

western coast, in the summer of 1868, the following incident came under my notice; and, although I made a note of the facts at the time, I have never hitherto made them the subject of a scientific communication: On July 26, when approaching the strand at the river below the village of Newport, County Mayo, I noticed what appeared to be extensive streaks of scum floating on the surface of the water. As it was my intention to bathe, I was somewhat dissatisfied with the appearance of the water, until I stood on the edge of the strand, and I then perceived that what was apparently scum, seen from a distance, consisted of innumerable particles of sand, flat flakes of broken shells, and the other small *débris* which formed the surface of the gently-sloping shore of the river. The sand varied from the smallest size visible to the eye up to little pebbles, nearly as broad and a little thicker than a fourpenny piece. Hundreds of such little pebbles were afloat around me, and it is probable that the flakes of floating matter seen farther off contained also a considerable proportion. The air during the whole morning was perfectly calm, and the sky cloudless, so that, although it was only half-past nine, the sun had been shining brightly for some hours on the exposed beach. The upper surface of each of the little pebbles was perfectly dry, and the groups which they formed wereslightly depressed in curved hollows of the liquid. The tide was rapidly rising, and, owing to the narrowness of the channel at the point where I made my observations, the sheets of floating sand were swiftly drifting farther up the river into brackish and fresh water. On closely watching the rising tide at the edge of the strand, I noticed that the particles of sand, shells, and small flat pebbles, which had become perfectly dry and sensibly warm under the rays of the sun, were gently uplifted by the calm, steadily-rising water, and then floated as readily as chips or straws. I collected a few specimens of these little objects, but I regret that they have been since mislaid. This phenomenon, it is scarcely necessary to say, is due to molecular action, such as accompanies the familiar experiment of floating needles on the surface of a basin of water. Although the specific gravity of the floating objects exceeds that of the fluid on which they rest, the principle of Archimedes still holds good, because the displacement of liquid produced by the body is considerably greater than the volume of the body itself. In the case of a floating needle, the repulsion of the liquid from the polished surface of the metal presents a groove, whose magnitude is obviously many times greater than the needle; but in the case of the floating pebbles this was not so manifest. The attraction of the molecules of water for one another produces, as is well established, a tension at the surface of the liquid, which, although extremely feeble, and generally noticed only in connection with capillary phenomena, yet interposes some resistance to the intrusion of foreign substances. I have floated small flat pebbles, similar in size and appearance to the largest of those observed floating on Newport river, for more than six days, while fragments of shells, and thin pieces of slate as broad as a sixpenny-piece, have continued to float much longer. These little bodies occasionally sank from the gradual absorption of water, but much more frequently from some accidental motion of the vessel containing the liquid. It is manifest that the floatation of sand in a tidal estuary, as in the instance I have seen, can occur only under favourable conditions. The shores must be very gently inclined, the air perfectly calm, and the weather dry and warm. Under these circumstances thin cakes or sheets of sand may not only be uplifted by the water, but if the tide flows rapidly they may continue to float sufficiently long to allow many of them to be drifted far from their original place up to the higher limit of the brackish water. In this way fragments of marine shells and *exuvie* might become mingled with those belonging to fresh water. The conditions favourable for sand floatation must exist during calm weather in a very high degree of perfection on the sandy shores of tidal rivers in tropical and subtropical districts of the earth. As this phenomenon can take place only with the rising tide, and never with the falling tide, the result must generally be favourable to the transport of sand and marine *débris* in the direction of the flow of flood tide; and this may sometimes hold good along a coast as well as on the shores of a tidal estuary. Geologists, as far as I am aware, have not hitherto noticed this phenomenon in connection with the formation of stratified deposits by the agency of tides and rivers, although they have paid great attention to the influence of the molecular resistance of water to the sinking of very minute solid substances, with the view of explaining the wide surface over which matter held in suspension by water may be spread when ultimately deposited over the sea

bottom.—Prof. W. King read a paper, by himself and Prof. Rowney, "On the Mineral Origin of the so-called *Eozoon Canadense*." It was resolved to purchase the Bell and Bell-Shrine of St. Patrick, from Dr. C. Todd, for the sum of 500*l*.

BOOKS RECEIVED

ENGLISH.—Travels in the Air: J. Glaisher, 2nd edition (R. Bentley).—The Natural History of Plants: H. Baillon, vol. 1, translated by N. Hartog (L. Reeve and Co.).—Primitive Culture, 2 vols.: E. B. Tylor (J. Murray).—On Aphaxia, or Loss of Speech: Dr. F. Bateman (Churchill). FOREIGN.—(Through Williams and Norgate)—Archiv für Anthropologie, vol. iv.—Zeitschrift der oesterreichischen Gesellschaft für Meteorologie, vol. v.—Compendium der chirurgischen Pathologie u. Therapie: Dr. C. Heitzmann.

DIARY

THURSDAY, MAY 4.

ROYAL SOCIETY, at 8.30.—On the Structure and Affinities of the Gwynia Anulata (Dunc.), with Remarks upon the Persistence of Paleozoic Types of Madreporaria: Prof. Duncan, F.R.S.—On Molybdates and Vanadates of Lead, and on a new Mineral from Leadhills: Dr. A. Schrauf. SOCIETY OF ANTIQUARIES, at 8.30.—Roman Villa at Beddington: J. Addy.—Antiquities from Cyprus: J. B. Sandwith. LINNEAN SOCIETY, at 8.—The phenomena of Protective Mimicry, and its bearing on the Theory of Natural Selection as illustrated by the Lepidoptera of the British Islands: Raphael Meldola, F.C.S.—On the Ascalaphidæ: R. McLachlan. CHEMICAL SOCIETY, at 8.—On the Productive Powers of Soils in relation to the Loss of Plant Food by Drainage: Dr. Voelcker, F.R.S. ROYAL INSTITUTION, at 3.—On Sound: Prof. Tyndall. LONDON INSTITUTION, at 7.30.—On Economic Botany: Prof. Bentley.

FRIDAY, MAY 5.

GEOLOGISTS' ASSOCIATION, at 8.—On the Fauna of the Carboniferous Epoch: H. Woodward, F.G.S. ROYAL INSTITUTION, at 9.—On Russian Folk-Lore: W. R. S. Ralston.

SATURDAY, MAY 6.

ROYAL SCHOOL OF MINES, at 8.—Geology: Dr. Cobbold. ROYAL INSTITUTION, at 3.—On the Instruments Used in Modern Astronomy: J. N. Lockyer, F.R.S.

MONDAY, MAY 8.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30. ROYAL INSTITUTION, at 2.—General Monthly Meeting. LONDON INSTITUTION, at 4.—On Astronomy: R. A. Proctor, F.R.A.S. (Educational Course.)

TUESDAY, MAY 9.

PHOTOGRAPHIC SOCIETY, at 8. ROYAL INSTITUTION, at 3.—On Force and Energy: Charles Brooke, F.R.S.

WEDNESDAY, MAY 10.

SOCIETY OF ARTS, at 8.—On the Application of Steam to Canals: Geo. Edward Harding, C.E. GEOLOGICAL SOCIETY, at 8.—On the Ancient Rocks of the St. David's Promontory, South Wales, and their Fossil Contents: Prof. R. Harkness, F.R.S., and Henry Hicks.—On the Age of the Nubian Sandstone: Ralph Tate, F.G.S.—On the Discovery of the Glutton (*Gulo luscus*) in Britain: W. Boyd Dawkins, F.R.S.

THURSDAY, MAY 11.

ROYAL SOCIETY, at 8.30. SOCIETY OF ANTIQUARIES, at 8.30. MATHEMATICAL SOCIETY, at 8.—On the Singularities of the Envelope of a non-Unicursal Series of Curves: Prof. Henrici. ROYAL INSTITUTION, at 3.—On Sound: Prof. Tyndall.

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