

The uniformitarian view on the origin of insect flight

Summary

Proposed: The source of insect wing motion (but not of wings) is a mechanism for sound production.

1. The potential mechano-acoustic properties of the insect cuticle are well known

Stiff, elastic lamina has ample sound producing and detecting properties. Insects universally use parts of the cuticle for sound making. The instances are numerous.

2. Retracing evolution

Whenever wings first evolved for whatever reason, they must have been to some extent mobile, if only not to impede the insect's locomotion, and so would have been operated by some mechanism that oscillated between at least two positions, wings angled against or away from the body. If we take away the wing motion mechanism we are left with a static projection that may act as a display, but not for long since it obstructs the insect's movements.

But if we remove the wing, a fully functional mechanical device still remains: an oscillator: the flight motor without wings is a vibrator! A bee with wings immobilized still buzzes. Would insects need a vibrator? Certainly. Insect communicate visually, pheromomally and sonically, and for all of these there are ample examples. Before getting wings insects likely used sound since their visual depth is anatomically limited (short focal length eyes), and, except in swarming, would have difficulty finding each other among the plants, and at a distance etc. The wings of today's insects are themselves sonifiers. Primitive sounds could have been mere clicks and ticks, but would under competition easily evolve into rhythmic pulses and increase in volume.

3. And what about wings?

Wing surfaces could have functioned in signaling, display, and could have derived from whatever source, e. g., from movable gills of an aquatic insects, as proposed by Kukalova-Peck, or appendages growing from the insect's legs, as has been suggested, but if a thoracic sonic vibrator was already present, such wing surface, when conjoined with a vibrating structure, the moveable wing would have appeared without the asking. This apparatus could first serve as a tool of both display and sound making, but with the application of the right aerodynamic motions, could have immediately led to lift and later to controlled flight.

4. Uniformitarianism

This proposed notion is a uniformitarian argument which shows that the source of insect flight may still be an observable and active part of insect behavior.