Parrots, long a favorite pet animal, are attractive to owners because of their vibrant colors. But those colors may mean more to parrots than what meets the human eye. For more than a century, biochemists have known that parrots use an unusual set of pigments to produce their rainbow of plumage colors, but their biochemical identity has remained elusive. Now, an ASU researcher has uncovered the chemistry behind the colors of parrots, describing on a molecular level what is responsible for their bright red feathers. The work casts a new light on what is chemically responsible for the colors of birds, and defies previous assumptions and explanations for color variations in parrots, said Kevin McGraw, an assistant professor in the School of Life Sciences.

Details of the work are in a paper by McGraw and Mary Nagare, a parrot fancier from Snoqualmie, Wash., published in a recent issue of the journal Biology Letters. Animals such as birds and fishes commonly use biochromes like carotenoids to acquire red, orange or yellow coloring, but McGraw and Nagare found that these compounds are not responsible for the red colors found in the parrot species they sampled. The researchers used a chemical analysis technique called high-performance liquid chromatography to survey the pigments present in red parrot feathers. McGraw and Nagare collected and analyzed samples from 44 parrot species that have red feathers. They found a suite of five molecules, called polyenal lipochromes (or poltactofulvins), that color parrot plumage red in all of the species studied. Overall, there are some 350 species of parrots, 80 percent of which have red in their plumage.

“We’ve uncovered a system where all red parrots use the same set of molecules to color themselves,” McGraw said. “It is a unique pigment found nowhere else in the world. We are fascinated at how parrots are able to do this ... The fact that there is a single set of molecules unique to and widespread among parrots, suggests that it is a pretty important evolutionary novelty,” McGraw said.