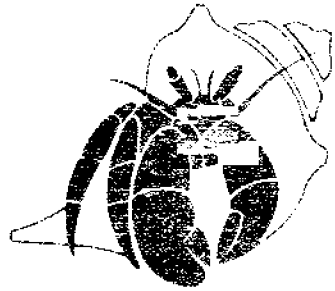
seascapes II

glimpses of our water world

A COLLECTION OF ARTICLES
ABOUT THE SEA AND SHORE
ORIGINALLY WRITTEN FOR DELAWARE'S
WEEKLY NEWSPAPERS, 1979-81.

October 1983



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seascapes II

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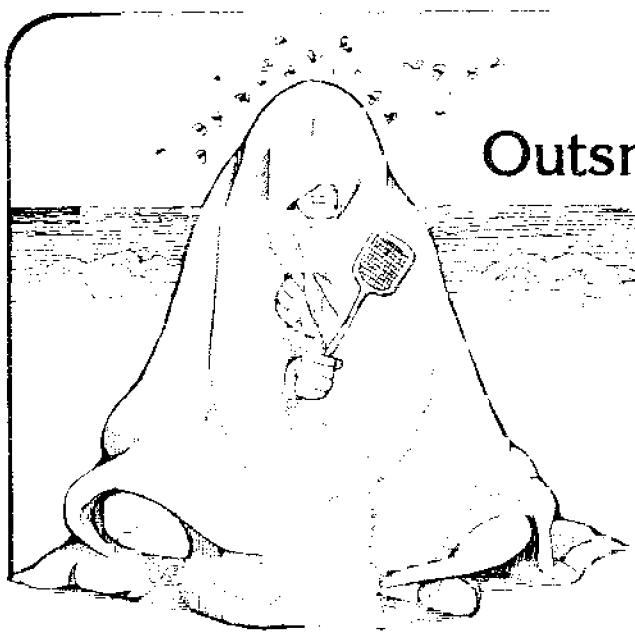


Outsmarting the Biting Flies

Now that the memories of Jaws 1 and 2 are fading, it's only a matter of time before some Hollywood tycoon capitalizes on the *real* seashore menace and gives us a movie called "The Fly That Ate Rehoboth Beach."

If you are an avid beachgoer, chances are you've been gnawed on by at least some of the small creatures that thrive on the warm, sticky red liquid that courses through our bodies. On most days, fortunately, ocean breezes keep down the number of biting flies on the beach. But every so often, the air along the sea becomes sluggish and, if the beach is flanked by salt marshes or woods, biting flies can quite effectively curtail your activities for the day.

Among the most pernicious blood suckers breeding along the coast are the punkies or no-see-ums (also called biting midges); the tabanid flies (including deerflies, horseflies, and greenheads); the stable flies; and, of course, the universally despised mosquitoes.

Biting midges can drive people crazy for several reasons. One problem is the size of these blood thieves. As the smallest of all blood suckers, these insects are appropriately nicknamed no-see-ums. In fact, some are only a few hundredths of an inch long. But what is worse than a virtually invisible assailant? Conquering legions of them. For when beach conditions are right, punkies arrive in strong numbers. Yet often, as you lie there

twitching, itching, and scratching at invisible pests, other sunbathers around you may seem to be unaffected (it happens). Instead of wondering whether you are "playing with a full deck," get up and move. Biting midges apparently do not travel far from their breeding places and a spot only yards from where you are sitting may be completely unaffected by "punky power." Beach punkies are thought to breed in the intertidal zone.

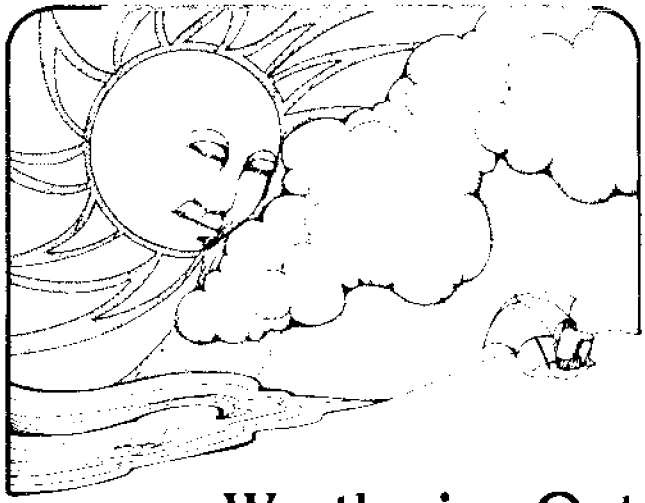
If insects live by mottoes, the greenhead's has to be "A good tabanid never gives up!" The persistence of the tabanid flies is legendary. Try to avoid them by throwing yourself into an icy sea and they may follow, circling patiently overhead, waiting for you to surface.

The pain associated with a good direct hit by a greenhead is considerably greater than even a monster mosquito can inflict. The reason is simple. Think about a mosquito. It uses a long, needle-like proboscis for its blood collecting. Often the "donor" never notices the deed until the itchy swelling appears. But a horsefly and associated tabanids use a broader blade which slices through a greater skin area to release more blood—leaving a wound that's hard to ignore.

Greenhead flies and mosquitoes both breed in salt marshes. Unfortunately, some of the control mechanisms that can reduce mosquito numbers will bolster greenhead populations. Similarly, altering water levels in marshes to control greenheads would encourage mosquitoes.

Unlike any of the other biting flies, both sexes of stable fly, not just the egg-laying females, take blood meals. And more than any other biting insect, the stable fly looks deceptively harmless because of its close resemblance to the housefly. Generally, these blood suckers infest herds of horses and cattle. However, during the oppressively hot days of summer, most fishermen are victims of stable fly attacks around the ankles. Stable flies deliver a healthy bite, perhaps because the ends of their piercing lancets are fortified by tooth-like parts.

The best way to protect yourself against the biting flies is to apply insect repellents. Many repellents are far more effective than you might think and new ones are being developed all the time. If that doesn't help, stay away from the woodlands and still water until the wind picks up or shifts—or go see a movie.



Weathering Out a Vacation at the Shore

Despite the hours of preparation that go into getting your family to the seashore for a vacation, there is always that one variable -weather—that you have no control over. Yet weather conditions and attitudes toward them may determine whether your vacation is a success or a disaster. Tuning into weather forecasts can help you plan a day's activities, but trying to understand marine weather can let you *accept* it.

Weather conditions along the coast are determined by the same forces that shape our weather inland—plus a few more. These include currents, which carry cold, temperate, or warm water, and breezes, flowing offshore or onshore. Put them together and they may spell bright sunshine at the beach while the folks at home, only a few hours away, are bailing out their cellars.

The slow-to-heat, slow-to-cool Atlantic Ocean tends to moderate maritime temperatures. Ocean temperatures rarely vary more than 2°F in a single day while spreads of 50° over a day are not extraordinary for land areas. Consequently, on those blistering hot August days, temperatures at the water's edge may be 10° to 25° lower than those on Main Street, half a mile inland.

In winter, coastal towns are equally fortunate. Frequently they are spared the accumulations of snow that fall 25 miles inland because their slightly warmer temperatures, resulting from proximity to the ocean, turn the coast's share of precipitation to rain.

Offshore and onshore breezes are phenomena that take place daily around certain large bodies of water. In this part of the country, breezes associated with the Atlantic Ocean occur primarily in the summertime. Here's what happens: Shortly after sunrise, the beach begins to warm up, transferring some of its heat to the air lying directly above it. As the warmed air rises, cooler ocean air flows in to fill the vacancy left close to the ground. In the

process, a noticeable ocean-to-shore breeze is created.

This "onshore" breeze usually develops 3 to 4 hours after sunrise and peaks at the hottest point in the day. If the difference between ocean and land temperatures is very pronounced, the onshore breeze may be felt as much as 10 miles inland. In the tropics, where ocean breezes may reach 25 mph (as opposed to a top speed of about 12 mph in temperate regions), towns 100 miles inland may feel the effects of cooling winds generated at the junction of land and sea.

At night, when land areas lose their day's accumulation of heat, the ocean and its overlying air become warm relative to the shore. Consequently, a reversal of the day's air circulation occurs and a moderately weak "offshore" breeze develops.

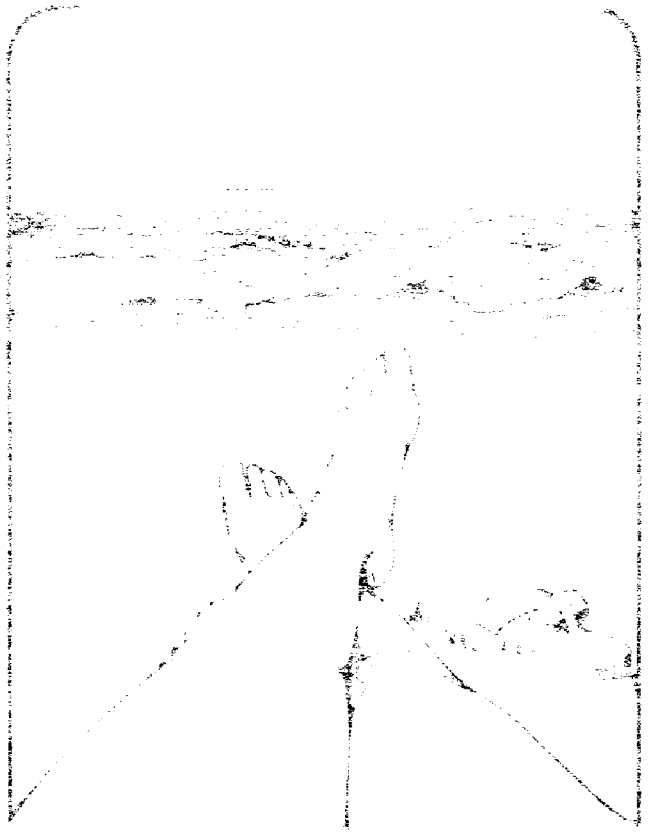
In Asia, monsoons are produced by onshore and offshore winds that are seasonal rather than daily. But onshore breezes only occasionally bring moisture to Delaware. Fog, however, is another matter.

Every veteran mystery writer must, at some time, have a character murdered under one of those eerie, thick white fogs that creep into and out of coastal areas with little warning. Fog develops when warm, moist air contacts cool water or land. Air cooled by water or land cannot hold as much moisture as warm air, so condensation occurs. In a fog, the particles of condensed water are so small that they are buoyant in air and not heavy enough to fall quickly as rain.

Cooling of warm, moist air by icy ocean currents is one of the most frequent causes of fog along the coast. Fog also develops at the seashore when warm, moist air blows in from the east or southeast.

Fogs along the shore can develop with frightening speed, but they also can disappear almost as rapidly. Fog "lifts" or "burns off" in an unusual way. As the sun's rays pour through the fog, the ground is heated and, in turn, warms the air directly above. Since heated air can absorb more moisture, the fog begins to evaporate from the bottom up.

Fog is only one of the special weather problems that affect mariners. One way for mariners and marine recreationists to keep on top of the latest weather developments is to tune into the NOAA weather station (WXJ-94, 162.550 M Hz) at the College of Marine Studies, which broadcasts weather information throughout the day at 15-minute intervals. Knowing the weather in advance doesn't mean you can change it, but at least you can be prepared for it.



Beating the Surf at Its Own Game

To many, a day or a vacation at the seashore is the perfect way to relax. After the long crawl down, how tempting it is to just hang out at the beach—to let the kids go their way while you hide behind dark glasses and a good book or nap beneath the sun's caress. As long as you're well-stocked with suntan lotion, how can this day go wrong? Unfortunately it can, especially if you ignore the fact that Delaware's seemingly gentle ocean waters can pose a number of hazards to the experienced swimmer as well as the novice.

To guard against having to make a quick run to an emergency room, take some initial precautions when you first land on the beach. Before anyone goes into the water, size up surf conditions. Are the waves gently spilling over as they break or are they crashing down? Are the sets coming in fast or slowly? Is the breaker line close to shore or far out? Are there many people in the water? If not, why? How are the waves affecting those people in the surf? Are there any strange-looking areas of stirred-up water (where a rip tide might exist)?

There is nothing wrong with asking lifeguards about the conditions that day or at that particular beach. Your interest and concern ultimately makes their job easier.

If the water seems fine and you give your family the signal for the much-awaited plunge, remember to keep an eye on the children. Being lighter in weight, they are going to be affected more than adults by drift, undertow, and heavy surf.

Drift is caused by the longshore current that subtly, but continually, pushes anything or anyone in the water along the shore with it. While you won't be carried out to sea, you may have a hard time finding your blanket and umbrella on a crowded beach and, if the current is strong, it may carry you into a jetty or other dangerous obstruction. So be aware of drift and, every so often,

compensate for it by shifting back to your original position.

Undertow is the force that accompanies receding water. Though its strength will vary with the tide and the slope of a beach, it is generally most noticeable on a short, steep beach. In some places, undertow can barely be felt; in others, it sucks sand out from under your feet and may cause you to lose your balance. Since undertow can pull you into deeper water, people caught in one may feel like they are being carried out to sea. Fortunately, though, the pull is short-lived and it ends with the incoming wave. But bear in mind that a strong undertow can be particularly frightening to small children playing in shallow water.

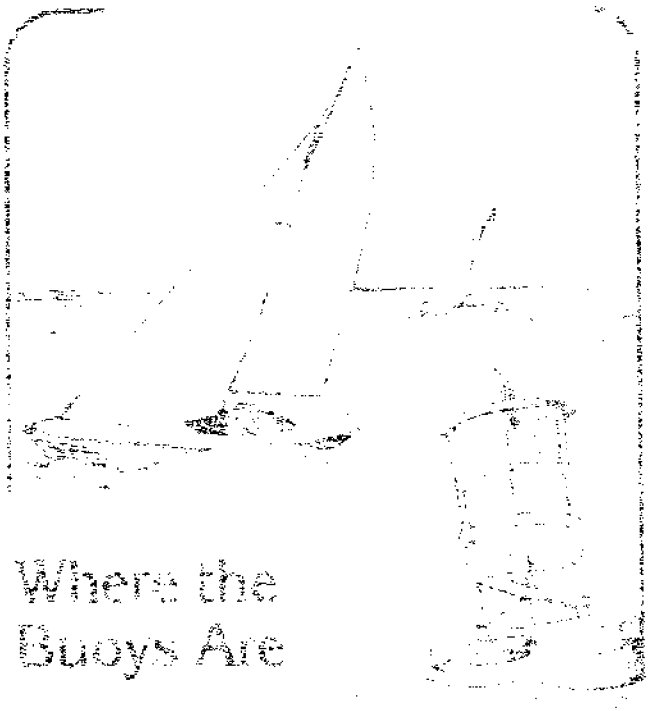
Heavy surf is not as big a problem here as it is on some of Hawaii's famous surfing beaches. Yet each summer, Delaware hospitals treat a number of serious neck, back, and shoulder injuries caused by heavy surf. If the surf becomes very dangerous, lifeguards may close the beach to swimmers. However, swimmers always should use common sense, especially on unguarded beaches.

Ordinary breaking waves can be handled by ducking or diving under them. Hollow waves, though, carry bone-crushing power. If you are caught accidentally by a breaking wave that is hollow or deeply arched, dive beneath it and dig your hands into the sand to avoid being tumbled about. When the turbulent water has passed, the return flow will help you surface. If you think this is the biggest wave you've ever seen, it may be the last wave of the set. After it passes, you can work your way toward shore in the relative calm before the next wave set rolls in.

A last, but not least, hazard to look out for at the seashore is a *rip current.* This is a narrow band of water perpendicular to shore that flows out to sea much faster than surrounding waters. Unlike undertow, rips are more common on gently sloping beaches. Beaches may have no rips or many; a rip present one moment may disappear or change its location the next.

On the beach, rips often appear darker than the surrounding water. The waves in a rip current are lower than those in water to either side of the band and they may not break on shore. If you are caught in a rip, your instincts will probably be your worst counsel. That is why rip currents are so dangerous. Never fight a rip by trying to swim directly back to shore against the current. This will only tire you out and you will continue to be carried out to sea. Instead, since rips are fairly narrow, usually only 15 to 30 yards wide, swim across the rip or on a diagonal toward shore until you are out of its influence.

Are you now afraid to go near the water? Don't be. All you need is a little common sense, a measure of caution, and a few facts about the tricks the sea is likely to play on the unaware bather. Then you can relax.



Where the Buoys Are

Somehow, amidst all the romantic notions of a seafarin' life as depicted in art and literature, fog-cutters, lighthouses, and God seem always at the forefront guiding the ever-grateful sailor through treacherous waters while the unsung heroes of day-to-day navigation—the buoys bob along on their tethers, forgotten.

This oversight is understandable when you realize that buoys are not designed to be objets d'art and yet, who has spent any time at the seashore or near a navigable river and *not* noticed and wondered about the odd-looking roadsigns of the sea?

Buoys, often the only objects distinguishable from sky and seawater, have many functions. Sometimes they aid mariners in making "landfalls" (sighting the shore for the first time). Others point out underwater dangers such as sandy shoals or jetties, which may be covered at high tide. The pilot of a vessel will be aware of much other information conveyed by the colors of a buoy or symbols painted on the side. A system of buoys marking off the entrance to an inlet may carry a very specific set of directions for steering boats carefully into the deepest and safest portion of the channel.

Lighthouses, day-beacons, lightships, radio-beacons, fog signals, and buoys are classified by the U.S. Coast Guard (the agency in charge of their placement and maintenance) as "aids to navigation," or just "aids." A true seaman will not make the mistake of calling them "navigational aids," for this expression refers not only to the warning system, but to charts and aboard-ship instruments, as well.

All major waterways of the United States, from coastal areas to large inland lakes which spill into more than one state, contain navigation markers as long as it is economically justified by the existence of significant amounts of water

traffic. As simple as some markers may be, it costs money not only to build and position buoys, but to maintain them. Maintenance is particularly important for those buoys which have lights or sound. If a buoy in a certain place is supposed to be blinking with a red light or beeping every 30 seconds and it is not, the mariner who has such a description on his charts may be thrown off, or not even notice the signal.

The simplest type of buoy, which does nothing more than bounce about in the waves, is called a "can buoy" and looks like an oil drum sitting on the water. A variation on the can is the "nun buoy" which has the same cylindrical shape plus a pyramid projecting skyward from the top. Beneath the cans, or the structure supporting any buoy, a long, heavy-duty chain generally two or three times the depth of water at that point attaches the buoy to a concrete base which weighs a hefty one to five tons. While a buoy in such a situation is not going to go anywhere, it does have a certain amount of freedom because of the excessive chain length. Mariners must take this into account when skirting a dangerous area. While a fixed object would do a better job of marking the exact position of underwater hazards, the variations in wave heights make this idea unfeasible.

Sound buoys look far more sophisticated than the simple cans, and many of them are. There are entire manuals written on the engineering of buoys, believe it or not. "Bell buoys" ride on steel floats from which a short framework (looking like an oil derrick in miniature) rises. Housed in the tower is a bell that rings when swayed by the rolling waves. Similar to the bell buoys are "gong buoys," which carry four clappers, each producing a different tone. As the ocean rocks beneath, music is played in changing sequences. "Whistle buoys" emit their warnings when compressed air is forced through the instruments as a result of sea motion. Then there are the electrically powered "horn buoys" or "pulse buoys" which are particularly effective in harbors and other sheltered areas that have subdued wave action.

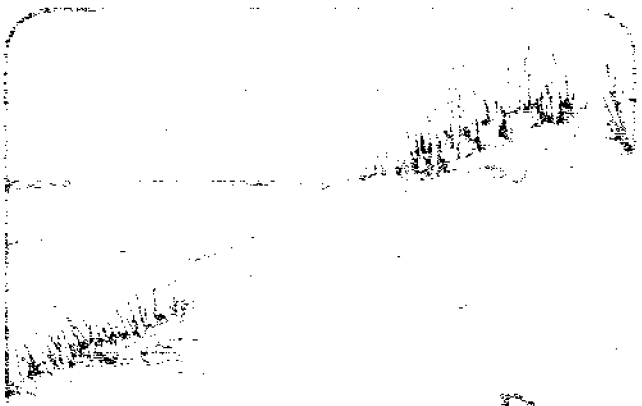
While most buoys today have night-glowing reflectors circling their bodies for the benefit of evening sailors, some buoys have electronic light controls. These are designed to operate for months without need of servicing. Many have controls that allow them to light only during dark periods, but all release their lights, which may be red, green, or white (for highest visibility), in flashes. A non-continuous light, as used in emergency vehicles, has been found to be far more noticeable and less easy to ignore than a steady beam.

Strictly navigational buoys come in a stark assortment of colors– red, black, red and black, or black and white. Buoys with these basic colors plus yellow, green, orange, or blue have special meanings to boatmen.

Though it would seem that a buoy's size could be a most important piece of information, it actually means absolutely nothing. Buoys vary from the midget "sixth-class buoy" that rises only a few feet above the water to superstructures which may reach 30 or more feet into the sky and spread to a diameter of 40 feet. Size is usually indicated on navigation sheets, however, because distance perception is often based on visible buoys.

Next time you are down at Indian River and the steady clang, clang, clang . . . of a nearby buoy intrudes upon your thoughts, observe the system of buoys laid out around the inlet and try to figure out what they are telling the boat pilots. Could you navigate into the channel using these aids to navigation? Or maybe you're just content, like me, to know that they do have a purpose, for someone.

ENVIRONMENT



Dune

How unfair! You finally escape to the seashore for that long-awaited vacation. Away from the territorial neighbor with his mile-high fences. Away from jackets and ties or dresses with stockings. Away from laws, rules, and government. Anything goes—right? Wrong.

Before you even catch sight of the ocean, the first restriction hits hard. KEEP OFF THE DUNES! reads the sign in big angry letters. Is your neighbor at it again? "I paid good money to get on this 'public beach'," you sniff, "and *they* ban us from enjoying it. Dunes are only heaps of sand with some skinny grasses and weeds growing on them. What's the big deal?"

The big deal is that beach dunes are part of a delicate system designed to protect marshes, bays, and land behind the beach (which is frequently developed) from high water and stormy seas. "But the dunes aren't even all that high," you complain, "and there are lots of places where the dune line is broken anyway."

Well, the height of a dune is determined by a number of factors, including the direction the dune is facing, wind velocity, wind direction, and rainfall. But a natural dune line will stabilize at a certain height and shape. Generally, the windward side of a dune will have a longer, shallower slope than the leeward side.

Those breaks in the dune line are important, too. During storms, when waves repeatedly batter sand dunes, the dune line can be "breached." That is, water funnels through the breaks so that the major dunes will remain intact. This is known as an "overwash" effect.

When beach areas are developed, too often the natural protective system is lost. Attempts are sometimes made to construct tall, steep-sided artificial dunes. But natural dunes have broad slopes for a reason. The steep sides of artificial dunes may hold storm waters back so well that when there finally is a breach, the flood is catastrophic, rather than controlled.

Oceanfront homes and roads are often protected by seawalls. These are never as effective as natural dunes at absorbing the continuous assault of wind and waves. The best way to combat these problems is to develop roads and cities beyond the beach-dune-marsh system.

Importance of Vegetation

A dune system left in its natural state will eventually travel landward at a slow pace due to the continuing rise in sea level. The primary reason that people are encouraged to stay off the dunes, though, is that the large barrier dunes would be highly unstable and would move landward even faster if it were not for the beach grasses and other delicate plants that can grow under the incredibly harsh conditions confronting the upper beach. For

instance, temperatures at the sand's surface may rise to 120° on a hot summer day, dune plants are frequently buried during wind storms, the salt content in beach sand is higher than most plants can stand, and water is scarce. Unless the grass can develop a root long enough to reach into the water table, its life as a dune stabilizer will be short. Yet the grasses survive all these adversities, holding down sand particles with their spreading root systems until they are trod upon by man. And that's the problem. Walking on dunes kills the vegetation needed to stabilize them.

When dunes have no vegetation stabilizing them, they may be called "traveling dunes" because of their abilities to shift position with dramatic speed. The famous traveling dune of Cape Henlopen once flowed west as much as 60 feet in a year. The rate is now about 14 to 20 feet. If you have an opportunity to visit this formation, you will notice twigs belonging to full-size hardwood trees sticking out of the top.

Life on the Dunes

Dunes in any beach area can be divided into several zones. Just beyond the "berm," or broad sandy flats of a beach, are the primary or "barrier dunes." Barrier dunes, because of their demanding environment, support few types of vegetation. The kinds that *do* grow there have to be flexible, for the winds can be strong and persistent. Ammophila, or dune grass, is the most abundant plant found on beach dunes in Delaware. After the massive winter erosion in 1978, the ensuing beach reconstruction included seeding ammophila over the upper beach.

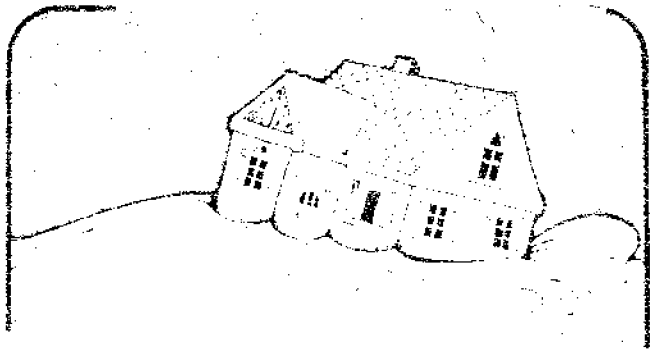
Besides dune grass, a variety of invertebrates lodged in the upper layers of the sand are the main inhabitants of barrier dunes. These include the light-colored ghost crabs, hairy wolf spiders, and unusual insects such as velvet ants and digger wasps.

Smaller, more stable dunes are found behind the beach. Low plants such as beach heather, with its tiny yellow flowers that appear in spring; seaside goldenrod; dusty miller; and prickly pear cactus (the only native cactus on the East Coast) may colonize this region. Further back, they mingle with the first substantial woody vegetation in the forms of bayberry and huckleberry bushes. A beach observer can often detect evidence of the various animals inhabiting this zone. The meadow vole, desired prey of many dune animals; opossum; cottontail rabbit; and fowler's toad are only a few. Most have light or camouflaging coloration, but tracks are easily seen.

Perhaps the most unusual animal found in the lower dune area is the hognose snake. When frightened, this reptile puts on a display of great ferocity. It is all a bluff, though, for if the hissing and head-puffing warning is not heeded, the snake may then play dead. Unfortunately, many hognose snakes lose their lives because their acts are quite convincing to frightened people. But since there are no poisonous snakes in the vicinity of the dunes, it is hoped that by using nature trail literature to familiarize beach visitors with this animal, we can succeed in protecting it.

In the third stage of dunes, the most stable community of plants and animals is found. Trees are still fairly short and stubby as a defense against strong winds and sand blasting. The gnarled effect so often seen in beach areas is a woody plant's response to being pelted with sand and dried out on its seaward side. Excessive growth occurs on the protected side to compensate for the abuse.

Nature trails maintained at Cape Henlopen wind through beach, marsh, and dune systems. A stroll through these complex and fascinating habitats should give you a better appreciation of what the dunes are trying to protect. And all we are asked in exchange for this beautiful and important system is to Please Keep Off the Dunes.



Where Did the Beach Go?

They are among the most temporary of geological structures, our barrier islands are, and yet because of their proximity to water, few areas are more desired by developers and would-be seaside householders and businessmen. That's the problem.

What exactly are barrier islands? They are narrow strips of land that separate the ocean from the marshes, bays, and estuaries that reach inland. Through dunes and the low, sandy expanses designed to take a beating, barriers protect the delicate marsh and bay ecosystems from storm waves.

But that system goes out of whack when permanent structures are built too close to shore and when barrier islands are over-developed. Erosion is a fact of life for ninety percent of our nation's sandy beaches. If these sandy beaches are left in a natural state, they can compensate for erosion by slowly moving landward or by accepting replacement sand carried by longshore currents. In turn, the bays and marshes they protect can adjust their boundaries and make room for a retreating beach.

With unchecked development along the coast, though, the dune system that helps keep high seas and shifting sands from moving landward too easily is often damaged or even eliminated. Groins and jetties built to protect coastal structures from erosion have halted the longshore transport of sediment that can replenish beaches. And structures built too close to the sea are now endangered every time hurricanes and heavy storms strike coastal areas. Not only are barrier islands unstable in their natural state, they are even more unstable when they have been heavily developed.

All along Delaware's Atlantic shoreline, cities are built on "lagoon barriers." While the land may in some way be attached to the mainland, these structures are geologically every bit as unstable as barrier islands.

For years, state and federal governments have been furthering development of these geologically

vulnerable areas by subsidizing roads, bridges, and other structures; funding water supply systems and wastewater treatment structures on barrier islands; and providing flood insurance and disaster relief. A recent study by President Carter's Council on Environmental Quality found that the federal subsidy (spent or obligated) for three barrier islands examined amounted to $25,570 per acre of land. State subsidies were not figured in.

If the bill currently being put forth by Congressman Tom Evans of Delaware and Senator John Chafee of Rhode Island is passed, federal flood insurance for still-undeveloped barrier structures will be eliminated. The ban on flood insurance will also affect improvements to existing structures on islands designated for protection.

The last major coastal storm to affect Delaware was in the spring of 1962. The storm was not that powerful, but it stalled, and a good deal of flooding, erosion, and property destruction occurred along the East Coast.

Fortunately, Delaware has not had a direct-hitting hurricane in 34 years. And, like Californians living along the San Andreas fault, coastal dwellers in this area don't seem to think much about the possibility for disaster anymore. Formerly, Delaware could expect a sizeable hurricane once every 16 years. According to Dr. John C. Kraft, Professor of Geology at the University of Delaware, we got our fair share of hurricanes in the 60s, 50s, and 40s. But recently, hurricane tracks mostly have run along the Gulf Coast. That doesn't mean that the next major hurricane can't turn up the Atlantic Coast and ravage Delaware. As the weather experts keep saying, it's not *if*, but when.

Dr. Kraft believes that a strong hurricane could lift out the Indian River jetties and wipe out at least the first block of every city from Rehoboth Beach southward. Hurricane waves in the North Sea have been known to toss around building-size concrete blocks. Ocean City would be in a particularly vulnerable position during a bad hurricane. The great number of waterways cutting through the city make it easier for storm waves to inundate that barrier island.

There is also a real danger of human injury, on a large scale, during a heavy storm or hurricane. The National Weather Service cannot promise more than 12 hours warning on the track of a hurricane. And yet, Dr. William Frank, Director of the National Hurricane Center in Miami, said it would take 20 hours to evacuate the Florida Keys in the event of a hurricane. Other barrier islands along our East Coast would pose similar problems.

Now may be the time to choose. Do we start to plan our barrier island development more carefully or do we stop developing them altogether? Whichever the case, current legislation could start a "beach" ball rolling.

Our Oceans: Getting Back What We Put Into Them

A Liberian oil tanker runs aground and ten tons of oil starts making its way toward the shore of an internationally popular bathing beach. The world is aghast. *(What you don't know is that nature probably will clean up the mess and restore the area completely over a period of a few years.)*

On a beautifully clear day in August, party fishing boats leave their respective marinas along the heavily recreation-oriented coast of New Jersey. Many of the vessels will be the source of non-degradable trash—plastic wrappers, knotted line, soda or beer cans—that will be casually flung into the sparkling waters. No one on board will bat an eye. *(What you don't know is that each piece of litter contributes to an estimated 6.4 million tons of ocean refuse per year—material that is unsightly as well as potentially deadly to innocent sea life.)*

The point of the above examples, and many more that could be given, is that any individual act, whether accidental or purposeful, that introduces "foreign" matter into the sea, has an effect. That effect may be greater than supposed, or it may be less than initially feared. But often, no one, top scientists included, can predict the total impact of any unnatural intrusion.

Interestingly, while ecologists will offer vehement protests over outrageous examples of ocean dumping, it is often primarily in the spirit of precaution. For they will be the first to admit that the world's oceans comprise an enormously complex system that has remained fairly stable over an inconceivably long period of time.

After all, it's not as if there had never been a waste problem in the sea before man came along. Natural oil seeps from the ocean floor at a rate of an estimated 600,000 tons per year. And it has been calculated that the total amount of natural oils found in all living and dead marine plants and

animals is somewhere around 1.2 billion tons. With all this oil in residence, our oceans must have evolved some way of dealing with it—and they have.

Oil

When an oil spill occurs on the open sea, clean-up commences immediately. Wind, waves, and sunlight act to spread the slick out, separate it into layers, evaporate parts, and change its chemical composition. There are also 70 known species of bacteria and yeast that actually enjoy gobbling up oil, and a speedy reaction to any spill is a proliferation of the minute organisms. (Some are specialists and prefer tarballs to No. 2 fuel oil, or vice versa.) Needless to say, this method of mopping up an oil accident is being heavily investigated since most mechanical operations range from marginally effective to highly inefficient.

If the oil spill happens near our shores, more problems can be expected. The rich variety of life feeding and breeding on the continental shelf and in our coastal estuaries and marshes are certainly hit harder, due to their abundance, than organisms in the open ocean. So oil hitting the shore may result in high bird mortality (from preening oil-soaked plumage and swallowing toxic amounts of the pollutant), a temporary end to shellfisheries, and destruction of coastal recreation and commerce for the time being.

But if we are patient, waves will lap at a polluted shoreline, as an animal might lick its wounds, and in a few years, there will be no visible evidence of the disaster. Fine, what's a few years out of billions? The problem is that *our* lifetime is much shorter.

Much remains to be known about long-term and total effects of oil spills although it is probably a good bet that most "catastrophic" oil spills on the open sea are less harmful than the daily releases of small quantities which occur in busy harbors and at refinery docks. The ocean never gets a chance to recover when it is being continually assaulted.

Chemical and Radioactive Wastes

Regardless of how open-minded one is, there is little evidence to support the continual dumping of dangerous chemical and radioactive wastes into the waters of our rivers, bays, and oceans. The tragedy of mercury poisoning in humans consuming contaminated fish in an industrial region of Japan is a nightmare that easily could be repeated elsewhere in the world. And as early as 1967, divers discovered a radioactive whale that had reached that sad state by feeding on plankton found near a nuclear waste site. As chemicals work their way up the food chain, they become more concentrated in each consecutive consumer. Man is generally a top level consumer.

Yet ocean disposal of many industrial wastes may be the *best* if not the *only* available solution to certain problems, and it is worth determining the effects of each chemical addition to decide what is acceptable.

Sewage

Animal waste products can be wonderful. You fertilize your garden, don't you? But when a city the size of Philadelphia or New York takes all of its sewage and dumps it into a certain spot in the ocean, we've got problems.

As sewage breaks down, it releases many nutrients which can be taken up and reused by other forms of life. That's good. The problem is that with too much fertilization, bacteria assisting in the breakdown start using up much of the dissolved oxygen that other plants and animals in the water need. So all other life in the region may die. Or there may be an algal bloom with all those nutrients. As the abundant vegetation consumes

large quantities of oxygen, other organisms are driven out.

Sadly, there are many cases of beach and shellfish areas being so contaminated with sewage and its bacteria that they must be closed, often abruptly, in mid-season.

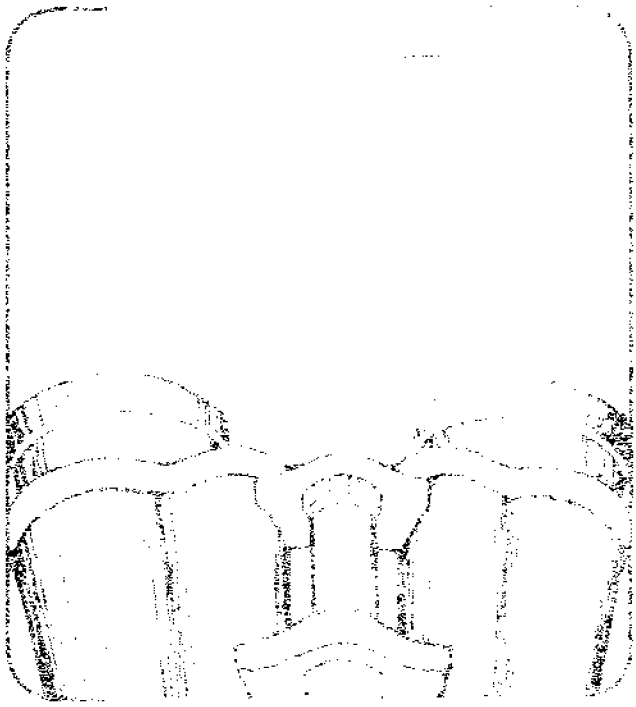
Litter

Here's a problem we all can work on. As mentioned before, there is a lot of junk in our oceans. Divers report that portions of the sea floor are covered with bottles, cans, and papers. While few of us will have the experience of deep ocean diving—thereby observing the situation first-hand litter does interact with marine life, as does any component of the ocean, from its terrain to the chemical composition of its water.

Sometimes foreign matter can be used to advantage. Barnacles or anemones have been known to colonize tar balls. Other creatures use debris as a hiding place or, conversely, as a location where food may be sought (in the form of those who are hiding).

On the other hand, animals can become trapped and die in a shred of fishing net or a narrow-necked bottle. Others, used to gorging on anything they can get their jaws around, may cut up their insides on a pop-top or choke on plastic that gets stuck in their throats. Seabirds may swallow hooks or become strangulated by fishing line that has become wrapped around their necks.

So while scientists expand their knowledge of the effects of dumping in our oceans and attempt to discover alternative solutions where foreign material is clearly destructive, let's each do our part to keep the oceans healthy by keeping our trash out of them.



Bombay Hook: Not just for the birds

Delaware has no national parks. But when it comes to celebrating a natural heritage, our protected tidal marshes at Bombay Hook and the newer, Prime Hook National Wildlife Refuge are, in their own way, as valuable as a Yosemite or a Yellowstone National Park.

Salt marshes cover eight percent of Delaware's land area. Many more marshes existed long ago when our earliest inhabitants thrived on the abundant crabs, fish, waterfowl, and fur-bearing mammals supported in the great series of tidal creeks and marshes that crisscrossed the eastern part of the state.

A visitor to Bombay Hook today is exposed to the kind of vast, unspoiled marshes that greeted the Delaware settlers. In every season, wildlife is all around. The overwintering snow geese and other waterfowl make way for shorebirds, the brightly plumaged migrating songbirds of spring, and the refuge's warm weather residents. In summer, glossy ibises feed quietly in shallow waters, terns hover overhead and suddenly dive out of sight, and majestic great blue herons and other large and small wading birds congregate where woods and water meet.

Fall brings another migration period when both common and unusual avian travelers stop at the refuge. The air is crisp and cool perfect for birdwatching—and Canada geese reach their peak numbers (40,000 to 65,000) in late October. They are a noisy bunch and the fields and ponds are covered with them.

Year-round there are owls, hawks, and mammals, like muskrats, deer, and river otters, to be seen by patient and lucky visitors. The pair of breeding bald eagles is most commonly seen from fall to spring as they feed, fly, or just loaf around

Shearness Pool (the second of the large pools along the autoroute).

While Bombay Hook is pleased to have a returning pair of bald eagles, their story is not particularly uplifting. "In over 25 years of nesting at the refuge," said Don Perkuchin, refuge manager, "there have been only three successful hatches. This year's attempt did not work out, either."

A contributing factor, if not the primary reason for this high rate of failure, is the high levels of DDE bound up in Bombay Hook eagle eggshells. DDE is a breakdown residue from DDT, a dangerous and persistent pesticide known to cause eggshell thinning in some birds -bald eagles and ospreys, included. When eggshells are too thin, they break from the mother bird's weight.

In yearly examinations of pesticide contamination in eagle eggs from around the country, Delaware's eggs have gotten low marks for purity. In 1978, DDE, Dieldrin, and PCBs were all discovered in Bombay Hook eagle eggshells. In 1977, DDE levels in the shells were the highest in the country. The presence of these contaminants perplex refuge biologists, especially since DDT hasn't been used in Delaware since the early 1960s.

Bombay Hook was established in 1937, mainly to harbor migrating and wintering ducks and geese. Comprising a total of 16,280 acres, 80 percent of this area is natural salt marsh. About 7 percent is impounded freshwater. Impoundments are diked water bodies fitted with water control structures so that water levels can be raised and lowered, or even drained and refilled—depending on what will benefit waterfowl and other birds.

Along the autoroute at Bombay Hook, there are paths to three wildlife observation towers and a trail and boardwalk to a salt marsh. Although about 50,000 people visit the refuge annually, many do little more than whiz through the car route and rush back to the city. The enforced refuge speed limit is 25 mph, but even that is far too fast for good wildlife viewing. Patience will be your key to success. Occasionally pull over to the side of the road and stop the car for a few minutes. There is a much greater likelihood that something special will fly overhead or swim into view.

When the saltmarsh mosquito and other vicious biting flies aren't a problem (during the cool months and some gusty, summer days), the wildlife observation towers and trails offer views of ponds that aren't revealed from the autoroute. Also, the waterfowl and other birds often cluster in the far corners of the ponds and are difficult to see from the road.

Bombay Hook National Wildlife Refuge is not a place for a family picnic; nor are there recreational activities available on the site. But for wildlife viewing, the refuge excels. Birders boast that the Bombay Hook Refuge is one of the best on the East Coast. Not only are there a variety of habitats, but northern species meet southern species and stragglers from Europe are not uncommon.

For a first-time visit, the refuge staff recommends the period between October 1 and November 30 when waterfowl populations are at their peak. If you arrive early or late in the day (the refuge is open from dawn to dusk), you will be observing wildlife during their periods of greatest activity. And be sure to stop at the refuge's new headquarters and visitor center, which is expected to open by late summer, 1981. The refuge is located off Route 9, nine miles southeast of Smyrna.

The Wild Ponies of Assateague

Wild horses can't keep people away from Assateague Island. On the contrary, the island's population of freely roaming wild ponies does much to attract visitors. Add to wild ponies Assateague's broad white beaches, gentle surf, and untouched barrier beach ecology, and the island's charms become evident. It is no wonder that beguiled visitors are always reluctant to return to their homes, jobs, and day-to-day lives.

Located just below Ocean City, Maryland, Assateague Island is managed by the state of Maryland, the National Park Service, and the U.S. Fish and Wildlife Service. At the northern tip of the island are camping facilities, nature trails, and a bathhouse and picnic area. Southward to the Maryland/Virginia line, the island is open by permit to beach vehicles and hikers. For 11 miles below the Maryland border, no vehicles are permitted; but then, there are no roads, either. To drive to the Chincoteague Wildlife Refuge, beach facilities, and campgrounds at the southern end of Assateague, visitors must travel by way of mainland roads.

Legends abound concerning how the ponies arrived on Assateague. One popular theory, for the romanticists among us, is that years ago mine ponies from South America were traveling aboard a Spanish ship when the vessel grounded. Equine survivors of the shipwreck swam to shore and, through time, mingled with domestic horses. If you don't believe that, how about this? Mainland settlers in the 1600s drove freely roaming horses across the bay to barrier islands such as Assateague because the animals were trampling crops and, as a result, colonial governments had started to impose livestock taxes and strict penning laws.

Whatever their origins, the wild ponies of Assateague today have most certainly bred with native horses and adapted to the harsh conditions on the island. Many of the ponies bear pinto markings, the characteristic patchwork pattern that results from crossbreeding. And like the stubby and gnarled barrier beach trees that have been exposed to sea winds for decades, Assateague's ponies are built to withstand biting winters and

never-ending winds. The low nutritional value and high salt content of marsh and beach grasses has probably contributed to the ponies' stunted growth and may also account for the swollen appearance of their bellies.

Today there are approximately 50 horses on the Maryland side of the island and about 150 horses in Virginia. The Maryland population roams freely and is managed by the National Park Service. Although this population has been increasing slowly, scientists studying the herds and their effect on the island's ecology say that the northern part of the island can support about 150-160 horses.

The Virginia population of wild ponies, separated from Maryland's by a fence, is owned by the Chincoteague Fire Company. Each year, to keep the population in check, the firemen round up a number of ponies at the end of July, swim them across the bay to the mainland, and auction off the animals. The price of an Assateague pony ranges from $100 to $1,000. Those animals not sold are returned to the Chincoteague refuge where they are kept in a large penned area.

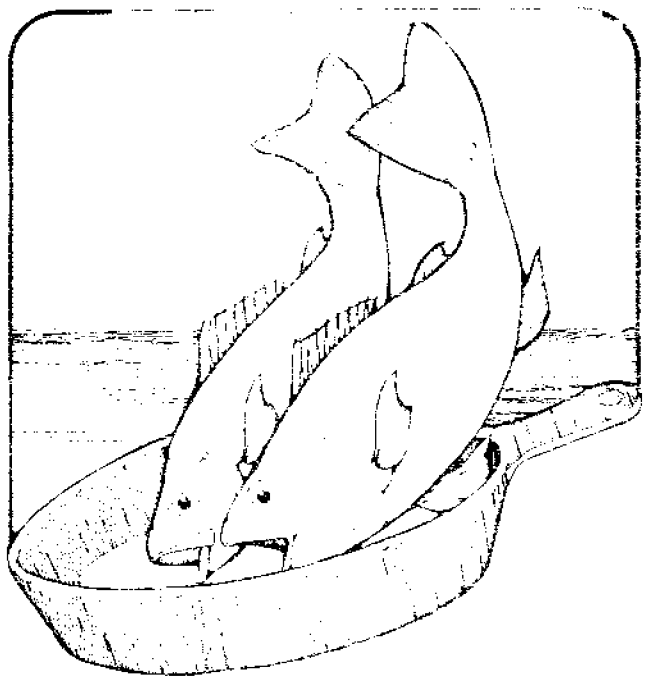
Like the bears in our wilderness parks, some of Assateague's ponies have become too accustomed to the island's human intruders. Currently, two herds of five and six horses are frequently seen around the bathhouse and camping areas. Although signs warning visitors to leave the ponies alone pepper the island, numerous incidents occur each summer—ranging from slightly aggravating to downright painful.

On the annoying side, seasons of generous visitors who have lured the ponies into their camps with food have produced a few fearless horses that will dine anywhere—invited or not. It may be cute to see a trio of ponies barge into a campsite to check out the spread on the picnic table, but sit there hungrily as they demolish your breakfast, knock over and lap up your coffee (totally oblivious to your shoves and threats), and kick the lid off your cooler to see what's for dessert, and the amusement fades. Without as much as a thank-you, they'll be off to the next promising area. Even with no food in sight, the uninhibited and nosy ponies have stepped on tents, eaten through mosquito netting, and made general nuisances of themselves.

Aside from the moochers, life on an island with wild ponies can become tense when the ponies get involved in their own social activities and forget that we are around. From amorous adventures in the middle of a crowded beach to stallions having it out in the parking lot, even the park attendants don't know what to expect next. They will admit though, that sometimes they wish the wild ponies of Assateague were the problem of someone else.

Each summer kicks and bites hospitalize 10 or 11 people. Of course, the ponies don't deserve all the blame when human/equine encounters go awry. As the signs say, these *are* wild animals and, gentle as they may seem as they stand motionless, just yards away, with manes and tails flowing in the breeze, you can't predict how they will react to your approach. Those ponies on the beach may have totally different personalities from the ones that broke bread with you last night.

Even if you go to Assateague Island for only a day, your chances of seeing its famous wild horses are very good. But don't be concerned that the animals will somehow manage to ruin your stay. As with the bears in some of our larger national parks, most people never have any problems. But you'll always hear about the few who do.



These Fish Followed Me Home—Can I Keep Them?

You wave with forced enthusiasm as the fishing boat pulls away from the dock—knowing that if your kids are as successful on this outing as they *think* they're going to be, you're going to be in trouble. What will you do with all that fish?

Knowing how to care for a fish properly from the moment it's out of the water to the moment it lands on your dinner plate can make the difference between disgust and delight when the fishing party has a *great* day and 20 beautiful weakfish arrive at your doorstep.

Fish is always best if it's fresh, and the unkept secret of fishermen, processors, and seafood markets for maintaining that freshness is ice. Arctic Oceans of it! Ice and refrigeration enable successful seafood markets to keep fresh whole fish for five to six days. Fillets will last a few days longer.

At home, it's best to dine on a freshly caught fish within a day or two of the outing. That doesn't mean that icing can be skipped. You should never allow even the freshest fish to sit around without refrigeration while you angle for the rest of the school. If you doubt the truth of this warning, just try leaving a bluefish out in the sun for a few hours and note its aroma.

Fatty fish, like bluefish, mackerel, and tuna, are more demanding of immediate shipboard attention. The "fishy" taste often attributed to these fish is probably the result of improper handling at the outset. While bluefish will never be as mild-flavored as flounder, it need not taste fishy. Bleeding these fish immediately (and gutting, if possible), followed by buckets of ice, will bring out the fine quality of their flesh.

If the fish have been allowed to sit around a

little longer than you would have liked, but they still smell all right, consider using the lighter portions of the meat for broiling or frying and the darker, fattier portions in more highly flavored recipes where spices and other seasonings can mask some of the strong flavors. As with poultry, the strongest taste in fish seems to be concentrated in the fattier dark meat.

If there is far more fish acquired in a day's outing than you can eat at one or two sittings, and there are far too few neighbors to receive your gifts from the sea, consider freezing the fish. Frozen in a good freezer for up to six months, fish will still retain their texture and flavor. If they are well-wrapped, leaner fish can endure up to nine months in the freezer.

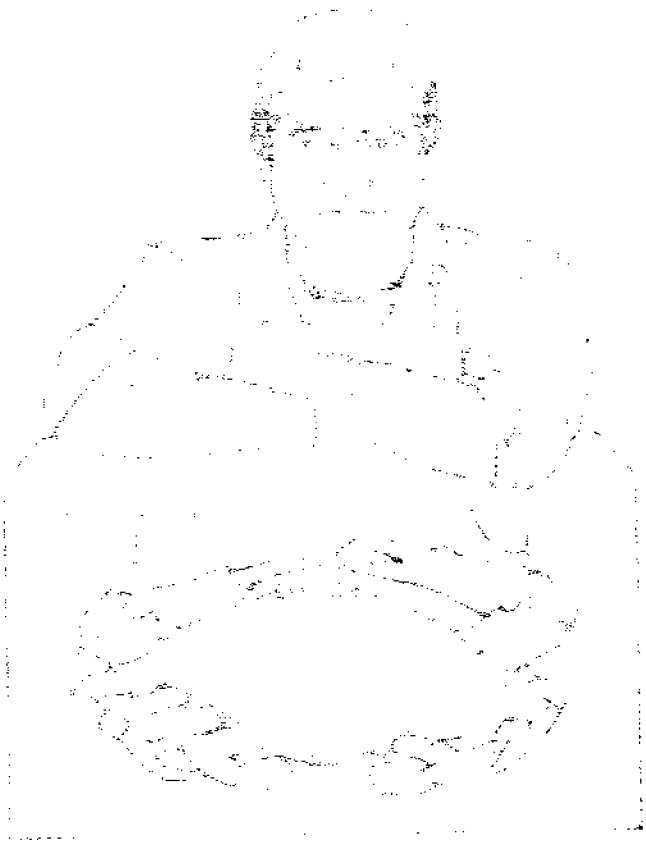
Fish can be frozen whole, but do gut them to deter bacterial growth. Considering that about half of a gutted fish will be edible, this method is only for the occasional fisherman or the multi-freezer family, as it takes up precious space. Two-thirds of a pan-dressed fish (that is, with head, tail, fins, scales, and innards removed) will be edible and, of course, fillets take the least freezer space since all that is frozen can be eaten.

Whatever method of preparation you choose, remember to rinse a cleaned fish thoroughly in cold water. A trick for enhancing the flavor of frozen fish is to plunge fish destined for freezing into a mixture of two-thirds cup of salt in one gallon of water (a five percent salt solution) for about half a minute. Then dry the fish. Seawater, though less pure, also works nicely in this step.

For freezing, use cellophane wrap or wax paper followed by heavy freezer wrap or aluminum foil and make your packages airtight. Freezer burn is a sorry fate for any fish you spent time and money acquiring--and a waste of good food. Wrap fish only in labeled, serving-size portions and never refreeze thawed fish if you value your health. For best quality, freeze the fish packages quickly by placing them in a single layer in the freezer so they will receive the best air circulation. They can be stacked later. A good freezer will maintain temperatures of about 0°F.

Once fish are frozen, please don't forget about them. If they are stored too long, they may not go bad, but their flavor and texture will change. Fatty fish will change most dramatically. The unsaturated fats predominant in fish are not very stable. Breaking down, they interact with proteins in the animal. Not only does this process cause flavor changes, but the protein alterations can produce a very tough fillet.

If you follow sensible freezing procedures, there is no reason why a fish dinner in December can't be as scrumptious as one held in July.



Don't Be Pinched by a Dead Crab

Among the many firm commandments of the cooking world (white wine with fish—red wine with meat), a few safety precautions stand out. Never pick wild mushrooms unless you are absolutely sure they aren't poisonous. Never eat rare pork unless you want to risk trichinosis. And if you're a seafood lover, never buy certain shellfish unless they are alive, previously cooked, or processed.

That tender succulent meat of shellfish that you are often willing to pay top dollar for is quick to deteriorate if the animal dies and its natural protective mechanisms are halted. As shellfish go, clams, oysters, lobsters, and blue crabs are relatively hearty. Scallops and red crabs are so perishable they must be processed at sea if they are to be marketed.

When shellfish die, bacteria begin a feast, lapping up the nutrients spilled from damaged cells and growing with abandon. The multiplication time of a single bacterium is astonishingly short, particularly when conditions are just right. By the time a bacterial colony has pampered itself with a nice plump dead crab for several hours in 80° heat, the crab may mean trouble for a human consumer.

Part of the reason for the high cost of shellfish is that seafood processors and markets lose a significant number of animals before they reach the market. Clams and oysters do fairly well if they are iced. Crabs and lobsters are fussier; they should be cool, but not iced. In Delaware, early season crabs are generally weaker, and the proportion that die en route to market is greater.

Reputable seafood dealers will not sell any shellfish that are dead when they receive them. But wise customers purchasing shellfish off trucks, at stands, or in markets will always make sure that their clams and oysters are tightly closed and iced, and that every crab and lobster selected is

alive. Be suspicious of special short-time-only reductions on shellfish, and be wary of shellfish rapidly selected and bagged for you behind a high counter or otherwise out of your view.

Even if you take these precautions, there is always the possibility of finding one or two dead crabs in a dozen once you get home. If you know that the crabs were alive when you bought them, and they couldn't have been dead too long, they probably will be safe to eat if you cook them immediately and refrigerate the meat. But if they are dead, use good judgement—an hour in the hot sun may be too long.

At home, you can keep live crabs refrigerated for up to several days. Don't worry about them crawling around and getting into your leftovers; they will settle down quickly. Just check them frequently.

There are several schools of thought regarding crab and lobster cookery. If you are concerned about the creatures' comfort (but not concerned enough to forego that crab dinner), place the animals in fairly warm water for about a half hour. If they are still active, add more hot water. They may lose their claws, but they will be alive and anesthetized before going to the steamer. Crab restaurants have another trick. They place their crabs and lobsters in iced water for a brief time. The shellfish are calmed, but don't lose their claws when they are steamed. You may have your own methods for preparing crabs and lobsters for the pot, but cooking choices are few. In this part of the country, boiling these shellfish is heresy. Get a good steamer if you are serious about your crabs.

If you have extra crabs at the end of a meal, pick the cooked meat and refrigerate it. Blue crabs can be frozen, but their maximum freezer time is so short that the effort is barely worthwhile. If kept in a freezer more than four to six weeks, their meat becomes spongy and fibrous. The better method for keeping crab meat is to pasteurize and refrigerate it. But unless you have a good pressure canner at home, this method isn't for you. Other species of crab, like the West Coast dungeness and Alaskan king crab, can be frozen successfully for reasonable periods. Check with your market or consult a good cookbook for information on other varieties of shellfish. Oysters, clams, and scallops can be shucked and frozen in their own juices for up to six months. Shrimp are best if frozen raw; they toughen if cooked before freezing.

One last word of advice is strictly for those who collect their own shellfish. Never take shellfish from any waters that have been declared closed to shellfishing. These warnings are for your own good. Some of the closed areas are swept by dangerous currents; in other cases, pollution can render shellfish caught in them dangerous to your health, if not fatal. Shellfish, though delicious, are never worth these risks. For information on areas open to shellfishing, contact the Delaware Division of Fish and Wildlife in Dover.

Pilots of the Bay and River Delaware

A mariner's map of Delaware Bay is peppered with quaint and ominous-sounding names like The Shears, Deadman Shoal, Hawknest, Ship John Shoal, and Miah Maull Shoal. Deadman Shoal needs no elaboration. But even some of the more ordinary names have gloomy origins. Ship John Shoal pays eerie tribute to a ship lost on that spot. And Nehemiah Maull, an eighteenth-century bay and river pilot, lost his life aboard a vessel that was wrecked in another region of treacherously shallow waters, today named for him.

Nowadays such tragedies are rare, thanks to members of The Pilots' Association for the Bay and River Delaware who, with thorough knowledge of the waterway's hidden pitfalls, provide safe passage to large vessels traveling through it. Founded in 1896 by Capt. John Penrose Virden, its president for 22 years, the organization is run more like a medieval craft guild than a union, and high standards are demanded of the few admitted to its ranks.

By law, nearly all ships over a certain size that enter the bay must take on a pilot who is familiar with these waters. Records dating to 1655 suggest that a Nanticoke Indian was the first pilot to help a ship work its way around the shoals near the mouth of Delaware Bay and travel up river.

In the late 1800s, full-time pilots, licensed under the states of Pennsylvania and Delaware, belonged to many small, intensely competitive groups that were usually formed by the joint ownership of a pilotboat. Since there were no controls on the number of pilots in the bay, it

turned out that there were far too many pilots for the number of ships needing pilotage.

So men began to cruise farther and farther out to sea, way beyond the point of safety for the small pilotboats, in order to meet incoming ships. Even then, pilots aboard competing boats, having raced to a vessel, would often quarrel vehemently beneath its prow for the privilege of boarding. Further fueling the fire was the standing agreement that the first person to plant his shoes on deck would win the right to pilot a ship on both incoming and outgoing trips.

Matters only became worse as the waterway became more and more important to the shipping industry. Perhaps the final impetus for unifying these feisty little bands of pilots in 1896 was the desire to shift from sail pilotboats, which were fine as long as the breeze was stiff and the waterway was ice-free, to power pilotboats. The latter, though, were exceedingly costly and far beyond the means of any of the groups owning sail pilotboats.

In 1897, the new association had a wish fulfilled, and their brand-new steam pilotboat was christened *The Philadelphia.* A year later, the $80,000 vessel was taken by the Navy for use in the Spanish-American War. The pilots were back on sailboats until they again accumulated enough money to purchase another steam pilotboat. The second *Philadelphia* remained with them for the next 50 years and probably made up for the loss of her predecessor.

The Pilots' Association still includes many representatives of families active on the river in the 1800s. Young men wishing to enter the trade are sponsored by active pilots, but vacancies must be anticipated because the number of pilots, 92, is fixed by law. It is no wonder that boys with fathers and grandfathers in the association had the best chances of becoming pilots. The apprenticeship of four years is long and thorough, reflecting the great responsibility of licensed pilots.

It may seem that radar and other modern navigational aids have made piloting easier than it was in the days when Deadman Shoal and other dangerous points earned their names. But there are new hazards. Ships trying to pass through narrow channels are generally larger, faster, and more numerous than they used to be. Not only must pilots be highly knowledgeable about navigation, but they must also be constantly watchful and capable of making correct split-second decisions. There is little or no time to repair navigational errors in the narrow confines of a bay or river channel.

There's More to a Sunken Ship Than Its Treasure

Eyes brighten when they see headlines promising more news about Delaware's favorite sunken ship, the *Debraak*. But by comparison, the *Faithful Steward* stirs little excitement. Her story is sketchy and her whereabouts are vague. Depending on your sources, she may lie anywhere between Cape Henlopen and the Indian River Inlet region.

But at least one salvage company and a number of avid beachcombers have a strong interest in the vessel. She reportedly sank in 1785 while carrying Scottish and Irish immigrants and a treasure containing gold, silver, and copper coins. In support of the belief that her cargo was valuable, there exists a strip of sand south of Indian River Inlet that is known as Coin Beach. Since around 1930, beachgoers in that area have picked up hundreds of old Irish halfpence and a smattering of English gold and silver coins. Even today, eighteenth-century English coins occasionally wash ashore, depending on the weather and currents.

It is interesting to speculate what might be found if current salvage attempts on the *Faithful Steward* are successful. Equally interesting, though very sobering, are the accounts of the wreck. One report appearing in the Londonderry (Ireland) Journal shortly after the ship went down said that she struck bottom on September 1, 1785. Though the ship was only about 100 yards from shore, high seas and strayed lifeboats prevented the rescue of more than 68 of the 250 passengers aboard.

Another account, told to a reporter more than 46 years later by a survivor of the tragedy, offered many more details. On July 9, 1785, 22-year-old James McEntire left Londonderry with his parents, brother, sister, and other relatives. Having scooped up all of its worldly possessions, this Scottish family was seeking a new land where tenants could till their own soil and worship God in a faith of their choosing.

Near the end of August, some passengers and sailors learned that they should have been close to Philadelphia, their destination. They weren't, as far as they could tell, and those privy to this information grew understandably uneasy.

On September 1, one of the passengers threw a party "to commemorate the morn of his felicity" (he and his wife had married one year earlier). Taking part in the evening of merrymaking were the captain and the first mate. Both, according to McEntire, "were borne insensible to their cabins at the close of the most intemperate carousal. Prior to this, I had considered him [the captain] a very sober man, nor do I believe he was a habitual drinker." Nevertheless, this survivor seemed to hold the anniversary party, and the captain's conduct at it, responsible for the mayhem that ensued.

The revelry eventually concluded and by ten o'clock that night most of the ship's sailors and passengers were asleep. Suddenly the second mate, the one officer on duty, announced that the ship was in only four fathoms of water. The captain, by this account, was in no state to help and soon after the warning the ship struck a sand bar with a terrible jolt. Two children were killed on impact.

Panic followed and passengers exhibited every extreme of terror from total stupefaction to mental derangement. Throughout the night, "waves like mountains rolled over us and I thought of jumping overboard to get away from the ceaseless and appalling sounds of the women and children," said McEntire.

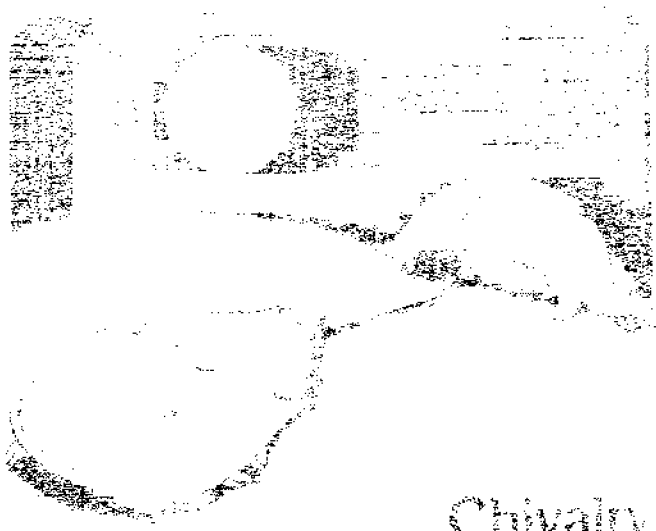
At daybreak, four sailors swam ashore to save themselves and the long boat that had broken loose from the ship. Carrying ropes that were fastened at one end to the *Faithful Steward*, they managed to secure the wandering long boat and those trapped on the vessel eagerly began to haul it closer. As it neared the *Faithful Steward*, now fallen to her side, crowds jammed into position to board the small boat. When it was almost within reach, something happened. The ropes either loosened or broke, but the boat was quickly carried away. No further attempts to retrieve it were made.

That set off a sequence of escape attempts. Periodically throughout that day, brave and desperate individuals would break from the others, hurl themselves overboard, and start the swim to shore. Many good swimmers perished in the heavy seas, but a few passengers clung to chunks of debris that provided them safe passage to shore.

McEntire, being young and strong, was urged by his mother to try the swim to shore. With great reluctance, as the family stood waist-deep in water, he agreed to leave the ship. Her advice was sound. McEntire made it, as did his father and sister. They later found the body of a small nephew washed up on shore and buried him in the sand without ceremony.

On shore at Cape Henlopen, people had assembled from great distances. Some attended to the needs of the ailing. Others just observed the spectacle of twisted bodies that nature had tossed up savagely on the beach. And still others, McEntire reported, "stripped lifeless bodies of clothing and heaped their plunder on wagons for hauling away."

By McEntire's count, the toll in this disaster was far greater than has generally been thought. There were 69 survivors, he said, but nearly 300 lost. By anyone's count, though, there was far more lost than treasure when this ship went down.



Chivalry on Our Shores

It is claimed by many that nights of the full moon are uncertain times when crazy things seem to happen and little conforms to the norm. Regardless of whether it is true that violent crimes increase, hospitals deliver more babies, or werewolves appear on full-mooned evenings, it is certain that at least one bizarre event does occur: our beaches are invaded by monsters of a past age.

Each year, on warm evenings of the full moon (mostly in May and June), our creatures appear. The ancient beasts, resembling an ill-trained battalion of rusty-armored knights, lumber onto the beach, sluggishly dragging their "lances," and often their mates, behind them. This amphibious assault, with troops sometimes numbering in the thousands, occurs for one reason: to produce armies of offspring that will continue the seasonal invasions which have occurred so successfully for about 200 *million* years.

Though we may treat this ugly and seemingly useless animal, the horseshoe crab, with great disdain, it is apparent that the "crab" (which is not really a crab at all but a relative of the land spider) is well-outfitted for the life it is destined to live.

Horseshoe crabs are found only in certain parts of Asia, Indonesia, and along our Atlantic coast from Canada to Florida as well as in the Gulf. Yet, for some reason, the greatest numbers are found in Delaware Bay and Long Island Sound. The spotty distribution of this animal has been quite a puzzle to biologists.

During most of the year, horseshoe crabs reside on the ocean and bay floors, swimming or washing onto shore only for mating. Of course not all horseshoe crab spawning is restricted to nights of the full moon, but there are clear

advantages to these periods. First, at night, people and avian predators (gulls) are mostly off the beaches. Secondly, *full* moon coincides with periods of higher than normal tides.

For spawning, the animals crawl up to the top of the high tide mark and females deposit eggs just within the water's reach. An accompanying male then crawls or is pulled over the "nest" where he releases sperm. Waves can cover the nest with sand and usher the adults back to sea (in theory). Obviously, some individuals get stranded, but when they are stuck on their backs, the forbidding-looking tails go into action and try to lever the body into its correct position. (Incidentally, the lance-like tails are not poison-filled or in any way dangerous. If you have occasion to right a stranded horseshoe crab, the tail can be handled quite safely.)

In the days that follow mating, horseshoe crab eggs go through a series of changes which are beautiful and fascinating to observe. For much of the time, especially toward the end, the transparent, minute replicas of adults can be seen turning inside the tiny eggs. When the tides are again higher than normal (in two weeks' time), waves will sweep sand from the nest and young horseshoe crabs can emerge and head for the sea.

Probably the main reason the seemingly primitive and clumsy horseshoe crab has endured the ravages of time and civilization is that very little can be done with it. There was a period when Indians in this area made use of the tails as spear tips, meat for food, and shells as canoe bailers. But because there were either too few Indians or too many horseshoe crabs, the population of the latter remained large despite harvesting. Since then, however, modern man has decided that the horseshoe crab is quite inedible (or that the small bit of meat found in any one crab is not worth seeking). One known attempt to feed horseshoe crabs to egg-laying chickens resulted in odd brown-colored eggs with a nauseating flavor.

Earlier this century, someone decided that the plentiful horseshoe crabs could be ground and used as fertilizer. This scheme worked fairly well until it became far cheaper to produce chemical fertilizers.

Today, horseshoe crabs are sometimes used as bait; others are maliciously chopped up or hauled far from water, so it is impossible for them to return before dying of dessication. Clam diggers are particularly avid in their attempts to decimate the population because horseshoe crabs have a strong taste for young mollusks like clams. Fortunately, the horseshoe crab has been able to survive man's attacks. But will its luck continue?

An important recent discovery could elevate the horseshoe crab's status considerably. A substance called "lysate," isolated from the creature's blue-colored blood, is proving to be useful in many ways, including cancer research. When injected into the blood, the lysate will react with "endotoxins," harmful materials found in the walls of certain bacteria. Horseshoe crab lysate can help to detect the presence of such contaminants in blood as well as in medications meant for our bodies.

An Object of Desire

Men, be on the lookout! Ladies, hold onto your hearts! There's a real cool number in town and he can be quite a temptation. Believe me, I've already fallen. Eyes bluer than Paul Newman's. Great muscle tone. He's a terrific athlete and an excellent swimmer. And he knows when to keep his mouth shut. Hard on the outside, but a softy at heart, he's all animal!

Well, even though you can't date the "blue-eyed scallop," might you consider consuming it?

The shellfish known as the scallop is, in many ways, a debonair cut above its relatives, the clams and mussels:

- While one can easily open a can of clam chowder, for example, the elegant Coquilles St. Jacques requires tender gourmet preparation.
- While clam shells adorn rustic summer cottages and are decorated and given, at some point in each child's life, as the most gorgeous ash tray imaginable, the delicate fluted scallop is depicted in art and legend as the birthplace of Venus, the goddess of beauty, and is often found in the art and architecture of classical cultures.
- While any family can indulge in a rugged day of clam digging or mussel collecting, the elusive scallop can only be taken from deep-sea fishing boats and demands immediate cleaning and icing due to the ephemeral nature of its flesh.
- While thugs request "50 clams" in advance of their heist, or tell underlings to "clam-up," scallops speak only of refined and gentle things—like a pretty scalloped edge on a lady's collar, a decorative border to a piece of furniture, or even a fancy potato dish reserved for company.

Anatomy of a Scallop

It's not just that we treat scallops as being different. They *are* quite different from other "bivalves" (two-shelled invertebrates). First, there are those magnificent blue eyes. Shining blue. In an average size sea scallop, there may be as many as 100 eyes arranged in two rows around the outer edge of the shell. Each eye is well-developed and contains many of the same elements as our own—retina, lens, and optic nerve.

While the optical function of a scallop's eyes may not be as advanced as ours, they do at least make the scallop sensitive to light. The shine is similar to that found in a night animal when its eyes are caught in the glare of an approaching headlight. It all depends on a unique layer of tissue

at the back of the eye which has special reflective properties. We do not possess this tissue.

The light-weight scallop shell has a characteristic shape which, once you've identified it, should make any of the other 300 species with this type of ribbing easily recognizable as a scallop. Pliny, the Roman scholar, gave the scallop its scientific name, *Pecten*, because of its resemblance to the arc-shaped combs worn by women of his day. Scallops also have a unique straight edge across the back of the shell where the hinge is found.

Scallop Travel

Instead of "clamming-up" and burying themselves as a reaction to fear, scallops have another arrangement. When it is desirable to leave an area on the double, scallops simply set their "mantle" (the soft, flowing tissue which secretes the shell and protects a bivalve) against the shell in a certain way—as we might purse our lips—and spit water from a point that is opposite to the direction of expected movement. Forward motion is accomplished by streaming water diagonally from both sides of the back hinge. If you vaguely remember your math lessons on vectors, the net movement is straight ahead. Likewise, retreat can be effected by forcing a jet from the front of the shell.

Prolonged "swimming" by a scallop is rather comical with the animal appearing to chop at the water while rapidly opening and closing its shell. But scallops do not spend all day darting around. A peaceful *Pecten* will just rest on the soft sandy bottom, in the company of perhaps thousands of peers, and permit the currents to gently sway him to and fro. If, however, a scallop becomes too lazy and remains stationary for a long time, he may be weighed down by colonies of barnacles or sponges covering his back. In this case, the scallop is said to be "absalomed."

Scallop Dining

Feeding is accomplished in the same manner as with other bivalves. Scallops hang their thin-walled gills out of the shell, which can never close tightly, and filter out all the tasty morsels of a size they can absorb. If you have ever seen a scallop in a saltwater tank, it may have appeared to have a fringe or beard around the margin of the shell. Those are the tentacles, not the gills, and they also dangle in the current to gather information about odors or changes in water pressure.

Adult deep-sea scallops, preferring cold-water residence, are enjoyed by a variety of cold-water animals. Cod, plaice (a type of flounder), wolffish, and starfish are among the scallop's known enemies. The starfish seems particularly ruthless in its method of predation. Those suction cups, which enable the animals to cling to rocks for survival, also can exert great force when wrapped around a scallop. Since the scallop can't close tightly anyway, letting a starfish catch up with it insures a speedy demise. Once the shell is open, the starfish's stomach shoots out of its mouth and proceeds to digest the meal, with relish.

But *we* are also predators of the scallop. Unlike the starfish, we are somewhat particular and generally eat only the squarish adductor muscle responsible for snapping the shell shut. The two types of scallop found here are the large deep-sea scallop with its narrowly ribbed shell and gulp-sized meat, and the bay scallop with its smaller, more tender offerings. While the bay variety is usually more expensive, many people prefer it. To me, they both taste equally delicious. What's your verdict?

A Long Fish Story

Eel. Say it slowly. E-e-e-e-l. For most of us, just the word alone is enough to instigate a rapid message relay between our brains and tummies. The reaction is swift. The nose wrinkles up, the teeth clench tightly (lest a meal of eel tries to force itself past our lips), and there may be a slight twinge of nausea. E-e-e-e-l. Even the mouth is left in position to form the most natural expressions of repulsion. Uggh! Icch! Yucch! Yet in many other countries of the world, including those with outstanding cuisines like China, France, and Italy, the word connotes such scrumptiousness that it starts stomach juices gushing. But more about its delectability later.

The eel is a fascinating animal that has suffered unfairly from association with two biologically unrelated fish: electric eels and parasitic lamprey "eels" (the latter being long, sucker-mouthed fish that are doing a job depredating sport fish in the Great Lakes). Incidentally, eels *are* fish, but if you always thought they were some kind of snake, or even a worm, you have lots of company.

Admittedly, eels are slimy. The slime layer permits the fish, normally a gill breather, to respire directly through the skin. This adaptation makes it possible for eels to remain alive outside of water for several days, as long as they are kept cool and damp. It also explains how eels can turn up in ponds and lakes that have no outlets. During migrations, eels are known to wriggle along on moist land for short distances when insurmountable obstacles, like huge dams, hinder their progress.

Until about 1922, the life cycle of eels remained quite a mystery. No one had ever seen eels laying eggs or noticed any fish distinguishable as newly hatched baby eels swimming in our lakes and streams. The ancient Greeks, as clever as they were, thought that eels arose from horsehairs which had fallen into streams. Even Aristotle remained in the dark, claiming that it was all a matter of

spontaneous generation that caused mature eels to spring from the bottom mud of lakes.

Actually, the confusion over eels in ancient times is understandable. Eels belong to a select group of fish that are able to change sexes when high population densities dictate that a non-reproducing male would be preferable to a female egg factory. As a result, males and females are completely identical except for a microscopic ovary found in the female eel. That way, little complex engineering is needed in order to effect the transition to another gender.

Scientists are now sure that new generations of eels are created in the following way: mature female eels, the predominant sex found in fresh water, leave their homes somewhere between their seventh and fifteenth year and aim for the ocean. The ultimate destination, for both American and European species of eels, is a strange vegetation-choked part of the Atlantic, located about 1,500 miles off the coast of Florida, and known as the Sargasso Sea.

As the ladies swim downstream to meet males hovering near the rivers' mouths, their normal olive-green color grows black and they stop eating, the primary activity in their lives until this point. It is obvious that this will be their last journey since the internal digestive organs also begin to deteriorate during the long trek. Upon reaching the Sargasso Sea, it may well be that a short mating ritual, performed up to a quarter mile beneath the water's surface, is the last event in the life of a female eel. With a release of two to four million eggs, her usefulness is spent, and biologists conjecture that the new mother then sinks slowly into the depths of the Sargasso and dies.

When the eggs hatch, transparent leaf-shaped larvae, which bear little resemblance to adult eels, are released. It then takes about a year for the American species to find its way to our Atlantic shore while the European eels, carefully programmed to head only for Europe, do not turn up on its coasts for about two and a half years. Upon entering coastal waters, the inch-and-a-half-long fish, still transparent and now called "glass eels," stay around river mouths until they double in size. Then as "elvers," the young eels begin their migrations into freshwater lakes and creeks. This is also the stage at which eels become commercially valuable.

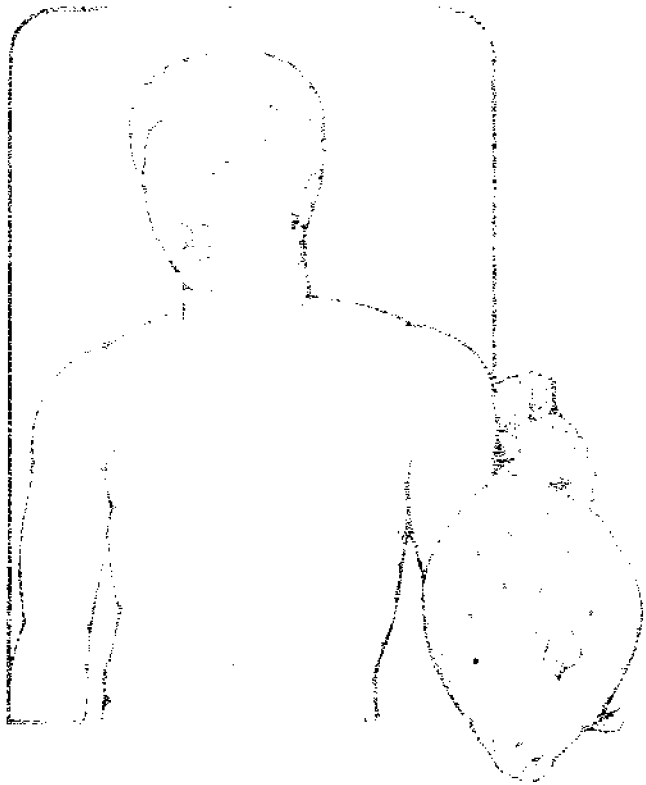
Japan is one country that has cultivated an insatiable hunger for eel meat. It's no wonder, really, that this fish should be a gastronomic joy. Eel flesh is reported to be very white and tender, it lacks tiny bones, and is devoid of the characteristically "fishy" taste. Also, the body is almost pure muscle which, when cooked, translates into loads of meat with little waste.

The Japanese and Taiwanese are masters at exploiting resources from the sea which surrounds them. Not only are oysters and seaweed cultivated, but eels as well. These people have developed a remarkable system where eels taken at the elver stage can be raised to maturity in captivity in a fraction of the time it would take in the wild. They have encountered problems, though. A few years ago, nearly all of the Japanese elver stock was eradicated because of water pollution and disease. At the same time, Taiwan's elver stock suffered a disastrous drought. As a result, these countries began clamoring for fresh supplies from our East Coast.

Consequently, eeling, or rather the taking of elvers, has grown so rapidly in some states that wise environmental controls do not yet exist which would limit the number of licenses or eels taken. While most environmental officials are aware that such bountiful taking of tomorrow's breeding stock can mean doom for the species, it takes time to conduct the necessary population surveys re-

quired to prove that such laws are necessary. Fortunately, most states, including Delaware, are now well on the way to making sure that their eels are receiving the protection they deserve.

If you fish, there is no need to feel guilty if you catch an eel and want to see why so many European and Asian countries desire its flesh. It is only the vast commercial fishery for young eels which is of ecological concern. One way to both kill and remove the slime from an eel is to cover it with salt. There is no need to provide grisly detail as to what happens next, but this method does the job. The eel can then be skinned and cut into inch-long pieces, dipped in flour or your favorite fish batter, and fried. Or you can get fancy and find recipes for the classic English jellied eel, Italian roast eel (eaten at Christmas feasts), German smoked eel, New England-style eel, potato, and onion casserole, or Belgian eel smothered in green herb sauce. Perhaps once you've tried eel, a fishing trip on which only eels are caught may no longer be struck from memory. Just think of the possibility for fish stories: "I caught a fish that was almost a yard long!"



What's in a Name?

Tell your friends that the seafood buffet you enjoyed last evening featured *Homarus americanus, Crassostrea virginica, Mytilus edulis, Aequipecten irradians,* and *Paralicthys dentatus* (lobster, oysters, mussels, bay scallops, and summer flounder) and they're likely to call you crazy or obnoxious and walk away. But there are reasons why a substantial number of people always use these lengthy Latin and Greek names, and it's not just to impress or confuse us.

First, some background. The capitalized first word of a scientific name refers to the organism's "genus." The second word is the "species." Two very closely related animals will often share the same generic name. For instance, *Felis* is the genus of many animals in the cat family mountain lions, jaguars, ocelots, and house cats, to name a few.

Already we have one good reason for using scientific names. They show relationships. *Canis* is a genus that draws together wolves, coyotes, and dogs. *Prunus* labels a surprising number of our fruit-bearing trees, such as cherries, almonds, plums, and peaches. Interestingly, only a few of the many crabs found in this area share the genus name *Cancer.* Yet "cancer" (Latin for crab) has become synonymous with crab-like characteristics—whether they are manifested in the sky or in a disease-ravaged body.

One problem that arises through the use of common rather than scientific names is that different plants or animals sometimes acquire the same common names. There are a fair number of people on the Atlantic Coast who call that brown, armor-plated beast on our shores a king crab. No wonder they become ill when they see king crab legs on the menu at a fancy restaurant. Actually, the armor-plated, spike-tailed "horseshoe crabs" have no connection at all to our market crabs. *Limulus polyphemus* is a nearer relative of the tarantula!

Rockfish is the fishermen's name for the sea bass caught in our New England states. If you catch a rockfish in Delaware, a striped bass will be dangling at the end of your line. Are sea basses and striped basses closely related? See for yourself. The sea bass is *Centropristis striata;* our striper is *Roccus saxatilis.*

On the other side of the coin, instead of one name describing several different animals, sometimes several different names describe one animal. Hook a *Cynoscion regalis* in Delaware and it's a weakfish; in Boston, it's a squeteague; down South, you'll have a grey trout. All this can get pretty confusing. Imagine the Cape Codder who goes fishing in Delaware: "I've got a squeteague on my line," says the visitor. "Nope," says the host, "that's a weakfish." "I'm sure it's a squeteague." "Weakfish!" "Oh . . . is it good to eat?"

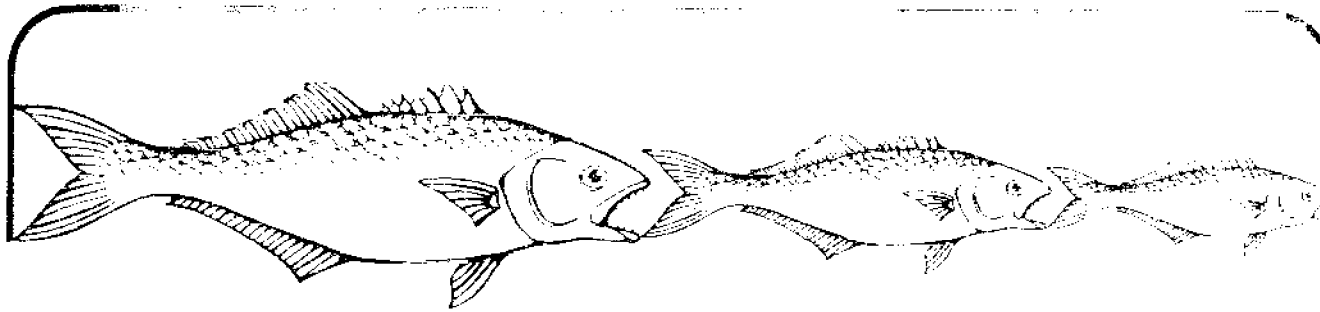
If you're a clam eater, you have probably become dizzy at some time in your life over the offerings of little necks, cherrystones, quahogs, and hard clams. Did anyone ever tell you they're all the same thing, but at different stages of growth? If not, you know now.

Perhaps most pitiful of all in the controversy over using common vs. scientific names are the countless plants and animals that have not attracted sufficient human interest to merit common names. How many creepy-crawly things on our shores are simply called worms or snails? Have you any idea of how many kinds of shells have been incorrectly ascribed to clams? It's worse still with plants. On the coast they are most often identified in one of the following ways: "It's a weed," "It's a pretty flower," or "It's seaweed."

Of course, those plants and animals that do catch our fancy sometimes acquire names that are beautiful, spunky, or just fun-on-the-tongue. Imagine what these fish look like—decorated warbonnet, monkeyface prickleback, gafftopsail, sarcastic fringehead, and oyster toadfish.

Scientific names, too, can sometimes be helpfully descriptive. *Paralicthys dentatus,* the summer flounder or fluke, is a fierce predator, as flatfishes go. *Dentatus* refers to its distinctive set of choppers. We know that the blue mussel is edible because its name, *Mytilus edulis,* tells us so. You really wouldn't want to eat any of the other mussels in our area. The hard-shelled clam, or quahog, is called *Mercenaria mercenaria.* Considering that these shells were once used as wampum, the word "mercenaria," meaning "one who serves only for money" or "greedy," is quite appropriate.

Some points to ponder and perhaps some justification for the persistence of those yard-long, unpronounceable scientific names. After all, a clam by any other name would taste as good.



Bluefish: Piranhas of Delaware

Move over Shark, your fearful reputation is about to be dimmed. Enter Bluefish, and display your awesome credentials:

Bluefish, like sharks, have razor-sharp teeth. But sharks are somewhat discriminating, while schools of young "snapper" bluefish will munch on everything and anything in their paths . . . including brothers and sisters who get in the way of those well-designed "chopping machines."

Wherever found, bluefish are renowned for their tendencies to charge through schools of fish, consuming relatively little compared to the gruesome battlefields of maimed and dying victims left behind. This habit of taking a few bites out of everything in sight has not endeared the bluefish to fishermen, especially those anglers trying to land something other than bluefish—weakfish, for instance. When the blues are running strong, it's not unusual for weakfish fishermen to find that every third or fourth fish hauled in is missing a chunk of its body.

It has been suggested, but not proven, that bluefish may have played a part in the decline of

Chesapeake Bay's striped bass population. Ten to fifteen years ago the Bay was teeming with striped bass; at the same time, there were few bluefish in the Bay. Today, the situation is reversed.

Estimates are that bluefish eat about twice their weight in live food each day. Even after a full meal, however, a choice dining opportunity, such as a school of menhaden swimming by, can prove irresistible to the bluefish. In the worst tradition of the declining Roman Empire, bluefish have been known to vomit an earlier dinner so they may continue their feast.

Bluefish in the midst of a feeding frenzy can be every bit as dangerous to swimmers, divers, and accidentally-overboard boaters as sharks. Any fisherman who has seen a "war party" of bluefish leave a trail of blood and shredded fish in its wake is, at the very least, respectful of their power. A person caught in the middle of a school of frenzied bluefish would certainly suffer- and perhaps be gnawed to the bones.

Unlike sharks, bluefish are aggressive on land as well as in water. Catching bluefish is tricky because they see unusually well out of water and can capably aim those constantly-running jaws at their captors. Most experienced fishermen use long-handled pliers to extract their hooks from bluefish or, in more difficult cases, permit the landed bluefish to keep a well-swallowed lure. It's been said that the last part of a bluefish to die is its mouth. That may not be too much of an exaggeration.

While the bluefish's pugnacious personality is not universally appreciated, sportfishermen who crave a good fight are enthusiastic about blues. Pound for pound, bluefish are considered unmatched in scrappiness. In fact, if bluefish came in 100-pound sizes (the largest officially-landed blue is just over 30 pounds), it would take Herculean strength to catch them.

Unfortunately, diners do not always appreciate the bluefish, and many anglers who accumulate large catches of blues will throw them out or give them away. The reason is that bluefish can be stronger tasting than some of the more popular commercially-caught fish like flounder and haddock. However, careful handling of bluefish—by bleeding and then icing as soon as they are caught—makes them particularly delectable. Smoking is a fine method for preparing older bluefish, which are generally more oily-tasting than the snappers.

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Index