but I see no *à priori* reason for expecting to find one such law rather than another; we must try which assumed law will most nearly coincide with fact, and the hypothesis of a harmonic mean does so coincide pretty nearly. The following table (see my previous letter) gives the ratios of the wave-frequencies of red, orange, and yellow as observed, of their complementaries as observed, and of the same as calculated on the hypothesis of the harmonic mean:—

		Observed.	*Calculated.*
Red . . .	36·40	Bluish Green	48·30	48·53
Orange .	39·80	Blue	51·80	53·07
Yellow .	41·40	Indigo	54·70	55·20

The discrepancies between the observed and the calculated outlines are much less on this hypothesis than in that of the geometric mean; but they are on the same side, and, as I explained in my former letter, I think it likely they may be due to the solar spectrum not being of a truly white colour, owing to the absorption lines toward the violet end. They are on the side which this way of accounting for the fact requires. It would be desirable to make a set of comparative experiments with solar light and the electric light, as I suggested before, in order to clear up this question.

Old Forge, Dunmurry, Co. Antrim, June 13 JOSEPH JOHN MURPHY

On the reported Current in the Suez Canal

IT is stated on excellent authority that a constant current runs through the central portion of the Suez Canal, from the side of the Mediterranean to that of the Red Sea, and a good deal of surprise has been excited by this apparently anomalous phenomenon. A little consideration will, however, suffice to establish a theory, that constant currents are almost necessary conditions of inter-oceanic canals, and that their absence, not their presence, would be contrary to just expectation. My reason is based on the improbability that a long canal, A B, could be constructed across strata that are almost necessarily inclined in one direction more than another, which should not resist the flow of tidal water from, say, A towards B, more than from B towards A. Wherever this differential aspect is established, a quasi-valvular action is called into existence, and a current along the middle of the canal, in a constant direction, is the necessary consequence.

Let A B be the canal, and *a b* the extreme limits of tidal influence. After each successive rise and fall of the tide on either side, more water will have passed from A towards *a*, than

will have returned from the side of *a* to A, and more water will be able to travel from the side of *b* to B, than can get up the canal from B towards *b*. Consequently there will be a constant current in the ultra-tidal portion, *a b*, of the canal, from the side of A to that of B.

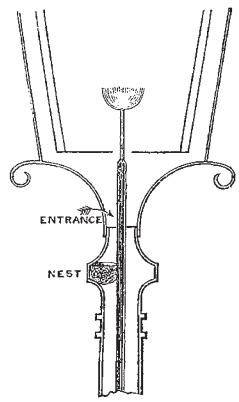
I have made some inquiries, but am unable to learn what notchings, indentations, or sweeps of the sides of a canal, would exercise the greatest differential effect, at low velocities, of the kind of which I am speaking. However, I hear it is a fact well known to sailors, that a spar cannot be towed behind a boat, unless with the greatest difficulty, if its small end be foremost, whereas, it is moved easily enough if its thick end be in front. I argue from this that if a number of spars were moored against the sides of the canal, with their large ends towards A, much less strain would be exerted on the ropes by which they were secured when the current ran from A to B, than when it ran from B to A, and consequently that the current itself would be much less resisted in the former than in the latter case. A succession of very long notches in the sides of the canal would produce identically the same effect, and might call into existence a considerable aggregate of differential resistances. I constructed a model for the purpose of experiment, but found it much too small to give satisfactory results; nevertheless, I will describe it, in hopes it may save trouble to others in designing a suitable arrangement, for the same purpose, on a larger scale. A notched trough was cut, running up and down in long zigzags, and its two ends were brought together into the same reservoir. By alternately allowing water to run into the reservoir, and then drawing it off, the effect of the rise and fall of the tide was simulated. I scattered lycopodium on the water, in the middle part of the channel, to show the direction of the current.

I venture to suggest to those engineers who are connected with inter-oceanic canals, the importance of making experiments on this problem, because it may prove to be quite within their means to produce and to regulate a current within such canals, in the direction and of a velocity most convenient to keep its bed clean and serviceable. FRANCIS GALTON

Birds' Nests

BIRDS, though almost always adapting themselves to circumstances in the use of materials, are frequently, even in the country, very eccentric in their choice of a place for their nests. I have seen a blackcap's nest built of the ordinary materials, in an open flower-pot standing on the top of a garden wall. Apparently there was no possible reason for this, there being plenty of hedges and banks hard by. But in the neighbourhood of London birds may be allowed an excuse for their eccentricities.

In a quiet street in one of the southern suburbs there is now a pair of tom-tits who have taken possession of a cast-iron lamp pillar, wherein they have built their nest and reared their young for two or three years past. It is curious to think what business they could have had there, to have found out that it was a suitable residence. The nest is placed in the bulb or swelling out of the column, just below the lamp, and the birds creep through



the space between the gas-pipe and the iron rim at the top of the column. This space is not three-quarters of an inch in width. The nest is on one side of the pipe, and cannot be more than two inches across. The lamp is lighted every evening, and on one occasion the pillar was actually taken down for some repairs with the nest inside, containing seven or eight eggs, which were, I believe, destroyed; but the birds, concluding I suppose that this was not done with *malice prepense*, but that it was only a necessary domestic difficulty, wisely returned to their home, and continued to occupy the lamp pillar for the remainder of the season, rearing another brood that same year. The accompanying sketch shows the position of the nest. Under the eaves of the adjacent house, two pairs of house martins have built this year. They came flitting about on the 1st June, and the weather being very dry, and no mud to be got at, the "gudeman" of the house kept a little spot in the road well watered, from whence the birds obtained all their necessary mud. The sparrows would plump down after the martins, thinking there was food there, and stand watching the martins at this little wet spot, and wondering apparently why they kept on flying down here, where there was no grub to be got. They tried hard to obtain possession of the martin's nests when half built, but were constantly driven away by the gentleman of the house, and now the nests are finished, and the entrance too small for the sparrows to get in; so that they dwell in comparative security. Two of these martins seem to be the sole occupants of their nest, but the other nest appears to be visited, at least, if not owned by, more than one pair of birds, three or four birds being often seen there at one time. I have often noticed this in the country, but never saw any remarks about it recorded by any one.

C. W. W.