among all of the species. And all of the vole species had roughly the same concentrations of the oxytocin hormone itself.

"This is evidence that oxytocin receptors may be very important for the social, 'affiliative' behaviors that make animals receptive to social attachments," Insel concludes. However, he adds, researchers have not yet determined the exact functions of the brain regions he and Shapiro studied, although the areas are thought to play a role in reproduction.

Insel says a team of Swedish researchers recently reported that human forebrains bear a large concentration of oxytocin receptors. "The question now is whether the level of that receptor changes over time," he asserts. "Is it different before than after puberty? Does it vary in women at different times of the month?" He and Shapiro next plan to measure oxytocin receptor concentrations in the autopsied brains of autistic individuals to see if lower amounts might explain the social isolation of autism.

Cort Pedersen, a behavioral neuroscientist at the University of North Carolina in Chapel Hill, says the new study is "very convincing" that oxytocin receptors shape sexual and parental behavior in rodents. He adds that the autism link "is an interesting and potentially clinically relevant idea." *– C. Ezzell*

From seaweed, a lighter-than-air solid

James Stoots/LLNL

Floating on soap bubbles overflowing from a jar, this airy, white solid represents the latest in featherweight materials. But made in its densest form, SEAgel (Safe Emulsion Agar gel) can support thousands of times its own weight. And it's even edible.

Produced from a natural material – seaweed – with a simpler technology than the light-as-air aerogels (SN: 5/5/90, p.287), SEAgel is 10 percent lighter than either air or aerogels. Only the air trapped in its microscopic pores keeps it on the ground, says Robert L. Morrison, a physical chemist who helped develop SEAgel at the Lawrence Livermore (Calif.) National Laboratory.

Morrison starts with agarose, a commercially available product extracted from kelp for use as a thickener in foods. He dissolves and emulsifies the agarose, then cools the emulsion to make a gel. He freezes and then freeze-dries the gel to make SEAgel's final gossamer form. He varies the density by varying the initial amount of agarose in his solution.

"The strength increases as the density goes up," Morrison says. Because this solid foam insulates well, he thinks it could replace balsa wood as a sound barrier in aircraft or high-speed rail cars. It may also prove useful as an inexpensive insulation for refrigerators or oil tankers.

Agarose's low cost and SEAgel's simple processing make this an attractive new material, Morrison says. And because SEAgel is biodegradable, it could prove a better packing material than plastic chips, he says. Others have suggested using the product as a time-release packaging for medication, insecticide or even fertilizer.

Bees use chemical password to show kinship

Wouldn't life be simpler if, just by dabbing on the right cologne, you could guarantee that your colleagues would welcome you into a new office?

Such may be the case for honeybees introduced to a new hive.

Entomologists studying communication in bees have discovered that a newcomer's acceptance or rejection – and possibly death – appears to hinge on a single chemical signal that overrides a multitude of other odors emitted by bees or present in a hive. That chemical password may differ from hive to hive but seems consistent within a colony, says Michael D. Breed of the University of Colorado at Boulder.

Worker honeybees distinguish themselves in the animal kingdom by their extreme devotion to their colony. But this social system requires that they have some way to tell kin from unrelated interlopers.

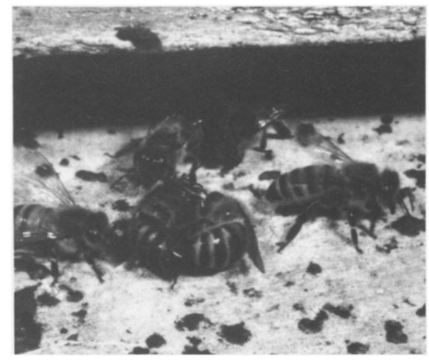
For the past several years, Breed has investigated whether honeybees recognize their hivemates by a common "hive odor" that young bees learn and use as a cue for the rest of their lives. He separated various components of beeswax from the hive's honeycomb, then tested them to see which chemicals affected honeybee recognition. He could not isolate the exact compounds, but he did find that two chemicals – hexadecane and methyl docosonoate – were very similar to the ones in beeswax that honeybees seemed to depend on for communication.

Breed and Glennis E. Julian, then an undergraduate student from Pomona College in Claremont, Calif., went on to test the two chemical cues together and separately on bees removed from a single hive and raised in groups of 10. For five days, the researchers exposed each group to one, both or no chemicals. Then they placed a bee from one group with a different group and monitored the group's reaction to the newcomer.

"The most important finding is that the two chemicals are not equal in the way that they are being used," says Breed. In the June 25 NATURE, he and Julian report that bees treated with a single chemical bit and stung newcomers that happened to smell of the other chemical. This indicates that either chemical, presented by itself, could elicit acceptance or rejection.

Bees treated with both chemicals shunned newcomers wearing only the methyl docosonoate scent. But newcomers smelling only of hexadecane gained acceptance, even though group members were expecting the mixture. "If the bee had hexadecane, the bee would not be attacked," says Breed.

These results imply that bees seek to simplify their chemical conversations, Breed says. To make sense of the chemical chatter that exists in a hive, they follow innate rules that let them cue in on one password over other odors, he explains.



James Hanken/Univ. of Colorado-Boulder

Bees attack a newcomer (center) lacking the correct chemical cue.

"For the first time, we're actually beginning to dissect the [honeybee's] decision-making process and the cue structure," comments Robert E. Page Jr., an entomologist at the University of California, Davis.

"But just looking at the structure of the compound, we cannot perceive what these rules are," Breed notes.

Even without knowing the rules, beekeepers may be able to use the new findings. Often, apiarists must replace a queen. By treating the new queen and exposing the colony to the same chemical password, they could let bees in the hive know what to expect, making them more receptive to the queen, Breed suggests. *– E. Pennisi*