

NOTEBOOK

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The Walls Are Alive

Spectacular fungus infestations raise many questions, but so far there are few answers

Homeowners in southern California are wrestling with an unusual wood-destroying fungus called *meruliporia incrassata*. Under the right conditions, the fungus (which is generally referred to simply as *poria*) can spread throughout a wood-framed structure in a matter of months, causing serious damage before the inhabitants realize there's a problem. Even if *poria* is discovered early, it's often mistaken for ordinary brown or white rot, and inadequately treated.

"My insurance company said I just had water damage," says Joanna Poppink, a Los Angeles psychotherapist. "I put in gutters, resloped the front lawn, and replaced some studs and drywall. I thought it was fixed until a few months later, when I looked up and saw this big orange mushroom growing out of an inside wall."

Like all fungi, *poria* can only consume wood in the

presence of moisture. Unlike more familiar forms of rot, however, *poria* forms rootlike structures, called rhizomorphs, that draw water up into the building, enabling it to consume otherwise bone-dry wood. The rhizomorphs typically have a reddish-brown exterior, and may grow as big around as a person's arm. "They look like a tree roots," says John Menge, a plant pathologist at the University of California at Riverside. "But if you break one open with your hands, it looks and smells like a mushroom inside."

Even in California's naturally dry climate, the enterprising *poria* fungus can usually find all the moisture it needs. "I saw one case where the rhizomorphs had grown into the swimming pool," John Menge says. Sprinkler systems that are used to water lawns or landscape plantings are another source of moisture. Not surprisingly, wet weather also seems to stimulate the growth of the fungus. In the aftermath of the rain-soaked El Niño year of 1997, John Menge observes, reports of new cases of *poria* doubled.

Science-fiction nightmare. The actual number of cases is still relatively small, with most estimates

placing the figure at fewer than 25 per year. But that's small consolation for those like Joanna Poppink, who have experienced its effects. Among other things, Poppink was horrified by the fungi's eerie ability to travel freely through solid concrete.

"It's hard to imagine unless you've seen it," she says. "You have this thing as big around as an anaconda that breaks into microscopic filaments when it comes to the concrete, passes through it, then turns back into an anacondalike thing that comes squirming up the inside of your wall. It's a science-fiction nightmare."

Repairing a *poria*-damaged structure is usually difficult and expensive. "You commonly end up with a bill for \$50,000 or more," says Jerry Turney, a curator with the Los Angeles County Arboretum. In addition to tearing out and replacing damaged wood, it's often necessary to break up and remove a fungus-filled slab and pour a new foundation. Even then, the fungus may remain active in the soil, making it impossible to rule out future infestations.

To make matters worse, insurance companies have so far been reluctant to pay homeowner claims for damage attributed to *poria*. "Homeowners' policies often have a clause that says the insurer doesn't have to pay for damage caused by dry rot," Jerry Turney says. "You can sue the company, but then it all comes down to what the judge thinks 'dry rot' means."

Even where the suit is successful, the settlement may fall well short of covering actual costs. "After I took them to court, the insurance company finally paid me a lump sum," Joanna Poppink says, "but I have to pay the cost of the lawsuit. I won't even know what the repairs cost until the work is done."

Prevention and control. Luis De La Cruz is a pest-control contractor from Van Nuys, Calif., who has treated hundreds of cases of *poria* over the past two decades, and is widely regarded as California's foremost practical expert on the subject. In general, De La Cruz observes, houses close to the ground, on slabs, are much more likely to be invaded by *poria* than those that sit up higher, with a well-ventilated air gap between soil and wood. "Sometimes you'll see *poria* coming in under the stucco, if the bottom edge is buried below the finished grade," he says. Brick or concrete patios that butt directly against the edge of a slab can also



Three months after buying the house, the owner of this house received an unpleasant surprise.



Unlike most wood-decay fungi, *poria* can attack wood in dry areas of a house, thanks to its ability to draw moisture from remote sources.

spell trouble. "If there are grade stakes or scraps of lumber under the patio," De La Cruz says, "the poria will feed on them, then move through the patio to the slab and into the framing."

In other words, builders can probably reduce the risk of poria infection by constructing higher, drier, better-detailed foundations. But no one can explain why so few of the seemingly vulnerable foundations are actually being attacked. "Why does poria enter one house, but not another one just like it?" De La Cruz asks. "I just don't know."

Unanswered questions. It's also unclear how the fungus moves from place to place. Most fungi reproduce by means of windborne spores, which poria produces in vast quantities. Wayne Wilcox, a forest pathologist with the University of California Forest Products Laboratory, tells of wriggling through a foundation crawlspace over what he thought was a thick layer of dust, only to find it was actually poria spores.

"If those spores were viable," he says, "you'd expect to see localized outbreaks, with spores from one house infecting others nearby. But that doesn't seem to be happening."



The black part of the wall is badly deteriorated building paper. The white is the innermost layer of stucco, as seen from indoors. The wall studs and floor are completely gone.

Poria growing through the inside of the hearth and emerging from the mortar joints between bricks. The brown dust is a layer of spores produced by the fungus.



A contractor replaced damaged wood and treated the new joists with copper naphthenate. A year later, the area looked like this.



If there's a mushroom growing out from under the bathroom mirror (above), there's no telling what you'll find inside the vanity (left).

Luis De La Cruz observes that most of the poria-infected houses he sees have had major landscaping done in the recent past, raising the possibility that the fungus may travel in loads of topsoil. Wayne Wilcox finds the idea plausible. "In the wild, poria lives on dead trees," he says. "If you scrape up landscaping soil from a forested area, it could contain pieces of infected roots."

Nor does anyone know how many cases of poria occur each year. There's a general sense that the fungus is on the rise in California, but this may be

more a matter of perception than reality. Many of the affected homes are large and expensive (the Santa Monica home of actress Julie Andrews, for example, recently sustained \$1.6 million in poria-related damage), and the effects of the fungus are so spectacular that the resulting media coverage may exaggerate the severity of the problem.

Wayne Wilcox finds the lack of hard information deeply frustrating. "I'll be retiring this fall," he says. "I spent years trying to convince the state of California to fund some basic research on poria, with absolutely no success." In the continued absence of research, he fears, better methods of control and treatment will be a long time coming. "There are probably millions of houses on poria-infected ground down here that no one knows about," he says. "It's an important problem with serious consequences, and we need to start taking it seriously."



Flexible Gas Piping Catching On

For the past hundred years, almost all residential gas-supply piping has consisted of threaded black steel pipe. Now, however, many plumbers are switching to corrugated stainless steel tubing, or CSST, for some of their gas piping jobs. CSST consists of a flexible inner stainless-steel tubing covered with a polyethylene or vinyl jacket. It comes in 250- and 500-foot rolls, and is available in 3/8-, 1/2-, 3/4-, and 1-inch diameters.

CSST, which was developed in Japan in the late 1970s, has been available in the U.S. since 1990. All of the major codes have approved the use of CSST for residential gas piping, but some local jurisdictions, mostly in western states, still require steel pipe.

Faster to install. Although steel pipe is very strong and resistant to abuse, it is time-consuming to install, mostly because of the need to cut pipe threads at each fitting. In remodeling jobs, steel pipe is difficult to hide, unlike CSST, which can be snaked through walls like electrical cable. CSST also requires fewer fittings — both because it comes in longer lengths, and because it is so flexible — and each fitting is installed much faster, since no pipe threading is required. CSST's main drawback is its cost per foot, which is considerably higher than black steel.

In spite of the higher materials cost, a CSST job can cost about the same as a black steel job, because the shorter installation time results in labor savings. Since installers using CSST finish each job faster, they can do more jobs in a week, improving their bottom line. Over time, labor rates have been edging up, while the cost of CSST is dropping, tipping the equation increasingly in favor of CSST. "CSST is expensive, but the price has come down a lot in the last year," says Paul Young, product sales

manager at Parker Hannifin Corp., a manufacturer of CSST. "We're experiencing a huge growth spurt now." In recent years, sales of CSST have been increasing 20% annually, and CSST now accounts for about 10% of all residential gas piping work.

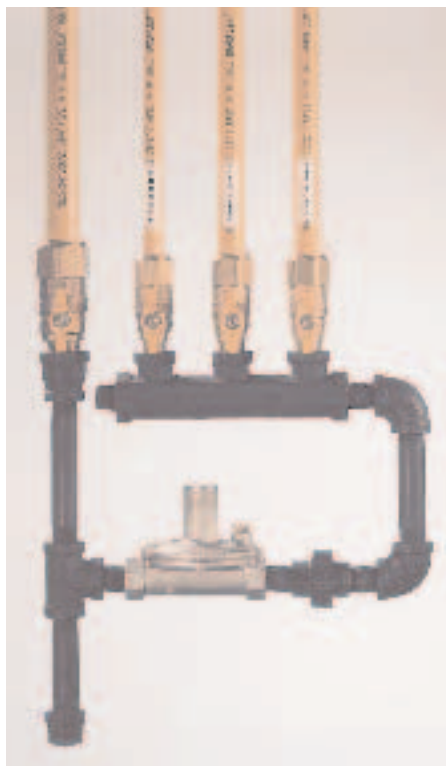
CSST is catching on more quickly in areas where the local gas utility offers 2-psi gas service downstream from a residential meter. With 2-psi service, less expensive 1/2-inch tubing can usually be used, instead of the more expensive 1-inch pipe typically used in homes with

0.25-psi gas service.

You go first. As in other trades, plumbers can be wary of new materials. "The gas industry is slow to respond to new technology," says Renny Norman, principal project manager at the Gas Research Institute. Tim Hale, service sales manager at Northern Petroleum in St. Johnsbury, Vt., has a typical wait-and-see attitude toward CSST. "I haven't used a lot of it," says Hale. "Let someone else be the guinea pig."

James Mullooney, manager of field services at Vermont Gas Systems in Burlington, Vt., uses steel pipe wherever it makes sense. "In the vast majority of homes, most people still use black iron, because it's cheaper. In an open basement, it's not too hard to run a 20-foot length of straight pipe across to the furnace. But in condos, you can get considerable labor savings using CSST." Norman agrees: "CSST is being adopted first in multi-family residential installations. It also makes sense in the more comprehensive gas-piped house. For houses that have a couple of fireplaces, plus a gas grill and patio heater, in addition to the furnace, water heater, and range, it becomes cheaper to run CSST. And you almost have to use CSST if you're renovating an existing building."

Incompatible fittings. One hurdle to the widespread adoption of CSST is fitting incompatibility. Each of the five principal U.S. manufacturers uses proprietary fittings which are not compatible with those of other manufacturers. Some fittings have a metal-to-metal seal, while other manufacturers have developed fittings with gaskets. "So far, CSST is being used only by trained plumbers and pipefitters," says Norman. "But the lack of compatible fittings may restrict the acceptance of CSST into the mass market."



The use of corrugated stainless steel tubing — which is covered with a polyethylene or vinyl jacket — is increasing quickly. The flexible tubing can be integrated with black steel pipe when used for residential gas service.

OFFCUTS

ASHRAE's proposed standard for residential ventilation is still stalled at the committee level. Standard 62.2, which would require mechanical whole-house ventilation for new homes, has been praised by some energy experts, but criticized by NAHB as too complicated and expensive (see *Notebook*, 7/99). Since the ASHRAE committee has still not agreed on the wording of the draft standard, it has yet to be released for public review.

The concept of "universal design" is based on the idea that a home should be functional for people of all physical abilities, and homes incorporating universal design features may come to represent an important piece of the housing market. According to the American Association of Retired People (AARP), one-third of the U.S. population is now disabled, chronically ill, or over age 65.

Sears Cuts Diamond, Subs Await Payment

The installed sales business received an ugly black eye in the beginning of February, when Sears — the nation's largest home repair and improvement provider — terminated its licensing agreement with Diamond Home Improvements, which had installed roofing, gutters, entry doors, garage doors and fencing under the Sears name. Immediately after the announcement, Diamond closed 70 sales offices and laid off 900 employees, none of whom had been paid for their last two weeks of work. Several thousand independent subcontractors who actually did the work for Diamond also went unpaid, although Sears has reportedly agreed to reimburse them.

Sears spokesman Larry Costello cited problems with customer complaints to explain the company's decision to end its five-year relationship with Diamond. "Diamond had made progress in the area of customer satisfaction," he said, "but only on the easy jobs. They were much less successful with customers with longer-term problems."

But according to Rebecca Hayne — of the public relations firm of Alexander & Walsh, which represents Diamond — much of the customer dissatisfaction had its source in an unresponsive customer service department at Sears itself. "Diamond did 350,000 jobs in the past year, with only 700 unresolved complaints," she said. "Sears had its own reasons for pulling the rug out from under us. The story isn't over yet" — even though a small army of frustrated contractors wishes it was.

Housing for Hurricane Victims

In the summer of 1999, New York carpenter David Cienki traveled to the island of Guanaja, off the coast of Honduras, where he spent several weeks building simple, low-cost houses for those left homeless by Hurricane Mitch the previous fall. The experience led him to start a nonprofit organization called Southern Exposure, which he describes as "something like Doctors Without Borders, but for professional carpenters."

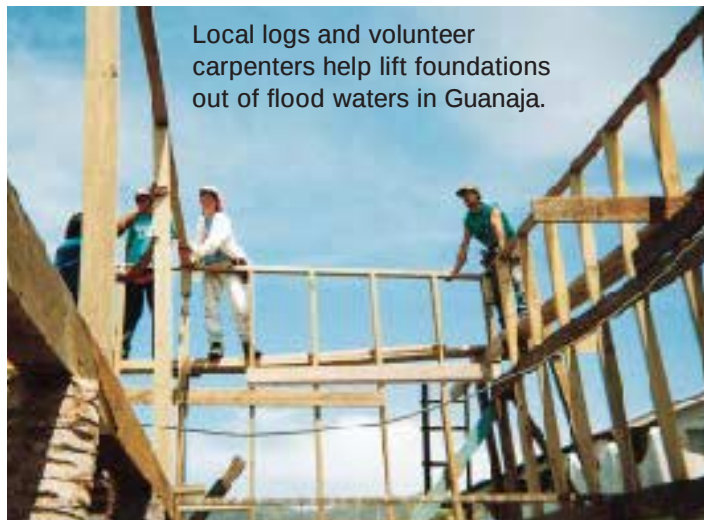
Cienki and a dozen volunteers returned to Guanaja in January with the goal of building 100 new houses and a hospital. The houses are essentially 16x24-foot sheds with 2x4 walls, board or OSB walls, and galvanized metal roofs, standing on coconut-log stilts to avoid seasonal

flooding. "Materials are a problem," Cienki says, "but we figured out a way to make hinges with a hurricane strap and a 16-penny nail."

The organization would welcome additional volunteers.

The weather in Honduras is always warm, Cienki reports, and although there are no building inspectors, there are lots of biting insects and the occasional poisonous snake. "The cockroaches are huge," he says, "but after working as a carpenter in New York for eight years, that doesn't bother me." Experienced builders who are willing

to work for a month or more should call Southern Exposure at 917/586-4121, or write to P.O. Box 3426, Church St. Station, New York, NY 10008.



Local logs and volunteer carpenters help lift foundations out of flood waters in Guanaja.

OFFCUTS

European sawmills are increasing their exports of dimensional lumber to the U.S., according to *Random Lengths* newsletter. European lumber exports to the U.S. during the first 10 months of 1999 increased 79% over the same period in 1998. Exporters in Scandinavia, Russia, the Baltic republics, Austria, Germany, and the Czech Republic all increased shipments to meet the booming U.S. demand for lumber.

A state environmental agency wants to ban the use of heavy construction equipment before 10 a.m. in Dallas and noon in Houston. The proposed ban by the Texas Natural Resources Conservation Commission is intended to reduce air pollution levels in the two cities. The restriction would cover all diesel equipment over 50 hp, which includes virtually all backhoes and bulldozers. Contractors have objected that the ban will raise the cost of excavation in the two cities.

An incarcerated carpenter in California just received a bill for \$328,000, according to *Fraud Focus* newsletter. Robert Johannsen is accused of fraudulently collecting \$1,406 a month in workers compensation payments for almost 19 years. He originally filed a claim in 1970, when he received injuries including broken bones and a skull fracture while working as a carpenter in Washington State. The state of Washington decided that since Johannsen got a job in 1981, he must repay Washington for all of the checks he received after that time. It won't be easy for Johannsen to come up with the money, though, since he is now imprisoned in California on unrelated charges.

If a Tree Falls in the Rainforest, Will It Hurt Builders?

Activists with the environmental group Rainforest Action Network put in a surprise appearance at January's International Builders' Show, held in Dallas by the National Association of Home Builders. The group unrolled a huge banner over the main entrance to the convention center, which read "There's No Place Like Home...For Rainforest Destruction." A second banner, reading "No More Homes From Old Growth Wood," hung from the ceiling inside the exhibit hall for over an hour before it was removed.

According to RAN spokesman Jennifer Krill, the Dallas protest marks a new tactic for the San Francisco-based organization, which opposes the logging of old growth forests. Rather than targeting loggers and other producers of forest products, she explained, the group will begin bringing its message to consumers by targeting home builders. "Surveys show that most Americans list the environment as a top priority," Krill said. "We don't need mahogany entrance doors or hollow-core luan doors. If people don't buy old growth wood, the old growth wood won't get cut."



California Housing Woes

Citing a shortfall of 300,000 homes annually, the California Building Industry Association is calling on the legislature to turn its attention to increasing the state's housing supply. Figures from a variety of sources already show California to have some of the least affordable housing in the nation:

- According to the most recent NAHB quarterly report, 8 out of 12 of the least affordable cities in the U.S. are located in California. The 8 cities are San Francisco, Santa Cruz, Santa Rosa, San Jose, Salinas, San Luis Obispo, San Diego and Oakland.
- California ranks second lowest nationwide in terms of homeownership, a full 11 percentage points behind the national average, which is at an all-time high.
- A Californian earning the median income is still \$30,000 below the base salary required to qualify for a median-priced home in the state.
- In San Jose, one of the 8 affected areas, a software engineer earning \$90,000 cannot qualify for homeownership, but does qualify for housing subsidies.
- Employers such as Sun Microsystems have cited the lack of housing as a reason for putting expansion plans on hold and invoking hiring freezes.

Developing a Better Toilet Test

Although toilet manufacturers tout the improved flushing action of their newer models, many users of 1.6-gallon toilets complain of poor performance (see *Notebook*, 11/98). NAHB has reported a survey showing that 78% of builders have experienced problems with their toilets. Toilet manufacturers tend to react defensively to such surveys. "When it comes to 1.6-gallon toilets, some people have an attitude problem toward them," says Jim Neumann, manager of manufacturing support at Eljer.

Owners of toilets that flush poorly may wonder whether there are any performance standards for toilets. In fact, toilets sold in the U.S. must meet ASME standard A112.19.6. When the standard was developed, the American Society of Mechanical Engineers was faced with choosing a flushable material for testing toilets in the lab. "Liquid waste removal is a no-brainer," says Dan Bartz, project engineer at Kohler, a leading toilet manufacturer. "The problem is bulk waste removal." For years, toilet testers have been on the lookout for the ideal artificial turd.

Synthetic waste. "We've tried numerous types of artificial stool — some made from sawdust, from polystyrene with binders, from a base of Metamucil," says Peter DeMarco, an engineer at American Standard. "We even tried an artificial stool that was used by NASA to test their spacecraft extraction devices — it was some kind of plastic."

Tom Kenney directs the toilet testing program at NAHB Research Center. "Some manufacturers have tried oatmeal," says Kenney. "We've tried filled condoms. But they were not appropriate, because they're very slippery. They go down too easily."

David Shin is an engineer at Toto USA, a toilet manufacturer with headquarters in Japan. "We use a simulated human waste made from miso," says Shin. Miso is a soybean paste that resembles mud. "We adjust the miso so that it has the same density and viscosity as human waste."

Plastic balls. After considering a variety of test media, ASME settled on the present testing proto-

col, which requires toilets to be able to flush a hundred 3/4-inch polypropylene balls, along with 2,500 very small polyethylene granules. Critics allege that the test does not reflect actual field use. "Almost every toilet passes the ASME test," says Al Dietemann, who oversees the water conservation program at Seattle Public Utilities. "It is not a definitive test. The store shelves are still full of toilets that don't meet the expectations of consumers or builders."

For one thing, the existing ASME testing protocol does not address the skid-mark problem. "Skid marks are not an issue," claims Jim Neuman from Eljer. "The ASME test is not supposed to be a performance test for toilets. It's a minimum requirement to protect the health and safety of the public." Peter DeMarco at American Standard admits that when the first generation of 1.6-gallon toilets was introduced, there was a noticeable increase in skid-mark complaints. "When we went to 1.6-gallon models, we had a smaller water spot. We have increased the size of the water spot, and that has definitely reduced the level of skid-mark complaints."

Other critics note that because the media used in the existing ASME test — plastic balls and granules — both float, they are unrealistic. "For any media, you need two types, what we call sinkers and floaters," says Tom Kenney from NAHB. In response to critics proposing a more realistic flushing test, ASME has formed a working group to reconsider the issue. But devising a toilet test is no simple task. "Trying to quantify the flush of a toilet is very difficult," says Peter DeMarco. "Flushing is a chaotic event."

The ASME working group is now considering the use of a so-called "mixed media" test, using sponges and kraft paper instead of plastic balls. "I personally feel that the paper and sponge test is a good one," says Eljer's Jim Neumann. Tom Kenney is using the new test in NAHB's lab. "We use two types of synthetic sponges plus paper. For sinkers, we are using sponges ballasted with metal."

NAHB's testing is ongoing, but they have



There ain't nothin' like the real thing. The "media" used to test toilet flushing in the existing ASME test are 3/4-inch white polypropylene balls and small black polyethylene granules. In response to criticism that the test is unrealistic, a committee is now looking into a new test using sponges and kraft paper.

already posted some preliminary conclusions on their website (www.nahbrc.org). "The data show that a [toilet] rating can be made, and that our protocol [using sponges and paper] differentiates performance in a more robust way than the current [ASME] standard." Unfortunately, NAHB is not identifying the brand names of the toilets that work best, but they do note that "price is not an indicator of performance."

There appears to be a growing consensus that the existing ASME standard A112.19.6 is inadequate, but no one can predict when and if it will be changed. "The current testing agencies have been slow to react," says Al Dietemann. "Trying to pry testing results out of manufacturers is almost impossible. It is very difficult for a consumer or a small builder to come up with information. The industry is saying, 'Let's take this slow and sure, even if it takes five years to develop.' But if the industry is slow in stepping forward, then maybe the utilities should specify performance standards for the toilets we offer incentives on."