International Journal of Humanities Social Sciences and Education (IJHSSE)
Volume 11, Issue 4, April 2024, PP 32-46
ISSN 2349-0373 (Print) & ISSN 2349-0381 (Online)
https://doi.org/10.20431/2349-0381.1104003
www.arcjournals.org

Guidance for Young Scientists from Autobiographical Scientometrics

José de la Fuente

SaBio, Instituto de Investigación en Recursos Cinegéticos (IREC), Consejo Superior de Investigaciones Científicas (CSIC), Universidad de Castilla-La Mancha (UCLM)-Junta de Comunidades de Castilla-La Mancha (JCCM), Ronda de Toledo 12, 13005 Ciudad Real, Spain. Center for Veterinary Health Sciences (CVHS), Department of Veterinary Pathobiology, Oklahoma State University (OSU), Stillwater, OK 74078, USA.

Corresponding Author:** ***José de la Fuente *, SaBio. Instituto de Investigación en Recursos Cinegéticos IREC-CSIC-UCLM-JCCM, Ronda de Toledo 12, 13005 Ciudad Real, España; orcid.org/0000-0001-7383-9649*

Abstract: *Autobiographical scientometrics studies of established scientists are rare but may contribute to guidance for young researchers. This study covered my 40-years career in Life Sciences and Biomedicine by focusing on bibliometric analysis of scientific publications and other papers and patents. Data included 811 papers published in international journals and book chapters and 6 books edited. Total citations for these publications are 44923 with author's 98 H-index and 521 i10-index according to the Google scholar profile. Correlation was not found between citations and the number of publications per research area, journal H-index or journal impact factor (IF). Data included 36 patents in the areas of pharmaceutical, transgenesis, vaccine, formulation, probiotic and diagnostic. Three of these patents resulted in products registered and commercialized. Students are highlighted as key components of research with 36 Ph.D. thesis supervised and 6 thesis under supervision. Lessons from this study contributing to guidance for young scientists include that quality of research is the priority together with productivity but considering what, when and where to publish not only based on journal IF, H-index and quartile (Q).Inter- and multi-disciplinary international collaborations in research and co-authorship in review and method papers contribute to research quality and to advance in scientific career. Projects leading to patent applications and products improve scientific and social impact of research. Additionally, communication of results in social media is important to promote research and scientific career, and exploration of other areas such as humanities, art and music contributes to inspiration and imaginative research approaches.*

Keywords: *autobiography; research evaluation; citation; bibliometrics; research evaluations*

1. Introduction

Scientometrics focuses on the quantitative analysis of scientific activities including publications, patents and communication. Garfield's journal impact factor (IF) was implemented by the Institute for Scientific Information (Thomson-ISI) as an important bibliometric indicator of scientific quality [1]. Citations play a key role in IF and quartile of journal citation reports (Q1-Q4).Although differences may exist, a positive correlation between Elsevier's Scopus CiteScore and IF has been reported [2].

The increase in open access publications is associated with a better dissemination of results, an increase in citations and academic, economic and societal impacts together with growing article processing charges (APCs) [3-5]. For example, publication pattern and scientific excellence of top-ranked scientists in biological, medical and agricultural sciences include papers published in open access journals from Elsevier, Springer, MDPI and Wiley-Blackwell (Sasvári et al., 2023). Recently established preprint platforms such as ArXiv (https://arxiv.org), Research Square (https://www.researchsquare.com) and medRxiv (https://www.medrxiv.org) among other also contribute to article visibility and dissemination.

Biographical and autobiographical papers are rare in scientific journals with highest number in Life Sciences and Biomedicine [6]. Nevertheless, these articles not only serve to highlight scientific careers, but also to provide insights on failure and success to learn from them.

Accordingly, the objective of this study is an autobiographical scientometric analysis of my 40-years career in Life Sciences and Biomedicine to provide information on assets and liabilities that may guide young scientists to get ahead in science.

2. DATA COLLECTION AND ANALYSIS

The scientometric analysis was based on author's 40 years career summarized in the biographical sketch updated on October5, 2023. Data was obtained from CV and bibliometric data collected from OpenAlex (https://openalex.org), CrossRef (https://www.crossref.org), Google scholar profile (http://scholar.google.com/citations?user=Cu4qOlgAAAAJ&hl), Research Gate profile (https://www.researchgate.net/profile/Jose_De_la_Fuente/?ev=hdr_xprf), ORCID ID (orcid.org/0000-0001-7383-9649), and Research.com second edition ranking of the best researchers in the field of Animal Science and Veterinary (https://research.com/scientists-rankings/animal-science-and-veterinary).

Journal H-indexand IF were obtained from Scimago Journal Rank (SJR) (https://www.scimagojr.com) and Clarivate Journal Citation Reports (https://jcr.clarivate.com), respectively. Word Clouds for topics (based on publications title words) and authors (based on publications authorship) were constructed using nubedepalabras.es and based on word counts with more than 10 entries determined with the data Basic.io Word Counter (https://www.databasic.io/en_GB/wordcounter/).

2.1. Biographical Sketch

Name: José de la Fuente. Position title: Professor, Health and Biotechnology (SaBio), Instituto de Investigación en Recursos Cinegéticos (IREC), Consejo Superior de Investigaciones Científicas (CSIC), Universidad de Castilla-La Mancha (UCLM)-Junta de Comunidades de Castilla-La Mancha (JCCM), Spain. Adjunct Professor, Center for Veterinary Health Sciences (CVHS), Department of Veterinary Pathobiology, Oklahoma State University (OSU), Stillwater, OK.

Education/Training: Faculty of Physics, Moscow State University, Russia and University of Havana, Cuba, Physicist, Solid-state physics, 1979-1984. Center for Biological Research and University of Havana, Cuba, Ph.D. in Biology, Genetic engineering, biotechnology and molecular biology, 1994.

Positions and employment:

1984 - 1986	Center for Biological Research (Centro de Investigaciones Biológicas, CIB). Havana, Cuba.
1986 - 1987	Institute for Molecular Biology I. ETH. Zurich University. Honggerberg 8093. Switzerland. Research assistant with Prof. Charles Weissmann.
1987 - 1991	Center for Genetic Engineering and Biotechnology (Centro de Ingeniería Genética y Biotecnología, CIGB). P.O.Box 6162. Havana 6, Cuba. Senior Scientist. Head of the Mammalian Cell Genetics Division.
1991 - 1992	Institute for Molecular and Cellular Biology. Division of Molecular Biology. Osaka University. 1-3 Yamadaoka, Suita-shi, Osaka 565, Japan. Matsumae International Foundation fellowship recipient with Prof. Tadatsugu Taniguchi.
1992 - 1999	Center for Genetic Engineering and Biotechnology. P.O.Box 6162. Havana 6, Cuba. Director for Research & Development (1992-1998).
2000 – 2008	Research Professor. Department of Veterinary Pathobiology, Center for Veterinary Health Sciences, Oklahoma State University. Stillwater, OK 74078-2007, U.S.A.
2002 – 2008	Visiting Professor. Instituto de Investigación en Recursos Cinegéticos IREC (CSIC-UCLM-JCCM), Ronda de Toledo s/n, 13005 Ciudad Real, Spain.
2008 – present	Professor. SaBio. Instituto de Investigación en Recursos Cinegéticos IREC (CSIC-UCLM-JCCM), Ronda de Toledo 12, 13005 Ciudad Real, Spain. Vicedirector IREC (2019-2023).
2008 - present	Adjunct Professor. Department of Veterinary Pathobiology. Center for Veterinary Health Sciences. Oklahoma State University. Stillwater, OK 74078-2007, U.S.A.

Current research interests and areas of expertise: Infectious diseases. Molecular biology of host-vector-pathogen interactions, gene regulation, pathogenesis, functional genomics, evolution and immunology. Systems biology. Ticks and tick-borne diseases. Intracellular bacteria (*Rickettsia, Anaplasma, Mycobacterium*). Alpha-Gal syndrome. Vaccinology. Biotechnology. Biomedicne.

Service: Serve as committee chair and member for several Master and Ph.D. students. Associate Editor for Ticks and Tick-Borne Diseases (2009-present) and Section Editor for Annals of Medicine (2020-present). Member of the Editorial Board for Experimental and Applied Acarology (2005), Biomolecules (2019), Vaccines (2019), Pathogens (2020) and. Serve as external reviewer for several journals. Councilor of The Society for Tropical Veterinary Medicine (2007-2018). Member of the Council of 100 for Vaccine. Involved in the organization of several Ticks and Tick-Borne Pathogens (TTPs) conferences. Member of Health Surveillance group, VISAVET, UCM, Spain (https://www.ucm.es/vigilanciasanitaria/). Taskforce expert on WHO CCHF project.

Selected Awards: Prizes of the Cuban Academy of Sciences for research results (1989, 1990, 1991, 1993, 1994, 1995, 1997).Fellowship of the Matsumae International Foundation, Japan (1991).Pfizer Award for Research Excellence, CVHS, Oklahoma State University, USA (2007).Senior Researcher Award for the outstanding contribution to the field of ticks and tick-borne pathogens, TTP9, Cairns, Australia (2017).Member of the Scientific Advisory Council. Foundation Gadea Ciencia, Spain. https://gadeaciencia.org/team-members/de-la-fuente-jose/ (2018-present).Prize for research and innovation in Castilla-La Mancha to Research Group SaBio (2023). https://docm.jccm.es/docm/descargarArchivo.do?ruta=2023/02/27/pdf/2023_1560.pdf&tipo=rutaDocm

Principal achievements with selected supporting references:

(a) Characterization of the mechanisms involved in the regulation of gene expression for interferons alpha and beta [7, 8].

(b) Development of transgenic tilapia with higher growth speed [9].

(c) Development and clinical registry of the first recombinant erythropoietin for the treatment of acute myocardial infarction and other cardiovascular diseases [10].

(d) Development, registration and commercialization of the first vaccine for the control of cattle tick infestations [11, 12].

(e) Characterization of *Anaplasma* membrane proteins involved in the interaction with tick and vertebrate host cells [13, 14].

(f) Discovery and characterization of tick Subolesin, a conserved protein involved in the regulation of innate immune response and other biological processes, with protective capacity as a tick vaccine [15, 16].

(g) Characterization of host-vector-pathogen molecular interactions to understand the mechanisms involved in pathogen infection, multiplication and transmission, and vaccine development [17-23].

(h) Characterization of biomolecules/biomarkers such as alpha-Gal in infectious and allergic diseases [24-28].

3. RESULTS

3.1. Bibliometrics

Results on publications are811 papers published in international journals and book chapters (Fig. 1A), 16 papers currently under review, and 6 books edited. The number of review/opinion/editorial papers increased with time (e.g., 9/123, 7.3% during 1986-1996 vs. 93/342, 27.2% during 2013-2023). Most publications were published in scientific journals (n = 759), but some papers addressed social communications, visual arts, music and humanities (n = 52; e.g., [29-32]). Research and publications have mostly focused on the characterization of host-vector-pathogen molecular interactions and developing and implementing algorithms to translate basic biological information into the discovery of biomolecules for the diagnosis, prognosis and control of tick infestations and infectious diseases (https://youtu.be/DhbBjQSuLYk). Accordingly, most abundant topics addressed in the publications include tick, vaccine, control, diseases, infection/infected, tick-borne, anaplasma, expression and proteins (Fig. 1B and Table 1). For example, a recent bibliometric analysis of tick vaccinology reports author´s name and publications among top ranked/cited [33].

Research has been inter- and multi-disciplinary with collaborations worldwide (Fig. 1C and Fig. 2). The number of authors per paper did not vary with timeor research area with (excluding methods paper on Autophagy with 2045 authors) a tendency of more authors in original (20±26 per paper) than review (6±6 per paper) more cited papers (Table 2), but without significant differences (p = 0.06; Student´s t-test with unequal difference). Collaborators with highest coauthorship include Christian Gortázar (IREC, Spain), Katherine M. Kocan (OSU, USA), Margarita Villar (IREC, Spain), Alejandro Cabezas-Cruz (Anses, INRAE, Ecole NationaleVétérinaired'Alfort, UMR BIPAR, Laboratoire de Santé Animale, France), Marinela Contreras (IREC, Spain), Agustín Estrada-Peña (University of Zaragoza, Spain), and Consuelo Almazán(Universidad Autónoma de Querétaro, Mexico) among others (Fig. 1C).

Table1. *Journals with 10 or more publications*

Journal	Number of publications	Years (first – last publication)
BiotecnologíaAplicada	47	1990 - 1999
Vaccine	38	1995 - 2022
Ticks and Tick-Borne Diseases	33	2012 - 2023
Veterinary Parasitology	32	1995 - 2018
Parasites & Vectors	25	2010 - 2023
Vaccines	23	2019 - 2023
Veterinary Microbiology	22	2002 - 2017
Frontiers in Cellular and Infection Microbiology	21	2013 - 2021
Advances in Modern Biotechnology	16	1992 - 1995
PLoS ONE	15	2008 - 2023
Experimental and Applied Acarology	13	1999 - 2023
Interferón y Biotecnología	13	1986 - 1989
Transboundary and Emerging Diseases	11	2010 - 2021
Theriogenology	10	1990 - 1999

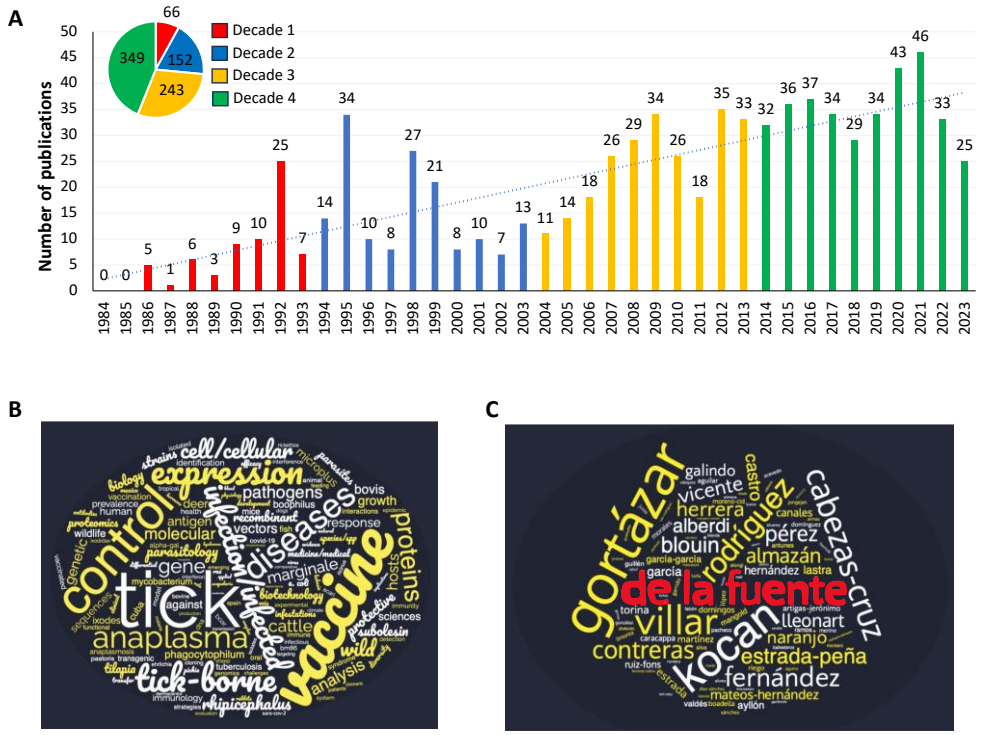

Figure1. ***Record of publications 1984-2023.*** *(A) Yearly number of publications. (B) World Cloud for research/publication topics using paper title words. (C) World Cloud for publication authors.*

According to the Google scholar profile, total citations for these publications are 44923 with author's 98 H-index and 521 i10-index.The most cited publications include original, review and one method articles (Table 2). Of these papers, the most cited recent publications are review or method papers (Table 2). Journals with more cited publications (Table 2) are 86% in Q1 and 14% in Q2 with 2.2 – 64.5 IF and 64 – 856 H-index.

Table2. *Publications with 200 or more citations*

Journal (reference)	Type	Authors	Citations	Year of publication
Autophagy [34]	Method	2045	3000	2016
Frontiers in Bioscience [35]	Review	5	889	2008
Veterinary Parasitology [36]	Review	5	677	2010
Clinical Microbiology Reviews [37]	Review	4	549	2003
Nature Communications [19]	Original	92	468	2016
Animal Health Research Reviews [38]	Review	6	467	2007
Veterinary Microbiology [39]	Original	4	418	2008
Parasitology [40]	Review	4	405	2004
Frontiers in Cellular and Infection Microbiology [41]	Review	23	371	2017
Antiviral Research [42]	Review	2	354	2014
Frontiers in Physiology [43]	Review	3	290	2012
Vaccine [44]	Original	19	286	1998
Parasite Immunology [45]	Review	7	284	2006
Frontiers in Cellular and Infection Microbiology [46]	Review	2	283	2013
Vaccine [47]	Original	13	277	2000
Trends in Parasitology [48]	Review	5	252	2014
Journal of Clinical Microbiology [49]	Original	14	248	2005
Journal of Biotechnology [50]	Original	13	247	1994
Genetic Analysis: Biomolecular Engineering [51]	Original	14	242	1999
Vaccine [52]	Original	9	230	1997
PLoS One [53]	Original	8	205	2008
Cell [54]	Original	13	200	1990

Number of citations were obtained from Google scholar profile (http://scholar.google.com/ citations?user=Cu4qOlgAAAAJ&hl)

Publications in the SJR top ranked journals in science included papers in Cell (original research by Kuhl et al. [7] and MacDonald et al. [54]), Nature Biotechnology (original research by Estrada et al. [10] and opinion byde la Fuente [11]), and The Lancet (letter by Gortázar et al. [22]).Of them, only an original research paper published in Cell [54] is among the most cited papers (Table 2).

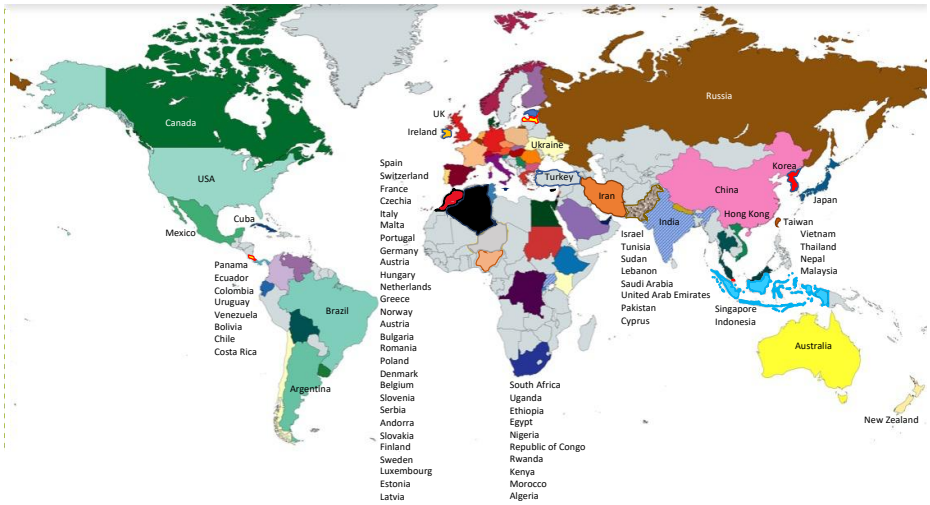

Figure2. ***Scientific collaborations worldwide.*** *Data based on scientific publications 1984-2023. Map created with mapchart.net (https://www.mapchart.net).*

The analysis of citations for scientific publications showed a negative correlation between the number of citations and the number of publications (i.e., more publications with less citations; Fig. 3A), thus reflecting as expected that few publications have a higher number of citations. A positive correlation was observed between the number of citations and the year of publication with higher citations for recent papers, which likely reflects higher visibility and accessibility for these papers (Fig. 3B). The highest number of citations varied between publications in the different research areas (Figs. 3C) with more citations (Fig. 3D) in biomedicine (9.1% of papers), tick-host-pathogen interactions (14.6% of papers), vaccine (27.4% of papers), functional molecular biology (17.1% of papers), and epidemiology/ecology (22.9% of papers). However, correlation was not found between citations and the number of publications per research area (Fig. 4A), journal H-index (Fig. 4B) or journal IF (Fig. 4C).

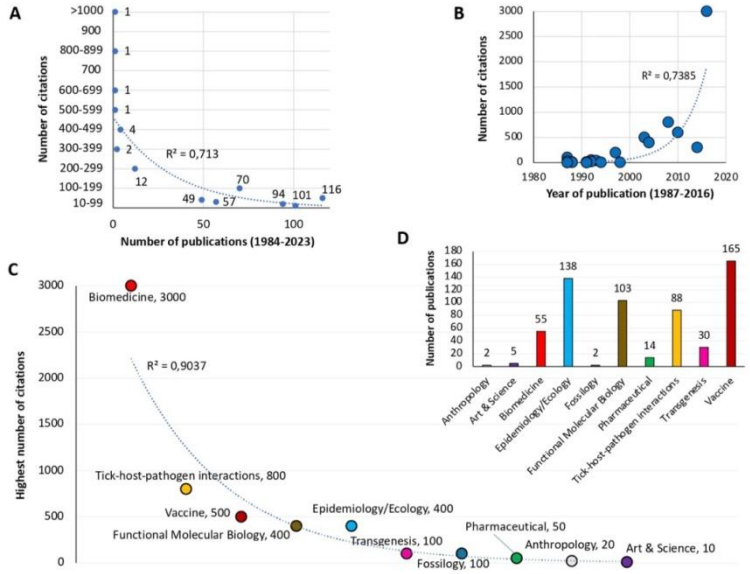

Figure3. ***Bibliometric analysis of scientific publications.*** *(A) Correlation analysis between the number of publications (1984-2023) and the number of citations equal or higher than 10. (B) Correlation analysis between the year of publication (1987-2016) and the number of citations equal or higher thanone. (C) Correlation analysis between highest number of citations for articles with 10 or more citations and the different research areas. (D) Number of publications with 4 or more citations in the different research areas.* R^2 *value for exponential correlation is shown.*

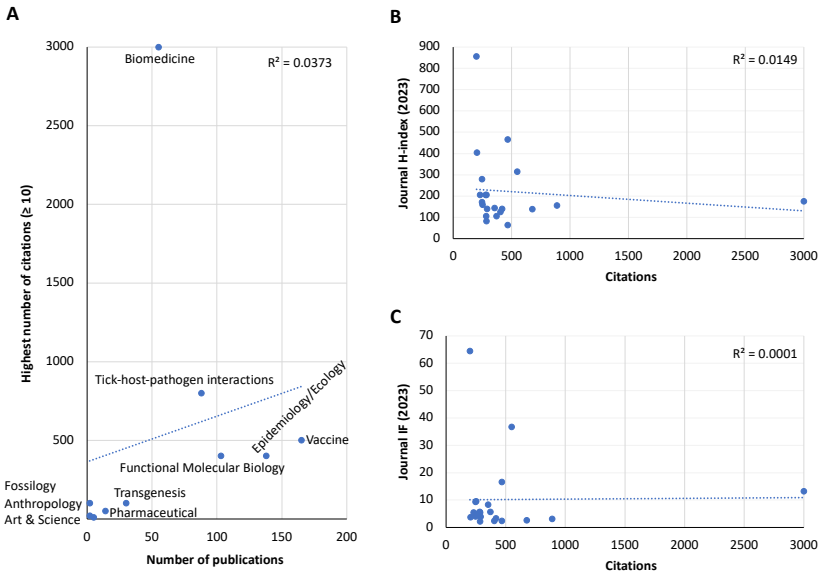

Figure4. ***Correlation analysis of article citations.*** *Correlation analysis was conducted between (A) the number of publication per research area and highest number of citations, (B) the number of citations and journal H-index and (C) the number of citations and journal IF.* R^2 *value for linear correlation is shown.*

Based on bibliometric analysis, author ranked No. 1 in Expertscape World Expert in Ticks (http://www.expertscape.com/ex/ticks) and Arachnida (http://www.expertscape.com/ex/arachnida). Ranked world No. 11, national (Spain) No. 1, 92 Discipline H-index (D-index), 29343 citations, 608 publications at Research.com second edition ranking of the best researchers in the field of Animal Science and Veterinary based on exclusively publications and citation data for an examine discipline collected on December 21, 2022 (https://research.com/scientists-rankings/animal-science-and-veterinary).

3.2. Patents and Products Registered and Commercialized

In addition to the role of publications in science impact, it is important to consider results that are included in granted patent applications and particularly those resulting in products registered and commercialized. During my career, 36 patents were filed in the areas of pharmaceutical, transgenesis, vaccine, formulation, probiotic and diagnostic (Figs. 5A and 5B). Of them, most patents were in the area of vaccine and filed in Cuba, Spain and USA (Fig. 5B).

Patents related to recombinant Streptokinase (e.g., US5296366A; https://www.lens.org/lens/patent/US_5296366_A and US6413759B1; https://patents.google.com/patent/US6413759B1/en) resulted in the registration and commercialization of pharmaceutical Heberkinasa, a drug for the treatment of cardiovascular diseases (https://www.cigb.edu.cu/en/product/heberkinasa-1-500-000-ui-750-000-ui/)[10]. In the area of transgenesis, transgenic tilapia with accelerated growth was patented and introduced in Cuba for food fish production (CU22330; https:// thefishsite.com/articles/genetically-enhanced-tilapia-introduced-in-cuba) [9, 55]. Research on anti-tick vaccines with antigens Bm86/Bm95 resulted in patents CU22326 and CU24/98 and the registration of Gavac, the only vaccine commercially available for the control of *Rhipicephalus microplus* cattle tick infestations (https://www.cigb.edu.cu/en/product/gavac-2/) [11, 44].The tick protective antigen, Subolesin (patents US7214784B2;https://patents.google.com/patent/US7214784 and ES2445467B1; http://invenes.Oepm.es/InvenesWeb/detalle?referencia=P201231253), and immunostimulant for oral vaccine formulations (patent WO2020115161; https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2020115161) are currently under vaccine field trials for registration and commercialization in Uganda for the control of multi-species tick infestations affecting animal health and production [56-58].

Some of these patents or products were cited by other patent applications (e.g., US5296366A cited by US 7105327B1 and WO 1995/027050A1) and scientific publications (e.g., [59]).

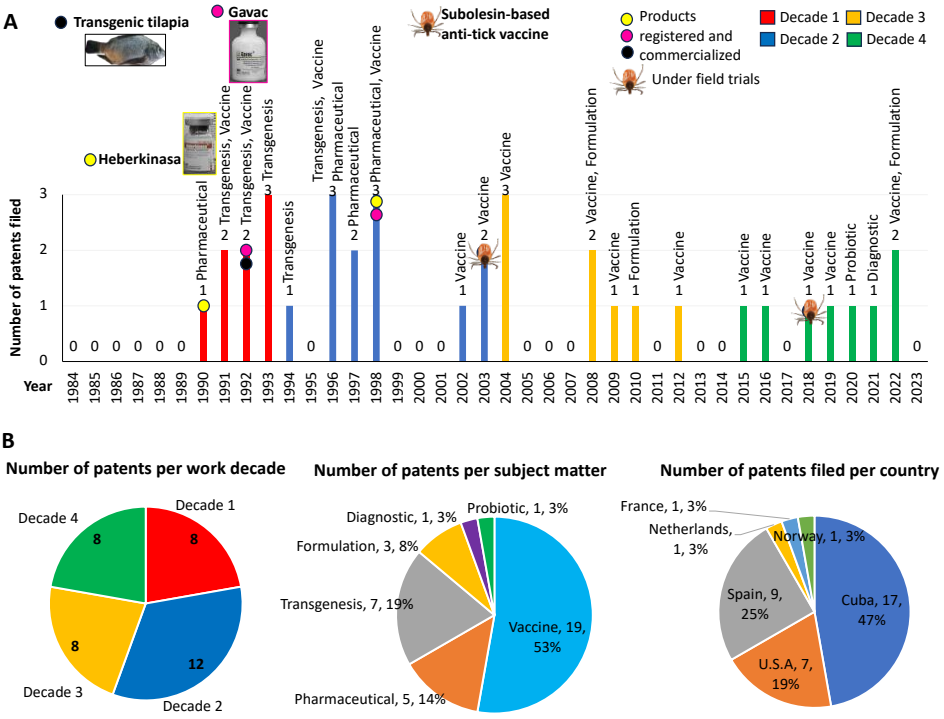

Figure5. *Data of patent applications and products registered and commercialized. (A) Number of patents filed per year during 1984-2023. (B) Analysis of patent applications per career decade, subject matter, and country of application.*

3.3. Mentoring of Ph.D. Students

A total of 36 Ph.D. thesis were supervised and 6 Ph.D. thesis are under supervision. The Ph.D. students play a key role in research groups and contribute to many papers included in their thesis. Additionally, students are also a key component of internationalization and scientific collaborations (Fig. 6).

For example, of the collaborators with highest coauthorship (Fig. 1C), A. Cabezas-Cruz [60], M. Contreras[61], and C. Almazán [62] were Ph.D. students with co-authored publications included in their thesis and continued collaborations as post-docs and researchers(e.g., [12, 15, 26, 28, 63, 64]). These collaborations may contribute to advancing in their careers. For example, A. Cabezas-Cruz has a 39 H-index (https://scholar.google.com/citations?user=S1rBBboAAAAJ&hl=en&oi=ao) and M. Contreras has a 23 H-index (https://scholar.google.com/citations?user=rihEH1kAAAAJ& hl=e n&oi=ao).

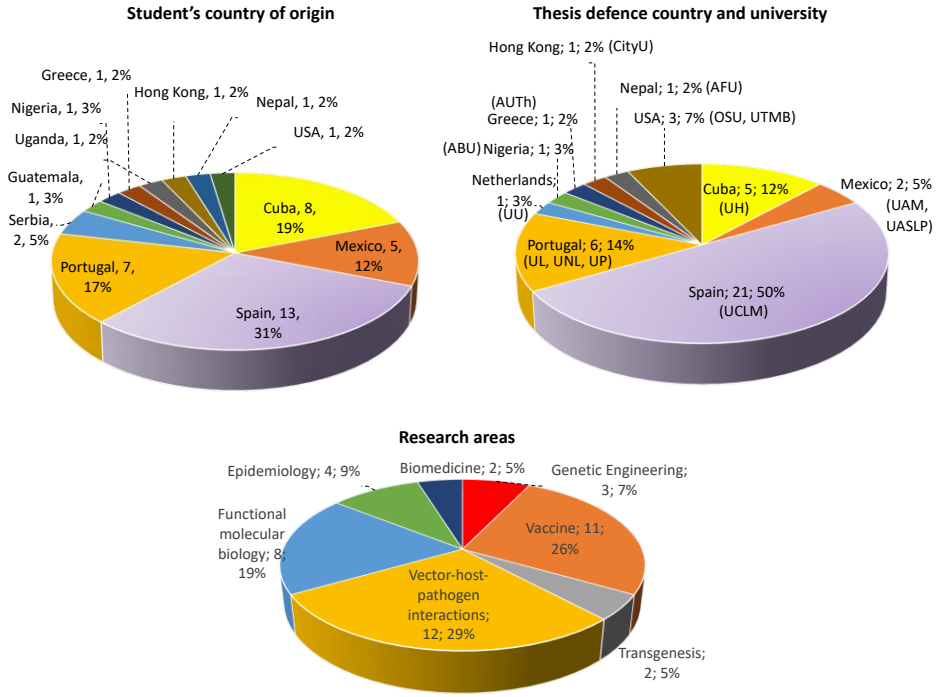

Figure6. ***Supervised Ph.D. thesis.*** *Data on Ph.D. students who completed thesis under author´s supervision. Abbreviations: UCLM (Universidad de Castilla-La Mancha), UAM (Universidad Autónoma de México), UH (Universidad de La Habana), OSU, (Oklahoma State University), UTMB (University of Texas Medical Branch), AFU (Agriculture and Forestry University), CityU (City University of Hong Kong), AUTh (Aristotle University of Thessaloniki), ABU (Ahmadu Bello University), UU (Utrecht University).*

4. DISCUSSION

It should be considered that although IF is an important bibliometric indicator of scientific quality [1], self-citations and editorial material covered by the Science Citation Index may contribute to journal impact [65]. Review articles are highly cited and positively affect IF [66]. The number of retracted papers published in different journals in Q1-Q4 increased since 2020 and have received citations [67]. Additionally, IF has other limitations including that it may be biased in favor of journals that have a rapid rather than a prolonged impact [68, 69] and the publication of several versions of the same manuscript [70]. Nevertheless, based on the high influence of citations on article impact, it has been proposed to use highly cited researchers with high H-index to establish a scientific elite [71].

The bibliometric analysis conducted here has shown that publications with inter- and multi-disciplinary research and collaborations worldwide are highly cited. In general, recent review/methods papers receive citations faster than original research articles. Correlation between citations and journal H-index or IF is not supported and publications in top ranked journals in science are not always highly cited. However, it has been documented that early co-authorship with top scientists positively impact on scientific careers [72]. Additionally, research in different areas facilitate collaborations and stimulate creativity, but it is important to focus on certain areas to advance scientific careers.

Scientometric analyses have shown that quality of research output regarding quantity and quality of publications is higher in certain countries and regions with strong dominance of United States and Europe [73].This factor is important to consider when promoting international collaborations and mentoring Ph.D. students from other regions.

Facing both global (e.g., COVID-19 pandemic) and personal (e.g., family/migratory issues) challenges as occurred in my career is important from the scientific perspective. For example, during the COVID-19 pandemic (years 2020-2023), 27scientific articles and 9 other articleswere published addressing this challenge (e.g., [22, 27, 32]). Regarding personal issues, intellectual activities including scientific research and publications in different areas were the best approach to address these challenges (e.g., [11, 29]).

A bibliometric analysis focused on patents and using largely ignored autobiographical studies showed that prolific inventors substantially contribute to technical creativity [74]. Consequently, apart from number of publications and IF, patents and related products registered and commercialized are an important component to evaluate scientific and social impact of research.

Predatory journals have been considered a global threat but are difficult to define and thus to establish strategies to avoid its use [75]. Nevertheless, we can receive multiple invitations from different journals to submit papers (in my case more that 20 emails per day) and thus trying to receive contributions from scientists who may contribute to improve journal IF.

Polymathy is defined as learning in many fields to build an encyclopedic knowledge and as attributed to T. H. Huxley (1825-1895), “Try to know something about everything and everything about something” [76]. The author discusses the decline in polymathy and concluded that “Crucially, there is often a restricted capacity for an informed, inspired, and imaginative facility that is the foundation of the greatest scientific and medical innovations for the benefit of mankind. We can conclude with Isaac Asimov (1920-1992) that “the saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom”. Therefore, communication of scientific knowledge not only through scientific publications but also in social media and other platforms is important to advance in scientific career.

The Nobel laureate in Medicine in 1960, Peter Medawar, argued that common sense and an inquiring mind are essential to advance in scientific career. In his book [77], he provides guidance on how to choose a research topic and collaborations, when and what to publish in scientific papers, and how to interact with arts and humanities. The scientific community values for excellence the international cooperation for high-quality research, and highly cited publications with a continuous publication history [5].

In a recent study, Sandström and van den Besselaar [78] showed a strong correlation between productivity determined by the number of papers and impact associated with the number of citations thus supporting that “the more papers, the more high impact papers”.

Young scientists are key components of research groups but also a challenge. We all experience how young scientists are presently pressured to produce a large quantity rather than high quality of publications to advance in their careers [79]. As cited by Lisa A. Harvey [79], they perceived need to “publish or perish”. This pressure has a negative impact and supports the need to value more quality than quantity [80]. For a Ph.D. thesis, it is not only important to establish good quality investigations and publications, but also to promote student’s collaborations, internationalization and open possibilities to continue their careers.

5. Conclusions

Lessons from this autobiographical scientometric analysis contributing to guidance for young scientists include (a) quality of research is the priority, (b) productivity is also important, and should consider what, when and where to publish, (c) journal IF, H-index and Q should be considered, but not as the only criteria for publications, (d) inter- and multi-disciplinary research with international collaborations contribute to research quality and to advance in scientific career, (e) journals bulling to receive papers should be avoided, (f) review and method papers in collaboration with other scientists contribute to citations and author’s H-index and should be published at early career stages, (g) projects that may result in patent applications and products with possibilities for registration and

commercialization improve scientific and social impact of research, (h) communication of results in social media is important to promote research and scientific career, (i) scientific research and publications in different areas contribute to facing global and personal challenges, and (j) exploration of other areas in humanities, art and music among other contributes to inspiration and imaginative research approaches.

ACKNOWLEDGMENTS

I would like to acknowledge the role in my career of all supervisors, collaborators and students worldwide. Also, would like to thank my family for their support with special attention to my wife, Karelia Deulofeu, and my daughter, Gabriela de la Fuente.

REFERENCES

[1] Van Leeuwen, T.N., &Moed, H.F. (2005). Characteristics of Journal Impact Factors: The effects of uncitedness and citation distribution on the understanding of journal impact factors. Scientometrics, 63(2), 357-371. https://doi.org/10.1007/s11192-005-0217-z

[2] Okagbue, H.I., & Teixeira da Silva, J.A. (2020). Correlation between the CiteScore and Journal Impact Factor of top-ranked library and information science journals. Scientometrics, 124, 797-801. https://doi.org/10.1007/s11192-020-03457-x

[3] Tennant, J. P., Waldner, F., Jacques, D. C., Masuzzo, P., Collister, L. B., &Hartgerink, C. H. (2016). The academic, economic and societal impacts of Open Access: an evidence-based review. F1000Research, 5, 632. https://doi.org/10.12688/f1000research.8460.3

[4] Piwowar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., Farley, A., West, J., &Haustein, S. (2018). The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles. PeerJ, 6, e4375. https://doi.org/10.7717/peerj.4375

[5] Sasvári, P., Kaiser, T., Várföldi, K., &Fási, C. (2023). Scientific Excellence and Publication Patterns: The Winning Applicants of the BolyaiJános Research Scholarship in Hungary in 2021. Publications, 11, 43. https://doi.org/10.3390/publications11030043

[6] Iefremova, O., Wais, K. & Kozak, M. (2018). Biographical articles in scientific literature: analysis of articles indexed in Web of Science. Scientometrics, 117, 1695-1719. https://doi.org/10.1007/s11192-018-2923-3

[7] Kuhl, D., de la Fuente, J., Chaturvedi, M., Parimoo, S., Ryals, J., Meyer, F., &Weissmann, C. (1987). Reversible silencing of enhancers by sequences derived from the human IFN-alpha promoter. Cell, 50(7), 1057-1069. https://doi.org/10.1016/0092-8674(87)90172-3.

[8] Riego, E., Pérez, A., Martínez, R., Castro, F. O., Lleonart, R., & de la Fuente, J. (1995). Differential constitutive expression of interferon genes in early mouse embryos. Molecular reproduction and development, 41(2), 157-166. https://doi.org/10.1002/mrd.1080410206

[9] de la Fuente, J., Martínez, R., Estrada, M. P., Hernández, O., Cabrera, E., García del Barco, D., Lleonart, R., Pimentel, R., Morales, R., Herrera, F., Morales, A., Guillén, I., & Piña, J. C. (1995). Towards growth manipulation in tilapia (*Oreochromis* sp.): generation of transgenic tilapia with chimeric constructs containing the tilapia growth hormone cDNA. Journalof Marine Biotechnology, 3, 216-219.

[10] Estrada, M. P., Hernández, L., Pérez, A., Rodríguez, P., Serrano, R., Rubiera, R., Pedraza, A., Padrón, G., Antuch, W., & de la Fuente, J. (1992). High level expression of streptokinase in *Escherichia coli*. Nature biotechnology (Bio/technology), 10(10), 1138–1142. https://doi.org/10.1038/nbt1092-1138

[11] de la Fuente, J. (2001). Wine into vinegar--the fall of Cuba's biotechnology. Naturebiotechnology, 19(10), 905–907. https://doi.org/10.1038/nbt1001-905

[12] de la Fuente, J., & Contreras, M. (2015). Tick vaccines: current status and future directions. Expert reviewofvaccines, 14(10), 1367–1376. https://doi.org/10.1586/14760584.2015.1076339

[13] de la Fuente, J., Garcia-Garcia, J. C., Blouin, E. F., &Kocan, K. M. (2001). Differential adhesion of major surface proteins 1a and 1b of the ehrlichial cattle pathogen *Anaplasmamarginale* to bovine erythrocytes and tick cells. International journalforparasitology, 31(2), 145–153. https://doi.org/10.1016/s0020-7519(00)00162-4

[14] Contreras, M., Alberdi, P., Mateos-Hernández, L., Fernández de Mera, I. G., García-Pérez, A. L., Vancová, M., Villar, M., Ayllón, N., Cabezas-Cruz, A., Valdés, J. J., Stuen, S., Gortazar, C., & de la Fuente, J. (2017). *Anaplasmaphagocytophilum* MSP4 and HSP70 Proteins are involved in interactions with host cells during pathogen infection. Frontiers in cellular and infection microbiology, 7, 307. https://doi.org/10.3389/fcimb.2017.00307

[15] Almazán, C., Kocan, K. M., Bergman, D. K., Garcia-Garcia, J. C., Blouin, E. F., & de la Fuente, J. (2003). Identification of protective antigens for the control of *Ixodes scapularis* infestations using cDNA expression library immunization. Vaccine, 21(13-14), 1492–1501. https://doi.org/10.1016/s0264-410x(02)00683-7

[16] Artigas-Jerónimo, S., Comín, J. J. P., Villar, M., Contreras, M., Alberdi, P., Viera, I. L., Soto, L., Cordero, R., Valdés, J. J., Cabezas-Cruz, A., Estrada-Peña, A., & Fuente, J. (2020). A Novel Combined Scientific and Artistic Approach for the Advanced Characterization of Interactomes: The Akirin/Subolesin Model. Vaccines, 8(1), 77. https://doi.org/10.3390/vaccines8010077

[17] Revel, A. T., Blevins, J. S., Almazán, C., Neil, L., Kocan, K. M., de la Fuente, J., Hagman, K. E., &Norgard, M. V. (2005). bptA (bbe16) is essential for the persistence of the Lyme disease spirochete, *Borrelia burgdorferi*, in its natural tick vector. Proceedings of the National Academy of Sciences of the United States of America, 102(19), 6972–6977. https://doi.org/10.1073/pnas.0502565102

[18] Ayllón, N., Villar, M., Galindo, R. C., Kocan, K. M., Šíma, R., López, J. A., Vázquez, J., Alberdi, P., Cabezas-Cruz, A., Kopáček, P., & de la Fuente, J. (2015). Systems biology of tissue-specific response to *Anaplasmaphagocytophilum* reveals differentiated apoptosis in the tick vector Ixodes scapularis. PLoS genetics, 11(3), e1005120. https://doi.org/10.1371/journal.pgen.1005120

[19] Gulia-Nuss, M., Nuss, A. B., Meyer, J. M., Sonenshine, D. E., Roe, R. M., Waterhouse, R. M., Sattelle, D. B., de la Fuente, J., Ribeiro, J. M., Megy, K., Thimmapuram, J., Miller, J. R., Walenz, B. P., Koren, S., Hostetler, J. B., Thiagarajan, M., Joardar, V. S., Hannick, L. I., Bidwell, S., Hammond, M. P., *et al*. (2016). Genomic insights into the *Ixodes scapularis* tick vector of Lyme disease. Nature communications, 7, 10507. https://doi.org/10.1038/ncomms10507

[20] Shaw, D. K., Wang, X., Brown, L. J., Chávez, A. S., Reif, K. E., Smith, A. A., Scott, A. J., McClure, E. E., Boradia, V. M., Hammond, H. L., Sundberg, E. J., Snyder, G. A., Liu, L., DePonte, K., Villar, M., Ueti, M. W., de la Fuente, J., Ernst, R. K., Pal, U., Fikrig, E., … Pedra, J. H. (2017). Infection-derived lipids elicit an immune deficiency circuit in arthropods. Naturecommunications, 8, 14401. https://doi.org/10.1038/ncomms14401

[21] Villar, M., Pacheco, I., Merino, O., Contreras, M., Mateos-Hernández, L., Prado, E., Barros-Picanço, D. K., Lima-Barbero, J. F., Artigas-Jerónimo, S., Alberdi, P., Mera, I. G. F., Estrada-Peña, A., Cabezas-Cruz, A., & de la Fuente, J. (2020). Tick and Host Derived Compounds Detected in the Cement Complex Substance. Biomolecules, 10(4), 555. https://doi.org/10.3390/biom10040555

[22] Gortázar, C., Del-Río, F. J. R., Domínguez, L., & de la Fuente, J. (2020). Host or pathogen-related factors in COVID-19 severity?. Lancet (London, England), 396(10260), 1396–1397. https://doi.org/10.1016/S0140-6736(20)32215-7

[23] Mazuecos, L., Alberdi, P., Hernández-Jarguín, A., Contreras, M., Villar, M., Cabezas-Cruz, A., Simo, L., González-García, A., Díaz-Sánchez, S., Neelakanta, G., Bonnet, S. I., Fikrig, E., & de la Fuente, J. (2023). Frankenbacteriosis targeting interactions between pathogen and symbiont to control infection in the tick vector. iScience, 26(5), 106697. https://doi.org/10.1016/j.isci.2023.106697

[24] de la Fuente, J., & Rodríguez, M. P. (1999). On the etiology of tropical epidemic neuropathies. Emerginginfectiousdiseases, 5(2), 311–312. https://doi.org/10.3201/eid0502.990231

[25] Cabezas-Cruz, A., Valdés, J., & de la Fuente, J. (2014). Cancer research meets tick vectors for infectious diseases. The Lancet. Infectious diseases, 14(10), 916–917. https://doi.org/10.1016/S1473-3099(14)70902-8

[26] Cabezas-Cruz, A., de la Fuente, J., Fischer, J., Hebsaker, J., Lupberger, E., Blumenstock, G., Aichinger, E., Yazdi, A. S., Enkel, S., Oehme, R., &Biedermann, T. (2017). Prevalence of type I sensitization to alpha-gal in forest service employees and hunters: Is the blood type an overlooked risk factor in epidemiological studies of the α-Gal syndrome?. Allergy, 72(12), 2044–2047. https://doi.org/10.1111/all.13206

[27] Vaz-Rodrigues, R., Mazuecos, L., Villar, M., Urra, J. M., Gortázar, C., & de la Fuente, J. (2023). Serum biomarkers for nutritional status as predictors in COVID-19 patients before and after vaccination. Journaloffunctionalfoods, 101, 105412. https://doi.org/10.1016/j.jff.2023.105412

[28] Contreras, M., Vaz-Rodrigues, R., Mazuecos, L., Villar, M., Artigas-Jerónimo, S., González-García, A., Shilova, N. V., Bovin, N. V., Díaz-Sánchez, S., Ferreras-Colino, E., Pacheco, I., Chmelař, J., Kopáček, P., Cabezas-Cruz, A., Gortázar, C., & de la Fuente, J. (2023). Allergic reactions to tick saliva components in zebrafish model. Parasites & vectors, 16(1), 242. https://doi.org/10.1186/s13071-023-05874-2

[29] de la Fuente García, J. (2001). El tratamiento del tema religioso en la pintura cubana. Gazeta de Antropología, 17, artículo 14. http://www.ugr.es/~pwlac/G17_14Jose_DeLaFuente_Garcia.html

[30] de la Fuente, J. (2018). Anaplasmosis: What we can learn from Lam´s surrealistic animalarium. Hektoen International. A Journal of Medical Humanities. Hektorama-Infectious Disease-Summer 2018. http://hekint.org/2018/08/23/anasplasmosis-what-we-can-learn-from-lams-surrealistic-animalarium/

[31] de la Fuente, J. (2021). The ancient Egyptian animalarium: a connection with human health. International Journal of Humanities, Social Sciences and Education (IJHSSE), 8(10), 164-168. https://doi.org/10.20431/2349-0381.0810015

[32] de la Fuente, J. (2022). Art-science multidisciplinary collaborations to address the scientific challenges posed by COVID-19. Annalsof medicine, 54(1), 2535–2548. https://doi.org/10.1080/07853890.2022.2123557

[33] Estrada-Peña, A., & de la Fuente, J. (2023). Evolution of tick vaccinology highlights changes in paradigms in this research area. Vaccines, 11(2), 253. https://doi.org/10.3390/vaccines11020253

[34] Klionsky, D. J., Abdelmohsen, K., Abe, A., Abedin, M. J., Abeliovich, H., Acevedo Arozena, A., Adachi, H., Adams, C. M., Adams, P. D., Adeli, K., Adhihetty, P. J., Adler, S. G., Agam, G., Agarwal, R., Aghi, M. K., Agnello, M., Agostinis, P., Aguilar, P. V., Aguirre-Ghiso, J., Airoldi, E. M., et al. (2016). Guidelines for the use and interpretation of assays for monitoring autophagy (3rd edition). Autophagy, 12(1), 1-222. https://doi.org/10.1080/15548627.2015.1100356

[35] de la Fuente, J., Estrada-Pena, A., Venzal, J. M., Kocan, K. M., &Sonenshine, D. E. (2008). Overview: Ticks as vectors of pathogens that cause disease in humans and animals. Frontiers in bioscience, 13, 6938–6946. https://doi.org/10.2741/3200

[36] Kocan, K. M., de la Fuente, J., Blouin, E. F., Coetzee, J. F., & Ewing, S. A. (2010). The natural history of *Anaplasmamarginale*. Veterinary parasitology, 167(2-4), 95–107. https://doi.org/10.1016/j.vetpar.2009.09.012

[37] Kocan, K. M., de la Fuente, J., Guglielmone, A. A., & Meléndez, R. D. (2003). Antigens and alternatives for control of *Anaplasmamarginale* infection in cattle. Clinicalmicrobiologyreviews, 16(4), 698–712. https://doi.org/10.1128/CMR.16.4.698-712.2003

[38] de la Fuente, J., Almazán, C., Canales, M., Pérez de la Lastra, J. M., Kocan, K. M., &Willadsen, P. (2007). A ten-year review of commercial vaccine performance for control of tick infestations on cattle. Animal health research reviews, 8(1), 23–28. https://doi.org/10.1017/S1466252307001193

[39] Naranjo, V., Gortazar, C., Vicente, J., & de la Fuente, J. (2008). Evidence of the role of European wild boar as a reservoir of *Mycobacterium tuberculosis* complex. Veterinarymicrobiology, 127(1-2), 1–9. https://doi.org/10.1016/j.vetmic.2007.10.002

[40] Kocan, K. M., de la Fuente, J., Blouin, E. F., &Garcia-Garcia, J. C. (2004). *Anaplasmamarginale* (Rickettsiales: Anaplasmataceae): recent advances in defining host-pathogen adaptations of a tick-borne rickettsia. Parasitology, 129 Suppl, S285–S300. https://doi.org/10.1017/s0031182003004700

[41] de la Fuente, J., Antunes, S., Bonnet, S., Cabezas-Cruz, A., Domingos, A. G., Estrada-Peña, A., Johnson, N., Kocan, K. M., Mansfield, K. L., Nijhof, A. M., Papa, A., Rudenko, N., Villar, M., Alberdi, P., Torina, A., Ayllón, N., Vancova, M., Golovchenko, M., Grubhoffer, L., Caracappa, S., Fooks, A.R., Gortázar, C., & Rego, R.O.M. (2017). Tick-pathogen interactions and vector competence: identification of molecular drivers for tick-borne diseases. Frontiers in cellular and infection microbiology, 7, 114. https://doi.org/10.3389/fcimb.2017.00114

[42] Estrada-Peña, A., & de la Fuente, J. (2014). The ecology of ticks and epidemiology of tick-borne viral diseases. Antiviral research, 108, 104–128. https://doi.org/10.1016/j.antiviral.2014.05.016

[43] Estrada-Peña, A., Ayllón, N., & de la Fuente, J. (2012). Impact of climate trends on tick-borne pathogen transmission. Frontiers in physiology, 3, 64. https://doi.org/10.3389/fphys.2012.00064

[44] de la Fuente, J., Rodríguez, M., Redondo, M., Montero, C., García-García, J. C., Méndez, L., Serrano, E., Valdés, M., Enriquez, A., Canales, M., Ramos, E., Boué, O., Machado, H., Lleonart, R., de Armas, C. A., Rey, S., Rodríguez, J. L., Artiles, M., & García, L. (1998). Field studies and cost-effectiveness analysis of vaccination with Gavac against the cattle tick *Boophilusmicroplus*. Vaccine, 16(4), 366–373. https://doi.org/10.1016/s0264-410x(97)00208-9

[45] de la Fuente, J., &Kocan, K. M. (2006). Strategies for development of vaccines for control of ixodid tick species. Parasite immunology, 28(7), 275–283. https://doi.org/10.1111/j.1365-3024.2006.00828.x

[46] Hajdušek, O., Síma, R., Ayllón, N., Jalovecká, M., Perner, J., de la Fuente, J., &Kopáček, P. (2013). Interaction of the tick immune system with transmitted pathogens. Frontiers in cellular and infection microbiology, 3, 26. https://doi.org/10.3389/fcimb.2013.00026

[47] García-García, J. C., Montero, C., Redondo, M., Vargas, M., Canales, M., Boue, O., Rodríguez, M., Joglar, M., Machado, H., González, I. L., Valdés, M., Méndez, L., & de la Fuente, J. (2000). Control of ticks resistant to immunization with Bm86 in cattle vaccinated with the recombinant antigen Bm95 isolated from the cattle tick, *Boophilusmicroplus*. Vaccine, 18(21), 2275–2287. https://doi.org/10.1016/s0264-410x(99)00548-4

[48] Estrada-Peña, A., Ostfeld, R. S., Peterson, A. T., Poulin, R., & de la Fuente, J. (2014). Effects of environmental change on zoonotic disease risk: an ecological primer. Trends in parasitology, 30(4), 205–214. https://doi.org/10.1016/j.pt.2014.02.003

[49] de la Fuente, J., Massung, R. F., Wong, S. J., Chu, F. K., Lutz, H., Meli, M., von Loewenich, F. D., Grzeszczuk, A., Torina, A., Caracappa, S., Mangold, A. J., Naranjo, V., Stuen, S., &Kocan, K. M. (2005). Sequence analysis of the msp4 gene of *Anaplasmaphagocytophilum* strains. Journal of clinical microbiology, 43(3), 1309–1317. https://doi.org/10.1128/JCM.43.3.1309-1317.2005

[50] Rodríguez, M., Rubiera, R., Penichet, M., Montesinos, R., Cremata, J., Falcón, V., Sánchez, G., Bringas, R., Cordovés, C., & Valdés, M. (1994). High level expression of the *B. microplus* Bm86 antigen in the yeast *Pichia pastoris* forming highly immunogenic particles for cattle. Journalofbiotechnology, 33(2), 135–146. https://doi.org/10.1016/0168-1656(94)90106-6

[51] de la Fuente, J., Rodríguez, M., Montero, C., Redondo, M., García-García, J. C., Méndez, L., Serrano, E., Valdés, M., Enríquez, A., Canales, M., Ramos, E., Boué, O., Machado, H., &Lleonart, R. (1999). Vaccination against ticks (*Boophilus* spp.): the experience with the Bm86-based vaccine Gavac. Geneticanalysis: biomolecular engineering, 15(3-5), 143–148. https://doi.org/10.1016/s1050-3862(99)00018-2

[52] Canales, M., Enríquez, A., Ramos, E., Cabrera, D., Dandie, H., Soto, A., Falcón, V., Rodríguez, M., & de la Fuente, J. (1997). Large-scale production in *Pichia pastoris* of the recombinant vaccine Gavac against cattle tick. Vaccine, 15(4), 414–422. https://doi.org/10.1016/s0264-410x(96)00192-2

[53] Gortázar, C., Torres, M. J., Vicente, J., Acevedo, P., Reglero, M., de la Fuente, J., Negro, J. J., & Aznar-Martín, J. (2008). Bovine tuberculosis in Doñana Biosphere Reserve: the role of wild ungulates as disease reservoirs in the last Iberian lynx strongholds. PloS one, 3(7), e2776. https://doi.org/10.1371/journal.pone.0002776

[54] MacDonald, N. J., Kuhl, D., Maguire, D., Näf, D., Gallant, P., Goswamy, A., Hug, H., Büeler, H., Chaturvedi, M., de la Fuente, J., Ruffner, H., Meyer, F., & Weissman, C. (1990). Different pathways mediate virus inducibility of the human IFN-alpha 1 and IFN-beta genes. Cell, 60(5), 767–779. https://doi.org/10.1016/0092-8674(90)90091-r

[55] Hernández, O., Guillén, I., Estrada, M. P., Cabrera, E., Pimentel, R., Piña, J. C., Abad, Z., Sánchez, V., Hidalgo, Y., Martínez, R., Lleonart, R., & de la Fuente, J. (1997). Characterization of transgenic tilapia lines with different ectopic expression of tilapia growth hormone. Molecular marine biology and biotechnology, 6(4), 364–375.

[56] Kabi, F., Dhikusooka, M., Matovu, M., Mugerwa, S., Kasaija, P., Emudong, P., Kirunda, H., Contreras, M., Gortazar, C., & de la Fuente, J. (2022). Monitoring the Subolesin vaccine field trial for safer control of cattle ticks amidst increasing acaricide resistance in Uganda. Vaccines, 10(10), 1594. https://doi.org/10.3390/vaccines10101594

[57] Kasaija, P.D., Contreras, M., Kabi, F., Mugerwa, S., & de la Fuente, J. (2020). Vaccination with recombinant Subolesin antigens provides cross-tick species protection in *Bos indicus* and crossbred cattle in Uganda. Vaccines, 8(2), 319. https://doi.org/10.3390/vaccines8020319

[58] Kasaija, P.D., Contreras, M., Kabi, F., Mugerwa, S., Garrido, J.M., Gortazar, C., & de la Fuente J. (2022). Oral vaccine formulation combining tick Subolesin with heat inactivated mycobacteria provides control of cross-species cattle tick infestations. Vaccine, 40(32), 4564-4573. https://doi.org/10.1016/j.vaccine.2022.06.036

[59] de la Fuente, J., &Kocan, K. M. (2003). Advances in the identification and characterization of protective antigens for recombinant vaccines against tick infestations. Expert review of vaccines, 2(4), 583–593. https://doi.org/10.1586/14760584.2.4.583

[60] Cabezas-Cruz A. (2014). Evolution and molecular characterization of tick-borne Anaplasmataceae and implications for pathogen diagnostics and control. Ph.D. thesis. Instituto de Investigación en Recursos Cinegéticos (IREC), Universityof Castilla La Mancha, Spain. https://www.researchgate.net/publication/312495412_Evolution_and_molecular_characterization_of_tick-borne_Anaplasmataceae_and_implications_for_pathogen_diagnostics_and_control

[61] Contreras, M. (2017). Tick-host-pathogen interactions and vaccine development for the control of tick-borne diseases. Ph.D. thesis. Instituto de Investigación en Recursos Cinegéticos (IREC), Universityof Castilla La Mancha, Spain. https://ruidera.uclm.es/xmlui/handle/10578/16475

[62] Almazán, C. (2005). Identification and characterization of protective antigens against *Ixodes scapularis* infestations. Ph.D. thesis. College of Veterinary Medicine, Oklahoma State University, U.S.A. https://shareok.org/bitstream/handle/11244/7647/Almazan-Garcia_okstate_0664D_1360.pdf?sequence=1&isAllowed=y

[63] Almazán, C., Fourniol, L., Rouxel, C., Alberdi, P., Gandoin, C., Lagrée, A. C., Boulouis, H. J., de la Fuente, J., & Bonnet, S. I. (2020). Experimental *Ixodes ricinus*-Sheep Cycle of *Anaplasmaph agocytoph ilum* NV2Os Propagated in Tick Cell Cultures. Frontiers in veterinary science, 7, 40. https://doi.org/10.3389/fvets.2020.00040

[64] Cabezas-Cruz, A., Passos, L. M., Lis, K., Kenneil, R., Valdés, J. J., Ferrolho, J., Tonk, M., Pohl, A. E., Grubhoffer, L., Zweygarth, E., Shkap, V., Ribeiro, M. F., Estrada-Peña, A., Kocan, K. M., & de la Fuente, J. (2013). Functional and immunological relevance of *Anaplasmamarginale* major surface protein 1a sequence and structural analysis. PloSone, 8(6), e65243. https://doi.org/10.1371/journal.pone.0065243

[65] Campanario, J., & González, L. (2006). Journal self-citations that contribute to the impact factor: Documents labeled "editorial material" in journals covered by the Science Citation Index. Scientometrics, 69, 365-386. https://doi.org/10.1007/s11192-006-0158-1

[66] Lei, L., & Sun, Y. (2020). Should highly cited items be excluded in impact factor calculation? The effect of review articles on journal impact factor. Scientometrics, 122, 1697-1706. https://doi.org/10.1007/s11192-019-03338-y

[67] Candal-Pedreira, C., Ross, J. S., Ruano-Ravina, A., Egilman, D. S., Fernández, E., & Pérez-Ríos, M. (2022). Retracted papers originating from paper mills: cross sectional study. BMJ (Clinical research ed.), 379, e071517. https://doi.org/10.1136/bmj-2022-071517

[68] Vanclay, J.K. (2009). Bias in the journal impact factor. Scientometrics, 78, 3-12 https://doi.org/10.1007/s11192-008-1778-4

[69] Vanclay, J.K. (2012). Impact factor: outdated artefact or stepping-stone to journal certification?. Scientometrics, 92, 211-238. https://doi.org/10.1007/s11192-011-0561-0

[70] Bornmann, L., &Marx, W. (2012). The effect of several versions of one and the same manuscript published by a journal on its journal impact factor. Scientometrics, 92, 277-279. https://doi.org/10.1007/s11192-012-0656-2

[71] Chaignon, L., Docampo, D. & Egret, D. (2023). In search of a scientific elite: highly cited researchers (HCR) in France. Scientometrics, 128,5801-5827. https://doi.org/10.1007/s11192-023-04805-3

[72] Li, W., Aste, T., Caccioli, F., &Livan, G. (2019). Early coauthorship with top scientists predicts success in academic careers. Nature communications, 10(1), 5170. https://doi.org/10.1038/s41467-019-13130-4

[73] Tóth, J.J., Háló, G. &Goyanes, M. (2023). Beyond views, productivity, and citations: measuring geopolitical differences of scientific impact in communication research. Scientometrics, 128, 5705-5729. https://doi.org/10.1007/s11192-023-04801-7

[74] Levine, L.O. (1986). Prolific inventors – A bibliometric analysis. Scientometrics, 10(1-2), 35-42. https://doi.org/10.1007/BF02016858

[75] Grudniewicz, A., Moher, D., Cobey, K. D., Bryson, G. L., Cukier, S., Allen, K., Ardern, C., Balcom, L., Barros, T., Berger, M., Ciro, J. B., Cugusi, L., Donaldson, M. R., Egger, M., Graham, I. D., Hodgkinson, M., Khan, K. M., Mabizela, M., Manca, A., Milzow, K., et al. (2019). Predatory journals: no definition, no defence. Nature, 576(7786), 210–212. https://doi.org/10.1038/d41586-019-03759-y

[76] Pearce, J.M.S. (2013). Polymathy in decline? Hektoen International. A Journal of Medical Humanities, 5(4). https://hekint.org/2017/01/30/polymathy-in-decline/

[77] Medawar, P.B. (1981). Advice to a young scientist. Basic Books 1981; 127 pp. ISBN 9780465000920.

[78] Sandström, U., & van den Besselaar, P. (2016). Quantity and/or Quality? The Importance of Publishing Many Papers. PloS one, 11(11), e0166149. https://doi.org/10.1371/journal.pone.0166149

[79] Harvey, L.A. (2020). We need to value research quality more than quantity. Spinal cord, 58(10), 1047. https://doi.org/10.1038/s41393-020-00543-y

[80] Ioannidis, J.P. (2016). Evidence-based medicine has been hijacked: a report to David Sackett. Journal of clinical epidemiology, 73, 82–86. https://doi.org/10.1016/j.jclinepi.2016.02.012

AUTHORS' BIOGRAPHY

José de la Fuente, is a Physicist and currently a Professor of Molecular Biology and Biotechnology in the SaBio group at the IREC (CSIC-UCLM-JCCM), Spain and the Oklahoma State University, USA. He is interested in innovative research approaches and his work focuses on systems biology of host-vector-pathogen molecular interactions, and translation of this basic information into development of effective vaccines and other interventions for the control of infectious diseases affecting human and animal health worldwide, ticks and tick-borne diseases, Alpha Gal Syndrome, Vaccinology and Quantum Vaccinomics.

Citation: *José de la Fuente. "Guidance for Young Scientists from Autobiographical Scientometrics" International Journal of Humanities Social Sciences and Education (IJHSSE), vol 11, no. 4, 2024, pp. 32-46. DOI: https://doi.org/10.20431/2349- 0381.1104003.*