

over, acquainted with the morphology and some of the cultural characteristics of this organism, which is a frequent source of contamination in my laboratory. Further, a number of similar bacilli were found in the smears from the other deposits, but in every case they were dead and quite incapable of growth. In many of these smears circular bodies were also visible, often very suggestive of torulæ. They varied so much in shape and size, however, that though some specimens were indistinguishable from living organisms, others were clearly irregular plates of silica which were capable of absorbing the usual stains.

As a result of these experiments I am forced to conclude that the remarkably lifelike bodies described and photographed by Dr. Bastian are due to the deposition of silica round minute nuclei or on the detritus of dead organisms, in the manner described by Moore and by Paine.⁴

I am quite at a loss to discover an explanation of the results of A. and A. Mary,⁵ whose original paper I have been unable to read, unless they are due to lack of sufficiently stringent precautions, as in the case of the contamination mentioned above; for when the greatest care is exercised, tubes prepared in this manner will still be absolutely sterile even after an interval of three years.

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Stability in Flight.

ALTHOUGH I am quite incompetent to hold any opinion on problems in human aeronautics, I venture to submit that the inference drawn by Prof. D'Arcy Thompson from the flight of certain birds (p. 409) does not agree with accurate observation, and may prove misleading.

Prof. Thompson's proposition is that long tails are disadvantageous to safety and stability in windy weather, and that birds of skilful or agile flight are equipped, "on the whole, with small tails and comparatively small and narrow wings." No such generalisation can stand in the face of facts. One has but to watch the evolutions of flocks of two of the commonest British birds—the rook with a long and broad tail, the lapwing with a shorter one, and both with remarkably broad, rounded wings—to admire their perfect mastery of flight in stormy weather.

Prof. Thompson describes the pigeon (species or variety not defined) as "a splendid flyer for mere distance," but indifferent in manœuvring because of its "large, rounded wings." No species of pigeon known to me has rounded wings; all have them long and pointed, and as for "sudden and acute changes of course," the pigeons in St. Paul's Churchyard have inherited a remarkable faculty in that respect from their "blue rock" ancestors, which had to thread their way at top speed through narrow sea-caves. Moreover, one variety—the tumblers—are perpetually "looping the loop," notwithstanding their long tails.

Coming to birds of prey, Prof. Thompson classes the kestrel with the buzzard as a broad-winged hawk, and remarks that falconers despised both. But the kestrel is a true falcon as testified by the dark iris, the notched maxilla, and the long and pointed wing (the second and third primaries being the longest). It is true that falconers had little use for the kestrel, not because of its inferior wingmanship, for it has few rivals in power and dexterity of flight, but because it preys chiefly on mice, beetles, and other diminutive ground game. But the goshawk and the sparrow-hawk are Accipitrinæ, with broad, rounded wings, the fourth and fifth primaries being the longest. Fal-

coners greatly prized the goshawk for its prowess in flight, and the sparrow-hawk is distinguished by extraordinary agility and quickness in turning when in pursuit. Two opposite types of bird may be noted as having long tails and superb powers of flight, viz. the kite and the nightjar, the latter taking all its prey on the wing.

Lastly, when Prof. Thompson suggests that the outstretched legs of a heron act "as a very useful counterpoise to the long neck and bill," he seems to have forgotten that this bird does not fly with outstretched neck like a swan or a mallard. The heron extends its neck in rising from the ground; but so soon as it is fairly on the wing it tucks back its neck and rests its head between its shoulders, thereby reducing to a minimum the lengthened axis which Prof. Thompson regards as "contributing very materially to the creature's longitudinal stability."

Monreith.

HERBERT MAXWELL.

I WILL give in to Sir Herbert Maxwell so far as to say that some of my examples might have been better chosen; I will go further and admit that my kestrel was clearly not a case in point. On the other hand, Sir Herbert throws more responsibility on me than I ever undertook, and he sweeps aside all the qualifying and questioning words with which I was careful to safeguard my letter: not that I wanted to hedge or hide behind these, but simply that my object was to suggest an inquiry, not to lay down the law. As to the mechanical advantages of short tails compared, *caeteris paribus*, with long tails, I made no assertion and laid down no proposition; but certain learned mathematicians had done so, bringing forward their proofs, and the naturalist has no right to dispute such abstract and theoretical demonstrations. When Galileo showed the mechanical advantages of a hollow pillar he adduced the straw and the quill as exemplifications of the principle; and the mere fact that so many trees and so many feathers are not hollow at all gives the naturalist no sufficient right to question it. I directed attention to the fact that Prof. Bryan and Dr. Brodetsky, after demonstrating a principle, had stopped short of inquiring whether it could be illustrated by, or recognised in, the case of the living flying organism; I considered that there were many cases in which it could be so recognised, and I am of that opinion still. We must not forget that "*caeteris paribus*" is an essential condition of our comparison, and that this condition we can only seldom and approximately fulfil. Moreover, we are dealing only with differences of degree, with grades of excellence. No one doubts that the rook flies extremely well, and for that matter every flying bird is marvellous in our eyes; but for all Sir Herbert may say to it, I don't believe that a flight of rooks can approach a flock of sandpipers, in the particular qualities of grace, dexterity, and precision of movement.

As to the heron and its long neck, it would almost seem to me as though Sir Herbert had gone out of his way for the sake of fault-finding. I never said the heron flew with its neck stretched out; I said it flew with its legs stretched out. Why, I was brought up in my boyhood within a couple of miles of a heronry, and saw the birds every day of my life! But the heron has a long head and a long neck, and they have to be carried somehow; and it is somehow by help of the long legs that they have to be counterpoised and balanced. The slender bill, narrow body, and long, thin legs make up a sort of long, narrow, axial framework associated with the machinery of flight. I was surely entitled to suggest, or to surmise, that this extended axis (a little like a witch's broomstick) might have a notable influence on the motions of the bird

⁴ *Annals of Botany*, vol. xxx., No. cxix., p. 383, July, 1916.

⁵ *Le Médecin* (Brussels), October 31, 1913, and January 15, 1914.