From its diminutive lavender flowers to its straggly windblown stalks, there is nothing about the beach weed known as the Great Lakes sea rocket to suggest that it might be any sort of a botanical wonder. Yet scientists have found evidence that the sea rocket is able to do something that no other plant has ever been shown to do.

The sea rocket, researchers report, can distinguish between plants that are related to it and those that are not. And not only does this plant recognize its kin, but it also gives them preferential treatment.

If the sea rocket detects unrelated plants growing in the ground with it, the plant aggressively sprouts nutrient-grabbing roots. But if it detects family, it politely restrains itself.

The finding is a surprise, even a bit of a shock, in part because most animals have not even been shown to have the ability to recognize relatives, despite the huge advantages in doing so.

If an individual can identify kin, it can help them, an evolutionarily sensible act because relatives share some genes. The same discriminating organism could likewise ramp up nasty behavior against unrelated individuals with which it is most sensible to be in claws- or perhaps thorns-bared competition.

“I’m just amazed at what we’ve found,” said Susan A. Dudley, an evolutionary plant ecologist at McMaster University in Hamilton, Ontario, who carried out the study with a graduate student, Amanda L. File.

“Plants,” Dr. Dudley said, “have a secret social life.”
Since the research on sea rockets was published in August in Biology Letters, a journal of the United Kingdom's national academy of science, Dr. Dudley and colleagues have found evidence that three other plant species can also recognize relatives.

A dodder after it attacked a tomato plant.

The studies are part of an emerging picture of life among plants, one in which these organisms, long viewed as so much immobile, passive greenery, can be seen to sense all sorts of things about the plants around them and use that information to interact with them.

Plants' social life may have remained mysterious for so long because, as researchers have seen in studies of species like sagebrush, strawberries and thorn apples, the ways plants sense can be quite different from the ways in which animals do.

Some plants, for example, have been shown to sense potentially competing neighboring plants by subtle changes in light. That is because plants absorb and reflect particular wavelengths of sunlight, creating signature shifts that other plants can detect.

Scientists also find plants exhibiting ways to gather information on other plants from chemicals released into the soil and air. A parasitic weed, dodder, has been found to be particularly keen at sensing such chemicals.

Dodder is unable to grow its own roots or make its own sugars using photosynthesis, the process used by nearly all other plants. As a result, scientists knew that after sprouting from seed, the
plant would fairly quickly need to begin growing on and into another plant to extract the nutrients needed to survive.

But even the scientists studying the plant were surprised at the speed and precision with which a dodder seedling could sense and hunt its victim. In time-lapse movies, scientists saw dodder sprouts moving in a circular fashion, in what they discovered was a sampling of the airborne chemicals released by nearby plants, a bit like a dog sniffing the air around a dinner buffet.

Then, using just the hint of the smells and without having touched another plant, the dodder grew toward its preferred victim. That is, the dodder reliably sensed and attacked the species of plant, from among the choices nearby, on which it would grow best.

“When you see the movies, you very much have this impression of it being like behavior, animal behavior,” said Dr. Consuelo M. De Moraes, a chemical ecologist at Pennsylvania State University who was on the team studying the plant. “It’s like a little worm moving toward this other plant.”

The California dodder senses airborne chemicals of its victims.

Although a view of plants as sensing organisms is beginning to emerge, scientists have been finding hints of such capabilities and interactions for 20 years. But discoveries have continued to surprise scientists, because of what some describe as an entrenched disbelief that plants, without benefit of eyes, ears, nose, mouth or brain, can and do all they are seen to do.

“A lot of the examples of plant behavior are examples in which the phenomena are pretty easy to observe,” said Dr. Richard Karban, a plant ecologist at the University of California, Davis.

The problem, for many scientists, is that as obvious as the behaviors sometimes are, they can seem just too complex and animal-like for a plant. “Maybe if we understood more mechanistically how it’s happening,” Dr. Karban added, “we’d feel more comfortable about accepting the results that we’re finding.”
It does not help credibility that scientists in the field often find themselves having to distinguish the results of careful experimental studies from decidedly nonscientific, even kook-fringe, discussions about phenomena like plant sentience and emotion.

Plants are not “sensitive new age guys who cringe when something around them gets hurt and who love classical music and hate rock,” Dr. Dudley said as she referred to depictions in popular works of plants living tender, emotion-soaked existences, in particular the 1970s “The Secret Life of Plants.”

Even mainstream researchers do not always completely agree on which ideas are clearly within the realm of science and which have gone a bit too far.

Recent debates have revolved around a longstanding question: which of the abilities and attributes that scientists have long considered the realm of just animals, like sensing, learning and memory, can sensibly be transferred to plants?

At the extreme of the equality movement, but still within mainstream science, are the members of the Society of Plant Neurobiology, a new group whose Web site describes it as broadly concerned with plant sensing.
The very name of the society is enough to upset many biologists. Neurobiology is the study of nervous systems — nerves, synapses and brains — that are known just in animals. That fact, for most scientists, makes the notion of plant neurobiology a combination of impossible, misleading and infuriating.

Thirty-six authors from universities that included Yale and Oxford were exasperated enough to publish an article last year, “Plant Neurobiology: No Brain, No Gain?” in the journal Trends in Plant Science. The scientists chide the new society for discussing possibilities like plant neurons and synapses, urging that the researchers abandon such “superficial analogies and questionable extrapolations.”

Defenders point out that 100 years ago, some scientists were equally adamant that plant physiology did not exist. Today, that idea is so obviously antiquated that it could elicit a good chuckle from the many scientists in that field.

As for the “superficial analogies,” the new wave botanists are well aware that plants do not have exact copies of animal nervous systems.

“No one proposes that we literally look for a walnut-shaped little brain in the root or shoot tip,” five authors wrote in defense of the new group. Instead, the researchers say, they are asking that scientists be open to the possibility that plants may have their own system, perhaps analogous to an animal’s nervous system, to transfer information around the body.

“Plants do send electrical signals from one part of the plant to another,” said Dr. Eric D. Brenner, a botanist at the New York Botanical Garden and a member of the Society of Plant Neurobiology.

Although those signals have been known for 100 years, scientists have no idea what plants do with them.

“No one’s asked how all that information is integrated in a plant, partly because we’ve convinced ourselves that it isn’t,” Dr. Brenner said. “People have been intimidated from asking that question.”

The mention of the possibility of plant neurobiology elicits such visceral responses that Dr. Brenner said he had at times worried that it could harm his career.

“I see a lot of people waiting on the sidelines,” he said, “to see how this all pans out.”