

follows as to the tribes of the vast region of the Amazons. "There are as yet no grounds for considering that the present barbaric condition in these districts is secondary, that any other higher social condition had ever here preceded it, that this swarming-ground of ephemeral unsubstantial hordes had ever been the theatre of a cultured nation."* It is to be noticed, however, that this passage does not seem necessarily to involve a recantation by Dr. Martius of his former opinion. He leaves it quite open that the tribes of the Amazons, though they did not degenerate in this region from civilised ancestors, might have done so elsewhere, and then migrated as savages into the forest regions where as savages they remain. The context may on the whole favour this view of his meaning. Now this matter quite deserves further looking into. It would be well worth while if Dr. Peschel, from personal or published sources available to him, would settle once for all the question whether the great Bavarian ethnologist continued through life the degenerationist that we in England suppose him to have been. Some twenty years ago, Dr. Prichard ("Natural History of Man," 1843, p. 497), citing Martius as to this very matter of the supposed fall of the South American tribes from an original higher state, remarked that "had he taken a more extensive survey of the nations of the whole continent, his opinion might have been somewhat modified." As Dr. Martius did take the more extensive survey thus recommended, it would be particularly curious to ascertain whether it did have the effect thus foretold on his mind.

EDWARD B. TYLOR

Flight of Birds

ALLOW me to return thanks to such of your correspondents as have been kind enough to notice the query (vol. viii. p. 86) on this subject which I made through your columns.

As the matter seems to have excited some little interest perhaps you will permit me to state in what respect the solutions proposed appear satisfactory.

That an "upward start" of wind of sufficient velocity would support a bird of given weight and surface of resistance is no doubt the case. As in still air a bird, by holding its wings in a plane slightly inclined to the horizontal, will glide with a velocity which ultimately becomes uniform, in a straight line obliquely downwards, so the same bird in the same position, but in a current slanting upwards in a like direction and with a like velocity, must remain at rest. Nevertheless there are difficulties in the way of thus explaining the phenomenon.

(1) It supposes the existence of air-currents of greater rapidity and at a greater angle of elevation than are likely often to be met with. Taking the number of square feet in the whole resisting surface of the bird to be equal to the number of pounds in its weight, then a vertical current of 15 miles per hour would be required to support a bird with its tail and wings fully unfurled but motionless, and a current of 30 miles per hour would be required if the current ascended at an angle of 30° with the horizon. Now wind directed upwards by encountering the side of a mountain is not likely to be inclined at a greater angle than this, which is the average slope of a very steep mountain side, and moreover the phenomenon of hovering without wing motion may be observed where such rapid currents have no existence.

(2) The phenomenon is sometimes observed where it is almost impossible to suppose the existence of any upward air-currents whatever. The first time it attracted my attention was in the neighbourhood of London, towards Finchley Common, where it will, I think, be admitted that there is nothing in the natural configuration of the ground to determine an upward current of sufficient velocity to produce the required effect. The wind at the time was certainly not boisterous, but as the bird was at a considerable elevation there is still room to imagine that the upper currents in which it was situated might be different from those below. I was informed at the time that the bird in this case was a kite; this may have been an error, as I understand that kites are now rarely seen near London. However this may be I should gladly hear from such of your correspondents as have the opportunity of watching the motions of the kite as to whether the position of motionless hovering, which I believe this bird continually assumes, can be explained always by the existence of upward currents. I do not of course deny but what birds, while hovering, avail themselves of upward currents where they can. If the position is the result of considerable though imperceptible

muscular action they would naturally seek to economise their strength as far as possible by availing themselves of whatever support they could get from upward wind currents.

As your correspondent, J. Herschel, implies, it is difficult to dissociate the hovering and the soaring of birds. That birds soar, that is, that they continue suspended in the air for long periods of time together, in rapid motion, with no further apparent movement of the wings than is necessary to guide them, and this under circumstances where it is obviously impossible for them to avail themselves of upward air slants, cannot be denied. Whoever has made the voyage to the Cape must have observed this in the case of the albatross. This bird appears to rise from the sea with great difficulty and with the expenditure of much wing power; but, being once fairly launched in the air, its flight becomes a most inexplicable phenomenon. In the open ocean, during a steady wind, it soars for hours about a ship going at the rate of six or eight knots an hour, without apparent difficulty, and with no further wing motion than seems necessary to guide it, now skimming the water in the wake of the ship, now sweeping round to the side or in front, rising and falling by what has been well described as an apparent act of volition, and with no perceptible loss of velocity. Now I think it must be admitted that the motionless hovering and the soaring of birds are phenomena closely allied to each other, that no explanation of the one is satisfactory which does not explain the other also, and that, as the theory of upward slants cannot possibly explain the soaring of birds, it cannot be accepted as a satisfactory explanation of their hovering.

Besides the "upward air slant" theory, a correspondent of one of your contemporaries refers me to the Duke of Argyll's "Reign of Law" under the supposition that the matter is fully explained in the third chapter of that work. I only refer to this to point out the curious example it furnishes of fallacious reasoning. The author obviously thinks that, by a proper arrangement of its wings and tail and the position of its body, a bird can without muscular exertion remain suspended in a horizontal air-current, provided the latter be of sufficient velocity (see p. 170). This of course requires no refutation; but the whole of the chapter in which it occurs may be read with interest as illustrating the curious mistakes a clever and earnest amateur will fall into in writing on even the most elementary scientific subjects in which he has had no exact training.

F. GUTHRIE

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An Optical Delusion

THE following is an optical delusion which is none the less interesting for being very easily explained.

Let a person standing before a looking-glass look attentively at the reflection of the pupil of one of his eyes, and then at that of the other—let him look at different parts of the eye, and from one eye to the other, first at one and then at the other. Knowing that in thus changing the direction of his gaze his eyes must move about in their sockets he will expect to see that they do so in the glass. As a fact they will appear perfectly still.

If he looks at the eyes of another person trying the experiment, the peculiar fixedness of his own will be still more striking, when he looks at them again.

I will not spoil the riddle by giving the answer at the end.

J. H.

Longevity of the Carp

CAN any of your readers give any well-ascertained proof of the length of life attained by the carp? When residing as a youth at St. Germain, I was told by an aged Legitimist that his father had watched the same carp throughout the whole of his life, and the son asserted that he had known the identical fish for twenty and thirty years after his father's death, thus giving to them an age of from sixty to seventy years. That remarkable statement is more than substantiated by Lady Clementina Davies, who, in "Recollections of Society" (p. 49), alludes to the longevity of the carp in the moat of the Château de St. Germain, one bearing in his gills a ticket proving him to be over 200 years of age; and others at Versailles, bearing silver rings through their gills with the name of the courtier who had inserted it, and testifying to an almost incredible longevity. What amount of truth may we attribute to these statements?

Croydon, Surrey, June 13 ROBT. RODOLPH SUFFIELD

* Martius, "Beiträge zur Ethnographie Amerikas," vol. i. p. 375. The other passages here referred to will be found in the same volume, pp. 5, 83.