The Secrets of Insect Flight

“Unfortunately, the evolutionary origins of flight in insects are not well known”, states the most comprehensive textbook on insect flight.[1] Indeed, flight in the animal kingdom poses a number of problems for those scientists who rule out divine design. First, it must have developed several times in parallel (called ‘convergent evolution’): we find flying animals among insects, birds, reptiles (extinct pterosaurs), and mammals (bats).[2] All these groups would have to have developed their abilities independently, through chance + selection creating new information and abilities not originally contained in their genetic heritage.

Creationists have often raised the fact that there is no adequate mechanism to generate such quantities of new information.[3] So any further consideration of evolutionary claims could stop right there.

Still, contemplating the intricacies of especially insect flight, and the lack of evidence for its evolution, enhances appreciation for the Creator’s ingenuity in making these little flying mechanical wonders.

Evolutionary explanations

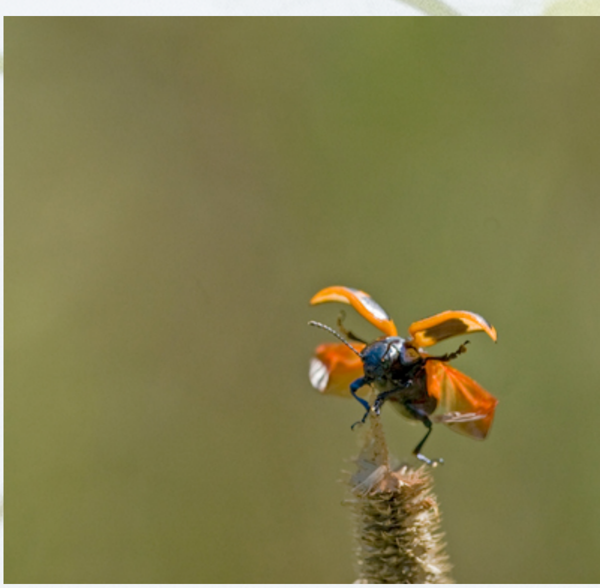
Several theories for the evolution of insect wings have been proposed.[4] For example, one theory[5] suggests wings grew out of a gill-like apparatus present in the very earliest (aquatic) insect ancestors. These so-called ‘tracheal gills’ in the larvae of some aquatic insects today are equipped with little vibrating winglets. According to the theory, some of these winglets allegedly grew over time, forming small flaps or proto-wings. Initially, these structures would only have been used for long jumps and then gliding. But over time, they would have become larger, until they could be used for controlled diving, gliding, and then flapping flight.[6]

Many environmental pressures have been invoked by evolutionists to account for the natural selection of wing-like features. For example, wing flaps would have enabled escape from predators by permitting jumping insects to jump further, and falling insects to move away further.[7]

Rarely discussed, however, are the evolutionary obstacles created by such part-functional wings. An insect with protrusions on the side would actually not be able to jump as far due to increased air resistance, or would have gotten stuck on top of vegetation (instead of hiding underneath). Either would make it easier for predators to catch, thus natural selection would actually operate against such proto-wings.

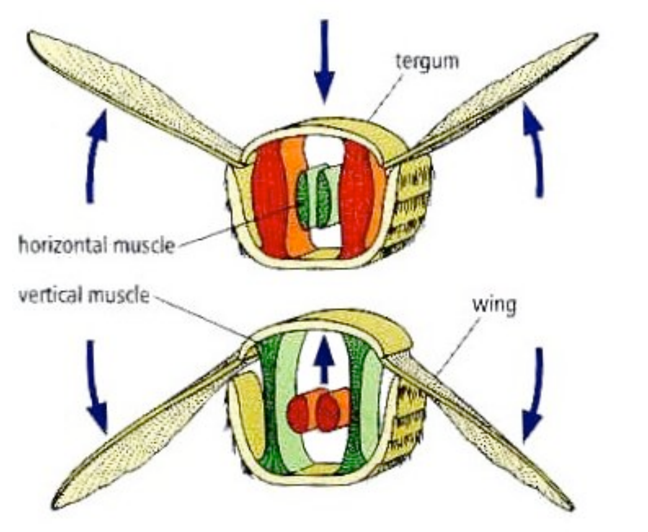
To explain flight as an evolutionary phenomenon, many things must happen in parallel. Directional and controlled flight not only requires wings of adequate size and appropriate form, but also muscles to move the wings. And of course the intricate programmed control mechanisms within, and connected to, the insect 'brain' (not to mention the need to have vision, without which flight is rather useless).

Then there is the need to generate the extra energy that flight demands. Insects flying in hot environments, or with extremely fast wing activity (like the hummingbird-like sphinx moth) also need an efficient thermoregulation mechanism to avoid overheating from muscle activity.



Given that flight needs a lot of energy,[8] an imperfect ability to fly (and to effectively reach food sources) would immediately put the insect at a great disadvantage to its peers that would simply crawl from one food source to the next. This disadvantage can only be overcome once the flying ability is fully developed—so again, all previous stages would be eliminated by natural selection.

And one indispensable feature of insect flight is the creature's ability to alter the wings' angle of attack, coupled to the flexibility of the wing itself.[9] Such obvious problems seem to rule out the idea of a gradual evolution of flight.



INDIRECT FLAPPING

Two pairs of muscles deform the insect's thorax for the mechanisms based on indirect flight muscles – the top part moves up and down and thus forces the wings hinged onto it to flap accordingly. This is common in many smaller insects, such as houseflies. By contrast, dragonflies' flight muscles *directly* move the wings.

Source: North Carolina State University[19]

Complications do not end here, however, since there are two very different flying mechanisms in insects. Dragonflies and damselflies have flight muscles directly acting on the wings, supposedly a 'primitive' mechanism. Allegedly more advanced insects have indirect flight muscles that act on the insect's thorax ('chest'), deforming it in opposing ways so the wings start moving (see diagram above).

Indirect flight muscles are said to have evolved in parallel with the ability to fold the wings on the back (as e.g. houseflies do). But then, damselflies can fold their wings along the back, too, seeming to further confound evolutionary explanations—evolutionists don't generally regard them as transitional.

Explaining why those two completely different mechanisms would have developed is difficult enough. But evolutionists must also believe that the asynchronous muscles needed for the high wingbeat frequencies seen in most insects have developed *independently* 7–10 times in evolutionary history.[10] This illustrates the leaps of faith required to put together an even partway credible hypothesis for insect flight evolution.

More complications could be listed that go beyond the actual flight mechanism. For example, how did the ability to fly evolve in insects that undergo metamorphosis? The caterpillar of butterflies, for instance, is programmed to dissolve into a shapeless 'soup', then be totally recreated as a flying adult of radically different design. Metamorphosis itself presents an insurmountable puzzle to evolutionary belief.[11]

Missing fossils

It will be little surprise to readers that the fossil record does not provide any evidence for the evolution of insect flight, despite many fossil insect specimens. Scientists lament this, stating that "the question of the origin of wings in insects is unresolved, in part due to the lack of fossil intermediates"[12] or that "in general, the well-developed flight apparatus of the Carboniferous and Permian fauna indicates that these insects can contribute little toward our understanding of the initial evolution of wing morphology and wingbeat kinematics."[13]

Winged insects emerge 'suddenly' in the fossil record, together with wingless and gliding insects, and no preliminary stages have been found of e.g. insects with wings, but unable to move them.

Conscious of the absence of fossil transitional forms, Pennsylvania State University scientists looked at 'living fossils' instead. They assumed that today's mayflies and stoneflies are fairly archaic insects with 'primitive' traits and situated close to the bottom of the evolutionary tree,[14] and then tried to establish a succession between non-flying and flying stoneflies. They also assumed that wings were first used as a propulsion mechanism to move on water, rather than for flying. Dudley,[15] however, warns that such an approach can be profoundly misleading, saying that "these taxa are highly derived relative to the earliest Paleozoic forms and provide only limited clues for biological reconstruction of ancestral pterygotes." In evolutionary terms, 'highly derived' basically means 'highly evolved'. So from the biblical perspective, Dudley's statement is consistent with today's stoneflies having been created fully functional for their particular ecological niches, not as some sort of 'ancestor' stage.

Also, the stoneflies used to reconstruct a succession[16] already have fully developed wings. Stoneflies with rudimentary (not fully formed or functional) wings exist, but this is also known from other species and the scientific consensus is that this is the result of a regression (i.e., loss of information), rather than a stage in an evolutionary process (where new information is created). The researchers actually admit this, conceding that the ancestors of today's stoneflies may have been fully capable of flying[17]—which would make their theory pointless.

Engineering lessons

Research around insect flight is on-going and many mysteries still need to be solved. However, some of the complicated features of insect wings are already being copied for man-made technology, including the development of micro-aerial vehicles—ironically modeled after the 'primitive' flying of dragonflies.[18]

So while they may not recognize insects as divinely designed, researchers are confirming that they are incredibly complex and use extremely sophisticated physical mechanisms. To date, even the most advanced modelling software is insufficient to properly show how they achieve all of their amazing feats.

When we consider all these grave problems with evolutionary explanations, it would seem to defy reason to assume insects acquired their flying abilities through a basically random, unguided process, rather than from a divine Creator who is more intelligent than today's best engineers.

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[1] Dudley, R., *The Biomechanics of Insect Flight: Form, Function, Evolution*, p. 261, Princeton University Press, 2000,
[2] Gliding animals exist among mammals (including marsupials, primates such as lemurs and rodents such as flying squirrels) as well as amphibian (frogs), reptiles (including snakes) and even some fish and squid, see mapoflife.org/topics/topic_343_Gliding-mammals.
[3] See Williams, A., Meta-information—an impossible conundrum for evolution, creation.com/meta-information, 30 August 2007.
[4] The development of wings is discussed from a creationist viewpoint in Bergman, J., Insect evolution: a major problem for Darwinism, *Journal of Creation* **18**(2):91–97, 2004.
[5] The exite or epicoxal theory.
[6] *Encyclopedia of Paleontology,* p. 618, 1999.
[7] Yanoviak, S. *et al*., Gliding hexapods and the origins of insect aerial behaviour, *Biol. Lett.* **5**:510–512, 2009.
[8] Dudley, Ref. 1, p. 159
[9] Clarke, P., Butterflies fly on designer wings, *Creation* **35**(2):28–31, 2013.
[10] Rour, M., *Insect Flight: Origins & Aerodynamics*, 2010, bioteaching.wordpress.com.
[11] See Devine, D., Inexplicable insect metamorphosis, *Creation* **29**(3):31–33, 2007.
[12] Yanoviak, Ref. 7.
[13] Dudley, Ref. 1, p. 290.
[14] Marden, J. *et al.*, Surface-Skimming Stoneflies and Mayflies: The Taxonomic and Mechanical Diversity of Two-Dimensional Aerodynamic Locomotion, *Physiological and Biochemical Zoology* **73**(6):751–764, 2000.
[15] Dudley, Ref. 1, p. 262.
[16] Marden, Ref. 14.
[17] Kipling, W., Plecopteran Surface-Skimming and Insect Flight Evolution (& Response by Marden), *Science* **270**:1685, 1995.
[18] Catchpoole, D., Dragonfly design tips, *Creation* **32**(2):51, 2010; creation.com/dragonfly-design.
[19] Meyer, John R.: Locomotion. North Carolina State University website, accessed October 2, 2015. https://www.cals.ncsu.edu/course/ent425/library/tutorials/external_anatomy/locomotion.html