# Catalyst

Journal of the Amateur Yacht Research Society

NUMBER 55 OCTOBER 2019

# How to supply information for publication in Catalyst:

The best way to send us an article:- an electronic (ascii) text file (*.txt created in Notepad, or Word, Libre Office or similar, with no formatting at all as we format in Catalyst styles). Images (logically named please!)as picture files (*.jpg, *.png, *.gif, or *.tif). If you are sending line drawings, then please send them in the format in which they were created, or if scanned as *.tif (never send line drawings as JPEGs because it blurs all the lines)

Any scanned image should be scanned at a resolution of at least 300 ppi at the final size and assume most pictures in Catalyst are 100 by 150mm (6 by 4 inches). A digital photograph should be the file that was created by the camera. A file from a mobile phone camera may be useful. Leave them in colour, and save them as example *clear_and_complete_title.jpg* with just a bit of compression. If you are sending a CD, then you can be more generous with the file sizes (less compression), than if emailing, and you can then use *.tif LZW-compressed or uncompressed format.

For complex mathematical expressions send us hardcopy or scan of text with any mathematical characters handwritten (we can typeset them), but add copious notes in a different colour to make sure that we understand. We can also process MS Equation and its derivatives. Include notes or instructions (or anything else you want us to note) in the text file, preferably in angle brackets such as <new heading>, or <greek rho>, or <refers to *image_of_jib_set_badly.jpg*>.

Otherwise: — If you sketch or include photographic prints, and trust to snail mail (a copy, never the original) then all can and will be dealt with in due course. If you have trouble understanding anything in this section, email to ask.

These days, we don't have skilled copy-typist effort, and find it difficult to handle hand-written articles. If you don't type yourself, please see if you can find a relative or friend to do it for you. For one thing, it is much more effective if *you* do the initial proof-reading and error correction rather than ask us to guess at what you meant. If you don't have email, then post us a clear, black, typescript - the original, not a photocopy (which you should make and keep) - as we can put it through the scanner.

As examples, the polar diagram p16 of *Catalyst 28* was re-created from a photocopy, photos of shunting in the Champion article in *Catalyst 27* (pp 19-21) were screen grabs from a video supplied on DVD. The rest of the images in that article were scanned from photographs, and the text was OCRed (Optical Character Recognition software) or keyboarded.

Send a copy of your work (copyshops can scan to file and email for you):

by email: catalyst@ayrs.org,
by post: Catalyst, BCM AYRS, London, WCIN 3XX

## Features



## Regulars



*Caver picture:*
*A North American M-Scow, possibly sailed by Brad Wright & Jamie Wasco in 2016.*
*Photographer : possibly Richard McOrmand; picture submitted by Ian Ward.*

# Catalyst

Journal of the
Amateur Yacht Research Society

Editorial Team —
Simon Fishwick
Sheila Fishwick

Specialist Correspondents
Aerodynamics—Tom Speer
Electronics—Simon Fishwick
Human & Solar Power—Theo Schmidt
Hydrofoils—Joddy Chapman
Iceboats & Landyachts—Bob Dill
Kites—Dave Culp
Speed Trials—Bob Downhill

*Catalyst* is a quarterly journal of yacht research, design, and technology published by the Amateur Yacht Research Society, BCM AYRS, London WC1N 3XX, UK. Opinions expressed are the author's, and not those of AYRS. AYRS also publishes occasional related booklets.

Contributions are welcome from all. Email them to **Catalyst@ayrs.org**, or send (at your risk) disks or typed copy with illustrations to the Society's office. AYRS can take no responsibility for loss or damage in the mail.

AYRS subscribers receive both *Catalyst* and new booklets. Subscription is UK£20/US$30 per annum for paper copies, £10/$15/€15 for download copies. Subscription requests can be made through the website using PayPal, or together with all other queries sent to the AYRS Office, email: **office@ayrs.org**

AYRS is a UK Registered Educational Charity (No 234081) for the furthering of yacht science.

Website: https://www.ayrs.org

Online Discussion Forum:
https://www.ayrs.org/forum/




ISSN 1469-6754


## AYRS Local Groups

In order for AYRS to survive we need not only more paper & forum discussions, we also need more face-to-face discussions. AYRS local meetings are, your committee believes, a way forward. We have one thriving local group meeting in Merseyside, and for the past 50 years or so we've held meetings in the London area. Once though, AYRS had a lot more.

One of the after-effects from last year's consultation exercise is that Mike Howard has looked at where members live and where there are sufficient to make local meetings worthwhile. His report can be found on the AYRS website in the Forum. It includes maps of showing where members live. (NB personal data has been redacted).

Leaving aside Merseyside and London (in and around the M25), the most likely (UK) areas are the South-West (say Exeter to Plymouth with a few outliers) where there have been a few meetings although they have not been heavily attended, Norfolk-Suffolk-Essex, and around Hampshire (Chichester – Poole). These are the obvious concentrations, although there is no reason to restrict ourselves to them. (Unfortunately, outside of the UK there are no real concentrations of members).

To start we need somewhere to meet where a dozen people or so can sit down and have a chat over some refreshment. It doesn't have to be anywhere formal; the Merseyside meetings mostly take place in Mike's living room. It would also be handy to have a local volunteer to arrange things. Kim Fisher has volunteered to arrange something in Ipswich (details on the website when they are finalised), but none of the Committee are sufficiently familiar with other areas, Southampton, say, to arrange something there. Volunteers needed please.

NB: AYRS will reimburse the reasonable expenses of organising, although if members wanted to chip in, as they do at Thorpe meetings, it would be appreciated.

## AYRS AGM & Directors' Report

The AGM calling notice is on the inside of the back cover.

Because this issue is too early, and the next will likely be too late, the Directors' Report to the 2020 AGM will ONLY be published on the AYRS Website Forum, it will not be published in Catalyst.

# Evolution of Scow Design Dinghies

Ian Ward, Glide Free Design

## Introduction

The sailing scow hull shape has been around for over 150 years, epitomised by the traditional inland lake scows of the USA, and also highly developed within the Moth class in Australia and New Zealand since

1928. In some ways, scows can be seen as an intermediate transition between a conventional fine bow, straight stemmed skiff hull shape and that of a wide, stable multihull catamaran.



The scow hull's basic features are typically wide, flat and stable with a shallow bow. This means the boat can carry a large sail area, because it gains righting moment as it heels.

Unlike a multihull which can be quite difficult to right once capsized, a scow is much narrower and relatively easy to bring upright. Also, as it is usually shallow to the water, it is easy for the boat to remain stable without assistance and easy to get aboard. All of these features make this type of boat safe and easy to handle.

# Hull Shape Development

## Beam

The wide beam throughout the length of the hull provides excellent natural stability and also a large righting moment, especially if the crew sits on the windward gunwhale. This stability makes scows safe and easy to sail, especially for beginners. It also increases their sail carrying capacity, making them relatively highly powered.

A downside of a wide beam of the hull is that the surface area increases, which can significantly slow the boat, especially in light air, when sailed upright. This is why scows are normally sailed heeled to leeward in light air.

The advent of 'wings' has made it possible to significantly reduce the beam of the hull, while maintaining righting moment. Typically, this has resulted in relatively narrower hulls which are much faster.

## Hull balance

Wide bow sections are a distinctive feature of the scow hull shape. The heeled waterlines typically remain parallel to the centreline of the boat, so there is no net steering effect of the hull as it heels. This provides immense stability, while the helm remains completely balanced. Not only are scows a pleasure to sail at any angle of heel, but they have a light helm, are easy to steer and a pleasure to sail in any conditions. Without the need to steer in order to control the hull, the rudder can be smaller, with less drag, making the boat even faster and more manageable.

Typically, wedge shaped skiff hulls with their fine bows and wide flat sterns are quite difficult to handle. As they heel, the centreline of the heeled hull changes angle to the centreline of the boat which produces significant weather helm, making them difficult to steer. So much so, that skiff hulls can round up into the wind or even become diabolical to steer downwind as the boat rolls. Keeping the boat upright at all times is the only way to sail these boats, it is not easy and requires special skill right from the beginning.

It is interesting that by making the stern of the scow narrower, the steering moment of the heeled hull shape can counter the turning moment of the heeled rig, resulting in a perfectly balanced boat when sailing in all conditions.

## Rocker

Initially scow hulls required significant for & aft rocker, due to the heavy construction of the boats and significant payload which could be carried. Rocker keeps the bow and stern clear of the water, reducing drag and improving light air performance, it also reduces the tendency to nosedive when pressed downwind.

More recently, lighter construction techniques and improved materials have made it possible for these hulls to more easily lift and plane in a good breeze.

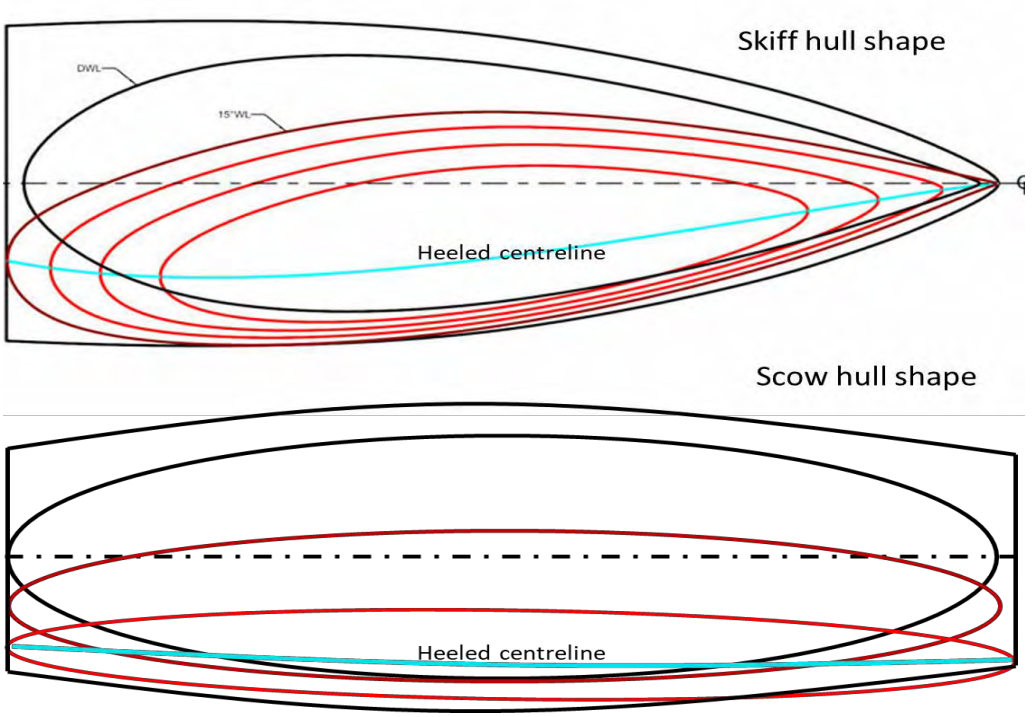



*Fig 1: The centreline of the scow remains parallel to the centreline of the boat, greatly improving the helm when heeled.*

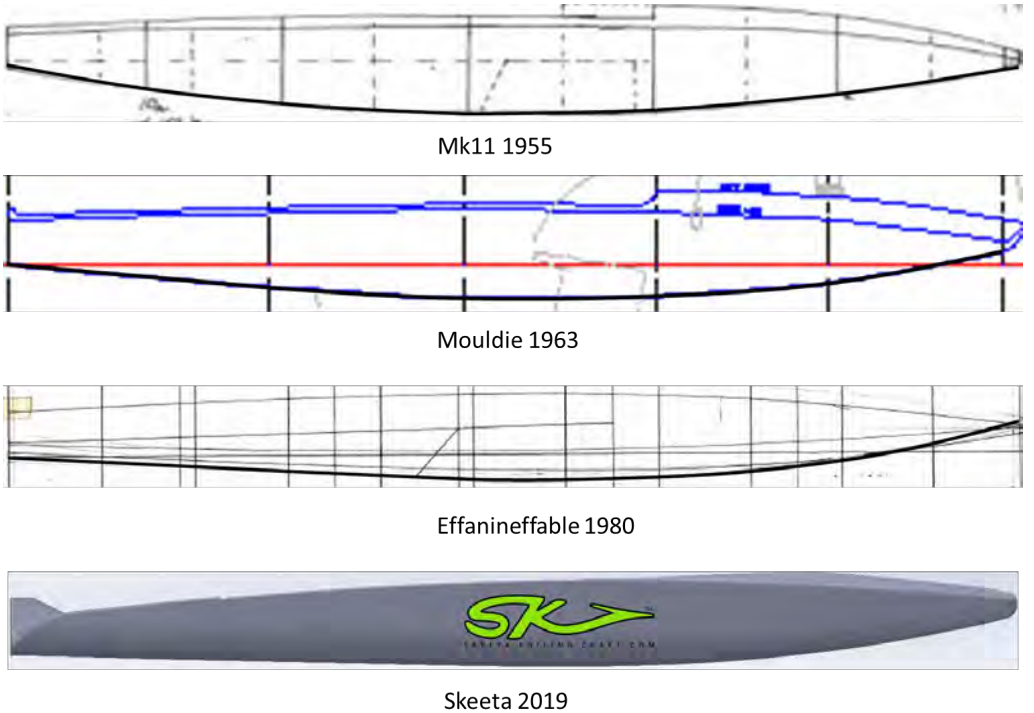



*Fig 2: Rocker has become flatter as designs improved, especially aft, which improves planing performance*

Over the past 90 years of Moth development it has been found that the lighter and flatter hulls, especially in the aft sections of the boat, provide for earlier and faster planing. Effectively the back of the boat does not get "sucked" to the water. This same development can be found in sailboards which have also developed flat planing surfaces aft for high speed sailing.

Reduced rocker and flat sections aft do however cause the smaller scows to nosedive more easily, especially in waves and downwind. For many years we just put up with this and found techniques to steer around the waves, rake the rig way aft in a breeze, even sit right on the transom to sink the stern. Eventually a neat design solution was developed by reducing the width of the stern.

## Narrow stern

During the 1980's in Australia it was discovered that pulling the stern narrower well aft, effectively solved this nose-diving problem, without compromising the planing performance. Unlike the developments applied to skiff shapes at the time, which produced wide, flat planing surfaces aft, the scow Moths instead developed narrower sterns. *Effanineffable* was the first such design, soon followed by the *McFrawd* production scow, built by Jim French in Melbourne. It was much later in the 90's that skiff Moths finally came to the same conclusion developing much faster narrow hulls with fine pintail sterns.

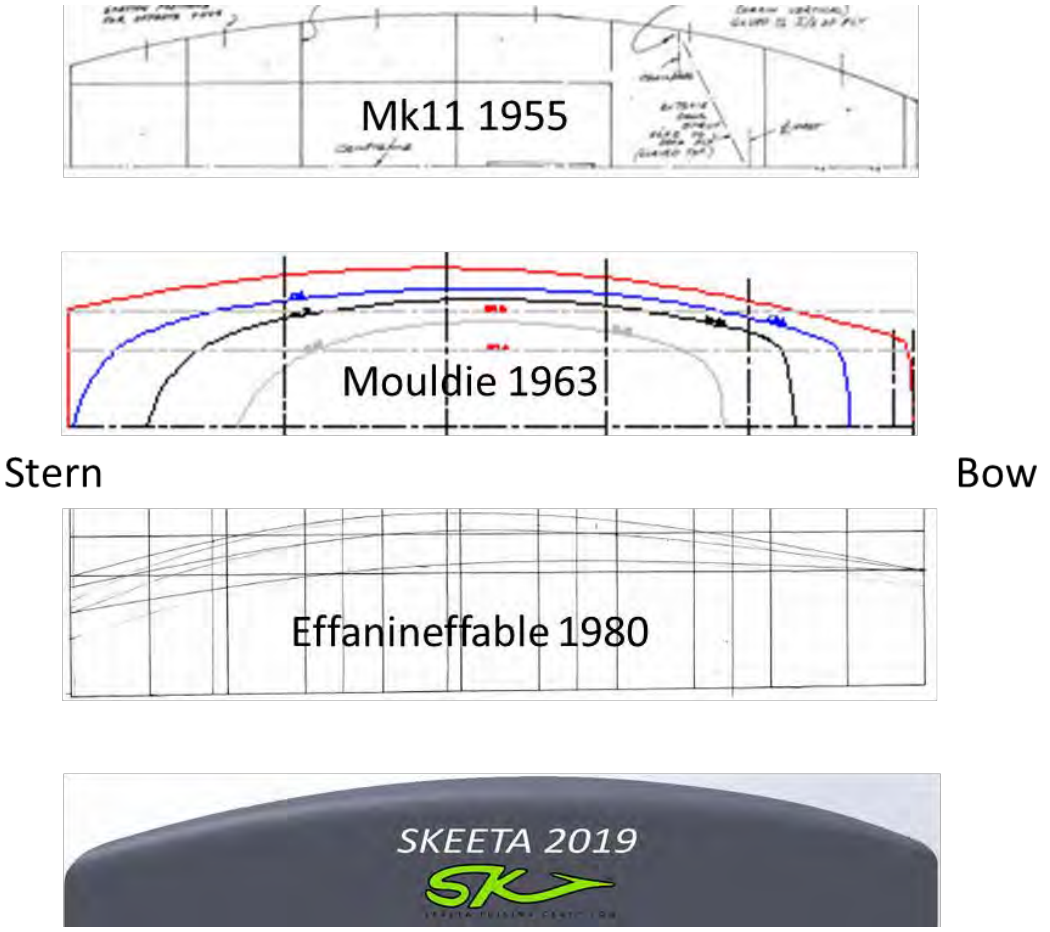



*Fig 3: Scow Moth planing performance improved as the stern became narrower, reducing nosediving.*

The concept was to allow the stern to sink when you moved your weight aft. This kept the bow clear of the waves. As the rocker remained flat, the boat maintained high speed when planing, producing the best of both worlds. In effect, the primary lift developed when planing is produced in the forward sections of the hull, the tail sets the trim and just goes along for the ride, so it can be quite narrow. This feature has been developed even further in the latest *Skeeta* design.

*Fig 4: Sailboards with refined sections aft. This trend also applies to the stand-up paddleboards "SUP".*


*Fig 5: The development of surfboards has followed a similar trend with finer tails for control and carving*

*Fig 6: Sail heeled*

## Similar developments

This design trend towards refined sections aft is common to the development of many 'scow' shaped craft over the same period, including Sailboards and SUP boards, for similar reasons.

Even the humble surfboard design evolution has followed a similar fundamental design trend.

Despite sailing 'scows' being considered until recently a relic of a past era, it is interesting to contemplate that the scow hull shape for water craft may in fact be more common and even more popular than the skiff shape when sailboards, SUP's and surfboards are included!

## Sailing

There is a significant benefit to sailing scows heeled to leeward, especially in light air, as this greatly reduces the wetted surface area and drag. In fact, the waterline becomes very narrow, just like that of a skiff or single hull of a catamaran and these boats are quite fast, even upwind.

Originally scows tended to be rather square, like a punt in plan view. These shapes tend to 'dig into the water' at the bow and stern when heeled, causing significant drag. Curvature in the side of the boat is therefore very important to provide a low drag displacement shape. This is why the latest scow designs such as *Skeeta* have significant curvature in the side of the boat to give good light air performance and weight carrying capacity.

### Round bilge

Initially Moths from 1927 were produced as 'single chine' hulls, but by the late 1960's the round bilged 'mouldie' shape was found to produce superior performance, especially in light air. This simply confirmed what was already known from the USA lake scows which always had round bilges.


*Fig 7:* Skeeta *has been designed for light air performance, as well as planing, gliding and foiling*

During the late 1970's the preferred design for Moths became the 'double chine' bilge shape. This was for ease of home build construction and to reduce costs, as scow Moths for many years were built from plywood sheets.

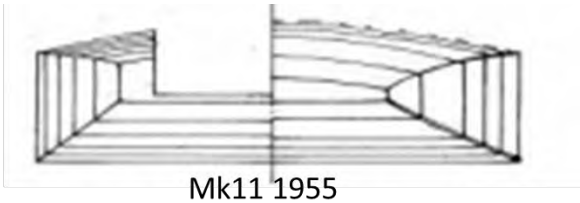






*Fig 8 Developing cross-sections*

More recently, moulded construction techniques have enabled Skeeta to be produced with a round bilge hull, which has the highest volume to surface area ratio, providing the best possible heeled performance.

## Tunnel hull

While scow hull shape development stagnated in the USA, as one-design classes increased in popularity, a long history of development continued to occur in Australia with many interesting hull shapes leading to the 'tunnel' hull.

The hollow in the underside of the hull further reduced the wetted surface when heeled, while also helping with early planing. This curvature stiffened the underside of the hull. Skeeta employs this 'tunnel hull' design, which helps reduce weight and strengthen the boat, while further improving performance.

*Fig 9: Tunnel hull of the Skeeta design*

## In summary

These important elements of scow design illustrate the complex nature of this type of dinghy and highlight the key aspects of producing a high-performance hull. It is not simple, as there are many conflicting requirements involved. Each aspect has been addressed in the design of the very latest Skeeta dinghy so that both light air displacement and high-performance planing are optimised, based on over 50 years practical experience sailing scows within the Moth class.

## Development of Skeeta

Unhindered by any restrictive class design rules, Skeeta has been developed as a sensible, high-performance foiling dinghy suitable for a wide range of sailors. The Skeeta hull is based on the unique "scow" hull shape as it is extremely practical for small dinghies, being highly stable and easy to handle, especially for beginners, and yet it provides the ultimate in high performance for both fun and racing.

This highly developed dinghy has come a long way from original lake scow designs of the 1900's. Just as both surfboards and sailboards have undergone extensive refinement over the years, the scow shape is actually very sophisticated with over 90 years continuous evolution within the highly competitive International Moth class. Some of the key features of the Skeeta design are described below:


## Displacement sailing:

In light air, Skeeta can be heeled well to leeward, sailing nicely in displacement mode on a single narrow, cat-like hull. Buoyancy has been designed into the bilge, keeping the bow and stern clear well of the water to reduce drag. The heeled hull effectively presents to the water a refined, light air displacement hull. The hollow tunnel hull shape adds to this effect. The boat is a pleasure to sail and fast, even in light air. As a result, no lower wind limit is applicable when racing.

## Fast planing downwind

The Skeeta hull is very light and easily driven, especially with its large sail area. Just like a sailboard, the planing surface has a flat run aft, making it very fast in planing conditions, skipping across the waves in as little as 8-10 kts of wind. The wide, stable hull makes Skeeta easy to handle, even in boisterous conditions.

## Planing upwind

The large planing surface, along with a large sail area and wide powerful wings, produces a dinghy with the amazing ability to "plane upwind". Normally the preserve of trapeze driven high performance skiffs, Skeeta is fast, exciting and fun dinghy to sail on the plane both upwind and down. There is no need any longer slog to windward, leaning hard for little result as with displacement dinghies, you plane all around the course!

It is really a whole lot of fun to sail Skeeta in any conditions, especially on a reach in a solid breeze where it is much faster than similar sized dinghies such as the Laser, Aero or even the Contender with its trapeze.

## Foiling

The Skeeta scow hull shape is also ideal for foiling as overcomes the stability issues with narrow skiff hulls while being easily driven for low speed take-off and is highly resistant to crashes due to the high-volume bow. This makes Skeeta a versatile, all-round dinghy offering high performance over the full wind range.

# Tandem Yuloh

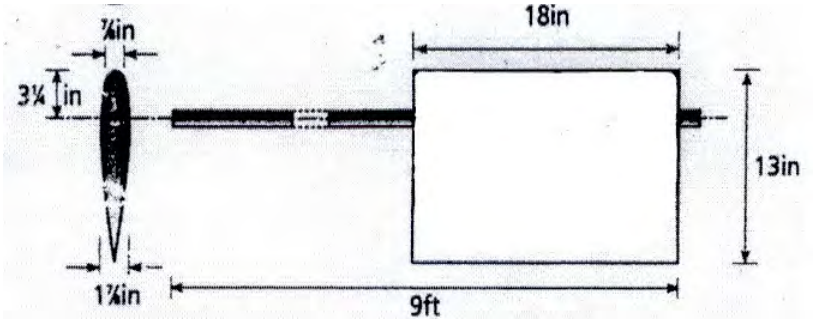
Michael Bedwell


"Tandem" as in trainer version of some fighter 'planes, where pupil and trainer sit one behind the other. Or, more commonly, the bicycle commended to Daisy. The picture shows what this means in my raft.

Yuloh (various spellings), transliterated from Mandarin Chinese. Still a common sight in the S. China Sea, often fitted with a sail. As in the English canal-boats of the 19th century, the sampan was/is commonly a family home; often the oar is to be seen in the charge of the mother.

My European version - a picture of myself using my original, shorter yuloh oar on my former steel estuary cruiser Mercia Maid on one of the wider UK canals. Like Tandem Yuloh, her beam (width) was such that she could readily be manoeuvred through the narrowest canals, where the locks and bridges are only 7 feet (barely 2 metres) wide.

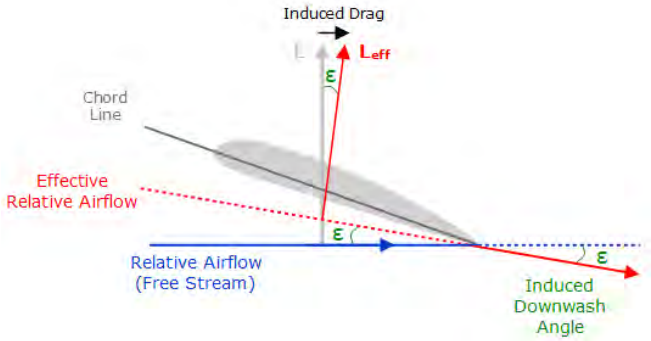
Details of oar are shown in the lower view, copied




from an article published in Practical Boat Owner about 1998, dimensions in inches (1 inch = about 25mm). Its most unusual feature of the paddle is its asymmetry, the shaft being 25% of the chord length back from the leading edge of the blade. The shaft was a 15mm diameter steel rod, which led to the article's description of the oar as 'agricultural". Nonetheless, it served me well over the ten summers in which I cruised some 1500Km of inland waterways, passing through London, Birmingham, Oxford and Bristol.

The width of Tandem Yuloh is barely 2 metres, so a more robustly built version would be uniquely capable of carrying camping gear through England's narrowest canals

This diagram shows the elementary theory of Yuloh, Lift/Drag, and Lift/drag Ratio . This theory is applicable to both water and air – the Yuloh paddle works on the same principle as the wing on an aircraft.




Lift devices are fundamentally more efficient than Drag. The most important reason is that lift devices require no recovery stroke. Hence, we can argue that, just as the marine propeller has replaced paddle wheel of 19th century river steamers, so …

… We can argue that over the 21st century will Yuloh-ing become as important as rowing as an Olympic sport – or even replace it !


Undoubtedly, there are many ideas competing with mine; Google will reveal many fascinating concepts. I am also indebted to rowing coach Bruno and an expert engineer of I.N.S.A, Lyon, France for convincing me that no Yuloh craft could be faster than the long-established and constantly-developing techniques used in current rowing hulls.

However, the narrowness of Yuloh does offer unique advantages of (i) carrying heavy loads, and (ii) increasing the number of boats that can be raced side-by-side; this opens the opportunity not only for camping boats but also for a democratization of water sports. In Oxford, for example, we find the 'toffs' traditionally usurp the river for their triennial inter-college races, while on the canal less advantaged people live in cramped conditions on narrow boats.

# Looking Forward To It

Chris Waite

The problem with rowing is that you only ever get to admire where you've been and that, after you've left. A quick glance over the shoulder may give you a notion of what's coming up next, but it doesn't paint the full picture and if your neck is anything like mine, then the process is a heap less than satisfactory.

This year – 2019 – is the tenth anniversary of the *Home Built Boat Rally*'s (HBBR) annual Thames Raid from Lechlade to Beale Park – some sixty miles – camping over five days. The first year, I had made a sixteen foot rowing skiff and rapidly found that the tortuous upper reaches of the river, all bends and bushes, were no place to be maintaining a blind, record-breaking dash. After I narrowly avoided creating a five knot furrow in part of Oxfordshire, (a chap on a moored narrow-boat roared "BANK!" at the crucial moment), it started to dawn on me that I had to be able to see where I was going.

First of all, there was not much smoke, but loads of mirrors; I tried one lashed to a stalk on a headband above and outboard of one eye.

Useless

Instinct is to turn toward what you see coming, but being a reflection, this simply causes it to disappear and age-related discombobulation means you ain't never going to learn the new trick of turning your head away from the threat. Next, I mounted a bigger rear-view mirror on a pole clamped to the gunwale. Better, but I found myself still needing to concentrate so hard on the limited reflection, that I really didn't appreciate much of the next trip at all. It also fell into the river after one long day and if anyone wants it, it's on the bottom, somewhere downstream of Wallingford bridge.

No; to absorb the full beauty of the surroundings, you have to face forward.

Options?

One of our number bought a Hobie Mirage Drive and has successfully mounted it in two vessels now, but it requires a large hole in your boat and an even larger one in your wallet. https://www.youtube.com/watch?v=lD6OQhCeXqs

Another, made up some multi-levered oars that work backwards while you face forward – effective, but too complicated for my rudimentary metal workmanship.

What to do? Well, I scratched around in the cobweb covered canyons of my mind and came upon the Oriental form of sculling over the stern – the yuloh. This is such propulsion, the blade working flat – across the flow, but with all the problems ironed out. There are two main difficulties and they're both solved with devilish cunning; firstly the pressure on a sculling blade causes it to try and dive under the boat. A tether on the handle, linked to a central eye somewhere forward and below handle level eliminates this problem.

The next is that the oar needs 'cocking' to an angle that encourages forward motion. If the scull loom forward of the notch or rowlock is bent slightly downward, then it naturally wants to rotate to a suitable angle of attack. https://www.youtube.com/watch?v=UjyE7dyR2X4&feature=player_embedded#at=49

It's as easy as that. Makes you wonder why us smarty-pant Caucasians couldn't work it out for ourselves, doesn't it?

Now this really is as simple as it sounds, but as I found out, the devil is in the detail. It was Thomas Edison who said – "I have not failed, I have just found ten thousand ways that won't work".

I second that.

As I am unable to make head nor tail of Chinese characters and I didn't happen to have one of those countrymen to hand, I spent some considerable time working out the following –

1. The bend in the loom should be inboard of the rowlock or pivot and the merest smidgen will do – it is after all, only a crank to alter the angle of the blade. Excess merely exaggerates the action and locus of the blade and is therefore a waste of good stroke.

The handle of the above yuloh was partially amputated for trying to poke me in the back, so it now measures:
LoA - 2150 mm. Blade - 500 mm x 135 mm.
Handle to Pivot - 525 mm. Handle Offset (bend) – 55 mm.

2. To encourage the yuloh to self-cock, rather than a rowlock, it appears to traditionally be mounted on a small rod, possibly ending in a ball, within a recess in the underside of the loom (shaft) of the yuloh itself. This makes the arrangement unstable so it prefers being cocked to 'feathered'.

3. The angle of 'cock' seems to work at least as best at around forty-five degrees each side of flat. This should depend on the speed of the stroke relative to the hull speed. I have based the yuloh on an eight foot oar being neither a complete shorty, or inordinately oversize and has worked well on hulls from ten to sixteen feet.

4. The angle of dangle doesn't get better the deeper the blade – almost the opposite and certainly no deeper than thirty degrees. I have to say this one is beyond me; I cannot decipher any good reason why a blade working at a shallow angle should be more effective than a deeper one, but it definitely is.

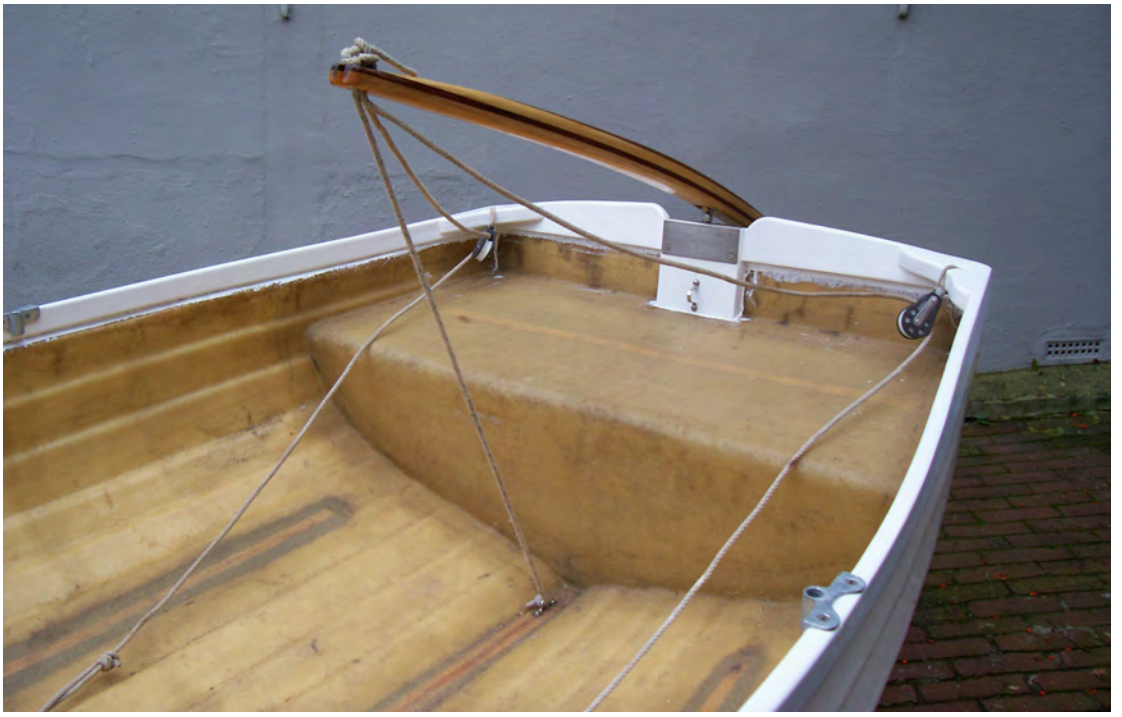
5. It seems to work with no more than a quarter of the shaft inboard of the pivot – pretty much like a real oar. Bear in mind that this refers to a leg-driven system with more muscle than is to be found in the arms.

**"But what about the facing forward?" I hear you cry!**

Well that's really what this article is about, but it helps to have the above points already in your head. I have stumpy little sailor's legs and it occurred to me that though thus limited, such limbs are designed to go the distance. And they could do with the exercise even if I am sitting behind them rather than balanced on top. So there I am sitting comfortably, facing forward and there is the yuloh behind me, anxious for my bidding. Once I had it in mind, I looked it up on the Internet – some Guys in the USA were discussing it and they agreed to go away and see what they could come up with; but there the trail went dead. No matter, the yuloh is so well tamed there is no skill; the only thing you really need to do is wiggle it to and fro….

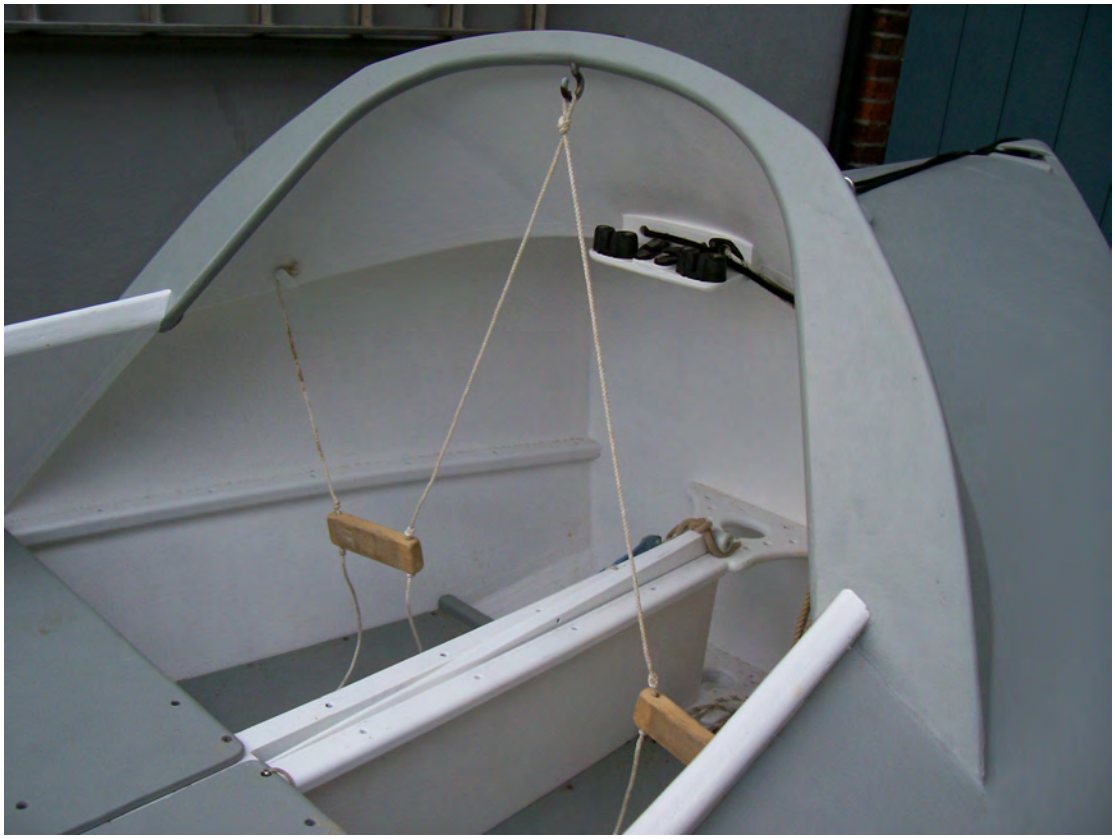
**With your legs?**

Yes, actually; the handle works from side to side, but if you fix turning blocks (pulleys) in each quarter – that is each side of the transom, you can run lines from the handle, through these blocks forward to foot pedals. Mine were and remain, simple stirrups, hung from a deck beam or frame, (though I have other ideas; but why bother?). What started as this – https://www.youtube.com/watch?v=nPo3qrVOp5w&feature=player_embedded
Went on to this –
https://www.youtube.com/watch?v=O2CxQbwjNMo&feature=player_embedded



And became this –
https://www.youtube.com/watch?v=OsUItqkomXk&feature=youtu.be


Polly



And I even tried this on the (original) skiff (above) – https://www.youtube.com/watch?v=IBbEUg0cirM

It sounds and looks somewhat Heath Robinson, but it works like a dream; among other shorter outings I've been down the Thames under yuloh some half a dozen times now to prove it.

## What else?

Here are some more tips – it is possible to steer by kicking harder and deeper with the outside foot of the turn, but my dinghy specifically has a through transom tiller so the yuloh can be mounted over the rudder. This provides much better directional ability.

As it is not easy to keep the yuloh on its pivot and at forty-five degrees each way while you are up ahead taking in the view, it really needs to be captive. I found this out the hard way too and first tried to lash it down with halyard wire – most of the strands gave way on just one short outing. Finally, I had a friend weld a 'D' shackle over the top of the unthreaded shaft of a stainless bolt. I cut a groove into the underside of the yuloh shaft, lined it with stainless sheet which provides a rather noisy forty-five degree stop each side, then screwed the D-hoop loosely into the shaft with a stainless coach screw. It has been good as gold for the last half decade.

It's cheap too, at perhaps a tenth the price of a Hobie Mirage Drive and unlike those, it doesn't pick up weed. It pushes my little, raid-laden, single-hander along at around two to three knots all day, on an eleven foot LWL. It does better on the lighter longer hull of course and can produce reasonable short bursts of speed.

Other pointers include a warning – like sailing, there are no brakes and I keep a single blade paddle to hand for such moments. The noise it produces easily out-decibels Captain hook's crocodile's alarm clock, but can be ameliorated by tying a piece of bungee into the system – I slung one over the forward, lower end of the tether where it takes the bump out of the tether when it snaps taught as each stroke bites. I think it would do just as well tied into the length of the tether itself. This system does not have the flexibility of using your hands and I suspect the tether would cause it to rapidly cease to function in a seaway.

Lastly I reckon to mount it on the rudder stock where hopefully it will oppose the somewhat vacillatory course it otherwise tends to induce. It may also reduce the amplifying effect of the transom or stern deck, which appear to act like a sound box; and will be tried on my next build – a river-raid, camping skiff.

And what is this marvel of sticks and string called? Well my chum Phil Oxborrow suggested a 'Pedyuloh' and that's what it has become; a label somewhere between rather clever and deliciously naff.

Chris Waite

## AYRS London Meeting, Thorpe, Surrey, 20th January 2019

The meeting began with a short slide show by Fred Ball who had recently been to the Science Museum and spotted a model of an oil tanker with a bulb bow which was meant to illustrate the benefits of mathematical design. Michael Ellison reminded us that during the war some frigates were fitted with sonar domes at the bow and incidentally discovered a marked increase in maximum speed! Which came first the chicken or the egg? [1]

Tim Glover showed his extended winch handle which gave increased leverage to help those of us getting older and weaker. (It's a real phenomenon, don't laugh). He also was able to show us bore cameras, which could be plugged into a mobile smart phone becoming a useful endoscope costing £6-£10.

Later a talk was given by Tim about repairing cracked thermoplastic materials using a soldering iron and scraps of compatible plastic material. A clean bit and some practice to get the heat right and cracks could be successfully repaired.

Roger Callum then described how he had repaired a Topper sailing dinghy where the mast foot had chewed through the socket. With persuasion the official repair depot provided a suitable chunk from a reject moulding for a repair to be made. He used a special type of soldering iron where the carbon block heating element was, by trigger action, moved to contact the bit giving almost instant control of heat.

Fred Ball then raised the matter of the future of AYRS, and introduced the topic by asking the age demographics of those present. The results: under 50, 1; 50-60, 2; 60-70, 5; 70-80, 5; over 80, 5. He stressed the importance of ensuring that members realised we are a co-operative organisation, and that we rely on them to generate ideas, discussion and experimental results. .

Ways of increasing membership were discussed, and membership forms handed out to be given to potential members, or used to gift membership. It was also suggested that members trying out their ideas should have to hand an information slip giving details of what the experiment was and contact details including those of the AYRS.

Michael Ellison talked about his duties as an observer for the WSSRC, and how, as he is now over 80, local rules about retiring before 80 were circumvented. Also, although wind forecasts were extremely good, it was difficult to get competitors motivated to be ready for the ideal conditions for a record run. He described how, on one occasion, a competitor wanted to set a record not included in the event. He coaxed that competitor to go on course at that moment and that competitor was rewarded with THE world record.

Kim Fisher had been given a film of Speedweek 1972 which he had had digitised, and we were able to show. The most noticeable thing was the huge variety of hull and sail configurations that were being used. There was a clip of Crossbow in action: long thin hulls and large sail area, also clips of several foiling boats including Icarus, a foiling version of a Tornado.

Fred Ball reminded us that Speedweek is on October 5th to 11th this year; and while it predominately features sailboards and kiteboards, the organisers are anxious to encourage boat entries. Although production boats often take the fastest boat of the day prize, less spectacular ones sometimes win and there are prizes for innovation.

Charles Magnan spoke about his thoughts on an improved hull design for the Challenger trimaran used by disabled people, with a view to improving its speed potential without losing the convenience of the present design. He was able to show some preliminary drawings from a proprietary CAD program.

Roger Glencross then made a short presentation about his thoughts on the Hagedoorn form of sailing, where a kite carries a man above the water constrained by a paravane. In view of his increasing age he now feels that some form of ekranoplane should replace the kite, so keeping him warm and dry and avoiding the athletic activities of kite boarders! The model he displayed had anhedral, and some concern was expressed about its stability when flying. He hopes that by remaining close to the water, he will retain ground effect and stability. (Some ekranoplanes do have marked anhedral and I understand their pilots need to learn new skills to avoid catastrophe. See AYRS booklet No 126)

John Perry then made a presentation about the new Americas Cup rules and how they were being developed. The boats

[1] Since this meeting Tim Glover has emailed the following link about bulbous bows: http://www.mar.ist.utl.pt/mventura/Projecto-Navios-I/EN/SD-1.5.4-Bulbous%20Bow%20Design.pdf.

sound as though they will be fast and exciting and certainly the small experimental ones which have been built appear to be extremely fast. However John went on to describe the complexities of the rules (and the rules that say which teams can choose the rules), which will need some interesting logistics planning to ensure the actual race boats will ready in time for the planned preliminary events.

John then talked about an idea he had for measuring pressure at various points on a sail in working conditions by implanting a disc with cuts in it, measuring and logging the stress reactions as the disc distorted. The lack of bulk would have little effect on the sail shape unlike a manometer or aneroid systems

He next gave us a quick review of his summer holiday sailing along the Croatian coast in his own designed and built dinghy. The harbours and towns visited were very interesting but much of the actual coast was rocky and covered in dense vegetation so exploring the country side was rather restricted.

After lunch we formally went round members' displays, starting with Chris Watson (see Catalyst 54) who had a very neat half model of his boat stuck to a mirror which produced an unusual but effective visualisation of the concept. Chris went on to say how a bigger version was being developed with Kim Fisher's help.

Roger Callan's display of lashings demonstrating how important it was to stabilise round materials using small inserts to produce a stable cross with a pair of figure of eight lashings and also how a broken spar or tiller could be firmly lashed with two clove hitches each of which had extra turns incorporated and finished after tightening with the free ends being inserted into the gap left between the lashing and the pieces to be joined to prevent loosening.

Chris Clark then showed us a model of a stand up rowing catamaran which had his experimental biplane rig with the foot of each sail fastened to the deck, and the luff on a spar which could be inclined aft to shape the sails or stow them at deck level. As well as producing useful drive downwind it was hoped that shelter could be gained in unpleasant weather without too much drag.

Mark Tingley then spoke about his drive system to generate an oscillating lateral motion minimising the period of acceleration at the end of each stroke. The device is intended to drive fish tail fins using eight blades in all.

He then went on to talk about foiling sailboards having problems with a sudden loss of lift causing them to nose dive to an almost instant stop. He felt that the problem was related to the "tail plane" running in the water at the same level as the main lifting foil; and that the problem might be reduced by having the tail plane set below the horizontal level of the main foil allowing it to retain pitch control as the main foil loses lift.

## AYRS North West UK Local Group, Record of Spring Meeting 16th March 2019

Mike Howard opened the meeting by welcoming Richard Fish who joined AYRS last year. Richard told the meeting that he owns and sails a Wayfarer and an Albacore sailing dinghy and is currently introducing his teenage children into the sport of sailing. He is interested in learning more about foils and is also hoping to develop a digital method for measuring the lift and drag of a soft sail using differential pressure measurements.

Mike then went on to explain why he had resigned from the AYRS Committee in December 2018, after serving on it for only six weeks, and why he had subsequently withdrawn his nomination for the post of Hon. Secretary. After Mike's summary a positive discussion took place which touched on the recent Members' Questionnaire, the demand for both digital and hard copy versions of the CATALYST magazine and the development of the AYRS website as a means of promoting AYRS to a younger audience. The results of this discussion are too lengthy to be included here and have been sent to the AYRS Committee.

After a welcome hot drink of tea or coffee and a variety of cakes (thanks Col) the meeting settled down into its more usual pattern of discussion. Colin McCowen began by thanking John Shuttleworth for organising the NWLG Spring Outing to the Manchester Museum of Science and Industry. Here the half dozen or so members who had attended were given the opportunity to view the substantial remains of Robert Stephenson's famous ROCKET locomotive, which had won the Rainhill Trials in 1830. Colin had also been impressed by a cutaway tank engine, which, together with an excellent talk by one of the Museum's guides, fully explained the internal workings of a steam engine. Colin made some scathing remarks about the exhibition about

Electricity and then delighted the audience with his own short illustrated resume of the birth of electrical power.

Colin then got 'back on course' and detailed how he had developed an easy method to raise and lower his five metre high wing mast and how he had also produced a method to lift his heavy Canadian canoe on and off his car roof rack. Both of these ideas were well known but it was interesting to hear how Colin had adapted them to suit his own individual needs and how he had overcome several less obvious obstacles. He finished by relating a story about his early Spring outings on the river Mersey during the fine spell of weather we had.

Colin then presented an interesting article he had unearthed about the length/breadth ratios of fish and sharks. Mike suggested that the more we learnt about the natural world, and in particular the oceans, the more conscious we become of natural ratios. John Alldred pointed out that fish have an L/B ratio of 4:1 but swim fully submerged so do not encounter wave making resistance and that the ideal monohull has an L/B ratio of 7:1 while a catamaran has an ideal L/B ratio is 15:1. There followed a discussion on the trends of ocean racing sailing vessels and the possible spin off into leisure sailing. Mike stated that many of the craft and systems being developed for the elite racing circuits were inherently dangerous. John Shuttleworth suggested that AYRS might have a role to play in the second phase by developing safe and reliable products albeit with less potential for outright speed. The latest trends in the America's Cup and the MiniTransat featured heavily in these discussions. James reminded the audience about his dissertation where he had compared various unfaired and faired shapes using Fluid Dynamics in SolidWorks, a computational and 3D modelling software package.

Mark brought the meeting up to date with his progress on his self righting proa project. He has had a sail made by Goacher of Windermere for his scale model. He has tried to produce a sail which can be scaled up to full size without having to make any major modifications. He has had to try and overcome several production difficulties while adopting this strategy. His 'wrap-around sail has to be capable of being reefed and this has led to some interesting problems in which he sought the member's advice about. No new ideas were tabled.

Finally, Adrian updated the meeting on his progress with his MicroTransat Challenger, which he has adapted to a junior sail trainer. The hull/deck and outriggers have been completed. He has produced a rigid wing sail, in line with the original concept. He has further developed a new and separate top section which can be lowered into the top of the existing wing sail. He hopes to be able to control this section separately from the main wing sail. A discussion took place on how he now might control the trailing flap remotely. Mike suggested that a high torque servo linkage coupled to a standard 2.4GHz remote control system as used on model boats would suffice. The joystick can be controlled by the helmsman.

The meeting came to a conclusion all too soon. There never seems to be enough time to discuss thoroughly the many diverse subjects put on the table.

## AYRS North West UK Local Group, Autumn Meeting, 14th September 2019

Mike Howard opened the meeting by informing the members that he had recently completed another aspect of his AYRS Action Plan, namely the location of the individual members within the UK with a view to forming additional Local Groups.

Colin McCowen was asked about progress on his project, a Hagedoorn-type kite powered hapa. He stated that he was still trying to master flying a remote controlled aircraft but weather conditions this summer had been far from ideal. He believes that this will be the next type of 'sailing boat' to challenge the World Speed Sailing Record.

A discussion on what was the definition of a 'sailing boat' brought to light several changes in the attitude of the sailing fraternity over the past 150 years. Mike Howard stated that in the 1890's catamarans had been banned from racing by the New York Yacht Club because they were winning all the races. Adrian stated that his club still upheld a ban on catamarans on their tidal moorings. Colin pointed out that kite surfing had only just been legitimised as a World class sport.[1]

[1] Author's Note: The Casssell Compact English Dictionary states: "SAILING BOAT – A boat with sails"; "BOAT – A small vessel, generally undecked, and propelled by oars or sails"; "VESSEL – A hollow receptacle for holding water, etc, a ship or craft of any kind, a tube or duct". Note there is no mention of a boat having to be immersed or floating in water!

Colin also showed a model helicopter rotor blade manufactured from carbon fibre which is produced by a local company. John expressed the desire to obtain some carbon fibre for experimentation purposes.

Richard Fish outlined how he was developing a digital method of attaining data from a sail using load sensors and air flow sensors. He had found that most of the cheap Chinese electronic components were of poor quality and did not meet their specification. He had perfected an analogue load cell with a digital readout. Mike Howard stated he would contact Richard Walker again as he had done a lot of research on various electronic components when developing the control systems for the AYRS MicroTransat Challenge. Mike felt a lengthy conversation between them would be very beneficial.

Richard also presented a superb oar he had built incorporating a cedar shaft and a plywood/carbon fibre/Kevlar spoon blade. It was about 2.7 metres long and balanced at a ratio of 2.7:1. Richard intends to utilise a pair of these oars to propel an Albacore sailing dinghy. He had used a vacuum bagging method when curing the composite blade. Although it was not weighed, it was extremely light. He also demonstrated a very secure and practical oarlock produced by John Murray, an Australian. This oarlock is ideal for ocean rowing as the oar, rowlock and rowlock holder are always captive. (*browser – gaco oarlocks, contact – mail@gacooarlocks.com).*

During the break for tea, coffee and cakes (*thanks Col*), members were able to view the map of the UK showing the distribution of AYRS members as well as copies of the Final Reports on the Members Questionnaire and Development of Local Groups. Mike pointed out that the two AYRS members resident in the North West who were not currently members of the NWLG had been contacted to join. One had replied.

After the break a discussion took place on an article which had appeared in the SEAHORSE magazine, which Martin Walford, an AYRS member, had kindly sent to Mike Howard. 'The Incredible Journey' outlines the start up and development of Richard Jenkin's company Saildrone. Richard Jenkins is the current holder of the Land Sailing Record which stands at 126.1 mph. The article outlines the development of the autonomous sailing craft, 'SAILDRONE' It is the first comprehensive article that the members involved with the MicroTransat Challenge had seen which details both the pitfalls as well as the triumphs of this craft which has taken ten years to develop, backed by $100 million of Silicon Valley venture capital.

John Alldred outlined how he was trying to build a towing test tank from Correx sheet. He had joined the sheet edges together by inserting glued splines into the internal spaces formed by the corrugations. It had leaked. Mike Howard expressed the opinion that a hole which penetrates the Correx sheet is very difficult to seal. He had experienced a number of leaks on his Correx canoe where screws passed through the internal floor, through the Correx and into the external keel or bilge runners. This was in spite of sealing the hole with Marine Silicone Sealant and caulking the joint between the external keel and bilge runners and the outside of the Correx hull with Marine Silicone Sealant. The answer that was agreed by both John and Mike was not to penetrate the Correx sheet below the waterline. The merits of GORILLA waterproof tape were discussed.

A long and frustrating discussion took place as to how AYRS might be brought back to life. Mike introduced the idea of a cheap and simple sailing craft which could be built with sustainable materials for a very low set price. In the USA, where 'cheap and dirty boatbuilding' was almost an institution, "Messabouts" were held on a regular basis at a lake or river side. Participants had to build a boat in a set number of hours at a fixed cost. This led to some very innovative ideas being employed, and success and failure were viewed with equal merit; (*but at least they tried!*). Whether this would work in the UK was doubtful although Adrian pointed out that boat building competitions have been held at Boat Shows in the past.

The conclusions were as follows:

a. Introduce AYRS to a younger audience by promoting the Society within the Education Establishments teaching Marine Sciences and also target Boat Building Academies.

b. Introduce AYRS inspired Research and Development Projects in which a number of AYRS members, with the relevant expertise, can work together. The development of an inexpensive 'starter' sailing dinghy was one suggestion. A 'bolt on' hydrofoil package to suit most single handed sailing/racing dinghies was another concept.

# *Catalyst* Calendar

This is a free listing of events organised by AYRS and others. Please send details of events for possible inclusion by post to Catalyst, BCM AYRS, London WC1N 3XX, UK, or email to **Catalyst@ayrs.org**

## October 2019

**5th – 11th Weymouth Speedweek**
Portland and Weymouth Sailing Academy, Portland Harbour, Dorset UK. See http://www.speedsailing.com/ More experimental boat entries are welcome and wanted!

**10th Speedsailing NOTE: CHANGE OF DATE**
**AYRS Weymouth meeting**
19.30 for 20.00hrs, Weymouth Sailing Club, Nothe Parade, Weymouth, Dorset DT4 8TX. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX. Check the AYRS website before going just in case the location changes (unlikely)!

## November 2019

**3rd AYRS London Area meeting**
9.30am to 5pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, near Staines
Bring your lunch - tea and coffee available. Donations invited to pay for the hall. Details from Fred Ball, tel: +44 1344 843690; email fredball@ayrs.org.

## January 2020

**26th All-Day AYRS Meeting**
9.30am-4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey .Tea and coffee available but bring your own lunch. Donations invited to pay for hall. Further details from Fred Ball, tel: +44 1344 843690; email: fredball@ayrs.org.

**26th AYRS Annual General Meeting**
4pm-5pm, Thorpe Village Hall, Thorpe, Surrey, after the All-Day meeting (see above). Agenda, Committee report and other papers will be posted in the AYRS Forum https://www.ayrs.org/forum.
AYRS desperately needs new Committee members, especially those with computer skills! Contact: Fred Ball tel: +44 1344 843690; email: fredball@ayrs.org **before 25th December**.

## February 2020

**29th – 1st March RYA London Dinghy Show, Alexandra Palace London N22 7AY.**
The RYA Dinghy Show is the only show in the world dedicated to Dinghy Sailing. It's a great day out for all the family and offers visitors the opportunity to visit the AYRS Stand.

**TBA AYRS NW UK Local Group Spring Meeting, 2pm**
Lydiate Merseyside
Contact: Mike Howard, email: ecotraction@aol.com

## April 2020

**TBA Sailing Meeting**

## May 2020

**TBA Sailing Trials Weekend**
Portland and Weymouth Sailing Academy, Portland Harbour, Dorset UK
A weekend messing around with boats in Portland Harbour. For more details contact Norman Phillips email: wnorman.phillips@ntlworld.com

## June 2020

**TBA AYRS NW UK Local Group Summer Meeting,**
Contact: Mike Howard, email: ecotraction@aol.com

## September 2020

**TBA AYRS NW UK Local Group Autumn Meeting**
Contact: Mike Howard, email: ecotraction@aol.com

## October 2020

**3rd – 9th (TBC) Weymouth Speedweek**
Portland and Weymouth Sailing Academy, Portland Harbour, Dorset UK. See http://www.speedsailing.com/ More experimental boat entries are welcome and wanted!

**7th (TBC) Speedsailing**
**AYRS Weymouth meeting**
19.30 for 20.00hrs, Weymouth Sailing Club, Nothe Parade, Weymouth, Dorset DT4 8TX. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX. Check the AYRS website before going just in case the location changes (unlikely)!

## November 2020

**8th AYRS London Area meeting**
9.30am to 5pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, near Staines
Bring your lunch - tea and coffee available. Donations invited to pay for the hall. Details from Fred Ball, tel: +44 1344 843690; email fredball@ayrs.org.

# 2020 ANNUAL GENERAL MEETING

The 56th Annual General Meeting of the AYRS will be held on Sunday 26th January 2020 at the Village Hall, Thorpe, Surrey, TW20 8TE, UK starting at or after 4.00 pm (after the all-day AYRS meeting). The AGM is open to all members and guests, but only paid-up members may vote.

## AGENDA

1) Apologies for Absence.

2) Minutes of the 55th Meeting held on 20th January 2019 at the Village Hall, Thorpe, Surrey.

3) Chairman's Report.

4) Treasurer's Report and Accounts

5) Confirmation of President and Vice-Presidents, Election of Officers and Committee Members. (See below)

6) To appoint a Reporting Accountant for the year. (See below)

7) Any Other Business
   a) Amendment of the Articles of Association to allow the Committee to work by video-conferencing. (Proposed item - see below)

8) Vote of thanks to the helpers of the society.

**Previous Minutes**: The draft minutes of the 55th AGM are on the AYRS website (in the Forum).

**Chairman & Treasurer's Reports and Accounts**: These will also be found on the AYRS website.

**Officers and Committee Elections**:

We have vacancies for: Chairman, Vice-Chairman, Secretary, & Treasurer (who also acts as Membership Secretary). Job descriptions for these positions wil be posted on the AYRS Website.

Under our rules, Committee Members Marcus Lee and John Perry have completed their current terms of office. They are willing to be reelected.

All nominations should be submitted to the Committee, preferably by email to committee@ayrs.org, as soon as possible. Note: Nominees may be asked to post on this Forum a statement of their skills and of what they will bring to the Committee.

Nominations received will be posted in the AYRS Discussion Forum in the Members section

**Reporting Accountant**: The Committee propose that Robin Fautley be re-appointed.

**Any Other Business**: Any items for formal consideration are to be submitted by 24th December 2019, but items for informal discussion may be notified to the current Chairman up to two days before the meeting.

**Amendment of the Articles of Association**: This Item of AOB has been proposed, but no details are as yet available. They will be published on the website by 31st December 2019 (or the Item will have to be withdrawn)

Note: Thorpe Village is close to Staines (and Thorpe Amusement Park), easily reached from the M25 Junction 11 or 13. The Hall is off Coldharbour Lane (follow signs to TASIS).

Note: Any paid-up member who, having registered on the Forum (https://www.ayrs.org/forum), is unable to access the Members-Only section should contact the Web Administrator without delay.

Catalyst — *a person or thing acting as a stimulus in bringing about or hastening a result*

---

## On the Horizon . . .

Nothing much really.

Would you like to write something?

Email it to catalyst@ayrs.org please.
Guidance notes are inside the front cover.

ISSN 1469-6754

**Amateur Yacht Research Society**
BCM AYRS, London WC1N 3XX, UK

Printed by Rapidity Communications Limited, London EC1V 7JD