

A Recent Stamp of Ukraine

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I was born in Złoczów, Poland, now Zolochiv = Золочів, Ukraine. This small town of some 12,000 people in 1937, actually has been in five countries in the last one hundred years: it was Austria-Hungary when my mother was born there, Poland in my time, the *Generalgouvernement* of Germany during World War II, part of the Soviet Union from the end of World War II, and independent Ukraine since 1990. I know that your natural inclination is to think of postal history, but that was not what the people living there, my people, had on their mind –it was survival. Of the four changes in government (and I am not counting occupations of less than two years) only the last was peaceful. For a Jewish child to be born in Złoczów in 1937 was not a good thing.

We survived, at least my mother and I did, not my father. In time we came to the USA, I became a theoretical chemist. And Ukraine decided to issue a stamp in my honor, for my 80th birthday, July 18, 2017. Actually, the suggestion to produce such a stamp was made by Yuri Kovalkov from Ternopil over the preceding years. Once it was approved in 2016, *Ukrposhta*, the Ukrainian Postal Service, was highly professional and responsive in its interactions with me. Antonina Siryk of *Ukrposhta's* Philately Center was my main contact there. On Nov. 24, 2016, they asked me for some photographs and I sent them several possibilities. The first suggestion of a stamp design came in a letter of Jan. 12, 2017, in the following form:



I did not give any design suggestions to *Ukrposhta*. But one of the pictorial elements in the offset design would be familiar to many –the buckminsterfullerene molecule. Less familiar, but in the background, recognizable to chemists at least, are pieces of two chemical structures of one and the same molecule, indigo. This is an ancient dye, derived from a number of species of snails around the world, and from plants of several families. Indigo is the main dye in Tyrian or Royal purple, and also in a biblically sanctioned pigment called *tekhelet*.

As beautiful as buckminsterfullerene, colloquially called fullerene or buckyball, is, I had nothing to do with its discovery, and published only one paper, a minor one, on its chemistry. It seemed clear that the buckyball was chosen for its aesthetic appeal (I never was a good soccer player). Indigo is another story. While I have also not worked on the chemistry of indigo, I have written much about its cultural history, as a molecule straddling craft, religion, science, and history. I give a lecture on indigo.

I told *Ukrposhta* that the indigo structure was fine (somehow they themselves came across the connection with me), but not buckminsterfullerene. To be specific, I gave them the following advice on cosmetics, subject, and text (I speak Russian, and with the help of a friend could make comments in Ukrainian):

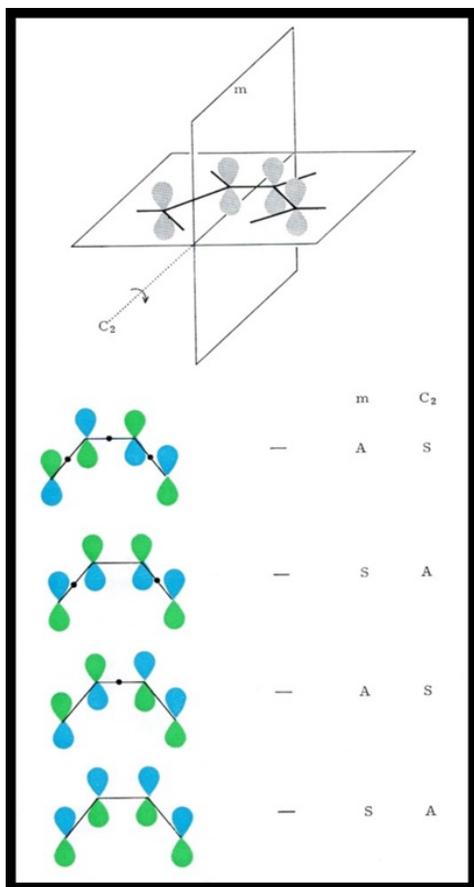
I have two comments on the stamp design and a correction to the text for the sheet. On the stamp design:

1. Blue arrow on attached image. Maybe just a little less hair on that side of my face.

2. Red arrow on image: the graphic element chosen is a ball-shaped molecule, called buckminsterfullerene or a "buckyball". It is certainly beautiful, and I like what the artist has done with it, "reversing" the dark/light in half. But it happens that this molecule is not connected to my work. I send along 7 images that show molecules more connected to me. 1 and 2 (the figure-8 shapes are called "orbitals") are closest to my work, 3-7 less close but still related. It is understood, of course, that the whole graphic cannot be reproduced –these are sent just to give the artist a set of graphic elements to choose from. In 3,5, 6,7 I have looked for roughly spherical molecular structures, which I agree echo graphically the face shape. If the artist were to choose a graphic element from 1 and 2, the orbitals, one color could be rendered in gray, the other in white.

On text for sheet: It needs improvement in several words and phrases. Please use this text:

Основні наукові досягнення Роалда Хофманна стосуються застосування квантової механіки для вивчення механізмів хімічних реакцій. Лауреат Нобелівської премії -«за розробку теорії перебігу хімічних реакцій»



Note from the Editor

This picture depicting the molecular orbitals of butadiene was also shown on page 7 of *"The Conservation of Orbital Symmetry"* by R. B. Woodward and R. Hoffmann (Academic Press, Inc., 1970). In the figure, A = antisymmetric, S = symmetric, m = mirror plane, C₂ = two-fold rotation axis.

Above (right) is my second suggestion, and any organic chemist will recognize it as speaking of my work. These are the molecular orbitals of butadiene, central to a body of work by R. B. Woodward and me, recognized by the Nobel prize to Kenichi Fukui and myself in 1981.

A few days later *Ukrposhta* sent to me a second draft (above right), editing my hair, and substituting two orbitals for the buckyball, based on my suggestion:

The *Ukrposhta* artist gave me my orbitals. But... among the four orbitals supplied by me, he or she chose two, a choice obviously dictated by the space available, and the color by the white plus two colors scheme of the offset process. And of the two orbitals chosen, only the lower one was crucial to the reaction (they are, respectively, the first and the third from bottom in my blue and green image). The dark on light or light on dark constraint was a serious one, and you can see that it dictated the artist's choice of orbitals and their ordering in space. I thought hard about this, tried some mockups (readers will know that the graphic sense of illustrations in my papers matters to me), and decided to go with the artist's suggestion.

I was happy enough to get a molecular orbital, or two, on a stamp. It is, as far as I know, the first philatelic portrayal of this important concept of theory in chemistry. There is a Swedish stamp [1] (found for me by Dan Rabinovich; Scott catalogue No. 1426) which is a superb rendition of an atomic orbital. But not a molecular orbital.



[1]

The careful viewer will see more differences between the final stamp (below) and the two proofs/drafts: The denomination has changed (nothing that was in my hands), and so has the spelling of my family name. On the latter I was consulted, and we had some back and forth. We are dealing here with languages and transliteration conventions. My family name is Hoffmann (that was not my last name at birth, but that is another story). And that presents several problems to a translator into Ukrainian (or Russian). The first, perhaps trivial, is whether to double the f and n in Ukrainian. People have gone in both ways (I wonder if there is an analogue to the Chicago Manual of Style in Ukrainian...). More serious is the first letter of Hoffmann. The point is that there is no H in Ukrainian, but the letter G (Г) is pronounced as an H in Ukrainian (but not in some Russian words). What to do? There is another Cyrillic letter X, which is usually transliterated as Kh, but sometimes is voiced and transliterated close to European H. We opted for that.



Two more points on the agonies of transliteration: (1) ethnic Germans or Jews in Russia named Ho(f)man(n) often wind up as ГОФМАН in Cyrillic. And that name would be transliterated into Latin script as Gofman. (2) If you think Hoffmann gives people trouble, think about what one might do with Hughes.

All in all, this was a really good interaction between a person portrayed on a stamp and the philatelic design agency of the state involved. Am I a Polish, or a Ukrainian, or a Jewish, or an American chemist? All of these.

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