Response to “Boats & Deckchairs”

Dear Dr. Gould;

When I saw the headline of the article you and your wife wrote in the December-January*Natural History*, as a chemist, one thought came to my mind: cyclohexane. As I read the article, I realized that the connection may be germane.

When learning organic chemistry, the structures initially are written as two-dimensional. Only later are three-dimensional representations introduced. Hence, methane (CH4) initially is presented as a Greek cross with carbon in the middle and the four hydrogens attached to it as the directions of the compass, with angles of 90º. Later, one learns the actual three-dimensional structure is different. Mutual repulsion keeps the hydrogens as far away from each other as possible, giving a tetrahedral structure.

Similarly, initially, cyclohexane is written on the board or paper as a perfect hexane. When the third dimension is introduced, we learn that the structure is puckered, with two more-or-less stable confirmations, called the boat and the chair.





The chair structure is somewhat more stable in cyclohexane and therefore is the predominant one existing in nature in the

pure compound. But the substitution of other groups for some of the hydrogens may make a difference in which structure is preferred.

I find it interesting that Duchamp picked these two objects, boat and chair, to represent his thoughts on three- and four-dimensional world, while we chemists associate them with the difference between two- and three-dimensional representations. Is it a coincidence?

Sincerely yours,

Robert Ausubel
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