

# Keels or Centerboards?

*A Paper Read Before the Cruising Club of America by the Skipper of "Diabliesse"*

By FREDERIC A. FENGER

IT is with no small hesitation that I approach this subject — the known merits of the keel yacht for offshore cruising versus the more or less unknown virtues, untried by most of us, of the centerboard craft. For I must frankly admit that practically all of my offshore sailing has been in the keel type, and that against this I can put forward no parallel experience in any centerboard craft. And so, while I cannot depart from a certain amount of bias, I believe that for the good of the sport, impartial discussion is far better than hot argument.

There is, of course, the technical side. But that involves theory, which after all is but refined practice. Furthermore, the technical discussion is rather apt to stand upon weak legs unless one can bring forth actual side-by-side experience. For instance, we would have to take the best type of keel yacht, such as I believe my old *Diabliesse* to be, together with Mr. Howard's *Alice* or Mr. Crabbe's *Windjammer*, and put 'em out in a real snorter off Hatteras in January. Then we would really come to know something about our subject. But such a test would be rather difficult to bring about and, I'm inclined to believe, might result in a tragedy — to the centerboarder.

Why? Because, with the utmost respect and deference to Mr. Howard and Mr. Crabbe, whose experience with their respective craft has been large enough not to be sniffed at, and whose statements regarding these experiences have been modestly and sincerely made, I must ask the question, not applied directly to them, "Does the average yachtsman know just what he may be up against when he goes offshore?"

The Gulf Stream has given some of us a bit of a kick in the Bermuda Races, while Northers and Trade squalls have given Mr. Howard and Mr. Crabbe a bit of salt water pounding in the West Indies. And the cruising yacht that will come through this stuff, handily, without undue discomfort to her company, and with no material damage to her gear, is good enough for our average requirements.

Yet this Gulf Stream business in June, and the West Indian conditions, outside of the hurricane season, are a mere nothing to the real up-and-down-stairs snorter which one may very likely encounter while running outside, from Beaufort to Georgetown, for instance, at any time during the winter months. And that is something which even the most cautious skipper may have to endure while making his way to the easier waters below 25° north.

At various times I have been made curiously aware of the comparative ignorance of men who I had thought were sufficiently experienced to know just what one might expect in the way of a real breeze. Our Grenadine whaler, said to have been one of the best of his kind for open sea work, lost his nerve completely when we ran into a snorter off Cape Fear. At another time, a friend who had spent all his life from early boyhood up, cruising about up and down the coast, exclaimed, "Gosh! I didn't know it was anything like *this!*" when we ran into a bit of Gulf Stream dirt. I'll admit that it was blowing hard, but not a full gale, and did not call for heaving-to.

"Well," thought I, for I did not want to take the heart out of him completely, "what would you say to a real twister?"

Another friend, of wide yachting experience, became so anxious in a June blow in Cape Cod Bay — we were romping along comfortably enough with just our fores'l handed

— that he refused to go below for the entire run from P'town to Boston. He was no coward, I can vouch for that, and yet I believe that I am a cautious sailor. I've been well scared, and I do not hesitate to admit it. And I shall probably be well scared again, till I'm done with sailing.

While I am on this particular phase, I want to bring up two points which struck me rather forcibly after reading the accounts of Mr. Howard and Mr. Crabbe.

Mr. Howard, in his article of last November, says that in March of 1925, he drove *Alice* across the Gulf Stream from Havana to Key West in the heaviest norther of the winter, under mains'l and engine. The distance of 95 nautical miles was covered in 21 hours, or at the rate of slightly more than 4½ knots to windward. This would figure at about 6½ knots through the water at four points off — which she might hold with the engine to help her. Now here, despite your expectations, I'm not going to question Mr. Howard's estimate of that norther, but shall spike this particular gun in his favor and say that this was a remarkable performance made by a remarkable boat. My sly point, however, is that perhaps, after all, northers are not quite as bad as we have been lead to believe.

Let us now turn, politely, in the direction of Mr. Crabbe. In his article in *YACHTING* of June, 1925 — we all seem to be writers of sorts, and so perhaps not to be taken too seriously — he says, that in a gale in the Gulf Stream, *Windjammer* actually worked out to windward while hove-to. Usually we heave-to for one of two reasons, namely, for comfort in a passing squall — a twelve-hour squall, say — or because we have to, as it has become dangerous to drive the vessel any longer. In this latter event, it is highly dangerous for a vessel to forereach. I have seen a large three-master forereaching while hove-to, and she was making rotten weather of it. A quartering drift should be established. That is, with the vessel lying about five or six points off the wind and while the riding sail is urging her forward, the windage and top drift of the sea somewhat more than overcome the tendency to forereach and give sternway, so that the action of the rudder is reversed. At first blush it would seem that the more the sternway, the better. But I am inclined to believe that this only holds true in case a small angle of rudder is required. For the wind pressure varies, from trough to crest, and with a great amount of lee helm — assuming that the wheel is becketed — the vessel may fall off in the trough and meet with severe punishment when she comes up again to a cresting sea. With a similar amount of weather helm, she may luff in the trough and then take the next sea with her riding sail shaking, and so invite its loss, which might be disastrous. Possibly a square drift — directly down wind, as I understand the term — with the vessel at five points off and having a small amount of lee helm, is best. Now in order to maintain a uniform angle with gale and sea, my instinctive feeling is that the vessel with the long, raking keel and comparatively deep forefoot, is inherently better than the centerboard vessel, because of the wide fore and aft distribution of lateral plane which, as we know, admits of a minimum variation from her heading.

As to the ability of a vessel to ease away from the seas, when hove-to — lee drift, in other words — you undoubtedly get this to a high degree in the out-and-out centerboarder. Yet the fairly beamy, not too deep-legged keel

boat is not wanting in this respect, as was aptly demonstrated by our experience in *Diablosse* with a sea anchor in a blow off Cape Fear in the middle of January in 1914. Our lee drift, quartering, was high enough, probably close to four knots, while the rope to the sea anchor was fairly taut. But when a breaking sea, or rather the top of it, hit us shortly after the drogue was set, the bag, in trying to check us, was blown out like paper. And so, while our drift was ample enough to ease resistance to the oncoming seas, it would probably mount to six knots, or fifty per cent more in the case of the centerboarder, calling for additional sea room even though she may be hove-to at a considerable distance from a lee shore. To my mind, then, the keel boat has a certain advantage in better being able to "hold its own" when hove-to.

Having examined the cart, let us now turn to the horse, for the chief danger, it seems to me, would be during a rising gale and just before heaving to — whether previously sailing on the wind, or running, especially when trying to bring the vessel around to heave-to after running before the wind. For the amateur is prone to run a bit too long! Then a knockdown might become a very serious matter, for there is a moment — a mighty long moment — when you are broadside, in the trough of the sea. Yet this may not be so bad if you are under bare poles and contemplate bringing your vessel into her hove-to position as you get up your trys'l after she has settled herself in the trough. I touch upon it, however, merely to state in passing that my first requisite for the offshore yacht be that her hatches, trunks and skylights are so sturdy and that she be made so tight above the ears, withal, that she be left to ride, like a bottle, in the trough of a hurricane after the masts have been cut away. There is nothing new in this, Captain Day having reiterated it many times in the "Hurrah's Nest."

More than this, she must be so designed that she will roll down evenly, neither by the head nor by the stern, and with fairly slack bilges which will allow her to lay over and spill the heft of the wind out of her top leaches without losing her gear. But she must not hang! As she goes down the relative balance of her lateral plane must not only be retained but also a considerable portion of her rudder must be active in the water. There must also be enough righting moment so that she will not even temporarily get off a sailing angle and she must have that respectable curvature of ample beam which inherently will tend to bring her to regardless of any great aid from the rudder. In other words, she must always be sailing!

From the outset, the keel vessel of moderate proportions and with a certain amount of outside ballast, will meet these conditions. This we all know from experience as well as we know that a poorly designed keel vessel is apt to be a worse critter than an ably designed centerboarder. If we remove the keel altogether, with its dollop of outside weight, we must increase the beam for stability's sake. Here, excessive beam is a menace in case of a knockdown. For the vessel will tend to "roll out" and the weather bilge will furnish an excellent leverage for the *next* sea. I understand fully the argument that the centerboard vessel at this point is likely to slide off to loo'ard, passing the *next* sea under her. But will this hold when she has a considerable area of her deck under water and acting as a leeboard? That question we cannot answer, perhaps, without actual trial. Further, the centerboard vessel, at this very extreme angle of heel, will materially lose rudder area, through *emersion*, just when you need it most. While the area of the centerboard, which we will take for granted is of the usual triangular shape (as the dagger boards would obviously be impractical in a sizable craft) also would be diminished. Its center moves aft a bit and so tends to throw the vessel into the wind — the desirable thing at the moment. But I rather doubt whether this would even begin to

compensate for loss of rudder area and lack of steering ability. In the meantime I cannot believe that the all-inside ballast can be as efficient as if a portion of it were in a shoe on the bottom of the keel, and the remainder rather better spread out than otherwise would be possible.

Let us now consider Mr. Howard's *Alice* more directly, for she is at least fifty per cent concerned in starting this discussion, and a study of her lines suggests a phase of cruising design which has interested me for some time. I first made her acquaintance last June, when for the better part of an afternoon Mr. Howard and I went over her blue prints which not only were the completest I had ever seen but also showed that Mr. Howard had gone into her building with the understanding of a man who knows exactly what he wants. At that time he very kindly asked me if I would like to go with him on the cruise which he is now making in the West Indies. With considerable regret I was forced to decline — having a paper cruise and other matters on my hands — for my mind is not at all closed against the possibilities of the shoal draft vessel for offshore work and I should have liked to have known her at first hand. Her merits for "going foreign" where many delightful harbors are closed against the deeper craft, where there are few days for hauling out small craft, and these often adapted only to shoal draft vessels, and where the tide fall, as a rule, is scarcely enough for drying out a vessel having a draft of more than three or four feet, are obvious. And so, not being from Missouri, the home of mules and obstinates, I am more than willing to be shown.

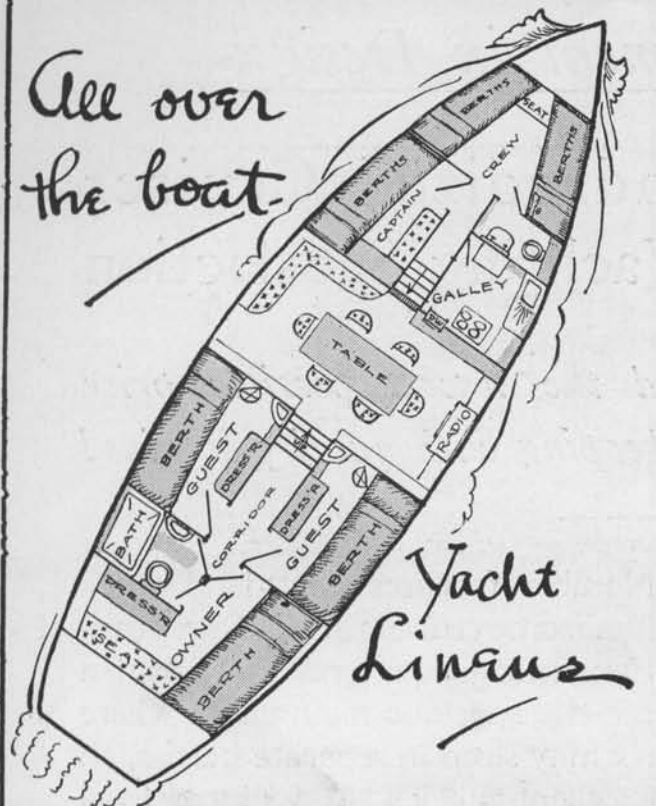
Now Mr. Howard's *Alice* is not altogether typical of the centerboard type, as we usually think of that type, for her beam is not excessive — a keel boat of her length might even be beamier — there is considerable deadrise throughout her sections, her bilges are what I call fairly slack, and nowhere do her topsides approach plumbness, except where they near the counter. Even here, there is not the usual tumble home. In many ways her hull is splendid. Perhaps more so than I realize. But she impresses me as being a bit of a paradox, for while she has something of the canoe in her characteristics, especially in the forward two-thirds, she tends to approach the keel type, so much so, that she actually seems to hanker for a good honest keel. And she does without the keel, I believe, at a considerable sacrifice to sail area. Without ample sail area and the ability to carry it, where are you in a hard chance and trying to claw off a lee shore?

You will note a fair degree of parallelism along her middle body. Not as pronounced, of course, as in the Norwegian type as developed by the late Colin Archer, who designed Nansen's famous *Fram* which was essentially a keel-less prototype of his later developments. Colin Archer, by the way, was a white-bearded man, rapidly balding, of about sixty or more when he designed the *Fram*.

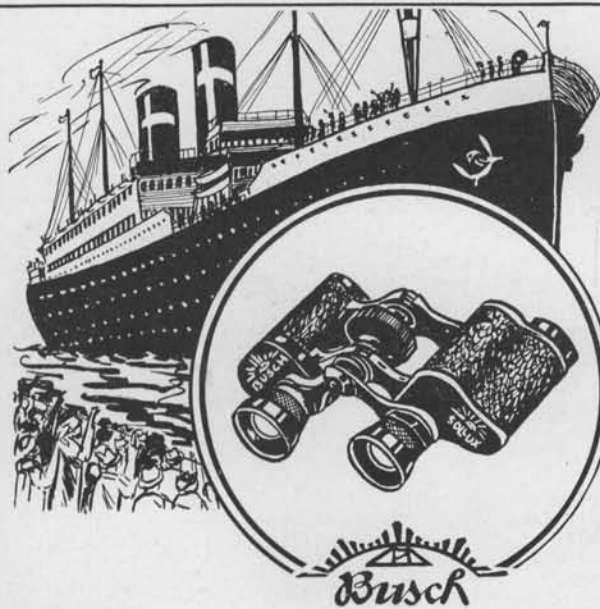
This parallelism brings us to the consideration of what I believe to be a rather important factor in cruiser design. By maintaining the same family of curves forward and aft for a moderate distance from the mid-section, the stability and buoyancy of the vessel is increased without increasing the extreme beam. All this we know, of course, from past experience with the more extreme scow type. Years ago I ventured in this direction in designing sailing canoes — not of the scow type — where it was imperative to keep down the beam in order that a double bladed paddle could be used efficiently. The result was a hull that not only was stiff, after a small initial heel, but that traveled very handily on her long lines, and would not bury. Neither would she roll out. The effect was that of riding out of the water — almost of planing — and there came a point at which

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## Keels or Centerboards

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she was reluctant to heel any farther but simply converted the extra energy of a passing squall into added speed. It seems that there is something here worth considering. And herein may lie, in part explanation, the remarkable performance of *Alice* when crossing the Gulf Stream in a norther. But there lies a danger in this parallelism, especially if carried to an extreme. For I have come to the conclusion that the first principle in designing an offshore vessel, of whatever type, is that she must have enough buoyancy in her middle third, to ride a single steep wave and, with both bow and stern clear of the water, maintain a reasonable amount of freeboard amidships — say a foot in the case of a vessel of about 52 feet long. Excessive parallelism at the expense of the full rounded beam, will not meet this condition. You may argue that this very steep wave is not an "ideal wave." But you do not always meet with the "ideal" wave offshore. You will find waves upon waves, sometimes with deep valleys between, and oftenest when it is imperative to have free ends! In reading the accounts and studying the lines of the famous clipper ships, of which so much has been written during these last years, I have often speculated as to how much drier and how much abler they might have been, possibly with an *increase* rather than a decrease of ultimate speed, had some of the parallelism of their middle thirds been converted into additional easy rounding beam. And therein, to a large extent, no doubt, lay the extraordinary virtues of the splendid *Cutty Sark*, which has managed to survive to this day. For it was said of her, in contradistinction evidently to her contemporaries, that nowhere along her hull could one lay a cane and find contact but at one point. No doubt, the horned cattle of those days were largely wet-waisted due merely to over loading, but we are told that even when moderately laden, most of them had a wicked habit of bucketing up huge seas over their lee rails. Commercially, a rounded beam vessel whose bilges necessarily would have to be slackened to an appreciable degree as the beam was increased, in order to save her spars and gear, probably would not be a success. For she would be rather more expensive to build and at a possible sacrifice of carrying capacity. Yet this may be a debatable question.

But we are now considering yachts for offshore work where seaworthiness, comfort, ultimate safety and, not much less than these, speed, are the essentials. So I come back to my premise of the steep wave, or "test" wave as one might call it. At once you will say that the centerboard craft easily can be designed to conform to this requirement. But she can do so only by means of carrying excessive beam and being very much on top of the water and so not having any great holding power, or, as in the case of *Alice*, by approaching the keel type. But not having the keel, she sacrifices sail area. It becomes evident then, if my small theory lies anywhere near the truth, that the out-and-out keel vessel, wherein her mid-section with ample beam and fairly slack bilges allows for displacement well distributed vertically as well as horizontally, more nearly conforms to my contention.

In conclusion then, I believe that the question is largely one of distribution of displacement, not merely comparative external figures, and so we find that a comparison of the beam and draft of the yachts we have been having in mind, while interesting, is not altogether conclusive.

Reduced to a length of 52' over all, we have: —

*Whim*, beam, 13'3"; *Cythera*, 8'6" (which I believe explains the reason for her failure); *Alice*, 13'7"; *Windjammer*, 14'5"; *Diablosse*, 15'6"; *Diablosse*, curiously enough, being beamier than the center boarders.

I have said nothing about *Windjammer* as I know less of her on paper, than *Alice*; but I wouldn't mind, at all, making a voyage offshore in either of them.



# In the Lee of the Longboat

by Cap Stan

GORDON PRINCE has my thanks for his able summing up of the merits of the ketch rig for cruising — self-steering, and general all-around ease of handling. If you are a cruising man, read his article in the last issue, and you'll see why many real cruising men are swinging over to the ketch from schooners, sloops and yawls.

Unfortunately, Gordon doesn't shed much light on just *why* the ketch is a self-steerer. Who does know, positively? No one, apparently. But Fritz Fenger tells me that he has a brand new theory he is working on, and which he fondly hopes is right. If it is, Fritz believes that it will be possible to design a boat which will be *guaranteed* to hold a course without a helmsman. I hope Fritz has solved the problem, and will tell the world what a lot of cruising men are anxious to know.

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Harking back to the shoal draft controversy, and to that schooner design of Tom Bowes's in the March issue, I happened down around Port Norris, N. J., not so long ago, and saw two fine-looking examples of Delaware River oyster schooners, very similar to the Bowes design. One was 90' on deck, while the other was still on the stocks, half planked, and 100' long. In general, they greatly resembled the Bowes schooner, had about the same beam and draft, but seemed to have more deadrise, and carried a double headrig instead of a single jib. They certainly looked husky enough to stand anything, had a fairly easy entrance for a beamy boat, and a beautifully clean run. Get the wind aft in a good breeze, and maybe they couldn't travel! Some day I hope to take a trip on one of those hookers and see what they'll do — and Lower Delaware Bay can dish up the right kind of weather to make it a real test, don't think it can't. If you don't think so, just stick around down there for a while during either March or April — dollars to doorbells you'll change your mind in a hurry.

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I haven't checked up on the 1924 Bermuda Race, but in the 1923 affair I know of four cases where chronometers went wrong, accounting for dubious landfalls. The reasons for these chronometer errors are two, in the main — change of temperature, and the fact that the chronometers are adjusted and rated on shore, and "act up" when transplanted aboard a pitching, rolling yacht. Now, you can't expect to win an ocean race unless you make a good landfall, and without the exact time your navigator

is pretty helpless. The answer seems to be — Radio. There are plenty of good, moderate priced radio sets on the market which are capable of receiving time signals at a distance of 600 miles, especially at sea, where interference from other stations, X-ray machines, "bloopers," etc., is practically nil. Use a keel bolt, your water intake pipe, or propeller shaft, for a ground. An aerial can easily be rigged up by hoisting up a wire on one or more halliards. Install the set at least a week before the race, carefully log the stations sending out time signals, start with fresh batteries, and you should get an absolutely accurate check on your chronometer at least once a day, lift a heavy load from your navigator's mind, and greatly increase your chances of making a perfect landfall.

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Our British cousins are beginning to see the light as regards a measurement rule for the Fastnet Ocean Race. Their rule last year was a good rule — better, undoubtedly, than rating the boats on overall length, as is done in many of our long distance affairs. The trouble was, however, that the rule was entirely too complicated, and almost impossible to apply in many cases. This year they have eliminated the displacement factor, and substituted the factors of beam and depth in its place. Displacement was unquestionably the big stumbling block, and may have accounted, in part at least, for a rather abbreviated number of starters. Whereas it is sometimes impossible to get the displacement of a boat, beam and depth are easily measured. The troubles of the Committee should be greatly lessened, and a bigger fleet should face the starter as a result of the simplification of the rule.

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These charcoal briquettes which Frank Draper recommends would seem to be the real thing for the Bermuda Race. A coal fire lasts too long for comfort in hot weather, wood and charcoal are bulky, dirty, and you have to "stoke up" all the time. They tell me the briquettes make a dandy fire, last long enough to cook a meal, and then expire, leaving very little ash. I believe they can be obtained locally now, though I'd be willing to have some shipped from Philadelphia to get what seems to be the finest kind of Shipmate fuel, for summer work at least.