Soaring Birds

by JOHN H. STORER*

A study of bird flight with a slow motion camera brings up some questions about gliding and soaring which so far as I know have not been satisfactorily answered.

We find among gliding and soaring birds three classes adapted to three different types of environment. Soaring birds of the ocean that can travel on dependable air currents near the ocean surface have, almost without exception, wings of high aspect ratio and narrow or pointed tips. They sometimes soar to great heights but probably seldom need to. As Mr. Alfred Woodcock has shown in his studies of soaring gulls, when conditions are right for soaring over the ocean they are apt to be uniformly good over great areas, and fairly close to the surface.

The birds that are built to travel on these currents are built for straight soaring ability, with the modification that their wings must be short enough to be manageable for active flight when necessary, and simple enough so that they can be used when wet. As a rule they are not strong fliers and depend on soaring for most of their travel. The albatross, one of the most highly specialized of this class, has an aspect ratio of about eleven.

An intermediate group of birds lives on or near the water, but also travels long distances overland by soaring, and to do this must often soar to great heights from which it can glide between the widely separated thermal currents. Here we find a sort of hybrid wing. The white pelican, with a nine-foot wing spread has the high aspect ratio of the ocean soarers, but the slotted tips of the land soaring birds. The wood ibis habitually flies with a series of flaps followed by a glide on its momentum. During this glide, it uses pointed wing tips, but when it starts to soar, it spreads the feathers at the tips to form a series of slots, and so far as I have been able to observe it keeps these slots open habitually when soaring.

The third group of soaring birds, buzzards, condors and hawks that travel chiefly over the land must usually get a good elevation for gliding between scattered currents of rising air. These birds, almost without exception, use slotted wing tips for soaring. The condor, one of the most highly specialized, depending almost entirely on soaring and gliding for its travel, has wings slotted for about four feet out of its entire span of ten feet. Most of these soaring birds have a lower aspect ratio than the ocean soarers. They might seem to have altogether a less efficient wing for either gliding or soaring than the ocean birds, and yet nature has developed this wing through a process of evolution based on the survival of the fittest, a wing that is certainly more complicated to use and probably more fragile. Why?

A number of reasons have been advanced,—the need for banking sharply at low speed in a tight spiral to keep within the limits of a narrow thermal, the ability to spill lift by opening the slots when enough elevation has been gained, the greater stability given by slots in violently changing mountain currents, etc. But there are plenty of observations of slots used when none of these reasons seemed to apply. I have watched condors trying to gain elevation when there was barely enough air motion to keep them going. I have watched them travel for long distances on a straight level course, and spiralling upward, always with motionless wings, and they used slotted tips under all these conditions. Having seen albatross pivoting on a pin point among the rollers of the Pacific, I would credit the pointed tips with good stability.

These slotted tips are very deceptive to watch, and in studying them one should always keep this point in mind, the feathers are banked somewhat one above the other, highest in front, lowest behind, so that when seen from a certain angle, below and behind or above and in front, they mask each other and appear closed, even when seen at close range through powerful glasses, but from below and in front the condor slots always appeared open in my observations, but they can vary the size of the openings.

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