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SORTING OUT SEaweEDS: UNH RESEARCHERS DETERMINING WHICH SPECIES OF RED SEaweED ARE NATIVE, WHICH ARE NOT

Durham, N.H. – Sherlock Holmes would have had a difficult time distinguishing between the various species of red seaweed (genus *Porphyra*) found in New England. Although this puzzle is far from “elementary,” using DNA from the plants has helped researchers like Art Mathieson and Chris Neefus come closer to determining which plant is which.

Mathieson and Neefus, both University of New Hampshire research professors of plant biology, along with several UNH graduate students, have welcomed playing the part of scientific sleuths for part of a NH Sea Grant-funded project investigating this topic. There has been recent concern among researchers over whether or not many of the *Porphyra* species found in New England are originally from the region or if they are instead Japanese cultivars, plant varieties propagated for specific traits. This concern stems from the potential of non-native species to utilize the habitat and resources necessary for the survival of native plants.

When researchers realized that distinguishing among the various species was too difficult to do by sight, they turned to more powerful genetic analysis tools to help out.

“There’s a lot more genetic variation in *Porphyra* than people originally understood, there’s more cryptic variability,” Mathieson explains. “There has been difficulty knowing what is the native plant and what is introduced, so we had to apply molecular techniques in addition to traditional taxonomic techniques. A lot of *Porphyra* plants look alike but are extremely diverse genetically.”

DNA sequencing of the species requires being able to compare present-day samples collected throughout the coastal regions of New England with species collected from the region in the past. This enables researchers to determine if new species have begun colonizing the region or if samples from the past were simply misidentified. It is possible that a species considered to be a newcomer to the area has actually been here for quite a long time, Mathieson said.

This research requires going back to historical collections of seaweeds held in herbariums where samples are kept from 200 years ago in some cases, rehydrating the samples, and then doing genetic analyses on a small piece of the old seaweed.

“It’s fascinating to be able to use samples from herbarium collections that are really old and make them have meaning, that’s really interesting,” Mathieson adds.

Once analyses are conducted on both the old and new samples, the genetics can be compared to see if a Japanese cultivar has been introduced recently and is spreading or if it was here hundreds of years ago without scientists knowing it. However, it can be extremely difficult to determine how a species came to be in a particular region.

Mathieson and Neefus explain that one potential method of introducing non-native *Porphyra* is accidental aquaculture release, specifically when the spores of *Porphyra* grow on shellfish and the host organisms are subsequently relocated. Transportation via boat traffic is another potential method, where the species may have hitched a ride in the hulls of ships moving from port to port. In addition, the introduction could have come from the nori industry that has tried to raise certain *Porphyra* cultivars off the coast of Maine and along Long Island Sound.

Future research will include trying to determine the geographic distribution of the various red seaweed species along the New England coast and sorting out the pieces of the genetic puzzle.

"It's a can of worms in terms of finding out the right names of the species and when they were introduced to a region, and then determining the potential effects they could have on native species," Mathieson says. "There's a lot of detective work that goes on."