

course no one taught the donkey to do this; but the quadruped gave the biped a practical lesson, from which I am not aware that they drew the abstract verbally formulated conclusion that reason may be exercised without rhetoric.

March 14

HENRY MUIRHEAD

I BELIEVE that instances of rats gnawing through water-pipes are frequent. Two have come to my knowledge during the past fortnight. The one instance occurred at the house of a gentleman near West Hartlepool; in the other case a large hole, $3\frac{1}{2}$ inches long, and varying from $\frac{1}{8}$ ths of an inch to $1\frac{1}{8}$ th inch in breadth, was gnawed in the fresh-water pipe of the screw-steamer *Mary Coveydale*. A portion of this pipe, containing the hole, was cut off, and is preserved by me; it is a stout leaden pipe, a quarter of an inch thick, and with a diameter of $2\frac{3}{8}$ inches. It is very doubtful whether there was any flaw before the hole was begun.

R. MORTON MIDDLETON

West Hartlepool

Distribution of the Black Rat

PERHAPS some of the readers of NATURE may be able to throw some light on the present geographical range of the Black Rat (*Mus rattus*, L.). In the early part of 1877 some individuals of this species came on board the steamship *Lady Frances* either at Bombay or at Rangoon, but, as the captain believes, at the latter port. The animals multiplied on board the vessel, and in August last I had the pleasure of receiving from the ship a living specimen, which was at once forwarded to the Zoological Gardens in Regent's Park, where, I believe, it may still be seen. In a "Catalogue of the Mammals of the Sahara," by my friend, Canon Tristram, F.R.S. (*vide* "The Great Sahara," p. 385), the author states that the "Far el Klâ," as the black rat is called by the Arabs, "still maintains its position" in the Algerian Sahara. And I was yesterday presented by Mr. F. Donald Thompson, of Seaton-Carew, with a skin of *Mus rattus* from New Zealand. This example, like those from Burma, was brought over by a vessel (the *Tredolvan*) which loaded grain at Lyttelton, in the province of Canterbury, New Zealand, where the rats embarked. In August, 1878, Dr. Selater, F.R.S., was good enough to inform me that "*Mus rattus* has rather an extensive range over Europe and Western Asia," and added, "I fear it would not be possible to state it very exactly." But it is evident that the range of the species is much wider, as it is known to occur in North Africa, British India, and New Zealand; and it is also said, by Prof. Bell and Mr. Macgillivray, to have been carried to America and the South Sea Islands by ships. I should be glad to have further evidence as to its occurrence in Burma, and it would be also desirable to know if it is found in the Malay Archipelago, China, Japan, or Australia. Dr. Peters, of the Zoological Museum at Berlin, assured me, in June last, that the species was extremely rare, if not actually extinct, in Germany, and showed me the only specimen in the fine collection under his care—an old and faded skin from Hanover. The animal lingers in one old building at Stockton-on-Tees, and there is clearly a possibility of its being reintroduced in many seaport towns through the agency of ships.

West Hartlepool, March 11

R. MORTON MIDDLETON

The United States Fisheries

IN your review of the report of the United States Commission of Fish and Fisheries, you say you are of opinion there is almost no difference between *Salmo salar* and *Salmo ginnat*. My friend Prof. Baird sent me his report some time since, and also forwarded several thousand eggs of *Salmo ginnat* for experiment in the hatching tanks of the Southport Aquarium. The eggs hatched out remarkably well, a very small percentage only being lost, and have proved much more hardy and tenacious of life than any *Salmo salar* I ever had to do with, and very much easier to feed. *Salmo salar* have never done well except when fed on the minute red worms found on the mud in the beds of some rivers and streams (our supply was obtained from the Thames). *Salmo ginnat*, however, live well, and grow faster on the roe of fish (refuse from the fish market), such as whiting, than *S. salar* will on anything. From what I have seen of them I quite agree with Prof. Baird in his admiration of this member of the salmon family, and I share his surprise that it has attracted so little attention among English fish-culturists. It would certainly be a most valuable addition to our food-fishes,

stronger, and apparently of more rapid growth than our native species. On the continent, and in New Zealand and other countries, it is most greedily sought after, and each season for several years past an agent has carried from America to France, Germany, and other countries, large consignments of the ova. In England, so far, it appears to have been quite neglected.

Hill Fold, Bolton, March 15

CHAS. L. JACKSON

Plovers in the Sandwich Islands

I CAN vouch for the truth of the visit of golden plovers to the Sandwich Islands mentioned by Prof. A. Newton in NATURE, vol. xix, p. 433. They are very numerous during the winter from November until March. I do not know the scientific name, but I have shot a great many on Oahu and Hawaii.

If it will help Mr. Newton in the solution of the very interesting question he raises I may mention that M. Baillièrè, Consul-General for France at Honolulu, is in the habit of sending specimens of birds to (I think) the Jardin des Plantes, Paris, where doubtless a specimen might be found.

Hertford, March 15

S. LONG

Unscientific Art

IN the *Graphic* for December 28 there appeared a sketch of a man taking a reading on a marine barometer, on board the *Sarmatian*, during the voyage of the Marquis of Lorne to Canada. To see the scale better by the light of his lantern, the observer is represented as sloping the barometer at an angle of about 30° from the vertical.

New Kingswood, Bath

JOHN W. BUCK

ON THE POSSIBILITY OF EXPLAINING THE CONTINUANCE OF LIFE IN THE UNIVERSE CONSISTENT WITH THE TENDENCY TO TEMPERATURE-EQUILIBRIUM

THE idea of the ultimate final cessation of all physical change and life in the universe¹ has been contemplated by many physicists with some dissatisfaction, and with the desire if possible to find some explanation or physical means by which so apparently purposeless an end is averted, and of avoiding the necessity for assuming in past time a violation of physical principles at present recognised to exist.² Several attempts have been made to surmount the difficulty,³ but apparently with no generally satisfactory result. Having given much time to physical problems having a relation more or less to this question, and having always kept the question itself in view, I should like to submit the following conclusion to the readers of NATURE as an attempt to solve the difficulty, though what I have to bring forward is probably not entirely new, as considerations partially tending towards the same final result have already been published by Mr. James Croll, *Phil. Mag.*, May, 1868, "On Geological Time;"⁴ and Mr. Johnstone Stoney, "On the Physical Constitution of the Sun and Stars," *Proc. of the Royal Society*, 1868-69. The groundwork of what I have to suggest may be described in a few words.⁵

Taking a general view of the universe, we may consider it as so much matter, which contains a certain quantity of energy. Let us suppose for illustration the energy of

¹ Thomson, "On the Universal Tendency in Nature to the Dissipation of Mechanical Energy," *Phil. Mag.*, October, 1852; Clausius, Ninth Memoir, *Pogg. Ann.*, July, 1865; see also Tait, "Recent Advances in Physical Science," second edition, p. 22.

² The allied idea of the whole universe tending to agglomerate into one mass under the action of gravity, the notion of instability thus involved, all this has something incongruous and unnatural about it that appears to be scarcely in harmony with the orderly working of physical phenomena, and would seem to point to the necessity for some additional explanation.

³ Grove, "Corr. of Physical Forces," p. 67; Rankine, "On the Reconciliation of the Mechanical Energy of the Universe," *Phil. Mag.*, November, 1852, &c., &c.

⁴ Also *Quarterly Journal of Science*, July, 1877.

⁵ The same problem was considered by the writer in special reference to Le Sage's theory of gravitation in the *Quarterly Journal of Science* for July last, but my present object is to deal with the question entirely independently of any special theories, and solely on the basis of generally accepted facts, or facts which if not known would be in harmony with or deducible from those which are known.