ment of mechanical conformation which can be attained by the development of a vertebrated structure.

The power of flying is derived altogether from the resistance which the air opposes to bodies moving through it, or acting upon it by mechanical impulse. In the ordinary movements of our own bodies, this resistance is scarcely sensible, and hardly ever attracts notice; but it increases in proportion to the surface which acts upon the air, and still more according to the velocity of the moving body; for the increase is not merely in the simple ratio of the velocity, but as its square, or perhaps, even a higher power. In order that an animal may be able to fly, therefore, two principal conditions are required: there must, first, be a considerable extent of surface in the wings, or instruments which act upon the air; and there must, secondly, be sufficient muscular power to give these instruments a very great velocity. Both these advantages are found combined in the anterior extremities of birds, and no animals belonging to any other class possess them in the same perfection. No quadruped, except the bat, has sufficient muscular power in its limbs, however aided by an expansion of surface, to strike the air with the force requisite for flight. No refinement of mechanic ingenuity has ever placed the Dædalian art of flying within the reach of human power; for even if the lightest possible wings could be so artificially adapted to the body as to receive the full force of the actions of the limbs, however these actions might be combined, they would fall very far short of the exertion necessary for raising the body from the ground.

Examples, however, occur in every one of the classes of vertebrated animals, where an approach is made to this faculty. In the *Exocetus*, or flying-fish, the pectoral fins have been enormously expanded, evidently for the purpose of enabling the animal to leap out of the water, and support itself for a short interval in the air; but its utmost efforts are inadequate to sustain it beyond a few moments in that element,