WARM AIR 28 August 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

Hope everyone is safe in their bubbles and you have acclimatised to lockdown.
In Warm Air this Week;

- ***Weekend Reports – not too much to say***
- ***Video Corner – some links to some cool aviation videos.***
- ***Soaring in the Blue – Techniques***
- **Our Avian Compatriots Part 9. Getting airborne – At last Jonathan Pote**
- ***Roster***

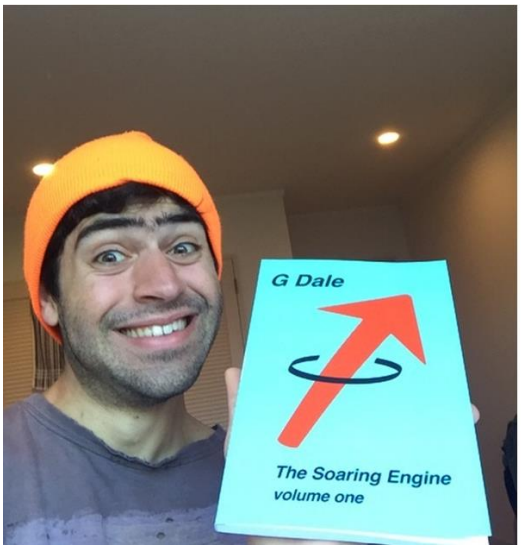
Weekend Reports

Saturday Instructor Reports

Sunday Instructor Reports

Okay nothing to report in this department. However, you may have recalled from last week I requested if you can *send us pictures and brief comments on any of your aviation related Lockdown activities that are keeping you occupied e.g, flight sim, model-making, books etc.*

Well Alex responded. Some light reading and preparing himself for his forthcoming badge attempts. Good on you.



So don't be shy send us pictures and brief comments on any of your aviation related Lockdown activities that are keeping you occupied e.g. flight sim, model-making, books etc. We will note in next week's Warm Air.

Video Corner – Are you bored, well here are some cool videos

Derry Belcher (Mr Fine Vintage) sent out some videos, so some of you may have seen these already.
This one has beautiful footage and I found it very relaxing. So put it on the Big Screen, have a glass of red, feet up on the couch and Enjoy!
Vintage Gliders in Sweden

Continuing the Historical Theme.
SAILPLANES & GLIDERS SOARING IN THE AUSTRIAN ALPS 1954 HISTORIC FILM 51704a - YouTube

Thanks, Derry, for Sharing

Zigermeet - Okay this one isn't about Gliding, but the footage and scenery is awesome. Go for the big screen.

Impressionen Zigermeet 2019 - YouTube

Right for those Competition and Cross-Country Pilots here is a great video. It's based in the US and they are flying at 14000 -17000 feet, and I know we get excited at 4500 feet, but I think there were some good lessons to learn. Now it's a long video, so I just increased the playback speed.

World's Fastest Glider Race - 12 Lessons How To Win - Most Detailed Glider Race Analysis On YouTube - YouTube

Cropdusting – Follow Jimbo Burgess with his aerial top-dressing adventures. Great footage and iconic kiwi humor

Difficult airstrip - Cropdusting up a mountain - YouTube

Techniques in the Blue

By Roy Bourgeois

Courtesy of Wings and Wheels Newsletter Join here: https://wingsandwheels.com/newsletter

When soaring in the blue it's time to develop your maximum sensitivity to what the glider is experiencing and make subtle changes of direction toward the areas that make a wing lift. While you will generally fly a straight course, the glider will always want to fly away from thermals so if you find one wing lifting slightly make a minor course correction toward the area that made it rise. Resist the temptation to pounce too early on a gust surrounding the thermal - if it's real you can be patient. When you do find a thermal pay close attention to which direction to turn - this is not a time when you can afford a mistake in turn direction and if, after 45 degrees of the turn you haven't felt the surge of a real thermal under your wings it might be best to abandon the circle and press on in your original direction without a complete circle. When you center a thermal, use it to its maximum height (at least until you figure out how the thermals are working in the blue) and expect the lift to end earlier than you have been seeing - there is a reason why it's blue there! When cruising in the blue watch for fast cycling clouds and haze domes (these are short-lived cloud wisps that are shaped somewhat like eyebrows) in the distance and when you see one note the ground reference area where it was (it's going to disappear before you get there) and head toward that. A good pair of non-polarized sunglasses can help with this. Dust devils, birds, farm or factory smoke, and other gliders are all helpful in figuring out where the lift is. Frequently refocus your vision by looking at a ground reference point before looking out at the horizon. In blue conditions, our eyes normally relax and focus to a point about 6 feet away until you "reset" them to infinity by looking at a specific ground point. As you get lower try to visualize areas where the ground features (hillsides, open mines and quarries, etc.) are perpendicular to the sunlight. These are likely to heat up first and strongest. Urban areas and infrastructure are also helpful.

It can be difficult to estimate the distance to a cloud field or to distinguish between a large cloud far away and a small cloud that is closer to you. I have found it helpful to look at the shadows the far clouds are forming on the ground to estimate their distance from me or to figure out which cloud is actually closer. And, as you complete your crossing of the blue area expect the conditions to get a little better as you approach the good clouded area. Frequently you will find a good climb just before you reach the clouds. Energy lines (which in moist

areas form cloud streets), honeycomb thermal connections, and similar lift phenomena all exist with dry thermals but without the ability to see them it's hard to recognize or work them. There is one exception to this: When heading upwind or downwind in the blue you may observe patterns of lift areas followed by areas of no lift (or some sink). This may be a crosswind wave or a street pattern that you can predict and use with some confidence...

Health in the blue

A few words about the physiology of blue flying seem appropriate. It is more demanding in terms of both hydration and skin protection needs. If you are expecting a completely blue day start hydrating an hour or so before your flight. Sports drinks that replace sodium and electrolytes are better than drinking just plain water. Frequent drinking should lead to frequent urination so be prepared for that. Wear long-sleeve light-colored shirts, a light-colored hat that protects the ears and neck, sunscreen on your nose, and avoid shorts that expose your upper legs to UV sunlight. I wear fingerless gloves that protect the back of my hands.

Fun in the blue

Lastly - when flying in the blue stay optimistic. I have enjoyed many very long XC flights in blue or mostly blue conditions. It's very satisfying - especially if the other pilots decided to stay home because it's "too blue" or the good clouds are "too far away." You will get a lot of, "How the heck did you do that?" from your buddies. But it's not magic - there is a huge amount of the sun's energy heating that blue area. Unless you are trying to cross a swamp in the early morning there will be lift in the blue areas - although different from the lift under the clouds. Blue flying has the advantage that 100% of the sun's energy is flowing into an area without being disturbed by cloud shadows so it's very likely that you will find a climb - especially if you stay high and fly conservatively. Blue flying is a great part of our sport - learn to enjoy it. Stay safe. Have fun. Get better.

Roy Bourgeois is a well known US and South African glider pilot who serves as the Chief Pilot for the Greater Boston Soaring Club. He has held several US national records, competed in many US and Canadian Nationals, and has flown over a quarter million XC kilometers in his 4200 hours of gliding. He can be reached at royb@bw.legal

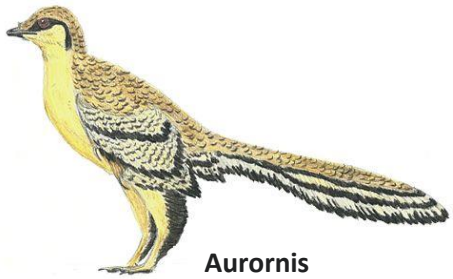
Our Avian Compatriots Part 9. Getting airborne – At last

Last week quite a large chunk of that week's article had to be held over. It was **C**ut **O**ut **V**iciously, **I**ndiscriminately & **D**isastrously. I blame everything on Covid: Everyone else does.
(Warm Air Ed apologises, I am blaming Lockdown and failure of Copy & Paste)

This week, sadly, there are no weekend gliding reports, so here it is the missing bit from last week grafted into this week's offering.

To recap:

Whilst Archy still holds the imagination as 'the first bird', in fact earlier similar fossils are now known, grouped as *Avialans* and an example, *Aurornis*, is shown below.



Aurornis

Avians, modern birds, evolved from avialans. Avialans, who were about during the Jurassic period, 160 MYA, were 'almost birds', looking similar to the later true birds, Avians, but whose evolution was driven by needs other than flight.

How Avians differ from mammals.

Evolution has, of course, moved birds towards perfection in every way that aids survival in their environment, and this refinement continues. Since the European Union and its forbears started 'organising' the European population via the Common Agricultural Policy, one of the unexpected effects is that subsidies on different crops has led to finches evolving the shape of their beak to better cope with linseed. The widespread use of bird feeders in UK gardens has led to Great Tits *(Parus Major)* evolving longer beaks compared to their mainland European cousins. Darwin must be smiling in his grave: A central part of his *Origin of Species* concerned how the various small seed eating finches of the Galapagos Islands had distinctive beaks, related to their preferred food source.

Digestion: The unique digestive system of modern birds includes a *'crop'* for storage (buy now, eat later) and a *'gizzard'* containing swallowed stones to grind food (no teeth, so use a liquidizer). They rapidly digest their food, making the energy contained quickly available for the exertion of flight, and migratory birds, in particular, store large amounts of energy in protein stores throughout their bodies, especially in the gut wall. Aotearoa's Bar Tailed Godwit adds fat stores to the energy supply and one BT Godwit (Tagged E7) has been tracked covering 11,680 kilometres non-stop from Alaska to the Piako River. Imagine a goal flight to Matamata from Alaska, sensing the weather systems so as to navigate with a tail wind most of the way.

Aerodynamic perfection: A Bar-tailed Godwit

The heart: Considering the evolutionary gap, the hearts of birds are remarkably similar to our own, both in the four-chamber structure and the conducting system for cardiac contraction. The respiratory system, however, has undergone a complete re-design.

Respiration: Mammals (and that includes glider pilots despite some debate) breathe in and out of their lungs in a continuous cycle about twelve times a minute at rest. Each breath at rest is about five-hundred milliliters, of which the first half is already in the airway (part of the last expiration) and thus partly depleted of oxygen (14% cf 20%). An equal volume of fresh air that is the first portion of the inhalation to pass through the mouth also enters the lung, the last half of the new inhalation remaining in the airway and then being exhaled unused with the next exhalation. For us, that inefficient system works satisfactorily, and even when exercising, let alone at rest, the blood leaving the lungs close to 100% saturated with oxygen and the excess carbon dioxide has been exhaled. Despite *homo sapiens* evolving at about two thousand metres above sea level (in East Africa), humans now regularly reach the summit of Mt Everest (8850 metres) without supplementary oxygen, which is quite remarkable. To quote David Attenborough in *Life on Earth* "Higher up the mountains, small birds feed on dead insects windblown lying in snow gullies, blown up there by the wind. There is no life higher up, except for mountaineers up there for reasons known only to themselves".

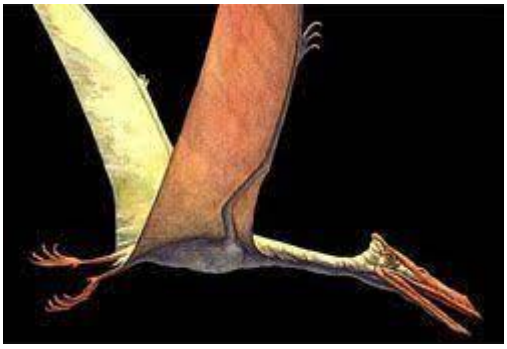
Birds have evolved a completely different system of continuous flow through the lungs. On inspiration, less than half of the air passes into and through the lungs, over half being diverted into air sacs (which communicate with hollow spaces in the lightweight skeleton). Their lungs have an internal surface area for gas exchange (compared to body weight) some ten times greater than mammals. On expiration, air that has passed through the bird's lungs is exhaled to the atmosphere via a lung bypass, and fresh air, replete with 20% oxygen, simultaneously passes through the lungs from the air sacs on its route to exhalation. This is similar in some ways to a gas turbine, where fuel is burnt continuously in combustion chambers, air (=Oxygen) being supplied continuously from the compressor section. In the reciprocating piston engine, with the Otto Cycle of 'Suck, squeeze, bang, push', each piston is only contributing power for one quarter of the time. Even a two-stroke cylinder is 'working' during just half its cycle.

To continue, that still leaves the two biggest questions unanswered. Firstly, why did feathers evolve, and secondly could Avialans fly? We have no proof that they could fly, and even so they certainly were not the first animals to fly; Pterosaurs achieved that right back in the Triassic period (228 MYA) using membranous flapping wings (apparently being able to fly as soon as they hatched) and insects (specifically beetles) trump that with flight 300 MYA. Most definitely birds did not develop wings, cover them with feathers, and find they could suddenly fly. As with all evolution, that had to happen in conjunction with other gains driven by evolutionary success. There is no definitive accepted explanation.

As complete tangents, of course some plants evolved to use aerodynamic flight, aiding dispersal in lieu of the plant inability to move itself (eg Sycamore seeds), whilst arachnids 'fly' with silk threads (gossamer) of controllable length to harvest lift from rising air currents. Some amphibians and mammals have evolved a 'wing suit', so useful is gliding flight.

Getting airborne.

Insects may have been the first to fly, but they did choose a very complicated way to do it. I'll try to cover that later (if I can understand it). Pterosaurs managed flight somewhat later, around 228 MYA, and in a far more comprehensible way. They evolved membranes stretched between the bones of the digits of their fore and hind limbs, specifically from the fourth digit of the forelimb to the femur (thigh bone) of the hind limb.



Pterosaur

Thus they could walk a well as beforehand and also retained much of the prior capabilities of their forelimbs (grasping, aggression, locomotion). With a powerful downstroke of the fore limb, enough air was displaced downwards to generate a resulting force upwards. "It's lift, and as we know it Scottie" as Star Trek might have put it. Of course, the membrane forced downwards has to be moved back upwards before the next downstroke, but this does not have to entirely negate the lift already generated if the 'wing' can flex so as to shed air around its edges. Thus Avialans could leap an increased distance vertically, or extend the trajectory of a leap off a branch or rock as geological time passed by. This gave advantages both in safety (leap or glide out of the way) and feeding (glide from high in a food-bearing tree to the base or lower branches of another, cutting out the tiring and dangerous walk across open ground infested with predators). Evolve the membranous 'wing' and the skeleton a bit further, and some of the lift can be traded for thrust to propel the creature forward. This forward motion gives a relative airflow over the 'wing', and if a suitable airfoil also evolves, this allows lift from forward motion to add aerodynamic lift to the 'downstroke lift'. Thus was born Pterosaur flight. Not only that, but fossil evidence implies they could fly as soon as they hatched, gaining great survival potential by evading predators and seeking their own food from above.

Feathers

A single feather (Underside

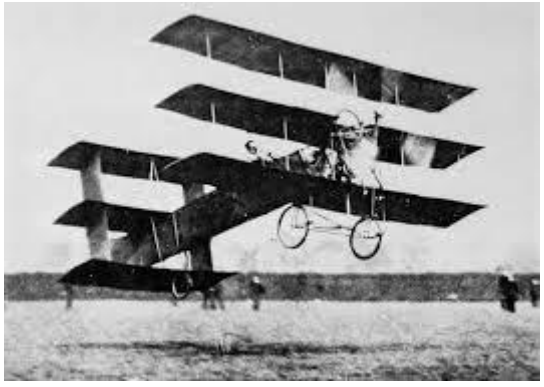
Note that the proximal end is downy (insulation), the rachis ('spar') deviates further forward from the centre line towards the tip, and that the barbs (protrusions from the rachis) are largely well ordered here. Each barb

has many smaller barbules, these in turn having tiny hooked barbicels. Ideally, before flight, preening ensures that every barb is in its correct place and the barbicels interlocked to maintain the aerodynamic integrity of each feather.

The result of 'survival of the fittest' during evolution.

Feathers, first seen in dinosaurs including Avialans, had to evolve greatly before they were of any aerodynamic use. The evolutionary line was becoming warm blooded as it evolved towards mammals (that a constant body temperature was maintained rather than the environmental temperature dictating the creatures body temperature). Feathers provide excellent controllable insulation; Each feather quill has an attached muscle (as do hairs), so the bird can raise the feathers to greatly increase the insulating air gap. The same action makes the bird look larger and more threatening, hopefully driving a predator away, or proving to a female that this is the one to mate with. As the proto-wing developed, when folded it provided a wonderful insulating layer for the body. Feathers can have different colours too, although only changed by moulting. Thus Arctic and Antarctic species are often white for camouflage, whilst black-backed gulls, not too fussy about hiding, use dark feathers to absorb solar heat energy at no cost in exertion. Woodland birds combine green and brown to their advantage. For these and no doubt many other reasons, feathers were a desirable accoutrement long before birds could actually fly in a sustained manner.

Birds became able to fly by evolutionary inevitability. Whether they first used their proto-wings to jump higher, or to glide further from one tree to the next, no-one will ever know. Whilst both are possible, and probably both occurred, I prefer to think that "the Running Leap" led to powered flight, whilst gliding from a high launch point led to ***proper*** aircraft, namely our gliders.



1909: A V Roe takes a running leap, lasting seconds, in his Type 1 Triplane.
This still exists, in the London Science Museum

Schleicher K-8B launches for a flight of many hours, aided only by a small bungee. Thun, Switzerland

Next week will bypass birds for a while, as we cover the path up to, and then obliquely past, the Wright Brothers flights in 1903.

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ROSTER

Month	Date	Duty Pilot	Instructor	Tow Pilot
Jul	~~3~~	~~G LEYLAND~~	~~I WOODFIELD~~	~~P THORPE~~
	~~4~~	~~I O'KEEFE~~	~~A FLETCHER~~	~~R CARSWELL~~
	~~10~~	~~M MORAN~~	~~S WALLACE~~	~~F MCKENZIE~~
	~~11~~	~~T O'ROURKE~~	~~R BURNS~~	~~D BELCHER~~
	~~17~~	~~R BAGCHI~~	~~A FLETCHER~~	~~R HEYNIKE~~
	~~18~~	~~T PRENTICE~~	~~L PAGE~~	~~G CABRE~~
	~~24~~	~~C BEST~~	~~P THORPE~~	~~R CARSWELL~~
	~~25~~	~~E LEAL SCHWENKE~~	~~I WOODFIELD~~	~~D BELCHER~~
	~~31~~	~~R MCMILLAN~~	~~S WALLACE~~	~~P THORPE~~
Aug	~~1~~	~~A MICHAEL~~	~~R BURNS~~	~~P EICHLER~~
	~~7~~	~~R WHITBY~~	~~A FLETCHER~~	~~R HEYNIKE~~
	~~8~~	~~C DICKSON~~	~~P THORPE~~	~~G CABRE~~
	~~14~~	~~K JASICA~~	~~L PAGE~~	~~F MCKENZIE~~
	~~15~~	~~J DICKSON~~	~~I WOODFIELD~~	~~R CARSWELL~~
	~~21~~	~~S HAY~~	~~S WALLACE~~	~~D BELCHER~~
	~~22~~	~~K BHASHYAM~~	~~R BURNS~~	~~P EICHLER~~
	~~28~~	~~K PILLAI~~	~~A FLETCHER~~	~~R HEYNIKE~~
	~~29~~	~~G LEYLAND~~	~~P THORPE~~	~~G CABRE~~
Sep	4	I O'KEEFE	L PAGE	P THORPE
	5	M MORAN	I WOODFIELD	F MCKENZIE
	11	T O'ROURKE	S WALLACE	R CARSWELL

	12	R BAGCHI	R BURNS	D BELCHER
	18	T PRENTICE	A FLETCHER	P EICHLER
	19	C BEST	P THORPE	R HEYNIKE
	25	E LEAL SCHWENKE	L PAGE	G CABRE
	26	R MCMILLAN	S WALLACE	F MCKENZIE