

by-and-by to become a universal possession in more or less degree.

It may require some peculiar state of mental calm or abstraction for this reading of the thoughts of another (apart from external expressions appreciated by the other senses) to become practicable, just as, in order to perceive distinctly the over-tones of a musical sound, it may be necessary to quench the fundamental tone.

As to the modification in the human body, supposing the sense in question to become general, this might be of a very minute character, constituting, not in the ordinary view, yet in a quite correct one, a distinct *organ*.

With regard to the influence of distance on the supposed sense, little, of course, can be said; but it is perhaps noteworthy that corresponding to the gradation referred to at the outset there is a general gradation in the distance at which the sense-exciting cause is capable of operating; from the direct contact of touch, to the action of light at the distance of a remote fixed star.

M.

### The Circumference of the Circle

To some readers of NATURE the following construction will rhaps be of interest:—

Take  $AOB$ ,  $DOC$  two diameters of a circle at right angles to one another.

Make the length of the tangent  $DS$  equal to three diameters of the circle  $ADBC$ , then make the angle  $AOP = 60^\circ$ , and



draw  $PR$  at a right angle to  $DC$ . Connecting the points  $S$  and  $R$  you will find the length  $RS$  very nearly equal to the circumference of the circle.

This will be clear from the following proof:—

From the triangle  $DRS$  we have—

$$RS = \sqrt{DR^2 + DS^2}.$$

But taking the diameter  $DC = 1$  the length  $DS$  is  $= 3$ , whereas  $DR = OD + OP \cos 30^\circ = \frac{1}{2} + \frac{1}{2} \cos 30^\circ = 0.9330127$ . Therefore—

$$\begin{aligned} DR^2 &= 0.9330127^2 = 0.8705127 \text{ and} \\ DS^2 &= 3^2 = 9.0000000 \end{aligned}$$

$$DR^2 + DS^2 = 9.8705127$$

$RS = \sqrt{DR^2 + DS^2} = 3.141738$ , whereas the exact value of  $\pi$  is  $3.141592$ ,

giving a difference of  $0.000146$ , or  $0.0046$  per cent.

This approximation is, of course, more than sufficient for practical purposes. Although this method has been found by me quite independently, yet I shall not be surprised to hear of its having been proposed before by others, for it is almost too simple not to have occurred to somebody else as well as to me.

Prague, Spálená ulice, 2 nové, January 11 L. HAJNÍŠ

### Sun-Spots, &c.

I READ with interest the letter of Mr. Bedford's in NATURE, vol. xxi. p. 276, on "Sun-Spots." Perhaps the following may interest Mr. Bedford, and as I have not seen this noticed before by students of the solar orb, it may interest others besides Mr. Bedford.

Prof. Sayce, in his Lectures, says: "The Accadians had anticipated our almanack-makers in discovering a connection between the weather and the changes of the moon; indeed all kinds of astronomical phenomena were supposed to have an influence upon the clouds; and in anticipation, as it were, of Dr. Hunter, the same weather was expected to recur after a cycle of twelve solar years." . . . Even the appearance of the sun was not allowed to go unnoticed, and in one place we are told that on the 1st of Nisan it was "bright yellow," and in

another that it was "spotted." Who, says the professor, "would have thought of looking for a notice of sun-spots in the clay tablets of ancient Babylonia?" Lectures, pp. 53-54. See also the "Astronomy and Astrology of the Babylonians," by the same, in the *Transactions of the Society of Biblical Archaeology*, vol. iii. pp. 145, 339.

EDWARD PARFITT

Devon and Exeter Institution, Exeter, January 27

### Intellect in Brutes

IT might prove interesting to some of your readers to put the following incidents on record relative to intellect in brutes:— Some time ago I kept in town a bitch and three of its puppies; the former had a strong pair of lungs and a weakness for letting the passers-by know it; when the latter became of age they exhibited all the hereditary peculiarities of the mother, and when the four animals joined in chorus, which was their favourite amusement at night, the result was anything but agreeable. Some of my friends hinted to me that if that state of things continued I should probably be indicted for causing a nuisance, and I therefore determined to explain to my four animals that they really mustn't bark. One night I remained late in town, and having provided myself with a stick, I waited till I heard one of them bark, and I immediately afterwards went out and chastised him, or rather the one I thought had made the noise. I was, however, soon met by a difficulty; although I could recognise the bark of the old one, I could not discriminate well

between those of the puppies; and whilst the old one was silenced after a few chastisements, the puppies were not; probably in mistake I had thrashed the wrong puppy. I therefore hit upon the plan of making the whole four responsible for each other, and as soon as I heard any one of them bark I applied my stick freely to the whole four, the one after the other. When this had been done two or three times I heard one of the puppies bark, and the next moment it gave a pitiful squeal; the mother had it by the neck. I went out and patted her, thus explaining that she had done well. She wagged her tail, as much as to say she under-

stood me perfectly, and the dogs never barked again except upon the most provoking occasions.

Some other instances which I observed lately might be mentioned as tending to show that animals of a much lower class exhibit reasoning faculties. I had occasion lately to keep some leeches and water-beetles; they were put into round open glass vessels, about six inches high and about two-thirds full of water. A medical leech which was put into one of these vessels got out, and within an hour afterwards it was found on the table and replaced in the water. Now although the vessel was left uncovered as before, this leech never again tried to get out. A horse-leech and two water-beetles, treated in the same way did the same thing once, and once only; each preferred the water to the dry table, and on being replaced they never tried to get out again; *ergo*, they had been taught by experience. Is this not a high order of intelligence? How many examples have we of the genus *homo* where so much intelligence is not exhibited?

Manchester, January 17

W. THOMSON

SEEING a letter in NATURE, vol. xxi. p. 276, with the heading of a "clever spider," puts me in mind of a circumstance that came under my own observation near Tremadoc, in North Wales, many years ago. I sat down on a bank about four o'clock in the afternoon after a long day, when I presently saw I was close to one of the common garden spiders of rather large size, with its pretty spreading net-like web about a yard from the ground; so, for want of something to do, I alarmed the spider to discover where his *den* was, when off he trotted about the distance of a foot to a couple of leaves nicely tied together, where he stayed perhaps ten minutes; I then saw a beetle of rather large size walking at my feet—one of those slow moving dull black ones—I am not coleopterist enough to know its name; I picked it up and put it in the web at a place I thought sufficiently strong to hold it, when out rushed the spider in his boldest manner. But when he saw who his visitor was, what an alteration in his manner! He drew back, and rapidly separated the cords, when down dropped the beetle on a single line, rather quickly, to within about 4 inches of the ground, so that he was suspended on a line about  $2\frac{1}{2}$  feet long. The spider then trotted back to his den. The beetle was now struggling in its slow,