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The Mystery of the Disappearing Isotope

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Like Agata Christie´s murder mysteries, nuclear sciences can have their detective episodes too. Recently Argentina participated in one of these. In this genre´s best style, this case has been satisfactorily resolved.

A fortunate historical circumstance happened in our country in the 1950's. On the one hand the recently formed CNEA[1] (the Argentine AEC) counted with a cyclotron capable of producing unknown, until then, isotopes. On the other hand the head of the radiochemistry group, a bunch of mostly young sorcerer apprentices, was Prof. W. Seelmann-Eggebert,[2] a well known German radiochemist and an excellent teacher. The result of these coincidences was that Argentina at that time got a name as an isotope discovering country. The story has been sufficiently related elsewhere,[3-6] for not going into further details. All of us, then young sorcerers, Rey, Baró,[7] Radicella[8] and this narrator[9] are or were witnesses of the primitive radiochemical group.

In retrospect it must be confessed that isotope hunting was rather a lukewarm occupation amongst us, a sort of training for bigger things, like measuring nuclear properties with the physicists of the CNEA or preparing compounds for the incipient nuclear medicine of the day. We had no idea at all that a new isotope could have historical significance some day. However, there was a clear spirit of competition with other countries in the sense that, "look, we also can do it". Internally, the situation was quite non-competitive regarding publication rights; if there were several authors, their names used to rotate if the paper was published more than once. Even Seelmann´s name once appeared in a publication with one of the female helpers who cleaned the lab material as a co-author. Assignments were on the same line: "hey, it´s your turn now. What do you think of this or that isotope which has a blank in the table of isotopes?" The scope for this was thinning rather fast as the empty holes in Seelmann´s embryonic isotope chart[10,11] were being filled up.

On exploring the web recently I was greatly surprised to find two researchers, M. Thoennessen[12] and J. W. Arblaster,[13] taking the trouble to find out all about the discoveries of those blessed isotopes, the who, the when and the where. Both of them base their data on publications in refereed scientific papers, sometimes also on international conferences. Their selection criteria are similar, although not identical. Arblaster is a chemist, now retired, who has published much about the noble metal´s histories and properties in Platinum Metals Review. For him it is more like a hobby of completing all data on ruthenium, rhodium, palladium, osmium, iridium and platinum. Thoennessen is an active professor who,

since 2012 and with a large group of collaborators, is publishing complete lists[14] of discoveries. The isotopes discoveries story now seems to have become an obstacles race, an international marathon. Argentina came out well in these lists: with 12 isotopes, it occupies position number 15 among the first 25 discoverer countries, after Denmark and before Italy. Also on the authors list Argentina did well. Among a restricted list of authors, 3 names are mentioned belonging to the original Argentine radiochemistry group.

In Radicella´s own list[5] twenty isotopes were mentioned, of which of course not all have been internationally accepted. For example, a qualification of "less than so and so many minutes" does not count as a discovery. A wrong mass number assignment means a disqualified isotope; isomers are considered under special rules, etc. That twelve of our findings had survived international scrutiny for so many years is a miracle by itself. I was very happy with the result until I noticed that one of our jewels in the crown was conspicuously missing: namely the osmium isotope Os-195, discovered in 1957 by P. Rey and G. B. Baró.[15,16] Simply, it had disappeared altogether.

I had no doubts about the correctness of this work. The mass number was undisputable. The half-life of 6.5 min had been measured by beta decay and by interval separations. It´s decay into the daughter product, Ir-195, had been measured and gave the correct nuclear constants known at that time. The chemical process, knowing my colleagues, would have been first-class too. But I knew this only from my card-file because I couldn´t find the original publication among my collection of old papers. What to do now? The first thing was to contact both authors of those famous discovery lists and I was lucky in finding them on the web. Both were kind and helpfully assisted me in getting the papers which I, as a simple pensioner, couldn´t lay my hands on. And both were wrong, each in their own way. In the meantime I found my own musty copy of the original Rey and Baró's[15] paper which settled the controversy for good.

The error's origin

In a lab report (progress report) of 1974, an incorrect and absurd deduction was made assigning one isotope to another (that Ir-195 was really Rb-81) quoting another correct publication. With this statement the report put into doubt the origin of the whole isotopic chain, which was Os-195. This report and its publication were recognized by the international data base called NUBASE without verifying its correctness. In this way Os-195's place was suspended until it could be verified independently. For more than 50 years nobody thought of repeating the simple 1957 Rey/Baró experiment. The reason may be that it was taken for granted that Os-195 was already confirmed. The lists of Arblaster and Thoennessen are based on NUBASE's official rules, which are supposedly safe. And so, up till now, Os-195 disappeared from all official lists.

Happy ending

Both authors will be making the pertinent corrections in their lists as well as advise NUBASE. Presumably the question will be settled before the end of the year. Argentina will then be listed with thirteen internationally recognized isotopes instead of the current dozen.[17,18]

Conclusions

Is everybody happy? The result is positive, yes, but this case has left me with many unresolved questions. In the first place, as usual, whatever is published in English has a greater weight than a paper in Spanish. A simple lab information should have been handled much more carefully in view of the full publication by Rey and Baró. What worries me most is how many cases of this type have we overlooked? So much time has passed since some discoveries that not many authors are able to present their claims. And finally, what is the long-term effect of publishing those lists? If our radiochemistry group had known at the time they would be coming some day, would its collaboration spirit still have persisted?

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