

resist this inexorable enemy on the part of the shallow water denizens of the sea or any encroachment on exposed areas during fine weather by animals unfitted to meet the storm will incur the penalty of death.

The prime necessity for every member of the littoral fauna is the power of resisting the attacks of waves; and every development and variation undergone by such littoral fauna must of necessity have been carried out under the immediate control of waves.

If, as Prof. Moseley tells us, it was in the "littoral zone . . . that all the main groups of the animal kingdom first came into existence," we may go further and say that these main groups were modelled by the ceaseless action of waves, as these in their turn were brought into being by winds raised by solar heat. Thus the early stages of evolution can be carried back directly, by the two short links of wind and wave, to the sun itself.

One point that I have never published myself or seen recorded by others, is the curious conflict that may be observed between wave- and tidal action. For example, a shell with a wide bathymetrical range, from tide-marks to, say, fifty fathoms, may evince a tendency towards the elaboration of a useful form and sculpture, in the deeper water; whereas, between tide-marks the two daily checks to growth arising from the fall of the tide would immediately check any such variation in sculpture, and the altered form would no longer be best suited to the along-shore conditions.

Moreover, as the form best suited to tide-marks is often in conflict with that best suited to deeper water, the form of a species living between tide-marks might soon diverge from that of the same species frequenting deeper water. As a possible instance I would adduce the case of *Trochus zizyphinus* and *T. granulatus*. These gasteropods have always, I believe, been considered distinct species; but I have in my possession specimens from about fifteen fathoms, showing a distinct passage between the smooth zizyphinus and the sculptured granulatus, and this both in outline and sculpture.

I regret that I have been unable to obtain odontophores of the intermediate forms to ascertain if they confirm the passage from the one species into the other. It is, I think, evident that though *T. zizyphinus* can retain its form in deep water, *T. granulatus* could not retain its symmetrical granulated sculpture were it to invade the tidal strand.

The variety of method exhibited by the littoral fauna in resisting wave-currents affords a most interesting subject of research. Take for instance an exposed ledge of rock—no hypothetical one—with sturdy limpets living on it, the fragile *Pholadidea papyracea* living in it, and the hardy little *Littorina obtusata* clinging to the sea-weed. A storm attacks the trio, and tests their several methods of defence. The limpet is safe on the rock, the *Pholadidea* in it, and the *Littorina*, though at once washed off its feeble support, is safe, thanks to its solid shell, from the utmost violence of the storm. The tenacious hold of the limpet on the solid rock and the feeble adherence of the *Littorina* to the sea-weed indicate very opposite methods of meeting a common danger.

In conclusion I would put in a plea for working-models of the sea in some of our new aquariums. When one sees in a tranquil tank such a fish as the gurnard with its far-spreading feelers ready to steady itself amid swinging wave-currents, one would like to see its machinery brought into action. A gentle swinging motion could be easily imparted to the waters of a tank, and under such conditions the observer would see the animals use the special appliances they possess for resisting or evading their most formidable enemy.

ARTHUR R. HUNT

Torquay, July 6

#### "New System of Orthography for Native Names of Places"

ALLOW me room for a few remarks on the Royal Geographical Society's "New System of Orthography for Native Names of Places," just published in your number for July 2. The Society has earned the thanks of the public for grappling with the neglected and vexatiously inconsistent question of place-name spelling. Attention was called by myself to this subject in *Notes and Queries* of May and July, 1884, and I can take no exception to the vowel and consonant system suggested by the Society, save to the retention of the un-English letter *x* and to one other particular.

This latter exception deals with the statement contained in paragraph (2) that "no change will be made in the spelling of

names that have become by long usage familiar to English readers—as Calcutta, Cutch, Celebes, Mecca, &c." Now, why make even these exceptions to the excellent rules laid down? Exceptions are always a nuisance, and in the cases of justifiable reforms prove more often than otherwise the means whereby the benefits of such reforms are frustrated altogether. A little more boldness by the Society in grasping the nettle is wanted; and while an improved alternative spelling would soon become familiar to the public, the help given by this concession to logical consistency would encourage reforms both here and in other fields. The attempt to consider the public convenience here illustrated is, I believe, unnecessary; while the seeking to preserve historical spellings, as with other historical and venerable anachronisms, comes to this—that the progress of reform is continually becoming hidebound and stunted, if not stopped altogether, by the impossible attempt to energise distinct stages of growth at one and the same time. It is earnestly to be hoped that the Geographical Society, upon whom the mantle of "Bahnbrecher" in spelling reform has suddenly fallen, will do the wise thing here, and boldly declare against all "exceptions" to the wholesome, justifiable improvement.

The need for, and the influence on other departments of spelling reform, of bold action on the part of the Society is illustrated by the retention of the letter *x*. In any reform scheme of the spelling of English place-names—the next urgent question to the above—the abolition of this letter will stand in the fore-rank of improvements. Witness its mischievous working in "Boxted" (Buckstead), "Hoxton" (Hogston in 1790), "Oxted" (Ockstead), Huxtable (Huckstable), &c.!

N.

July 9

#### Recession of Niagara Falls in 133 Years

THE fallacy of Lyell's guess at the rate of recession was always plain if we referred to the first accurate account, that of the Swedish traveller Kalm, in *Gent. Mag.*, January, 1751; since which the gorge has both been enlarged full 100 acres, and had miles of its bed deepened many feet. In p. 16, col. 1, A, he said: "Canoes can go yet half a league above the beginning of the carrying place, . . . but higher up it is quite impossible, the whole course of the water, for two leagues and a half up to the great fall, being a series of smaller falls, one under another." Now plainly this whole series have so levelled their bed that the main falls now descend some 160 feet instead of the "137 feet" that he repeatedly maintained (col. 2, E) to be the utmost the engineers, "with mathematical instruments," then admitted. But as for the plan, he is yet more definite. P. 16, col. 1, E: "The river (or rather strait) runs here from south-south-east to north-north-west, and the rock of the great fall crosses it, not in a right line, but forming almost the figure of a semicircle or horse-shoe." (Prof. Tyndall has well remarked that, the upper stream having probably been always much wider than the gorge, the chief fall has always been concave; but Kalm's view makes it appear very slightly so, and we know that very flat segments are, by a perspective illusion, commonly thought semicircles or even "horse-shoes.") "Above the fall, in the middle of the river, is an island, lying also south-south-east and north-north-west, or parallel with the sides of the river; its length is about 7 or 8 French arpents (an arpent being 120 feet). The lower end of this island is just at the perpendicular edge of the fall." He proceeds to tell how this island, once thought inaccessible, had been the scene of the heroic rescue, twelve years before, of two Indians by two others. Then, p. 18, col. 2, F.: "The breadth of the fall, as it runs in a semicircle, is reckoned to be about 6 arpents. The island is in the middle of the fall, and from it to each side is almost the same breadth" (barely 350 feet then, but in his engraving not half that). "The breadth of the island at its lower end is two-thirds of an arpent or thereabouts." His view makes it but one-third the height, *i.e.*, one-third of "137 feet."

Now this mere reef, about 900 feet by less than 80, was plainly one whose length the falls were reducing. Is there the least ground for holding they have ever reduced Goat Island (now ten times larger than that) or will reduce it one rood? But, prolong "Luna Islet" north-north-west till 900 feet long, and you will have the site, I submit, of Kalm's middle rock, barely 350 feet from the point Mr. Wesson marks, on Fig. 2, "New York Shore," and about as much from a Canadian point west-south-west of it. As for Goat Island, it cannot, in his time, have yet been touched by the falls, but may be one of those the hunters had habitually visited above. His description can

be so well plotted on this last survey that the amount of gorge excavated since 1750 should be knowable to an acre. The west fall, then, only slightly the larger, has ever since been widening, lowering its edge, and getting more of the stream; so that the east one, comparatively stationary, retaining its height and decreasing in volume, must dry up, and its bed and all the isles become part of New York State. E. L. GARBETT

July 11

### Sky Glows

EVER since the sunsets of 1883 and last year there has been at times an abnormal glare both before and after sundown. But I have seen nothing in the way of twilight effect so strange as that of Monday evening, the 6th, when about 10 p.m. a sea of luminous silvery white cloud lay above a belt of ordinary clear twilight sky, which was rather low in tone and colour. These clouds were wave-like in form, and evidently at a great elevation, and though they must have received their light from the sun, it was not easy to think so, as upon the dark sky they looked brighter and paler than clouds under a full moon. A friend who was with me aptly compared the light on these clouds to that which shines from white phosphor paint. This effect lasted for some time after 10 p.m., and extended from west to north, the lower edge of the clouds, which was sharply defined, was about 12° above the horizon. ROBT. C. LESLIE

6, Moira Place, Southampton, July 8

### Black and White

MY daughter has two terriers, one black, the other white; she has noticed that in the dusk of the evening the black dog is much more visible than the white one, and has asked me the reason for this fact. I cannot properly explain why a white or light coloured garment shows much less in the dusk than a dark coloured dress, but this is a well-known fact to all sportsmen who shoot ducks at night, when it is their custom to wear a night shirt or other white dress over their ordinary costume. When the black and white dogs are playing together in the dusk of evening, the black dog can be distinctly seen when the white dog, at the same distance, is quite invisible. Will you please explain this? WM. E. WARRAND

Bught, Inverness, July 8

### "Foul Water"

DURING a brief stay at Beaumaris in June 1883, and again in June 1884, I had frequent opportunities of observing the "gelatinous masses" mentioned by Mr. Shrubsole as occurring in large numbers at Sheerness-on-Sea. I first noticed them in 1883, while procuring a supply of water for my marine tanks at home. They then existed in very large numbers, and as I had no means of filtering the water before returning to Manchester, I almost expected to find it "foul" upon my arrival. I was, however, agreeably disappointed. The "gelatinous masses" had settled at the bottom of the jars, and were apparently dead. While at Beaumaris I subjected a few specimens to microscopical examination, but being busy with other work did not learn more than is given in Mr. Shrubsole's description.

Manchester

HERBERT C. CHADWICK

### Earthquake-Proof Buildings

UNLESS my memory plays me very false a number of light-houses secured against earthquake shocks by saucers and balls were built in Japan just about twenty years ago from the designs of Mr. Stevenson of Edinburgh. WM. MUIR

The London Institution, Finsbury Circus, E.C.

### THE QUESTION OF CIVIL AND ASTRONOMICAL TIME

ONE of the points made at the Washington Congress was that if Universal Time (surely Earth-Time or Prime Meridian Time would be a better term) were generally accepted, astronomical time might be abolished, astronomers accepting the new day of twenty-four hours commencing at midnight

Since the Congress the question naturally has been

well considered, and we think it desirable that we should now refer to some of the most important opinions which have already been given, not only as regards the desirability of the change, but as to the time at which that change should be brought about.

Among the first to accept the resolution was the Astronomer-Royal, for the internal use of the Observatory of Greenwich. Many opinions were collected at an early date and forwarded by Mr. Chandler, the Secretary of the U.S. Navy to the Senate. This action grew out of an order of Commodore Franklin, the Superintendent of the U.S. Naval Observatory, to adopt the new time on January 1, 1885; this was communicated to Prof. Newcomb, the Superintendent of the *American Nautical Almanac*, and drew a reply from Prof. Newcomb, from which we make the following extract:—

"(1) The Conference expresses the hope that as soon as may be practical the astronomical and nautical days will be arranged everywhere to begin at mean midnight.

"(2) That east longitudes shall be counted as plus and west longitudes as minus.

"The first of these recommendations proposes a change in the method of counting astronomical time which has come down to us from antiquity, and which is now universal among astronomers. The practice of taking noon as the moment from which the hours were to be counted originated with Ptolemy. This practice is not, as some distinguished members of the Conference seem to have supposed, based solely upon the inconvenience to the astronomer of changing his day at midnight, but was adopted because it was the most natural method of measuring solar time. At any one place solar time is measured by the motion of the sun, and is expressed by the sun's hour angle. By uniform custom hour angles are reckoned from the meridian of the place, and thus by a natural process the solar day is counted from the moment at which the sun passes over the meridian of the place or over the standard meridian. For the same reason sidereal time is counted from the moment at which the vernal equinox passes over the meridian of the place, and thus the two times correspond to the relation between the sun and the equinox.

"It would appear that the Conference adopted the recommendation under the impression that the change would involve nothing more than the current method of reckoning time among astronomers, and could therefore be made without serious inconvenience. A more mature consideration than time permitted the Conference to devote to the subject would, I am persuaded, have led that distinguished body to a different conclusion.

"A change in the system of reckoning astronomical time is not merely a change of habit, such as a new method of counting time in civil life would be, but a change in the whole literature and teaching of the subject. The existing system permeates all the volumes of ephemerides and observations which fill the library of the astronomer. All his text-books, all his teachings, his tables, his formulæ, and his habits of calculation are based on this system. To change the system will involve a change in many of the precepts and methods laid down in his text-books.

"But this would only be the beginning of the confusion. Astronomical observations and ephemerides are made and printed not only for the present time, but for future generations and for future centuries. If the system is changed as proposed the astronomers of future generations who refer to these publications must bear the change in mind in order not to misinterpret the data before them. The case will be yet worse if the change is not made by all the ephemerides and astronomers at the same time epoch. It will then be necessary for the astronomers of the twentieth century, using ephemerides and observations of the present, to know, remember, and have constantly in mind a certain date different in each case at which the change was made. For example, if, as is officially announced, the Naval Observatory introduces the new system on January 1, 1885, then there will be for several years a lack of correspondence between the system of that establishment and the system of the American Ephemeris, which is prepared four years in advance.

"It is difficult to present to others than astronomers who have made use of published observations the confusion, embarrassments, and mistakes that will arise to their successors from the change. The case can be illustrated perhaps by saying that it is of the same kind as—though in less degree than—the confusion that would arise to readers and historians in the future if