Hundreds of glass vials with rubber stoppers sit in boxes on Norman I. Platnick's desk at the American Museum of Natural History, stacked like atoms in a crystal lattice. Inside the vials, magnified and refracted by the glass and the liquid it contains, are creatures ranging from itsy-bitsy to huge and hairy.

Spiders -- thousands of them, enough to send Miss Muffet into a coma -- are pickling in alcohol, awaiting Dr. Platnick's perusal.

Most are specimens collected from his own fieldwork, but many have been sent from various institutions around the world. Amid the mass of vials stand a light microscope and a computer -- the basic equipment he needs to conduct his research: finding new spiders.

Not simply new species, but new genuses and families, grouped by their similarities and evolutionary histories. All spiders are united by their order, Araneae, classified by their ability to produce silk. And all Araneae fall into the larger class Arachnida, eight-legged creatures, which in turn belong to the phylum that contains all arthropods, or invertebrates with exoskeletons and segmented bodies.

Within this web of Latin, the 53-year-old Dr. Platnick navigates without getting stuck, weaving new threads to connect the species he encounters with the species he knows.

His logic is simple: find characteristics of spiders' shapes that independently select the same exact group of organisms. "There are about 1.75 million species on this planet," Dr. Platnick explained. "Select from these all the organisms with abdominal spinnerets to produce silk -- about 38,000 species. Repeat this process and select all organisms with modified male pedipalps for copulation. You end up with the same 38,000."

This congruence of characteristics unites spiders uniquely from all others, he said. Apply the concept with higher degrees of specificity, and species' characteristics emerge.

"You start with the null hypothesis that they are all the same. It doesn't take long to see that they are not," he said.
"Then you divide them into groups of specimens more closely related to each other."

As he explained the process, Dr. Platnick dug out a paper describing a new species he had identified in Australia. "The differences here are in the male sex organs, or their pedipalps," he explained. Carefully drawn in profile, one pedipalp had subtly different arrangements of sub-millimeter-sized bulbous growths.

These minuscule differences have put Dr. Platnick and his museum at the center of research on spiders, termed arachnology. With the museum already housing tens of thousands of arachnids in by far the largest collection of spiders in the world, Dr. Platnick seeks to add to the number by cataloging the world's biodiversity of spiders, one at a time. In total, he has discovered more than 1,200 new spider species, several dozen new genera and a couple of new families.

"His contributions to spiders are unmatched," said Quentin Wheeler, the keeper and head of entomology at the Natural History Museum in London. "He is the best arachnologist of his generation, has published more monographs and nomenclatural contributions than anyone, period." Dr. Platnick has written or collaborated on more than 250 scientific papers.

Moreover, his classification efforts have revolutionized the field of taxonomic study. Dr. Platnick is known as one of the greatest thinkers in the field of modern cladistics -- a method of sorting organisms based on the evolutionary features they share, all derived from their closest common ancestor.

His dedication to cladistics in the 1970's helped invalidate the commonly held views that evolutionary patterns could not be known and that classification could be based only on similarities between organisms.

For example, if one were to go solely by similarity, one might think the manatee's closest relative was another marine mammal. In fact, cladistics shows that features like its toenails and the way it gathers food with its snout make it more closely related to the elephant.

Cladistics now determines how organisms are classified. "This was the most important event in the discipline since Darwin, and I would rank Norman as one of the three or four most important scientists who expanded, refined and explained these ideas to the world," said Dr. Wheeler, who worked with Dr. Platnick in the early 1990's on systematic biology, or the biology behind classification.

Born in 1951 in Bluefield, W.Va., Dr. Platnick started out in rural schools but at age 12, eager to take more classes in biology, enrolled in Concord College in Athens, W.Va. It was there, as a 14-year-old sophomore, that he met Nancy Stewart Price.

"Yeah, she was a normal college student," he said. "It took me two years to get her to take me seriously." As partners in a class on the biology of arthropods, they went to the Appalachian Mountains to collect millipedes. But all he collected was spiders.

"I took one spider and tried to determine what it was," he said. "It took the better part of the day, but I finally figured it out." Dr. Platnick squinted his eyes as he dredged up the memory. "It was in the genus Cicurina. Common name?" He laughed. "Common names are not what we study."

Still, the partnership proved rewarding. He and Ms. Price were married in 1970.

At 16, the young biologist headed to Michigan State to pursue a graduate degree in genetics, but switched to arachnids. After earning his master's degree, he went to Harvard to earn his Ph.D., then, in 1973, to the American Museum of Natural History, where he currently serves as a curator.

In his early years in New York, he read the work of Willi Hennig, the German scientist who developed cladistical theory in the 1950's. Dr. Platnick became hooked, and began categorizing the museum's collection following a cladistical model.

While busy making his mark in the study of spiders, he also advocated that scientists use cladistics to classify all organisms. He debated fiercely with biologist and taxonomists in academic journals and at conferences.
"Throughout the 70's and early 80's, Norman fought a scientific revolution, and won," said Jonathan Coddington, the head curator of arachnology at the Smithsonian Institution. But Dr. Platnick's primary interest is still the evolution of his eight-legged subjects. "I really want to assemble the spider part of the tree of life," he said. "To figure out how these families -- there are 110 identified so far -- are related to each other."

He has traveled to places as far-flung as New Caledonia, Australia, Chile and Argentina to study museum collections, and to sift through dirt and sand to herd specimens into vials for later study. It is no easy task.

"You dig, you search, you become very adept at herding a spider into your vial," he explained. "They are not long-distance runners, but can be blindingly fast at short distances, and to capture them, you have to figure out which direction they will run. It can get pretty comical when you've got to chase them."

Some specimens are immediately drowned in alcohol. Others are scalded in boiling water to bloat their cells. This forces each individual hair on the spider to protrude, making the specimen ideal for imaging with the high magnification of a scanning electron microscope.

In the lab, Dr. Platnick spends hours hunched over his light microscope, turning his specimens around with tweezers, cutting spiders open with a scalpel and taking extensive notes on the minute details of their spinnerets and pedipalps. He then sends the spiders and his notes to his assistant, Dr. Mohammed Shadab, who sketches them and then draws them to scale for publication.

Dr. Platnick is aware that to most people, spiders inspire annoyance at best, fear and revulsion at worst.

To him, they inspire wonder. "I come to work in the morning and look at an animal no one has seen before, and it starts a cascade of new projects," he said, gesturing to his vials stuffed with spider carcasses.

"I need to have multiple lifetimes to conduct all these projects. It's what gets me up in the morning."

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