WARM AIR 9 October 2021

Aviation Sports Club Gliding Newsletter

THIS WEEKEND: **No Flying this Week**

www.ascgliding.org Bank Acct 38-9014-0625483-000

Saturday	Instructing:
	Towing:
	Duty Pilot
Sunday	Instructing:
	Towing:
	Duty Pilot

MEMBERS NEWS

- ***In Warm Air this Week;***
- ***Club News***
- **Part 15: Insect flight. Jonathan Pote**
- ***Roster***

Thank you for the contributions from members.

Club News

Obviously, Auckland remains at Alert Level 3, and although there is a slight ease in some restrictions at Step 1 of our Roadmap, the intent remains for each of us to take a huge amount of care and responsibility to minimise COVID transmission and harm to ourselves, family, friends and community.

Gliding and recreational flying remain grounded, and we will not be able to consider flying activities until at least Alert Level 2, and with Air Force approval.

It is fair to say the Matamata Soaring Camp on Labour Weekend will not be a runner, unless there is a miracle.

The Club Committee and Instructional Team will continue to discuss and develop a “start up plan” for when we return to flying operations. Obviously, for many of us, if not all will be lacking currency by the time we are be able to return to flying in 4 - 8 weeks. So, a focus on our Tow Pilots and Instructors currency will be key. Also, the required inspections and checks on our aircraft will be needed. So, we may need a small amount of time to get operational and current. In other words, just hold your horses if we get approval to fly. Your time will follow shortly after.

We will update our COVID Infection Control Procedures and inform you what these involve once the committee has had the chance to meet, discuss and finalise in this everchanging area.

Editor’s note
Regrettably COVID Delta looks to have set up shop and will remain in our community. The likelihood of enjoying the carefree Alert Level 1 period appears to be well and truly over. COVID Delta has changed the way we need to operate and behave. However, vaccination is now in our armoury, and this is a means to protect and significantly reduce harm and transmission to fellow members for when we return to club flying. The activities of gliding mean physical distancing (dual flights in the Twin trainer) and other controls e.g., masks will not be effective alone.
So, if you have not got the jab underway, and you are eligible, we would strongly encourage you to do so. And if unsure, go and talk to your medical practitioner and seek guidance.

Warm Air – Fortnightly Update

Due to the current environment, the ability to produce weekly content is becoming challenging after a period of 8 weeks. So, we will change this to fortnightly and if need be, send any updates as required. A big Thank You to Jonathan in particular with his comprehensive supporting articles during this period, and to others for their contributions.

Reminder
Membership Application/Renewal - 1 October 2021 - 30 September 2022

Please find attached this year's membership form. All members are required to complete and return to either Ray Burns (ray.burns.ggl@gmail.com) or Lionel (lionelpnz@gmail.com). The PDF document is PDF Fillable. Which means you can complete it on your computer (which means we don't have to de-cipher some of the handwriting!). I recommend you save this to your computer, open the form and complete the first two or three fields then save the form. Open it a second time before completing so that you can be sure your entries have been saved correctly.

For those of you new to the club, we all need to complete this form each year. Our year runs from 1 October to 30 September.
Those under 26 in full time education: The fee structure is $30 for membership and the $25 communication levy. That is all. Your total subs are $55.
While we are all locked down, now is the perfect time to get this completed and returned.

Many thanks,
Ray

Part 15: Insect flight. Jonathan Pote

Dragonfly with 'D'-day markings!

Insects were the first class of animals to master flight – four hundred million years ago, in the Carboniferous period (when there was abundant vegetation and coal seams were being laid down). Until 1988, however, it was possible to prove mathematically that larger insects, such as the always-quoted bumblebee, could not fly. Clearly the mathematical formulae were leaving something out, but what?

To quote Wikipedia, *"The concept of leading edge suction first was put forth by D. G. Ellis and J. L. Stollery in 1988 to describe vortex lift on sharp-edged delta wings. At high angles of attack, the flow separates over the leading edge, but reattaches before reaching the trailing edge. Within this bubble of separated flow is a vortex. Because the angle of attack is so high, a lot of momentum is transferred downward into the flow. These two features create a large amount of lift force as well as some additional drag".*

Let's look at the simple facts first. A flying insect has two pairs of wings attached to its thorax, close to the center of gravity. Each wing is a rigid layer of non-living material that could be replaced by an artificial membrane; it has none of the variable geometry of a bird's wing. These four wings can move independently, flapping in the vertical plane and rotating along their horizontal axis. The muscles initiating these movements are controlled by nerves much as our muscles are. For frequencies of up to one hundred times a second, each nerve impulse is followed by a single wing beat. For frequencies greater than 100 Hz, including the 'impossible flyer', the Bumblebee, the muscles contract more than once after each nerve impulse, relaxation initiating a further contraction. This allows higher wing cycle frequencies, up to 1000 Hz.

As ever, not everyone follows the rules. Many female insects have no wings, relying on a male finding them and being able to lay their eggs whilst walking. Gardeners hate the codling moth for their attacks on apple trees, the female crawling up the tree to the developing fruit. Being unable to fly must be a disappointment, but many insects are unable even to feed, their imago stage being consequently brief. Beetles, amongst others, decided that four wings were a luxury, and have their fore-wings modified as protective cases for the vulnerable hind wings. Moths semi-attach their fore and aft wings to act as one, whilst some larger insects (New Zealand's introduced Monarch butterfly being one) glide and even soar in rising air on their simple flat-plate wings.

There is no clear understanding of how insects – and by no means all of them – evolved flight. As with birds, evolution must have produced structures advantageous to the species, structures which eventually evolved to give these species the ability to fly although other uses must have preceded flight. To this lack of understanding one must add metamorphosis from a wing-less ten legged larva to a winged six-legged imago and the plot gets too murky to solve. Many animals (and even some plants) change their shape over their life cycle, but there is seemingly no connection in the insect world between a caterpillar and a butterfly:

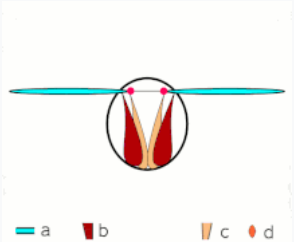
Metamorphasis of the Monarch *(Danaus plexippus)*, the first and probably only species to have completed a complete life cycle, egg to flying imago, in space (International Space Station, 2009).

Having covered everyday knowledge, it is time to complicate things. The images below, from Wikipedia, connect to animated images

The structural and aerodynamic basis of insect flight

There are two distinct mechanical arrangements of insect flight musculature

1) Direct coupling of muscle and wing

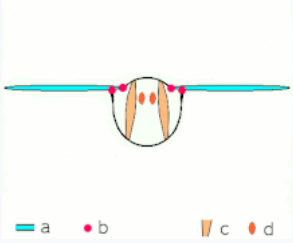


Dragonfly

Each wing has a pivot close to the inner end, aligned fore and aft. Thus two pairs of muscles, one pair inboard and one outboard of the pivot, power a simple flapping cycle. Only two Orders of flying insects, Odonata (dragonflies and damselflies) and Ephemerata (Mayfies) have direct coupling. The former hunt other flying insects and the maneuverability direct muscular coupling to their four independent wings gives great 'air combat' efficiency for their 'kills'. Conversely, the Ephemerata are so named because the imago has no mouthparts and even twenty-four starving hours is a long life; for some it is just minutes, but mass emergences allow just enough time to mate with a nearby companion.

2) Indirect coupling of musculature and wing

This is by far the commonest arrangement in the insect flight world.



Indirect flight: muscles make thorax oscillate in most insects

Butterflies use indirect muscle/wing connection

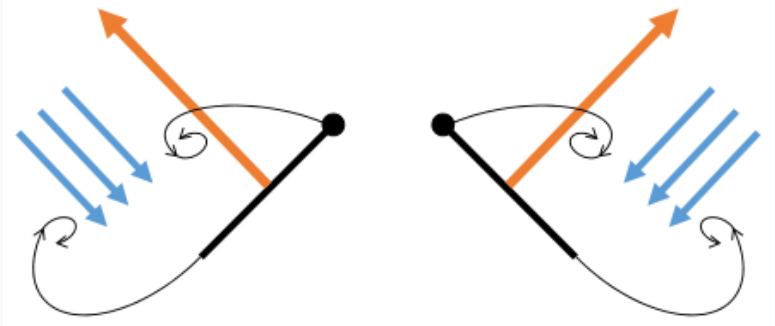
With indirect flight muscles, one set of muscles pulls compresses the thorax vertically, alternating with another equally powerful set that compress the thorax longitudinally (and are seen in circular cross-section above). The wings are not directly attached to the flight muscles but flap up and down as the thorax, to which they are attached, alters shape. We are back to that unfair advantage of living aeronauts, variable geometry.

Minute Insects:

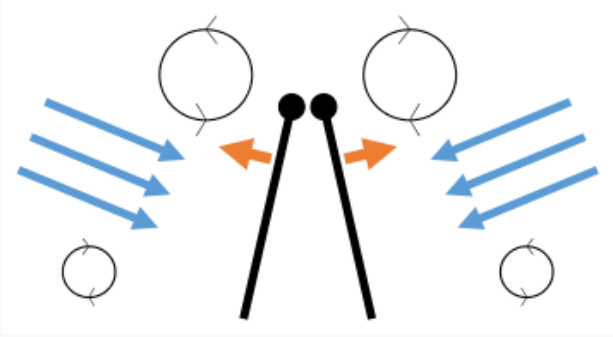
Many insects are very small indeed, and although they contribute vitally to our ecosystem, we rarely if ever notice them. Their minute size means that to fly in the same atmosphere as we glide, the immutable laws of physics (particularly viscosity and turbulent flow) leads to different outcome because of scale. I will leave you to investigate the explanation below via the link. Please click on the diagrams.

jonathanpote47@gmail.com

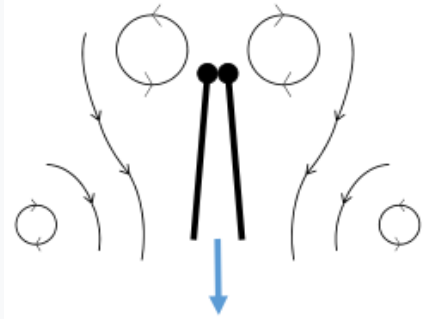
- **Clap and fling flight mechanism after Sane 2003**



Clap 1: wings close over back

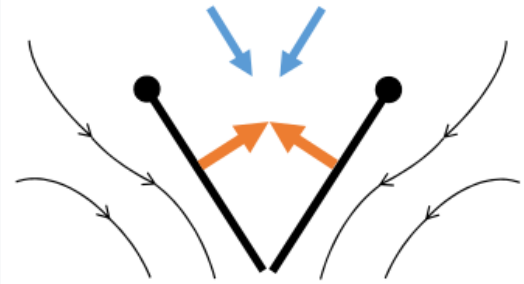


Clap 2: leading edges touch, wing rotates around leading edge, vortices form

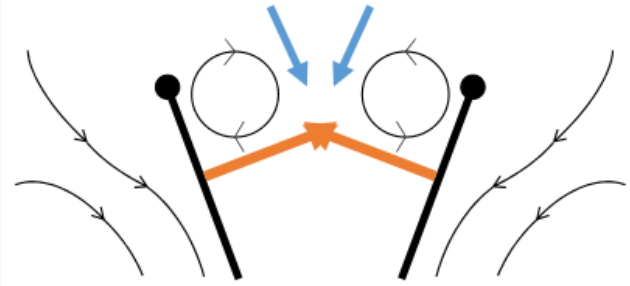


Clap 3: trailing edges close, vortices shed, wings close giving thrust

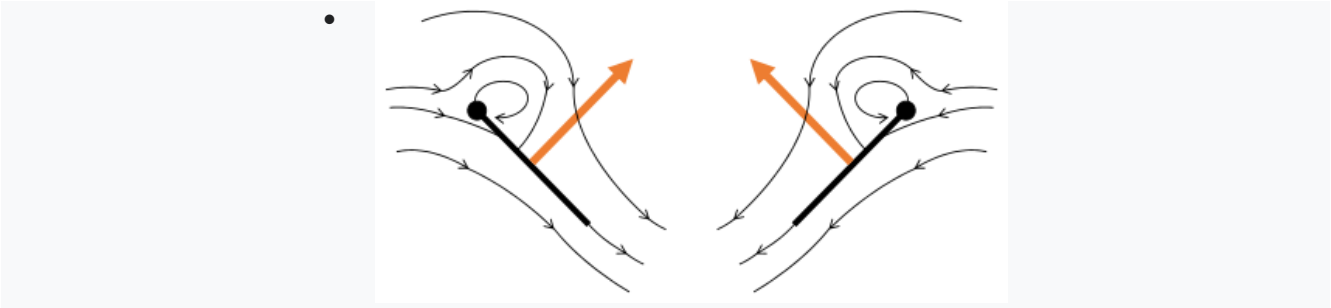
- **Black (curved) arrows: flow; Blue arrows: induced velocity; Orange arrows: net force on wing**



Fling 1: wings rotate around trailing edge to fling apart



Fling 2: leading edge moves away, air rushes in, increasing lift



Fling 3: new vortex forms at leading edge, trailing edge vortices cancel each other, perhaps helping flow to grow faster (Weis-Fogh 1973)

Okay from the Something Different Pile

John Styles
September 30 at 10:30 PM ·

Glasflugel is always one step ahead of everybody. It's the seventies and this concept glider was designed with the help of uni students. Its special feature, the world's first heads-up display in a glider
designed and marketed by a Frenchman but it never caught on. Fast forward to 2021 and heads-up displays in gliders are yet to make it into current production gliders. An opportunity for a smart young engineer?

Duty Roster For Oct,Nov,Dec

Month	Date	Duty Pilot	Instructor	Tow Pilot	Comments
Oct	2	A MICHAEL	I WOODFIELD	P THORPE	
	3	R WHITBY	R BURNS	R CARSWELL	
	9	C DICKSON	A FLETCHER	D BELCHER	
	10	K JASICA	L PAGE	R HEYNIKE	
	16	J DICKSON	P THORPE	G CABRE	
	17	S HAY	S WALLACE	F MCKENZIE	
Labour W/E	23	K BHASHYAM	L PAGE	P THORPE	Matamata
	24	K PILLAI	R BURNS	R HEYNIKE	Matamata
	25	G LEYLAND	S WALLACE	D BELCHER	Matamata
	30	I O'KEEFE	I WOODFIELD	D BELCHER	
	31	M MORAN	R BURNS	G CABRE	
Nov	6	T O'ROURKE	A FLETCHER	F MCKENZIE	ATC
	7	R BAGCHI	P THORPE	R HEYNIKE	
	13	T PRENTICE	L PAGE	P THORPE	ATC
	14	C BEST	S WALLACE	R CARSWELL	ATC
	20	E LEAL SCHWENKE	I WOODFIELD	P EICHLER	ATC
	21	R MCMILLAN	R BURNS	G CABRE	ATC
	27	A MICHAEL	A FLETCHER	D BELCHER	
	28	R WHITBY	L PAGE	F MCKENZIE	
Dec	4	C DICKSON	S WALLACE	R CARSWELL	
	5	K JASICA	R BURNS	R HEYNIKE	
	11	J DICKSON	A FLETCHER	P EICHLER	
	12	S HAY	S WALLACE	G CABRE	
	18	K BHASHYAM	I WOODFIELD	D BELCHER	

	19	K PILLAI	P THORPE	F MCKENZIE