



and Pleasure

has on it several feathers which are curved so as to make a slot when raised and which fit flush with the leading edge when in the down position.) The Gannet's alula is dark and in both down and up positions shows clearly against the white leading edge. It can be seen perfectly in the raised position in the photograph on page 12 of a Gannet landing beside its chick. This slot is seldom seen open except when the bird is landing.

There has been speculation as to whether this slot is opened by muscular action or whether it opens automatically. Dr. R. H. J. Brown tells in a recent paper how he mounted a pigeon's wing in a wind tunnel before it had stiffened and found that the slot opened automatically just before the stalling angle had been reached. He then showed that if the slot is fastened in the shut position, and the wing is held so as to be just stalled, release of the feathers and the consequent opening of the slot re-established a smooth flow of air over the wing.

Shape of the Tail

The Gannet has a pointed tail, the centre tail feathers being longer than the outer ones; not a common feature in birds. In flight it is kept shut so that the body has a characteristic cigar-shaped appearance. Thus the rear end of the bird has perfect streamlining, the effect being further helped by the bird's habit of hiding its feet beneath its tail feathers. These completely retracted feet pop out when the bird is landing and are lowered as airbrakes.

The tailplane of an aircraft is used mainly to keep the back end *down*, the centre of gravity being in front of the resultant lifting force. If the angle of attack should increase, the increased lift will tilt the aircraft back on to its original course, giving stability. The Gannet doesn't need this stability for it can achieve it by swinging its wings back or forward a little. So it uses its tail as an additional supporting surface, as can be seen when the bird comes in to land when, as it slows down, the tail is grad-

Species	Weight	Wing-area	loading Wing-	Wing-span	Aspect ratio	Flight muscles as % of total weight	Remarks
	lb	sq. ft.	lb/sq ft	ft		%	
Mute Swan.....	27	6.7	4	8	9.5	14	About the heaviest bird capable of flight
Gannet.....	7	2.2	3	6	16	13	Highest aspect-ratio of British birds.
Great Black-backed Gull.....	3.1	2.5	1.2	5.2	11	16.5	A general purpose design. Can fly fast, glide, soar.
Mallard.....	2.8	1.1	2.6	3	9	25	A high-powered fast flier.
Guillemot.....	1.8	0.4	4.5	2.2	13	25	Despite high power only just able to take off. Very high wing-loading. Designed for swimming under water using wings.
Fulmar.....	1.6	1.05	1.5	3.75	13	10	A glider, pure and simple.
Owl.....	0.55	1.1	0.5	2.7	6.5	7.5	Remarkably low-powered, with low wing-loading.
Snipe.....	0.21	0.24	0.9	1.4	8	29	Very high power-weight ratio climbs very steeply and fast.