



mon ancestor had a very high intron density. Most of those original introns were lost as the eukaryotes evolved, although vast differences in rates of intron loss were experienced by the different lineages. It has been calculated that, on average, a fraction of only 10 to 40% of the ancestral introns remains at present time. But intron loss is only a part of the story. As inferred and/or observed from novel intron positions at many nodes, certain lineages must also have experienced a substantial gain of introns in the recent past. It has been estimated that the number of introns gained per genome in the last million ( $10^6$ ) years would be about 6.1 in the lineage of *Drosophila melanogaster*, between 7.6 and 22.9 in *Arabidopsis thaliana*, 7.5 in rice and 6.6 in Ascomycete fungi.

### And what about new introns?

The mechanisms by which novel intron positions originate have been a matter of controversy. It was assumed that new introns had to originate by transposition or tandem duplication or any of the other known general mechanisms by which new DNA fragments are generated within a genome. Any of these mechanisms implies that new introns originate as copies of pre-existing ones and that certain homology should then be traceable among them. However, up to now, genome scans carried out in different organisms have been unable to detect a single case of homologous introns in non-homologous genes. Then, where have new introns come from? This question has been puzzling the researchers over the last years.

In their new paper (*PNAS* 105: 7223-8), Tarrío, Ayala and Rodríguez-Trelles devise a solution to the enigma. Their model, inspired on recent advances in the understanding of pre-mRNA processing, proposes that new introns originate by sliding processes generated by alternative splicing. We now know that alternative splicing is a frequent and ubiquitous process, reported in animals, fungi, plants and some protists. The process of alternative splicing, by which exons of primary transcripts are spliced in different patterns, increases the coding capacity of genomes. Splice sites are short and imprecise, and potential new splice sites could be easily generated almost everywhere in a genome by point mutations. *Cis*- and *trans*-acting elements modulate the strength of alternative splice sites. New weak splicing sites may produce minor isoforms with only mild effects on fitness since the remaining

major fraction of transcripts would uphold the gene's function. As the authors state, "Intron slicing events are not expected to occur instantaneously. After the emergence of a novel donor/acceptor splice site, millions of years might be necessary until the fixation of the mutation(s), as well as the occurrence of changes in splicing code allow for the replacement of pre-existing major isoforms. At the process completion, little may be left of the original intron sequence." This would explain why it is so hard to find any trace of homology among putative, newly-generated introns.

### Allergenic reactions

Rodríguez-Trelles returned to Spain after his postdoc. Though the Ministry of Science recognised his merits and gave him enough financial support for his research, he did not feel welcome at his department in the University. "I returned to Spain with a Ramón y Cajal (RyC) contract for personal reasons," says Francisco. "Yet I could not have imagined how much of an allergenic reaction my background as researcher from abroad was going to elicit at the University of Santiago de Compostela. Academ-



How do new intron elements insert into the chain?

ic departments do not recognise researchers coming from outside the institution as 'theirs', which triggers an allergenic reaction resulting in the 'de facto' exclusion of newcomers from the plans of the university. I experienced lack of independent lab space, threats to professional status and isolation." Economic efforts by the central

government to circumvent these situations are often fruitless. Still, many universities gave in to pressures from the departments to keep control over access to the system, thus detracting from the essence of the RyC programme.

### Leaving this "scientists' grinder"

In Santiago, even Rodríguez-Trelles fell victim to University abuse. "I kept a record, documenting some of the abuses I faced during my kafkian journey as a RyC in the University of Santiago de Compostela. My paper in *Evolution* (vol. 57: 839) provides a good illustration of a *modus operandi*. The issue started shortly after my return to Santiago, when, in that month's issue of *Evolution*, I discovered an article by my former PhD supervisors. The article, which had been prepared and submitted to the journal without my knowledge, included altered data from my doctoral thesis and my name as a co-author. After checking outside opinions, I felt deeply embarrassed. Eventually, I followed the 'Business Conduct Principles Reference Guide' I was given when I arrived as a postdoc in the University of California, and requested clarification by the Chancellor of the USC. I remember, I was quite optimistic, thinking that my request could prompt the creation of an academic deontological code for the university. But the academic authorities responded that the issue was not the university's business. So I wrote to the Editor of *Evolution*, who took my allegation of scientific misconduct seriously and started an investigation, which included interviews with the respondents, who were given the opportunity to refute my allegation, and a rigorous investigation of the documentary evidence. The investigation found my allegation to be true. The published article was redressed but the matter did not finish there. When I applied for a permanent position at the Department of Genetics, the two professors found guilty of academic misconduct were designated Chair and Secretary of the examination board. I beseeched the Chancellor to require them to recuse themselves from the board. But the Chancellor declined my plea, based on the sole ground that the two professors declared no conflict of interests."

No wonder his return to Spain has become a highly frustrating experience for Rodríguez-Trelles and why, after six years, he is resolved to pack his bags again and leave the country: "I have had enough. Now, I have decided to leave this scientists' grinder."

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