, St. Petersburg, December 5-17, 1879

Hearing through the Mouth

THE principle of the so called "Audiphone," described in NATURE, vol. xxi. p. 243, is by no means a new discovery, although the application of it may be novel. It has long been known that sounds may be conveyed to the auditory nerves through the mouth when the drum of the ear is defective in its action, although the principle has, perhaps, been little acted upon by aurists. Mr. Rhodes's system is to press the edge of a vibrating metal disk against the upper teeth, and "the vibrations thus taken up by the disk are transmitted through the teeth and bones of the skull to the auditory nerve." (?) Such a remedy will, in many cases, be thought more inconvenient than the defect, and it is by no means necessary thus to jar the teeth and the bones. Although I am not deaf, some years ago I practised the listening to very feeble sounds through the mouth instead of by the outward ear, at the recommendation of the late Sir Charles Wheatstone. The inducing cause was to verify by experiment the true character and the notes of resultant tones, or Tartini's tones, about which no two authors had agreed. Sir Charles lent me one of his symphoniums—little instruments made like his concertinas, except that they were blown by the mouth directly upon the metal springs instead of by bellows. According to his directions I stopped my ears lightly with cotton, but pressed it into the *concha* with a thumb upon the lip of each ear. The little instrument was supported by my third and fourth fingers, leaving the notes to be touched by the first and second fingers of each hand. By thus excluding external sounds I could hear the deep and soft resultant tones to perfection; the instrument should not be tempered because they result from coincident vibrations of the notes sounded above. In these experiments I touched the symphonium as lightly as possible with elongated lips, the cavity of the mouth receiving the sounds. The teeth were covered by the lips.

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Intellect in Brutes

THE numbers of NATURE containing the interesting discussion on this subject have only lately reached us, and it is late to bring forward anything on the question, yet the readers of NATURE will be interested in two instances of "calculation" on the part of wild birds that I have noticed. Some years ago I was overlooking a penguin "rookery" as it is called, at the Falklands, and watching the goings on of the numerous colony below me. It was breeding season, and the birds were sitting on their eggs on