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How the news that we were not the first to conceive of soccer ball C_{60} got to us

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In this historical note, we describe how we learned of Professor Osawa's original conception of truncated icosahedron C_{60}, which appeared some fifteen years before our first publication. We believe this story gives an interesting insight into the rapidity of present-day communication and the detours that information takes in its travels around the globe. This narrative depends, alas, upon our somewhat dim memories and the somewhat less dim memories of others about what transpired. No one thought to make any notes at the time about what happened, but we think we have got it about right.

We remained completely ignorant of Osawa's contribution until late summer or early fall of 1986. We might have remained ignorant longer, except that Professor William Herndon of the University of Texas at El Paso (UTEP) visited du Pont de Nemours and Company, Experimental Station (Wilmington, Delaware) in February 1986 to deliver a lecture on Nonplanar Benzenoids. While he was there, Dr. Tade Fukunaga of du Pont gave him a copy and English translation of some pages from a book[1] published in 1971 in Japanese discussing soccer ball C_{60}. This book was *Aromaticity* by Yoshida and Osawa. Some time during June or July 1986, Herndon became aware of a paper[2] by Klein et al. from Texas A&M at Galveston, describing a theoretical treatment of resonance in buckminsterfullerene. Either Herndon called Klein to discuss this work, or Klein visited UTEP during a vacation in summer 1986; memories are vague. In any event, Herndon told Klein of the book chapter by Yoshida and Osawa and gave him a copy in Japanese.

UTEP is about as far, some 1,500 kilometers, from Houston, where Rice University is located, as you can get and remain in Texas, but Texas A&M in Galveston is only about 70 kilometers from Rice. During this period, the group at Rice was in constant communication with the group at Galveston about fullerene research and held face-to-face meetings between at least some of the participants every few weeks. However, we don't think we heard about the Osawa work directly from the Galveston group. Perhaps they believed that we already knew of it. Doug Klein sent a letter[3], dated August 13, about this publication together with a photocopy of the pages from the book[1] to Nenad Trinajstic at the Rudjer Boskovic in Zagreb. Trinajstic told one of us (Kroto) about the work and gave him a copy of the pages from *Aromaticity* in Japanese. Kroto then gave a copy of this to O'Brien, who went to Professor Tohru Fukuyama (who was then at Rice) for a translation. It was from this translation that we finally learned of Osawa's original publication.[4]

Thus, the knowledge of Osawa's original conception of C_{60} came to us not through any scholarly search of the literature, but rather through a series of personal contacts that followed a path from Japan to New Jersey to El Paso to Galveston to Zagreb to Brighton to Houston. Our experience is that personal contacts are the most likely route through which scientific information is transmitted. However, it is not so common for the transmittal trajectory to take an unnecessary detour of roughly twelve thousand kilometers!

When we were writing our first paper[5] on C_{60}, why did we not find this prior reference to the subject? Frankly, any search that we did was cursory; I think we believed that the concept was so novel that it had never been put forth previously, a belief that proved to be clearly wrong. Moreover, doing this search did not seem easy to us. At that time, electronic searching of *Chemical Abstracts* was available through a dial-up service (DIALOG; Rice did not subscribe to STN until December 1985), but we were not yet conversant in carrying out such searches. Regardless of how diligently we searched, we would have missed Professor Osawa's paper, as there is nothing suggestive of C_{60} in the abstract[6] of Osawa's

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original paper[4] in the original paper version of *Chemical Abstracts*, as has been described by Slanina.[7] However, *Chemical Abstracts* has recognized the importance of this paper[4] by recently (1998) augmenting the abstract in the electronic version.[8] Even so, today this paper is not found in *Chemical Abstracts* by searching for C_{60}, but it can be found by searching for "soccer ball."

We would like to conclude this note by briefly quoting[9] Professor Osawa. "No scientific discovery seems to be totally new, as has been discussed superbly well by Berson[10] with reference to the discovery of the Diels-Alder reaction and Woodward-Hoffman rule. In the case of C_{60}, the "near misses" by Iijima[11] and the unpublished work by Chapman[12] are more pre-eminent examples of the precedents than those described above."

To this we would add: the really pre-eminent example in the case of C_{60} is the concept of Osawa.

Professor Osawa follows the paragraph quoted above with two paragraphs of such stunning grace and generosity that we blush to reproduce them here. Professor Eiji Osawa has been extremely generous in his comments on our work. It is a great pleasure to recognize the value of his.

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