

The author, an aeronautical engineer, begins with a standard introduction to the basics of aerodynamics. Carefully avoiding overburdening the reader with details, he introduces atmospheric pressure, dynamic and kinematic viscosity, the Reynolds number, shear stress, the Bernoulli principle and the other terms important to aerodynamics. Even here he tantalizes the reader with the relevant range of the Reynolds number, with spores at the low end and birds at the other, separated by about ten orders of magnitude.

The strength of the book is the host of puzzles Ward-Smith presents. Why do falling water drops collide if they are similar in size, but avoid collision otherwise? As a water drop grows, why does it flatten, become concave on its bottom side, develop essentially into a bubble and then burst?

Ward-Smith explains how hexagonal plates and needles of ice fall broadside—an orientation that leads to the many halos, arcs and parhelia that one can often see in the sky. He examines the forces governing the fall of hail, pointing out that the large hailstones (up to 30 pounds) sometimes reported in the press are unlikely because their terminal speed of about 150 miles per hour would surely mean their destruction when they hit the ground.

A chapter is devoted to the dispersal of fruits and seeds. Tiny seeds, spores and pollen develop no lift but can be carried great distances by thermals and the wind. Dandelions wait patiently for the proper humidity, temperature and wind before releasing their plumed parachutes. The samaras of maples and sycamores have evolved into helicopter wings to slow their descent, so that they spread beyond the region of their parent.

Birds soar and glide in rising bubbles of hot air, broad uplifts or vertical velocity gradients, effortlessly altering their wing shapes and orientations for best advantage. They also are capable of hovering and of flying either quickly or slowly. When they fly in flocks, all but the lead bird position themselves so as to enjoy the upwash left by another bird.

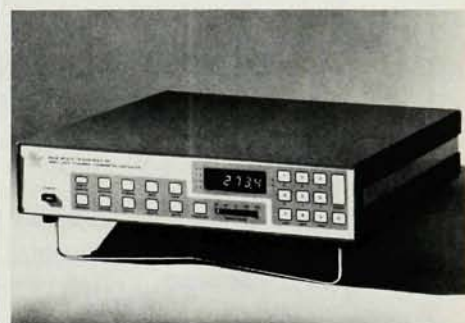
Ward-Smith examines the flight of insects, laying to rest the old and incredible claim that the botfly can exceed the speed of sound. Seemingly nothing escapes his observations, not tumbling tumbleweeds, flying frogs and fish or gliding lemurs, not even pterodactyls. This book works well as an introduction to biophysical aerodynamics, whether for classroom use or as enjoyable reading at home.

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