invoked to account for the white underparts and white quills of the pied forms, which would be well concealed if the bird lay flat on the ground.

Yet in this case of a bird which has been protected by man for a few centuries only, we see these beautifully arranged markings appearing suddenly and almost in full perfection, by simple variation happening to take, in this species, these definite forms.

Last winter I procured in the Bazaar here a pintail snipe (*Gallinago stenura*), marked much like a pied guinea-fowl, with white outer primaries, some white down the breast, and orange toes. This is the kind of resemblance which is put down to mimicry when occurring between two wild *species* of similar size inhabiting the same country.

And thus the view of Darwin, that mimicry has always commenced between forms with a considerable resemblance to start with, receives confirmation ; as also from the fact that, in birds at any rate, so many cases of ''false mimicry'' between species inhabiting distant countries can be shown to occur.

At any rate, whether we are dealing with recognition-marks, sexual selection or mimicry, it seems to me that the study of variation constantly tends to show that natural selection has always at hand far greater material in the shape of colour-variation than is commonly supposed.   F. FINN.

Indian Museum, Calcutta, May 1.

A Cubic and Submerged Cubes.

THE following is a curious puzzle. Given a square box having an area of 27 square inches on its floor and having vertical sides, and filled with water to a depth of 2 inches, it is required to find the size of a heavy cube which, when resting on the bottom of the box, will have its upper surface high and dry above the surface of the water. The curious thing is that there is no such cube. A very small cube will have its top nearly 2 inches below the surface ; the largest cube that can go into the box, its edge being 5 inches and a fraction, forces all the water above it except a film and, again, has its top nearly 2 inches below the surface. There is one cube, that with its edge 3 inches, which has its top just on a level with the surface of the water ; its top may be dry, but is not both high and dry. All other cubes are more or less submerged. This is a numerical example of a unique case.

For an example of the general case, let the area of the floor of the box be 28 square inches and let it contain 48 cubic inches of water. Now it will be found that there are two cubes which, when placed on the bottom, have their tops on a level with the surface of the water. They are the cubes with edges 2 inches and 4 inches respectively. All cubes between those two have their tops high and dry above the surface, while all other cubes are more or less submerged.

It may be interesting to know that these cubes give a physical interpretation to the roots of the cubic obtained by equating the trinomial $x^3 - ax + v$ to zero. The equation has two positive roots, m and n, and a negative root, $(m+n)$. If a be the area of the bottom of the box and v the volume of the water, then x is the edge of the cube which has its top flush with the surface of the water. There are, therefore, in general two such cubes, m^3 and n^3, the negative root being inadmissible. Since $a = m^2 + mn + n^2$ and $v = mn(m+n)$, by giving values as $m=4$ and $n=2$ we obtain $a=28$ and $v=48$, as in the second numerical example above. Again, if we suppose the two positive roots equal, as $m=n=3$, we have $a=27$ and $v=54$, as in the first example.

If a value be assigned to x lying between m and n, it is readily shown that the trinomial is no longer zero, but is negative, which is the condition that the top of the cube shall stand above the surface, while for values of x on either side of m and n the trinomial becomes positive, so that these cubes are submerged.   THOS. ALEXANDER.

Trinity College, Dublin, May 22.

The Electrical Resistance of the Blood.

IN a letter published in NATURE of July 13, 1899, the author communicated some of the results he had obtained in measuring the electrical resistance of the blood. These results showed that the average resistance of normal blood at 60° F. measured by Kohlrausch's method in the apparatus used amounted to 550 ohms, while the specific resistance was 93˙5

ohms. Further, a marked change was observed in pernicious anæmia, the resistance in this disease falling to about one-half (300 ohms) that of normal blood. The author has shown (*Proceedings* of the Royal Society of Edinburgh, December 21, 1891) that the electrical resistance of the urine in this disease is greatly increased (about 100 ohms specific resistance instead of the normal 45 ohms) ; hence we have the striking fact that, while the urine contains too few salts, the blood contains an abnormal amount. The kidneys, then, must obviously be in fault. In a patient, aged fifty-one, suffering from pernicious anæmia, under the care of Dr. A. James, in the Edinburgh Royal Infirmary, the blood resistance, measured on February 25, 1902, amounted to 300 instead of to the normal 550 ohms. The resistance of the urine, measured at the same time, amounted to 88 ohms instead of to the normal 45 ohms. The blood corpuscles numbered 900,000. The blood resistance in diabetes mellitus is high, like that of the urine. A number of experiments have been made by me to ascertain the time occupied by ingested sodium chloride to reach the blood. The blood resistance in five cases was measured before taking 30 grains of the salt and at five-minute intervals afterwards. The average time taken for the first lowering of the resistance of the blood was 15˙4 minutes, and the maximum effect was produced in 21˙4 minutes.

Further observations on these lines promise interesting results.   DAWSON TURNER.

Chickens Hatched in a Tree.

YOU may, perhaps, think the following account of an incident which happened here last week in our poultry-run worth printing.

About May 1, one of our hens, which was known to be laying, totally disappeared. For some ten days she baffled all our efforts to discover any traces of her. At last she was found sitting on the eggs she had laid in a squirrel's nest, in a Scotch fir-tree, at a height of 16 feet from the ground.

For the remaining eleven days of her incubation the hen was watched descending, and ascending from bough to bough to her high perch, at first every day once, but latterly once every other day, as far as could be observed.

On Thursday, May 22, the hen was found with six live chickens and two dead ones at the foot of the tree. Unluckily no one witnessed the actual descent. She could not, however, be persuaded to enter an ordinary hen-coop.

With some trouble, the hen and her six chickens were got eventually on to some straw in an old railway-carriage, which I had erected some years ago on the edge of the hen-run, which is sheltered from the north wind by a fir-plantation, where many squirrels build their nests.

In order to convey her chickens from the railway-carriage to the ground, the hen was seen to spread out her tail and descend with all six young chickens at once on her back. Doubtless she had conveyed them down the 16 feet from the fir-tree in the same fashion, but probably only one or two at a time.

Six-Mile-Bottom, Cambs., May 25.   W. H. HALL.

A Curious Optical Effect.

A FORTNIGHT ago, while standing with my back to the sun, which for a few minutes happened to be shining brightly, and with my face within a few inches of some darkly painted boards, which were covered with minute sparkling particles, presumably from an adjacent coke-grinding machine, I noticed that on approaching my face a little closer, the particles became iridescent and apparently magnified to a size of about one-eighth of an inch. On closing one eye and looking closer, concentric circles appeared, with a cross × over them, and in some cases there was a smaller circle just touching the inner margin of the larger one ; in others the small circle seemed to be nearer the centre of the larger one. On a subsequent examination, when the sun was not so bright, the concentric circles seemed to be wavy and indistinct, as was also the case with the cross. The whole thing reminded me of illustrations I have seen of effects produced by tourmalines under certain conditions.

If this is a commonly observed phenomenon, I should feel obliged for any references to literature on the subject.

E. MOOR.

49 Arbitration Street, Doncaster, Yorks., May 26.