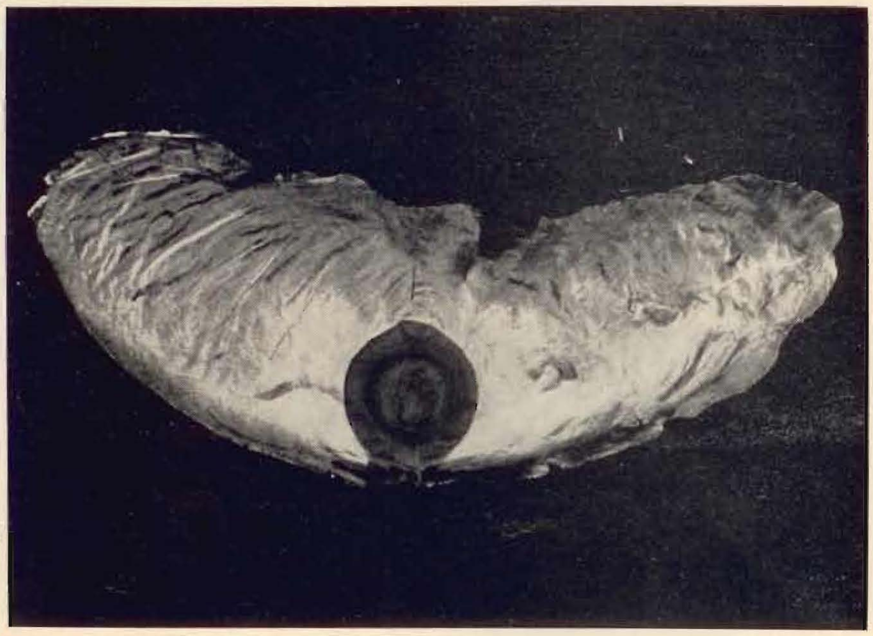
THE SEED THAT BECAME A TREE

The designer of the world's first Delta Wing aircraft tells of its evolution thru the glider stage, from an idea conceived of a seed



By ALEXANDER M. LIPPISCH

Several thousand years before men invented their flying machines, Nature was faced with the problem of the design of a flying seed, and she solved it in the most elegant manner you can imagine. The plant was a large vine of the cucumber family, and grew in the tropic jungles of Indonesia. Since there was no wind to propagate these seeds, the only method to disperse them over a wide area was to make them into little gliders so that, from the height of the trees on which these vines climbed as high as 150 feet, a large area could be covered by the gliding seeds. Instead of using a bird-like configuration, this seed (shown in cut) was designed like an allwing aircraft with a planform of a kidney. The seed in front of the center is surrounded by a very thin tissue, which forms this wing. These seeds are penned in the fruit and when it opens they fall out and begin to glide down, often carried over large distances by the thermals which develop in these moist areas.

When aviation was in its very beginning, the flying ability of this seed was discovered and the method of stabilization of flight of an Allwing model was analyzed. It was found that the wing of the Zanonia seed was so constructed that the swept-back wing twisted its tips upward, giving "wash-out"* to these wingtips. Since the tissue of the wing is very flexible, the inherent stability of this seed was produced by the load in flight. Today we would say that this stability is created by the "aeroelasticity† of the wing structure.

Since the problem of inherent stability of a flying machine attracted a large interest in the early days of aviation, several people thought that using the principle of the Zanonia wing would solve their problems. The first who attempted to fly with a large "Zanonia type" glider were the Austrian engineers, Etrich and Wels. After building several models of this type, they designed a man-carrying glider which was the first allwing aircraft ever built and they made many glider flights with this machine. Since the inherent stability of the Zanonia wing was so large, it was not necessary to use the controls all the time as was necessary for other aircraft of this period. The Zanonia glider of Etrich-Wels did not have any vertical surfaces — neither fin nor rudder — and the controlling of the aircraft was done only by deflecting the rear wingtips up and down. The success of their gliding flights encouraged Etrich to build a propeller-driven aircraft of this type. In the few flights he made with the new machine, he found he was unable to control the propeller-driven aircraft as well as he had the glider. He also found that the lift he got from the Zanonia wing was much less than that he got from a conventional wing. Discouraged by these difficulties, he left the Allwing design conception and combined the Zanonia type wing with a conventional monoplane configuration.

This aircraft, the Etrich "Dove", became famous in the years before the first World War and was the first military aircraft of the German Air Corps. Due to the inherent stability of the wing, the "Dove" was much easier to fly than any other type at the time. But the further development of military aircraft put more and more emphasis on combat maneuverability, and the "Dove" was abandoned in favor of the high- maneuverable Fokkers.

*Wash out — decrease of angle of incidence toward the wing tip; in this case, a means of obtaining longitudinal stability of sweptback wings.

†Aeroelasticity — elastic variations due to airloads.

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