

Preface to “Strained Molecules”

Chemistry is the truly anthropic science. The molecules we make can heal us, and they can hurt us, because they are on the scale of the molecules that make up our bodies. And our synthetic creations interact, even react with the molecules that nature -- our enzymes, the environment -- put into us.

The molecular science is also anthropic (male and female, of course) because it presents a challenge to human intelligence that is just right, commensurate to our intellect. The exciting story this book develops bears testimony on every page to that anthropic cognitive nature of organic chemistry.

Let me explain. Our remarkable neural system is steered by a complex brain. That brain has prejudices for sure -- it tends to simplify things, falling at every proffered opportunity for beautiful equations, simple mechanisms, Platonic solids and the honeyed simplicities of politicians. But when challenged, we can deal with substantial complexity. Indeed, the brain relishes being stretched -- by rich sensual inputs, by patterns, by puzzles.

Along comes a science, our chemistry. It offers in its molecular structures a game that is at first sight deceptively simple. Take hydrocarbons (most of the molecules in this book are in this category) -- what could be simpler? Two elements, C and H, a transparent rule of intercombination; form four bonds, form one bond, respectively. You know well the realization of these rules and combinatorics -- a chemical universe of incredible diversity.

Not only can these molecules be thought up; they can also be synthesized in a human span -- roughly the time it takes for a graduate student to get a Ph.D. We are not making a ladybug, nor a spiral galaxy -- we are making a paracyclophane. The complexity of the challenge is on the human scale. And so are the possibilities: What can I do to string eight carbons across the *para* positions of a benzene? Can I reduce the bridging carbons to seven? Will I make it easier if the eight carbons are partially in a benzene ring themselves? The questions just flow one after the other; it takes no talent to ask

them, just a normal curious human being, privy to the structural codes of chemistry.

So the game itself, the game of chemical structure, is exciting. Chess pales by comparison. Add to that ludic challenge potential utility, and also the natural human desire to probe limits (just how far can I distort that double bond out of its planar normalcy?), and you have all the makings of intense interaction, part intellectual, part emotional, between a human being and an object of his or her creation.

The object of our intense contemplation – a compound macroscopically, a molecule microscopically – is complex enough not to be boring, yet not unpredictably chaotic. The strained molecule is just right for some of us to exercise our creativity in thinking up these strange beasts, others in coming up with ingenious ways of making them (for molecules are real!), all of us admiring the complexity, simplicity and function all rolled into one.

What fun!

Roald Hoffmann