Erica Haybron 4/15/09

Kedging Through History

My grandfather once wrote a short story about a sailing trip. He had taken my grandmother out for a sail on Mosquito Lake, a narrow lake in eastern Ohio. On that day, with boats moored on either side of the dock and a moderate wind, it was necessary to use the outboard. When the engine did not start my grandfather proposed to kedge out. Kedging is a process in which a light anchor is flung as far as possible, the boat is pulled along the line; the anchor is hoisted up, and flung again. Now, as Mosquito Lake was, in fact, a lake, you can imagine there being a murky bottom, and when my grandfather flung the anchor into the air, some of the muck came with it! (To my grandmother's chagrin) (Haybron).

Now, I mention this story, and kedging, because this is what I intend to do with my paper. Because I don't have a "motor" or means to tell you the whole history of sailing into modern day racing, I am going to "kedge out." By this, I mean that I am going to throw my anchor out into the murky bottom of sailing history, fling some sludge of knowledge over you, and repeat!

Over the course of history, sailing has had many purposes. Trade, military, and expansion were all uses. Today, sailing is commonly used for recreation and racing (and rarely found in trade or military). Thousands of years ago, sailing had quite different functions. In fact, boats built for pleasure sailing didn't appear until the 16th century. Even so, recreational sailing was not available for the masses until the 20th century. To understand the complex racing vessels of today, it is imperative to make sense of their past.

Imagine Egypt in 30 B.C.E., a nation of trade and prosperity. Cleopatra sails down the Nile in her galley, a royal craft. Though this may have been the most magnificent boat on the water, it was not the only one. Vessels of trade and work also litter the Nile. Egypt depended on its waterborne trade and work for survival. Boats served crucial roles in the transportation of food, raw materials, royalty, and administrators (Hocker).

There is no doubt that the Egyptians have a long history of boat building. Records of boat construction exist from as early as 3500 B.C.E.! In the pharaonic period alone, over 100 different types of vessels were constructed. The two main categories of vessels were ceremonial and working. These "working boats" were traditionally papyrus skiffs or freighters. The freighters were commonly used in trade and warfare. The hulls were short and sturdy; built for carrying cargo. They would also provide refuge for administrators spying on the enemy. Who would ever suspect a lowly cargo ship of espionage? However, the more complex and well-recorded vessels were the ceremonial ships. Different from the working class, these boats were long, decorative, and were often built with a higher complexity (Hocker).

Whatever kind of ship was being built, reuse of materials was a prevalent concept in ancient ship design. When boats were built they were constructed in a

way that made them easy to dismantle. A system of mortise-and-tenon joints was the main technique of planking in boat construction. In this technique the edges were fastened together with mortise, tenons, and wooden pegs. Also, these boats were not caulked. To caulk is to make a boat watertight. This form of hull construction made boat disassembly relatively simple. This was important because of the high cost of timber. When wood was needed in Egypt, they turned to boats. An example of this is the Royal Dockyard at Thebes. Reused hulls have been found in the dock itself. Other instances include the vessels of Lisht. Wood from these boats was found in the ramps used to construct various pyramids! (Hocker)

Now jump 1000 years ahead and some 2000 miles north. The main purpose of sailing was still trade. The main ship of the 11th century was the Cog. Cogs were long distance trading vessels that traveled throughout Europe. These hull-based, "flat bottom" boats were the most common type of large seagoing transportation in all of Europe. The Frisians, Germans, or Southern Scandinavians supposedly invented them; however, they were so widely used and altered, their origin is difficult to determine. Similar to the cog was the clinker ship (Hocker). The clinker was an economic trading vessel that originated from the Viking design. Emerging from northern Europe these vessels were long with a square sail, and were built for extensive voyages. (The Navigators).

By the mid-14th century, the "carvel" construction method had begun to appear from various areas of southern Europe. The carvel-built ship could get quite large. They were of greater size than the cogs because of their planking and backbone structure. However there were downsides to building these monster boats. For one, one mast could not support such large vessels, not to mention cargo. Making larger sails only made the mast more susceptible to snapping. This was because the masts could not be, practically, built strong enough to handle large gusts of wind. Another problem was the availability of materials. Creating fleets of gigantic boats was both costly and impractical. By the 1430's boats had gained multiple sails, but it wasn't until the 16th century that the size of boats decrease. Hull size was finally reduced as a result of the Thirty Years War. The financial state of most of the European nations was not suitable for massive armadas. By 1525, the criteria for boat construction had been set (Hocker). In that time period ships were built by trial and error. One architect remarked, "It [shipbuilding] was unequal unsystematic full of successful experiments as well as inconsequential trials" (77). Boat design, especially in the Mediterranean, was not a result of science, as it is today, but a result of what was necessary because of surrounding conditions (Cipolla). Not until the 19th century does boat construction transform into a science.

Trade is an important chapter in sailing history. Spices, especially, are well known today for their historical trading value. Sailing vessels were critical to the transportation of this and other valuable goods. The economic expansion that occurred in that period was the main cause of European exploration. In the 15th century, Europe was full of feuding nations. The Seljuk Turks were the common enemies of the Mediterranean. With Turks and Mongols blocking land routes, such

as the Silk Road, different methods of trade with the East were a necessity (Cipolla). Most recognized for opening sea trade was Vasco da Gama of Portugal. His voyage is widely recognized for engaging trade European trade with Asia (Winser).

While important, trade was not the only aspect of European boating. Military was also prevalent in the origin of sailing. As long as there have been boats, there have been navies. Medieval Europe is no exception. Every major power in Europe had a navy, and used these ships for conflict and expansion. In the Mediterranean, since the time of the Romans, there were two major kinds of vessels. The first, the "round ship," relied on sails. These vessels were commonly used in trade. The other, the "long ship," also known as the "galley," was dependent on oarsmen to propel it. The "long ship" was often used in warfare. In 1295, these two classifications were combined to create the "great galley." The galleys remained the main war vessel of the Mediterranean until the 17th century. Ramming and boarding was the primary tactic of Mediterranean fleets. The Atlantic nations, however, which were forced to deal with the rough waters of the Atlantic, constructed their fleets differently. They adopted the "round ship" design that relied on wind power only. With artillery, these tough vessels were able to overcome Mediterranean opponents from a distance. They had a great advantage over "ramming and boarding" techniques. The Atlantic design eventually outlasted the Mediterranean style. Carlo M. Cipolla mentions "exchanging oarsmen for sails and warriors for guns meant essentially the exchange of human energy for inanimate power," (81). This change marks the beginning of a "mechanical" era in human history, an idea that is magnified by the Industrial Revolution (Cipolla).

When fleets were not involved in conflict, they were most likely engaged in religious and commercial expansion. A 16th century diplomat, Ogier Ghiselem de Busbecq, stated that, "expeditions, religion, supplies; the pretext, and gold the motive" (133). This quote refers to Portuguese expeditions to the Indies and Antipods. This exemplifies that, in the beginning, land possession and spread of Christian ideas were the driving forces of expeditions. Bernal Diaz, a conquistador and chronicler of Spain, when recording the motives of his travels stated, "to serve God and his Majesty, to give light to those who were in the darkness and to grow rich as all men desire to do" (132). This explains the religious and profitable motivation put on explorers in that time period. The most practical way of travel was sailing, and with such appealing benefits across various oceans, sailing became a critical mode of transportation, exploration, and expansion (Cipolla).

In Holland a leisurely pastime appears that, over 450 years later, becomes the foremost use of sailing. I am speaking, of course, of yachting. Today yachts are pleasure vessels used for recreation or racing. W. Falconer defined yachts in his *Dictionare universale de la Marine* in 1769 as:

> A state vessel generally used for transportation from one nation to another of princes, ambassadors, and great figures. The principle function of a yacht being to receive such passengers, numerous pleasantly furnished apartments are provided and equipped with fittings appropriate to the rank and number

> of passengers. Royal yachts are generally rigged as ketches with the exception of the principal vessel reserved for the sovereign, which is equipped with three masts like a ship. There are usually elegantly appointed, richly decorated with sculpture and always commanded by naval captains. Alongside these state vessels there are a host of smaller yachts used by customs and excise officials, the navy or as pleasure boats by high ranking individuals." (19)

While there is no doubt that sailing is still used to transport "great figures" sailing has certainly developed a universality that did not exist in the 18th century (Giorgetti).

The word "yacht" comes from the Dutch word *jacht*, which means "to put on speed" or "to hunt," (Scharff). The first seafaring nation was Holland. The aristocratic, merchant class of Zeeland, Holland used ships to show off wealth. Without conflict or military occupation, the aristocracy found other ways to spend their time and money. One of these ways was, of course, yachting. Only theses elites possessed *jachten, speeljachten,* or "land of water" ships (Giorgetti).

An important political motivator in the sport of yachting was King Charles II of England. In 1651, Charles II fled to Holland after Charles I was beheaded by the Puritans. Here, Charles II gained his *jachting* pastime. Upon his return in England, he was given *Mary* as a gift from the Dutch. This initiative brought yachting into the noble limelight. Charles was even engaged in the first official yacht regatta. With the first race between Charles II *Catherine* and James *Anne*, Charles II being victorious, yachting had become a popular sign of wealth across Europe (Scharff).

Wherever yachting became popular, yacht clubs were sure to follow. Recognized as the first yacht club ever is the "Water Club of Cork Harbor, Ireland" established in 1720. In 1770, the Royal Thames Yacht Club was created. The yachting hype quickly spread, and by the 19th century Cowes was the world capital of yachting. One of the oldest, most distinguished races, Cowes week, is still held in southern England (Giorgetti).

Next, we travel to the Americas, the "land of opportunity." Boating in the Americas consisted mostly of flat bottom, fishing boats up until the 19th century where recreational sailing began gaining popularity. The people of the United States did not have the means or the interest to pickup yachting as a pastime after the American Revolution. The first American yacht was *Francy,* a Dutch based model that belonged to Colonel Lewis Morris in 1717. The first American Yacht Club was founded in Boston in the early 1830's (Giorgetti).

The most important family in American yachting history is that of the Stevens. Colonel John Stevens and his sons; Edwin Augustus, John Cox, and Robert Livingston Stevens contributed greatly to history. Robert Livingston Stevens was an innovative designer who is famous for his construction of the two large sloops *Onkaye* and *Maria*. He developed a centerboard; longboards had been built into

Dutch ships before, but did not have the flexibility and adjustability that Steven's design did. Edwin Augustus Steven was responsible for the creation of the Stevens Institute of Technology, which later assist in the designing of modern day yachts. Maybe the most important figure was John Cox Stevens who becomes known as the "father of American yachting." John Cox Stevens later led America to victory in the Hundred Guineas Cup Regatta in 1851 (Scharff).

Aside from being an exciting sport, yacht racing was an important factor in the scientific development of hull design. It is only under the pretenses of competition that man has pulled together its greatest thinkers and designers (apparently war and trade does not inspire to the extent of bragging rights). The early 1870s was an important start for scientific development. There were several theoreticians working to develop a better racing yacht by studying hydrodynamics. As opposed to building yachts by trial and error, a system of testing models in towing tanks, that was first utilized by Frederick Henrik of Chapman, was used. Robert Livingstone Stevens also used tanks and models before designing his own yacht. This system saved money, time, supplies, and paved the way for other theoreticians to create theories about the dynamics of sailing. The tank system was occasionally unreliable, however because it was founded off of inaccurate theories. Kenneth S. M. Davidson later discovered this problem, and with his research he was able to point yacht design in a new direction. Science finally had a hand in boat construction (Giorgetti).

Another man that is noteworthy in the history yacht design is Nat Herreshoff. His innumerable contributions to the history include the "Universal Rule," various metal constructions, and the mainsail track. He designed many victorious ships for the America's Cup competitions, and almost all of his designs have had a lasting effect on sailing today (Giorgetti).

Where modern sailing really took hold was after 1935. British cutters and American schooners were a thing of the past. Science was taking yachting in a new direction. Thanks to aerodynamics, at the beginning of the 20th century, duralumin was used to construct hulls. Duralumin (an alloy of aluminium, copper, and magnesium that was first introduced in 1909, but can be seen today in modern aircraft construction) was a lighter, more flexible material ("Duralumin…"). Also, the triangular mainsail and jib sheet had been adopted for speed (Giorgetti).

Then came World War II. The effects of the war were detrimental to the world as well as the enthusiasm of recreational sailing. However, the industrial spur after the war made it possible for sailing to become mass-produced. Expensive building supplies were replaced by fiberglass, aluminium, and nylon. Also, stainless steel rigging was used as opposed to galvanized shrouds and stays (Scharff). These new materials and techniques made ships easier to assemble. With the emergence of assembly lines boat building became quick and inexpensive, which made sailing available to the common public. By 1945, recreational sailing had established its niche in society (Giorgetti).

Modern racing was established by the offshore races of the early 20th century. For example the first transatlantic race in 1905 historically broke barriers for yacht racing. Another race is the Bermuda race. This race was first held in 1906 but was postponed until 1923 due to the outbreak of World War I. Today, the Bermuda race is held biannually, alternating with the Fastnet race (this system was originally established so that sailors could participate in both). However, there was a problem with the logistics of these races. Boats of smaller size would often fall behind those of larger scale. In this way of racing, there was no true test of skill. As a result, a system of "rating" was incorporated (Illingworth).

In the rating system, time allowances were assigned depending on the potential speed of the hull. In essence, the system takes factors that account for speed and add values. Ships with large length and sail area, but a small freeboard, which are traditionally characteristics of a fast ship, are positive. Conversely, vessels with characteristics of slower speeds, which include extra beam and hull depth, are dividers or negative in the formula. With these restrictions in mind, Dick McLean Buckley developed the Royal Ocean Racing Club (R.O.R.C.) Rating Rule. Around the same time, the Cruising Club of America (C.C.A.) created an American version of the rule. The American version was fundamentally the same system, but the calculations were achieved by different means (Illingworth). Both the C.C.A. and R.O.R.C. rating rules were used, up until the early 1970s, but there much debate (during international races) over which system should be used. Then the International Technical Committee (established by the International Yacht Racing Union) completed the International Offshore Rule (I.O.R.). The I.O.R. was used without much controversy. Despite the rule's success with size and type equality, there was one flaw with its execution. The man that crossed the line first and received all of the praise and excitement, didn't necessarily win, he may have lost to a technicality. With this defect, level classes began. Under a system of level classes, only boats with similar ratings raced one another (Giorgetti).

The end of the 20th century brought a significant change in sailing. Ships could be built in a period of hours as opposed to the weeks it would take in ancient Egypt (something we would scoff at in today's busy society). The globalization of the 1980s and 1990s has made it increasingly easy to exchange information in a period of milliseconds (Giorgetti). Before modern communication, basic concepts of culture were identified by the concepts and patterns of boatbuilding. For instance, the techniques of boat construction in ancient Egypt showed the frugal attitude towards timber supplies. Another example is seen in the nature of the medieval cog ship. Its structure and popularity embodied the significance of northern trade. Conversely, the inherent features of contemporary society permit an idea thought of today to enter mass-production all over the world tomorrow (Hocker).

Of all the changes that have been made in sailing throughout the course of history, the largest difference that has taken place is that of hull design. The wooden planking of the ancient Romans, or Vikings couldn't be more different from the

current fiberglass construction. The complexity of the hydraulic and aerodynamic thought put into vessels today greatly exceeds that of history (Giorgetti).

The adaptations that sailing has undergone in all of its history are astounding. Carpenters and workers from ancient Egypt, while constructing their trading vessels, could never have imagined the outcome of modern sailing yachts over 5500 years later! Simple, wooden trading skiffs and ceremonial war vessels slowly transformed into galleys and caravels. More rapidly, sailing Medieval European yachts turned itself into a royal pastime. Once yachting had established itself on the world stage, science intervened. Despite fluctuations in the economy, recreational sailing continued on, and even flourished. Racing had faced a turning point in the beginning of the 20th century and hasn't looked back since. In the past century, sailing has accelerated exponentially. Methods and concept that were held true 10 years ago are now obsolete. Sailing will undoubtedly continue to expand and advance in the future.

My grandfather ends the story describing how his sailing misadventure had nearly done him in with his violent frustrations at kedging (Haybron). This paper was a difficult and involved project that, likewise, sent me teetering near the edge. However, I learned a great deal as a result, and hope you benefit from it as well.

Works Cited

Cipolla, Caro M. Guns, Sails, and Empires Technological Innovation and the Early Phases of European Expansion, 1400- 1700. New York: Sunflower UP, 1985.

"Duralumin definition of duralumin in the Free Online Encyclopedia." Encyclopedia. 2007. 14 Apr. 2009 <http://encyclopedia2.thefreedictionary.com/duralumin>.

Giorgetti, Franco. History and Evolution of Sailing Yachts (From Technique to Adventure). New York: White Star, 2007.

Haybron, Ronald M. The Time I Killed My Motor.

Hocker, Frederick M., and Cheryl A. Ward, eds. The Philosophy of Shipbuilding Conceptual Approaches to the Study of Wooden Ships (Ed Rachal Foundation Nautical Archaeology Series). New York: Texas A&M UP, 2004.

Illingworth, John H. Further offshore ocean racing, fast cruising, modern yacht handling and equipment. London: Coles, 1969.

"The Navigators - The Ships - The History of Sailing Ships - Evolution of the European Ship." ABC.net.au. 13 Apr. 2009 <http://www.abc.net.au/navigators/ships/historyeuro.htm>.

Scharff, Robert. "The History of Sailing." Encyclopedia of Sailing. New York, NY: Harper & Row, 1971. 1-39.

Winser, Shane. "BBC - History - Vasco da Gama." BBC - Homepage. 4 Sept. 2002. 13 Apr. 2009 <http://www.bbc.co.uk/history/british/tudors/vasco_da_gama_01.shtml>.