

The Living Dock

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*With illustrations by
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It was February, and the last of the major cold fronts had pushed through and the weather turned unseasonably warm. All the gloomy overcast skies and the gusting winds had abruptly vanished. I stood on my dock enjoying the warm sunshine, watching fiddler crabs starting to come out of their burrows as they felt the sun's rays warming the chilled ground. All during the harsh freezes of the past few months there had been no sign of them. Even when I had walked over the salt flats where stubby growths of pickleweed, *Salicornia*, and *Batis* grew and tens of thousands of fiddler crabs made their home, there hadn't been the first sign of a burrow.

A first-time visitor to the coast might walk the beach and declare that not even one fiddler crab lived in Panacea. But when the weather warmed up, those same salt flats and marshes at the edge of the dock were riddled with crab burrows. I watched them busily digging out their holes, molding pellets of mud and shoving them

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out the entrance. Some of the males were already standing at the entrance of their burrows, waving their single enlarged claws, rhythmically and methodically, hoping to attract some female that might be wandering by. Now and then a female would venture from her burrow, and the male would start waving all the more vigorously. Once in a while the female would hesitate for a moment and then dash down the burrow of her suitor. I could have spent many hours watching fiddler crabs, but that morning I didn't have time.

In a few hours the tide would be high enough and we were going to pull *Penaeus* out on dry dock. Lately she had been leaking worse than ever, and we could no longer afford to put it off. I walked out to the end of the dock where she sat, her bilge pump running, pumping the oily water out of her hull, spreading its shimmering iridescence on the crystal-clear waters. I hated being a polluter. I felt wretched about putting even that tiny amount of oil into the sea. Even with the most careful controls we would always have low-level spillage and waste. I hoped it could be minimized when the boat was finally hauled out and repaired.

On this exceptionally clear sunny morning I could see everything down below, including the hull of *Penaeus*. Her bottom was beginning to look like the rest of the Styrofoam floats; if anything, she was worse. Growing out from the once red-copper-painted bottom were big bushy masses of magnificently beautiful pink hydroids. Perhaps because she traveled out to higher-salinity waters and the mud and debris were periodically washed away, they were bigger than the hydroids on the pilings. It is really hard to describe hydroids. They branch and flower and expand, and are so delicate and fragile with their little pink polyps that they belong in a fairy world. And the barnacles, I could see them all over the hull. There were millions of them, feeding on the rising tide, throwing their feathery legs in and out like jack-in-the-boxes. It was amazing, our very own *Penaeus* was turning into a fouling community all by herself. She had clumps of green sponges on her stern, and even flattened gray oysters clinging to her hull. No wonder we couldn't run very fast. Barnacles can drag a boat's speed down to half and make it use

forty percent more fuel.

It had been almost a year since she was last hauled out and had all that life scraped off. Shrimping had been poor lately, so she had sat unused and motionless, tied to my dock, and more growth had set in than ever.

Dickerson Bay was really amazing about growing things. That bay could grow more fouling growths faster than just about any other bay that I knew of. And the muds were much, much richer in life than in any adjacent bay. You could drop a bucket dredge down off the dock, scoop up some of the living mud and sift it through screens, and the most amazing crawling residue of amphipods, worms, snails, little clams, sea cucumbers, and other creatures would be strained out.

Certainly there wasn't another bay anywhere in north Florida that grew such an enormous number of turd sponges. They literally carpeted the bottom, looking like cobblestones. They seemed to appear by spontaneous generation. A month before, there hadn't been a single sponge on the flats—they had all died after the heavy rains the previous fall—and now I could see hundreds of the hard-packed, spongy elliptical blobs with their felted holdfasts. They were quite small now, scarcely an inch long, but by the time summer rolled around they would have grown to the size of a man's fist and would keep growing until the first winter freeze. After that, they would all die off and turn white and mushy.

It was a bit unnerving to stand on that very dock, looking down at that tide flat, which had been totally barren of sponges only a month ago. It was as if I were looking down at a huge army that had encamped overnight around my dock, as far as the eye could see. It looked as if they had *moved* in, but sponges aren't supposed to move.

The Panacea fishermen curse the sponges because when they "move in" they clog their nets and make net dragging impossible. But again, how could a sponge move? They have a highly modified felted holdfast that anchors them down into the mud, and I often wondered if they could somehow pull it up and get whisked along

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with the current. I sent some off to Dr. Willard Hartman at Yale, and he identified them as *Tetilla laminaris*, but that really didn't help me a whole lot. I still didn't know why there were so many and where they came from.

Could it be that all the dissolved proteins that fed into Dickerson Bay were nourishing the turd sponges? Scattered around Panacea were a number of crab-picking plants. When the thousands of blue crabs were steamed, shredded, and canned, the wash-down water from the crab houses gushed out of pipes into the bay. Often I watched schools of killifish hovering around the pipes in anticipation of the bonanza of food, and hermit crabs would cluster all over the flats, chattering their mouth parts to partake of the nutrients that came by.

A little enrichment of a bay is probably a good thing. Too much and there's a chance of overenrichment and low oxygen conditions. Panacea's Dickerson Bay walked a fine line between the two. It wasn't polluted yet, but it could be, especially if land developers succeeded in filling in the wetlands. At the present, the marshes absorbed much of the nutrients.

As I looked at *Penaeus's* hull all overgrown with fouling organisms that made their living by filtering their food from the water, I wondered if they weren't benefiting substantially from crab house wastes. There were great mats of pink anemones with greenish brown tentacles growing all over the floating docks. Normally a rather rare and obscure species, *Aiptasiomorpha texaensis* was only found sporadically around the coast, but here, off my floating dock, was probably the largest supply to be found anywhere.

I noticed that they too were growing on *Penaeus's* hull right on the waterline. What else was growing on *Penaeus*, I wondered, or should I wonder what was growing inside the lumber of *Penaeus*? I looked at the cross-members on the dock, the bracketings that were originally put down to lend strength to the pilings. They were coated with muddy black barnacles and oysters and eaten away by shipworms.

At a glance you could see that in many places most of the wood

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was missing, and the rest was so honeycombed with tubes that it would only be a matter of time before they disappeared. I knew very well that I would have to replace all the cross-ties one day and get a crew of men out there with fresh lumber and nails to hammer new stringers into place. My poor old dock needed a lot more work than that. We had done what we could for it after the tornado winds struck it last September, but it was still twisted and bent. It would take almost a thousand dollars to get it back into first-class condition, and we didn't have that kind of money for aesthetics.

The dock served its function, wounded or not. Boats could still tie up to her, and she still supported our oyster strings and fouling plaques for growing specimens. There were still years of life left in the pilings; they were still filled with creosote. Once they had been tall straight pine trees, then they were cut, trimmed, and soaked in a huge vat of noxious chemicals that completely saturated the wood, and then they were driven down into the ground to make a dock.

It was hard to say whether or not there were any isopods or shipworms in the pilings, because all those borers are amazingly resistant to chemicals. Even though the wood was soaked with noxious oils, marine growths still managed to settle on them and flourish. If you took a hammer and knocked off a chunk of oysters and exposed a black scar, shimmering oils would seep out of the scar at high tide. But in a few months the wound would once again be grown over.

You can't help but develop some admiration for these frail traveling larvae. Creosote is one of the harshest, nastiest substances I know of. When we were building the floating docks we had to put down a number of pilings ourselves, and when we carried them they inflicted long-lasting burns wherever they touched our skin. Watching the oily poisons leach out of the pilings and into the water made me feel even guiltier than pumping oil out of *Penaeus*. The pollution of the adjacent water was low-level but continuous. It varied with the seasons. In the summertime, when the water was warm, it oozed out of the pilings in little globs and droplets, washed away by the tides and currents into the vast sea, where it was diluted and mixed with all the other oil of the world. In the winter, when the water was

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cold, it became viscous and oozed out more slowly.

A scientist who was studying the fouling communities once told me that creosote was a carcinogen, and that it actually accumulated in the tissues of barnacles and other fouling organisms. When I asked him if it also accumulated in the tissues of the sheepshead, drum, and other large tasty fish that liked to hang around the pilings and munch on barnacles and small crabs and oysters, he just shrugged and said, "Could be."

Then I thought of all the delicious sheepshead that we caught off the dock and baked, and wondered if it was so good after all. I thought of all the other industrial docks, wharfs, and bridge pilings all over the world, all of them secreting creosote globules into the water for years and years to come, and I worried. Yet, if they weren't there, man could never build a wooden structure on the sea.

But even with all the creosote in the world, sooner or later the sea washes out enough of the surface oil and the pilings become coated with slime, and it is in this slime that higher forms of life can take root. If life is ever reborn or re-created on our polluted, overcrowded, creosoted, asphalt- and plastic-covered planet, we will have slime molds to thank. Some slimes that first cover the pilings are made up of bacteria and later filamentous algae. Sooner or later, no matter what object is placed in the sea in any part of the world, slime begins to cover it.

To a boat owner, that first bit of life is a liability, but to a specimen company it is a tremendous asset. We deliberately grew shipworms off our dock so that zoology classes could study them. We cut some four-inch squares of plywood, drilled holes in their centers, and then strung them on ropes and hung them off the dock. In six months or so the wood would become riddled with worms, and when we shipped them off to a zoology class in Wisconsin that had previously only read about shipworms, they could split the wood apart and actually see the worms eating the wood like termites. It is an unforgettable sight especially to someone who has only seen logs and boards slowly deteriorating in fresh-water ponds, an endless process that takes years and years.

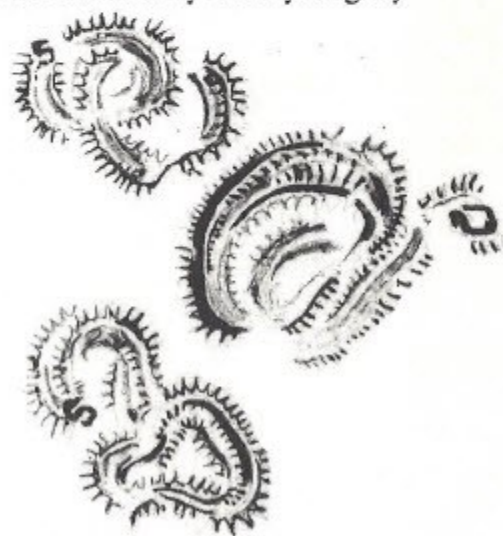
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We found that by treating the surfaces of these wooden plaques with various antifoulant substances we could alter the life that settled on them. For example, when we used the same copper paint that we used on *Penaeus*, the plaques stayed absolutely barren of life for almost a year, and then the slimes took over. Barnacles didn't grow on the painted surface, although they completely caked over the untreated plywood squares. However, since the barnacles were repelled, there was no competition for bryozoans, which resisted the paint, took over, and flourished. After a while, those same boards had a pure culture of white slipper limpets, *Crepidula convexa*, and nowhere else on the dock could these be found.

We could grow all sorts of animals on plastic squares, and we even grew clusters of brown *Padina* algae when we drilled holes in chunks of limerock and strung them off the dock. Never before had *Padina* been seen in Dickerson Bay. It was found offshore on limerock bottoms, but never inshore. But if we wanted wood borers, then we had only to hang out untreated wood, and we "cultured" all we needed.

If we didn't harvest the plaques and ship them off, then they would be eaten away to nothing and would have to be replaced with new ones. After a while we could mush up the soft board between our fingers. Shipworms have had their role in history. Every mighty sailing vessel that has crossed the sea and explored the new world, and every wooden bridge that ever sat in brackish or salt water, has crumbled and finally disappeared because of the tiny, busy wood-boring and wood-eating organisms.

There is a difference between the two. Shipworms such as *Bankia gouldi* and *Teredo navalis*, which live so abundantly along the Atlantic and Gulf coasts, are borers and do not eat the wood. They use



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the lumber to make their homes, building their lime-coated tubes within it, expanding their feathery siphons into the sea to partake of the plankton.

They are not worms at all, but very primitive clams, and their bivalved shells, which are small, are highly modified with teeth that rasp away at the wood as they twist and turn until their burrows are made. The shell is only a tiny portion of the clam's great elongated body, which may stretch a foot or more through the wood, out to the surface where the clam can feed. Perhaps to make their burrows more comfortable, or to lend them support, they secrete a lime coating. So when a student breaks apart a board, he will see dozens of limy white tubes and large fleshy white worms inside them. Often the worms will die off, leaving behind sand-filled tubes of lime.

Then there are the true wood eaters, which are perhaps even nastier. *Limnoria tripunctata* are isopods, related to the pill bugs that you find in a garden under a rock, or the gray sea roaches that scuttle out in all directions when you walk out on a dock. When you see a large wharf piling that is eaten down to a point, like someone put it into a gigantic pencil sharpener, then you know you are looking at the work of *Limnoria*. Fortunately, none of our pilings looked like that, but the pilings of the older Rock Landing Dock, where the crabbers tied their boats, were all badly eaten and the dock wobbled dangerously when you walked out on it.

If I wanted some to ship, I usually walked out beneath the older dock at low tide, grabbed a hunk of the piling and tore it off with my hand. It was easy to do. When I looked carefully, I could see that the piece of wood was riddled with hundreds and sometimes thousands of tiny holes. The wood itself was usually muddy from the silt suspended in the water that lodged down in the burrows, and it was practically impossible to see the *Limnoria* with my naked eye. But when I took the wood back to our laboratory and put it under a dissecting scope, I could get a good view. Then I could actually see the tiny little bugs down in their holes, eating away.

According to Dr. Robert J. Menzies of Florida State University, *Limnoria* are the only sea creatures that can actually digest cellulose.

The little isopods have a highly developed pair of mandibles, the right one with a rasp and the left with a file. As they saw away at the wood, fragments are crushed up and swallowed. Menzies's studies have shown that *Limnoria* can eat their dry weight of wood in ten days, which puts termites to shame.

They are prolific little creatures, very adept at reproducing. Females carry their young in brood pouches until they are ready to make their way in the world; then they leave the pouch as miniature adults, swimming off at night in search of new wood. This form of reproduction has a tremendous advantage over that of creatures which must live in a planktonic state, undergoing numerous stages of metamorphosis before they can mature. Survival prospects for the little isopod are greatly enhanced. It can live for a full month swimming in the sea, looking for a home.

The requirements for *Limnoria* homesteading are not as easy as one would believe, however. They are gregarious creatures and prefer to live in wood that is already infested with others of their kind. In fact, if an isopod lands on a surface and eats its burrow, and after a while no other isopods come to stay, it will leave and go elsewhere to find company. Sometimes, too, they will leave a piece of wood that has been almost devoured, and move elsewhere.

Most of this migratory movement takes place at night. The males leave first, and when they are established in a new piece of wood, the females join them. They arrive swimming, and crawl over the surface, going from burrow to burrow to see if a male is there, poking their antennae down inside. If the burrow is occupied by the opposite sex they disappear into their new home to raise a family. They are amazingly immune to antifoulant paint; all they need is one little scraped area where the surface is exposed and they can move in and take over.

Needless to say, I had very mixed feelings about isopods and shipworms. Here my boat bottom might be riddled with them and it would take hundreds of dollars to fix the bottom. As I stepped aboard *Penaus* and looked at the oily water rising from the floorboards over the engine cavity, I had less and less use for them.

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For all I knew, when *Penaeus* was finally hauled out and the barnacles were scraped off, I'd be able to drive my foot through her stout lumber. I didn't think that would be the case, but one never knew. Some years there would be bumper crops of isopods—all it took was the right combination of salinity, temperature, and nutrients, and there they would be.

Yet I knew that they certainly had their place in the design of nature. They cleaned the rivers and estuaries of wood. Rivers help nourish the sea by dumping leaves, bark, stems, and branches of upland vegetation into the fast-moving currents that find their way to the sea. They also carry down huge logs and often entire trees that are washed away by the current slicing into the riverbank, and sooner or later, it may take years, it all ends up in the sea. Beaches and shorelines erode, exposing the roots of pine trees, which die and fall into the water. Hurricanes rip down the mighty, twisted, wind-blown forested shorelines. If it were not for the busy little bivalves riddling their burrows into the great oaks and pines and cypress logs, and all the other little creatures that attach to the wood and dig their homes in it, the ocean would soon be peppered with logs.

As I stood on the dock I looked up at the head of the bay where the old *Isabel* now sat high and dry on the mud flat. Even from that distance I could see that planks were missing from her oyster-grown bottom, and I knew that shipworms were doing a job on her hull. All the remaining metal on her deck was a rusty orange, and in a few years, between the worms and the salt, there wouldn't be any remnant of her hull above the tide flat. Someday there might be a big oyster bar there, or even a marshy projection of the shoreline, but nothing more.

Looking at *Penaeus*, I knew that someday she too would join the boneyard. We could prolong her life for a number of years, but that was all. For the moment anyway, *Penaeus* belonged not to the worms but to us. And that meant that the worms, the barnacles, the hydroids, and all the millions of living forms that had taken up residence on her hull had to go. I finished gathering the specimens I had come after and then returned to the lab. The tide had risen.

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It was time to haul out *Penaeus*. It was eleven-thirty. She was scheduled for pulling at noon, when the water was tiptop high, far into the grasses. The weather couldn't have been better, with the sun shining and a gentle breeze blowing. Once the hull was scraped, *Penaeus* would be ready for painting. With luck, we could have her back in the water in a week.

We towed her down the bay with the tunnel boat and anchored her off the old Panacea Ways. The boat ways at Panacea had seen better days. Years ago, when Panacea was a bustling town and there were many things going on, and the fishing industry was much greater than it is today, the boat ways were a busy place, with a younger Baisden Roberts and other men hauling boats out and repairing their bottoms. But now the area that had been the boat ways was almost completely reclaimed by nature, and sand live oak, yaupon, and gallberry grew up around the railway. It was a peaceful place now, with towering slash pines overhead and woodpeckers hammering away, not a bustling boatyard.

It was against this setting that *Penaeus* was being hauled up on rusty railroad tracks, on a wooden cart with orange rusty wheels. The ancient winch clattered away, pulling in the loose rusty cables, and Baisden, the old man at the controls, looked intense and thoughtful as he operated the groaning old piece of machinery. Inch by inch *Penaeus* crawled up out of the bay and on to the elevated railway, and finally she inched into the marsh grass that grew around the railings, knocking the periwinkle snails off the tops of the marsh grass where they crawled up to escape the high tide.

The red copper paint on her waterline was now sitting high out of the water and as she came up farther, the shaggy barnacle-covered hull became exposed. You couldn't see a bit of the original copper paint, it looked like it was one solid sea of clicking, bubbling barnacles that were exposed to the dry air.

Hundreds of thousands of barnacles and tufts of hydroids were everywhere, hanging limply and forlornly, and clumps of oysters covered the hull. Just the numbers of animals that had attached and grown on the bottom was enough to make one stare with wonder.

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Click-click-click, the rhythmic sound of the winch continued, and more and more of *Pennaeus* was exposed to the air as she inched up the incline. Soon there was no water beneath her hull.

The bubbling and hissing of the barnacles was practically deafening under the boat; it was as if they knew that their whole world had come to an end. The year that they had lived on the boat, the miles and miles of water they had traveled, the plankton they had sucked up—all of it was to be a thing of the past. Even though the Panacea Boat Ways hadn't been used in ages, the ground beneath the working platform had a thick mat of ancient dead barnacles that had long ago been scraped off and packed into the sandy soils.

Three men dug into the barnacles with their heavy scrapers and the barnacle sounds seemed to increase. It was hard work, raking them off in sheets, scraping their metal blades back and forth, crushing the shells, tearing them off their bases. Leon and I hurried around behind them, catching the clumps of barnacles in buckets. I grabbed a handful of the mashed barnacles and looked them over. There was no doubt about it, there would be thousands of *Nereis limbata* on that boat bottom.

"Look at these," cried Leon excitedly, holding his hand out with two big pink worms for my inspection. "We'll get a hundred in no time. That man will go stark staring crazy when he sees them. He'll want a thousand like them. By God, *Pennaeus* even makes money when she's up on the ways."

"How much you get for them worms?" Henry asked me as he stopped his scraping to look at them.

"He gets plenty," said Baisden a little grumpily, "you can bet on that."

As the scrapers continued cutting great swaths on the bottom, the red paint was becoming exposed, and soon there were whole areas that were cleared, with only white barnacle scars left behind. There is a rule that one abides by when pulling any boat. As soon as the boat is hauled out, you have to scrape it right away while things are still alive and soft. If they are allowed to dry out and desiccate, they become firmly fixed and turn into a messy glue.

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At last we had our buckets filled with barnacle mush. Most of it was shells and tissues and yellow globs of eggs. Leon and I decided to sit beneath the shade tree and pick out the worms rather than haul them up to the lab. There was better light down there, so we could see them more clearly.

I went down to the marsh and fetched a bucket of water. The tide had dropped since they had begun scraping, and the mud flats were beginning to expose. As I waded out over the shallows I noticed a number of fiddler crabs down by the water's edge and I made a mental note to round up some before long. The warm weather was too good to last. A cold snap would set in before long, and the fiddlers would disappear again.

I trudged up the beach, past the men working on the boat, and poured some water into Leon's bucket of barnacle mulch. Immediately the water turned orange, coppery orange, and I had a sinking feeling.

"I reckon that was a dumb idea after all," said Leon, looking at the poisonous red water. "All that red paint that come off with the barnacles is going to kill off everything here."

We culled the hash, picking out the long pink worms. They were barely moving. Normally they squirmed and crawled around with vigor, but now they were as limp as spaghetti. They looked rather bleached out, and their proboscises were open and inverted. So there it was; beneath all the slime and the bases of barnacles was poisonous copper paint, still capable of killing.

Before long the entire hull of *Penaeus* had been scraped. The men hosed it down, and the water that ran off the hull was bloody red from the copper paint. The water washed away the residue, bits of shell and mushy tissues, exposing the neat round calcareous rings left by the thousands of barnacles. Those rings would be much harder to scrape off. The old men were sweating as they racked their scrapers back and forth and washed more red paint off. Finally, Baisden was finished. He drilled a hole into the hull and all the oily black water gushed out onto the ground.

I watched the copper paint running off into the marsh, mixing

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with the bay water. I hated that. Over the years, millions upon millions of gallons of this highly poisonous substance have been washed into the sea from boatyards all over the globe. I had bought many gallons in my lifetime and had painted it on many boats. The stuff we planned to put on *Penaeus* this time was one of the more expensive brands, almost guaranteed to keep fouling growths from coming back for a much longer period than the cheaper brands. But again, what could I do about it? Haul that monstrous boat up on a trailer and take it five miles inland and scrape it down on sand-hill country? That was too impractical and too expensive.

I watched the copper paint mixing with the water, spreading out. And then I saw the fiddler crabs near the water, basking in the sunshine. But at a glance I could see that something was wrong. They didn't move like fiddlers do, they were wandering around as if they were a bit goofy and drunk. Before, when I had walked past them, they scuttled out of the way and some stood cautiously at the mouths of their burrows. Now I could see that they were sick. Some were falling over on their backs and twitching their legs spasmodically.

"Can't we dike this stuff or do something?" I asked Baisden as he continued washing. "It's killing all the fiddler crabs."

"So what," he demanded defiantly, "there's plenty more, and they ain't good for *nothing* no-how. I swear, nowadays you can't do *nothing* without messing up the ee-cology. What do you want people to do, quit living? We used to kill them by the millions a few years ago when the boatyard was working, but shoot, there's plenty left to take their place. That's the trouble nowadays, all these people bitching about this ecology stuff is ruining the country. You better go to worrying about all these worms you got in this boat."

He pointed to a number of tiny pinholes that were peering out at me from the boards. Leon inspected them and shook his head. "No damn wonder she's leaking. Some of those boards are gonna have to come out."

"Now I can plug up some of them, you know, and drive a cypress plug in them, but some of these others—that's a different matter.

Now that's where some of the water is coming in from, but the rest is coming in from all this rotten caulking in the seams. All that will have to come out and be replaced, too."

I watched the poisoned fiddler crabs walking around in a dizzying circle "Well, how much is that going to cost?"

"Well, I don't rightly know," he said, rubbing his chin. "Like I told you, we do it by the hour. Why, if I was to tell you one thing and it came out another, you'd get mad. So I'll just tell you that we work for four dollars apiece, so that's twelve dollars an hour. A boatyard would cost you a heap more."

"Well, how many hours do you estimate?" I demanded. "Five? Ten? How many?" I was getting anxious. I hadn't bargained on the extra expense.

"It shouldn't be over twenty hours at the most," he said. "Not if all of us get right on it."

"All right all right, but when will she be ready?"

"I'd let her stay up there for a week or so and dry out good. We'll tear out the boards tomorrow and then we can get in and work her over. Now I told Leon here that we'd be able to pull and clean her today so you-all could paint her. I didn't figure on doing no big amount of work. We're building a room onto old lady Johnson's house and all, and we got to finish that up, but we'll get on this just as soon as we can. You know how it is. . . ."