locality being in Kent. It is therefore of the highest importance that one should know for certain whence the gravel has been derived that one sees on the roads.

I live in an implementiferous district, and find Palæolithic implements in the Highbury and Clapton gravels; but a visitor would make a fatal mistake if he supposed that all the gravel on the roads about here belongs to the district. Sometimes many tons of gravel are brought here from Walthamstow; at other times from Ware or Hertford; sometimes from Dartford, and from other places. Unless, therefore, the greatest possible care is taken in ascertaining the exact locality whence the ballast comes, mistakes are certain to occur.

The lowest gravels about here are unproductive of the works of primæval man, with the exception of, at times, a stray flake or two, probably derived from a higher level. The evidence that I have seen in the lower gravels round London points to the correctness of the conjecture made by General Pitt-Rivers, that the Palæolithic age had passed away before the lower parts of the Thames Valley were excavated.

WORTHINGTON G. SMITH

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How to Prevent Drowning

I HAVE read with some interest Dr. MacCormac's letters on the subject of water-treading as means of preventing drowning.

I am sorry that I cannot agree with him, as it would be decidedly a matter of congratulation if some practical means of diminishing the number of casualties from drowning were found. Personal experience, however, prevents my agreeing with Dr. MacCormac.

I am a tolerably good swimmer, can swim in all the different fashions, but I can neither float nor tread water.

Shortly after Dr. MacCormac's first letter appeared I went to swimming baths with a view of putting the matter to the test. I had carefully read Dr. MacCormac's letter, and determined to give it a fair trial. I minutely observed all his directions, and invariably sank every time I tried his plan.

Now it must be remembered that I am a swimmer, and so far as swimming goes, perfectly at home in the water. Moreover, I was not in the least flustered. When I sank I made no attempt to rise again by swimming; I remained in what Dr. MacCormac would call the orthodox position for treading water, only opening my eyes in order to see whether I was ascending or descending. As however I found that I continued to do the latter until I reached the bottom of the bath, and there seemed to be no probability that I should rise without some further effort, I was at last compelled to make this effort.

This was the course of affairs every time I made the attempt. Moreover, whenever I essayed to float on the surface, although I carefully assumed the correct position, threw my head well back, and took the deep inspiration, the result was the same.

Arguing from these facts, it seems to me pretty clear that it is not everybody who can tread water or float. Why this is so, appears to me to lie in the fact that the human body is not always lighter, bulk for bulk, than water. Perhaps with plump children and others with plenty of adipose tissue about their frame this may be the case, but with spare people who consist mainly of muscle and bone, the specific gravity must be greater than that of water. The body of a fish when the animal is dead will sink until decomposition sets in and causes it to float.

For these reasons I fear that Dr. MacCormac's suggestion will not be found of so much practical use as he hopes. The apparent ease of the process described by Dr. MacCormac may in itself be the cause of rash proceedings by those who cannot swim, and may so lead to greater loss of life, the very evil which the suggestion is intended to diminish.

W. HENRY KESTEVEN

401, Holloway Road, N., June 7

ON the Continent the facilities are greater than in England, where factories and steam-boats spoil the pleasure of swimming, and everybody is well aware that *all can float upon fresh water without assistance from their hands and feet.* It is what in the Paris swimming-schools is called "faire le mort."

Anybody—stout, lean, cripple, halt—is able to do so, and I taught, myself, a poor little hunchback how to perform this easy feat; but his deformity placing him in a state of unstable equilibrium, he was obliged to keep his arms stretched at an angle from 45° to 60°.

Some minutes are sufficient in fresh water to make a proficient and a live "mort." The way to do it is very simple, and Mr. MacCormac described it very exactly, with the omission of some particulars relating to the way of breathing, which had no direct reference to his chief and beneficial topic, "treading water."

He who wishes to "faire le mort" must first draw a deep breath, and keep it, then put himself on his back, with his head thrown backwards, as recommended by Mr. MacCormac, and allow his limbs to droop slackly without any stiffness, no matter in what position.

The body will sink at first under water, but it will immediately rise nearly on a level with the surface, the only parts quite free from water being the chest and the nose and mouth, around which the water describes an oval, whilst the eyes are at times over, at times under, water.

The "mort" can remain floating in this way as long as his breath allows, though it is better not to wait longer than two or three seconds, to avoid fatigue; then he must quickly emit it, draw another deep breath, and keep it again.

The body sinks as before, rises immediately, regaining its floating position, nose, mouth, and chest emerging again from water.

This can be continued for hours together without the least motion of legs or arms, as your readers will be able to verify for themselves, either at the Pont Royal or Ligny swimming schools, on their visit to the Paris Exhibition of Electricity.

Jersey, June 5 CHATEL

P.S.—I ought to add that whilst floating on fresh water the body is not quite on a level with the surface, but from the chest, that is out of water, to the toes, which are about six or eight inches under water, figures an inclined plane, the slope of which varies with everybody, and that any attempt to bring the toes on a level with the surface makes the body sink. On the contrary, the deeper the head is sunk backwards under water the more the body emerges.

Auroric Light

JUNE 6, faint lights, especially to the northward, between 10 and 12; smart frost.

June 7, at 10, masses of purplish light rising from the north-east and congregating about the zenith; pencils of greenish yellow and white rising to the north; these continued up to 12, after which no observations were made; very smart frost, which bit the potato-stalks.

June 7, from 10 to 12, well-marked and at times brilliant columns, pencils, and masses of red rising all round the heavens at intervals, and congregating at the zenith; a most severe white frost that burnt up all the potatoes on the valley flats and on the uplands. At 5.30 on the 8th the frost was so thick that the ground had the appearance as if it had snowed during the night.

Ovoca, Ireland, June 10 G. H. KINAHAN

A Singular Cause of Shipwreck

IN NATURE, vol. xxiv. p. 106, you mention a "singular case of shipwreck" caused by waves and spray freezing on a steamer and sinking it by its weight. Cases of this kind caused by frozen spray alone are known near the east coast of the Black Sea. North of 44°, where the mountains are not very high, an exceedingly strong and sudden north-east wind is frequent, quite similar to the Dalmatian Bora, and called alike. It descends at a certain angle to the sea, raising a great quantity of spray. In winter this spray immediately freezes, and ships may sink by its weight. On January 25, 1848, a war-ship, anchored in the middle of the Bay of Noerrossiisk, sank in this manner. As the weather was fine before, a great part of the crew were ashore, and the storm arrived with such suddenness that the ship sank from the weight of the frozen spray. On account of the bora this coast is avoided by merchant-ships in winter, and visited only by a line of steamers subventioned by the Government.

St. Petersburg, June 8 A. WOEIKOF

OBSERVATIONS ON THE HABITS OF ANTS

ON Thursday (June 2) Sir John Lubbock read a further paper on this subject at the meeting of the Linnean Society. He said that in one of his former papers

(Linnean Soc. *Journ.* vol. xiv. p. 278) he had given a series of experiments made on ants with light of different colours, in order if possible to determine whether ants had the power of distinguishing colours. For this purpose he utilised the dread which ants, when in their nest, have of light. Not unnaturally, if a nest is uncovered, they think they are being attacked, and hasten to carry their young away to a darker, and, as they suppose, a safer place. He satisfied himself, by hundreds of experiments, that if he exposed to light the greater part of a nest, but left any part of it covered over, the young would certainly be conveyed to the dark portion. In this manner he satisfied himself that the different rays of the spectrum act on them in a different manner from that in which they affect us; for instance, that ants are specially sensitive to the violet rays. But he was anxious to go beyond this, and to attempt to determine how far their limits of vision agree with ours. We all know that if a ray of white light is passed through a prism, it is broken up into a beautiful band of colours—the spectrum. To our eyes it is bounded by red at the one end and violet at the other, the edge being sharply marked at the red end, but less abruptly at the violet. But a ray of light contains besides the rays visible to our eyes others which are called, though not with absolute correctness, heat rays and chemical rays. These, so far from being bounded by the limits of our vision, extend far beyond it, the heat rays at the red, the chemical rays at the violet end. He wished under these circumstances to determine if possible whether the limit of vision in the case of ants was the same as with us. This interesting problem he endeavoured to solve as follows:—If an ant's nest be disturbed the ants soon carry their grubs and chrysalises underground again to a place of safety. Sir John, availing himself of this habit, placed some ants with larvæ and pupæ between two plates of glass about one-eighth of an inch apart, a distance which leaves just room enough for the ants to move about freely. He found that if he covered over part of the glass with any opaque substance the young were always carried into the part thus darkened. He then tried placing over the nest different coloured glasses, and found that if he placed side by side a pale yellow glass and one of deep violet the young were always carried under the former, showing that though the light yellow was much more transparent to our eyes, it was, on the contrary, much less so to the ants. So far he had gone in experiments already recorded; but he now wished, as already mentioned, to go further, and test the effect upon them of the ultra-violet rays, which to us are invisible. For this purpose, among other experiments, he used sulphate of quinine and bisulphide of carbon, both of which transmit all the visible rays, and are therefore perfectly colourless and transparent to us, but which completely stop the ultra-violet rays. Over a part of one of his nests he placed flat-sided bottles containing the above-mentioned fluids, and over another part a piece of dark violet glass; in every case the larvæ were carried under the transparent liquids, and not under the violet glass. Again, he threw a spectrum into a similar nest, and found that if the ants had to choose between placing their young in the ultra-violet rays or in the red they preferred the latter. He infers therefore that the ants perceive the ultra-violet rays, which to our eyes are quite invisible.

Now as every ray of homogeneous light which we can perceive at all appears to us as a distinct colour, it seems probable that these ultra-violet rays must make themselves apparent to the ants as a distinct and separate colour (of which we can form no idea), but as unlike the rest as red is from yellow or green from violet. The question also arises whether white light to these insects would differ from our white light in containing this additional colour. At any rate, as few of the colours in nature are pure colours, but almost all arise from the combination of rays of different wave-lengths, and as in such cases the visible resultant would be composed not only of the rays which we see, but of these and the ultra-violet, it would appear that the colours of objects and the general aspect of nature must present to them a very different appearance from what it does to us.

Similar experiments which Sir John also made with some of the lower Crustacea point to the same conclusion, but the account of these he reserved for a future occasion. He then proceeded to describe some experiments made on the sense of direction possessed by ants, but it would not be easy to make these intelligible without figures. After detailing some further experiments on the power of recognising friends, he gave some facts which appear to show that ants by selection of food can produce either a queen or a worker at will from a given egg. Lastly he stated that he had still some ants which he had commenced to observe in 1874, and which are still living and in perfect health; they now therefore must be more than seven years old, being therefore by far the oldest insects on record.

THE WEATHER AND HEALTH OF LONDON[1]

TO the statistician London affords materials for the prosecution of many inquiries such as could not be obtained from the statistics of any other city either in ancient or modern times. Among the more important of these inquiries are those which relate to questions suggested by the enormous aggregation of human beings over a limited area which London presents on a scale absolutely unparalleled in the world's history. It is one of these questions we bring before you this evening, viz., the influence of the climate on the health of the people of London.

The relation of weather to health is a question which has engaged the attention of Dr. Arthur Mitchell and myself for many years. In an early stage of the inquiry our attention was mainly directed to Scotland, and more particularly to the data supplied by its eight large towns; but it was soon found that, owing to the sparseness and other conditions of the population, and to the fact that the division of time into months only, adopted by the Registrar-General for Scotland, they were not sufficiently minute to show the true relations of weather to the fluctuations of the death-rate through the year. In truth it was only after not a little unsuccessful labour, and what could at best be characterised as no more than partially successful work, that we resolved eight years ago to open the discussion of the whole subject by an exhaustive examination of the meteorological and vital statistics of London and London alone. More specifically our reasons for the selection of London were that it afforded data from (1) an enormous population spread over an area so limited that it might be regarded as having one uniform climate during each of the seasons of the year; (2) full weekly reports of weather and the deaths from the different diseases; and (3) returns extending over a sufficiently long period.

In the case of diseases such as diarrhœa and bronchitis, which seem to be directly and immediately under the influence of temperature, and such epidemics as scarlet fever and whooping cough, the rate of mortality from which is largely determined by season and weather, a comparatively small number of years is required to give a satisfactory approximation to their true weekly curve of mortality. But as regards the great majority of diseases, it quickly became apparent that a thirty years' average was required in the construction of curves which could be accepted as true "constants" for the diseases to which they refer. The thirty years beginning with 1845 were therefore adopted. An examination of the curves shows that some of their striking features, particularly those

[1] Substance of a Lecture delivered at the Royal Institution, March 25.