



Art–Science Collaboration: Paleontology Inspired by Intercultural Surrealist Representations

Jose de la Fuente^{1,2}

Article History:

Received: 14-05-2025

Revision: 31-05-2025

Accepted: 18-06-2025

Publication: 29-07-2025

Cite this article as:

De la Fuente, J. (2025). Art–Science Collaboration: Paleontology Inspired by Intercultural Surrealist Representations. *Journal of Intercultural Communication*, 25(3), 01–10.
doi.org/10.36923/jicc.v25i3.1181

©2025 by author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License 4.0 International License.

Corresponding Author:

Jose de la Fuente

Health and Biotechnology (SaBio), Institute for Research in Game Resources (IREC), Spanish National Research Council (CSIC), University of Castilla-La Mancha (UCLM)-Regional Government of Castilla-La Mancha (JCCM), Spain.

² Center for Veterinary Health Sciences (CVHS), Department of Veterinary Pathobiology, Oklahoma State University (OSU), USA.. Email: jose_delafuente@yahoo.com

Abstract: The collaboration between art and science provides a powerful avenue for addressing complex scientific challenges and fostering intercultural communication. However, the intersection of paleontology, surrealism, and paleoart remains underexplored, presenting a critical gap in art-science scholarship. This study investigates how paleontological inquiry can be inspired by intercultural surrealist representations, focusing on the works of Salvador Dalí and Cuban artists Roberto Alvarez Ríos, Jorge Camacho, and Agustín Cárdenas. Using a qualitative visual analysis, the study examined artistic depictions of arthropods and skeletal forms and related them to fossil evidence, particularly amber inclusions and mineralized tissues. The methodological framework incorporated paleoart as a scientific illustration practice informed by artistic imagination and symbolic representation. Findings reveal that surrealist imagery not only parallels morphological features found in paleontological specimens but also stimulates novel perspectives on evolutionary history. The study concludes that intercultural surrealism, when integrated with paleontological research, offers a meaningful framework for interdisciplinary collaboration. These insights have important implications for expanding the scope of scientific illustration, advancing cross-cultural understanding in science communication, and developing innovative methodologies in both scientific and artistic domains.

Keywords: Art-Science Collaboration, Surrealism and Paleontology, Paleoart, Salvador Dalí Fossil Art, Amber Fossil Inclusions, Intercultural Visual Representation, Scientific Illustration in Paleontology

1. Introduction

The intersection of art and science has long been recognized as a fertile ground for interdisciplinary exploration, offering alternative methods for conceptualizing and communicating scientific knowledge (Cohen, 1991; Eldred, 2016; Galejev, 2005; Artigas-Jerónimo et al., 2020, 2022; de la Fuente, 2020, 2022; Miller, 2021; Contreras et al., 2022, 2025). This cross-disciplinary dialogue has become particularly relevant in fields that benefit from visual and symbolic interpretation. One such field is paleontology, which increasingly relies on visual representation to reconstruct prehistoric life. However, scholarly engagement with the potential contributions of surrealism to paleontological inquiry remains extremely limited. For instance, Kritsky et al. (2013) examined insect motifs in Salvador Dalí's art but focused primarily on the artist's personal associations, without extending the analysis to scientific implications.

Surrealism, emerging in post–World War I Europe, aimed to access the subconscious as a source of artistic inspiration (Nadeau, 1975). Although rooted in European intellectual traditions, the movement did not disappear with the Second World War (Colomb, 1986) and was readily adapted by Afro-descendant and Latin American artists, who used surrealism as a means of cultural resistance and expression (Luis, 2007, 2008; Jiménez, 2014; de la Fuente et al., 2023). Cuban surrealism, in particular, integrates indigenous and Afro-Caribbean themes, forming a distinct branch of the movement. This intercultural expansion of surrealism has yet to be systematically explored in relation to the natural sciences.

While surrealism and science may appear conceptually opposed, emphasizing the irrational versus the empirical, they frequently converge. Surrealist artists have drawn upon scientific concepts to challenge visual norms, while scientists increasingly recognize the heuristic value of metaphor, symbolism, and visual abstraction (Ball, 2008). Paleoart, defined as scientifically informed artistic depictions of prehistoric life, sits at the crossroads of these traditions (McDermott, 2020). Yet, despite its significance, the role of surrealist expression in paleoart has received minimal scholarly attention (Lipinski, 2022).

Paleontology, as the study of ancient life through fossil evidence, now incorporates a broad spectrum of interdisciplinary methods, including paleoproteomics, palaeoneurology, and molecular paleogenetics (Balanoff, 2024; Bai et al., 2025; Villar et al., 2025; Paterson et al., 2025; Lequin et al., 2025). A subfield of particular interest is paleoarthropodology, which focuses on the classification, distribution, and ecological roles of fossil arthropods, organisms whose chitinous exoskeletons are often preserved in amber (de la Fuente et al., 2003; Peñalver et al., 2017; Vršanský et al., 2024). Understanding these organisms is vital for reconstructing evolutionary histories and environmental dynamics.

¹ Health and Biotechnology (SaBio), Institute for Research in Game Resources (IREC), Spanish National Research Council (CSIC), University of Castilla-La Mancha (UCLM)-Regional Government of Castilla-La Mancha (JCCM), Spain.

² Center for Veterinary Health Sciences (CVHS), Department of Veterinary Pathobiology, Oklahoma State University (OSU), USA.

Despite these developments, scholarly literature remains sparse on the connection between surrealist visual culture and paleontological analysis. A bibliometric review reveals this gap. Searches in PubMed using terms such as “surrealism AND science AND art” or “Salvador Dalí AND science” yielded fewer than five relevant publications (e.g., Cohen, 1991; Rossiou and Orogas, 2018; Silvio, 2005; Brooks, 2017; Stevenson, 2021). In contrast, the term “paleontology” returned over 31,000 records, including more than 1,300 published in the past year alone. The term “paleoart” generated only one indexed study (Miller, 2021), highlighting a significant disconnect between artistic and scientific domains in this context.

Even journals dedicated to interdisciplinary work, such as *Leonardo* and *The International Journal of Art & Design Education*, feature few articles explicitly linking surrealism, paleoart, and fossil research (e.g., Galeyev, 2005; Poli and Stoneman, 2020; Wall and Hale, 2020). Therefore, it becomes evident that while paleontology continues to expand as a scientific field, its engagement with surrealist and intercultural art remains underdeveloped.

In response to this gap, this study addresses the following research question: *How do intercultural surrealist artistic representations inspire and inform paleontological inquiry, particularly in the morphological study of fossil arthropods and skeletal remains?* The novelty of this research lies in its systematic integration of intercultural surrealism with scientific fossil interpretation, offering a unique framework that connects symbolic artistic expression to the empirical demands of paleontological analysis. By incorporating both European and Cuban surrealist traditions, this study opens a new pathway for interdisciplinary understanding and scholarly engagement.

2. Methodology

A qualitative visual analysis was adopted to examine the selected artworks due to its appropriateness in interdisciplinary studies that bridge art and science. This method enables the decoding of visual symbolism and morphological parallels in artistic representations that relate to paleontological specimens. The artworks were selected based on their recurring biological motifs (e.g., insects, bones, fossils) and their prominence within surrealist and Cuban art history. This purposive sampling ensures that the selected pieces are both culturally and scientifically relevant, allowing for meaningful interdisciplinary interpretations.

The methodological approach for the paleontological component of the study was designed to analyze surrealist art as a source of inspiration and potential insight into fossil organisms. First, representative surrealist artworks featuring insects and bone-like forms were selected from the collections of Salvador Dalí and Cuban surrealist artists Agustín Cárdenas Alfonso, Roberto Jesús Álvarez Ríos, and Jorge Camacho Lazo. These works were chosen for their visual emphasis on biological forms and their intercultural aesthetic qualities, as illustrated in Table 1 and Figures 1–5. Some pieces attributed to Dalí are identified as “After,” indicating reproductions or reinterpretations based on his original compositions.

For each selected artwork, the depicted arthropods were analyzed through morphological comparison. Insect identification was performed using the Insect Identifier application (<https://insect-identifier.netlify.app>), which facilitated the classification of visual motifs by comparing them with known species. However, it must be acknowledged that surrealist representations are not anatomically precise, and as such, the identifications are tentative and intended primarily for conceptual exploration rather than rigorous taxonomic classification. For other arthropods, such as spiders and mites (e.g., Figures 4B and 4C), the analysis was based on low-resolution imagery, and therefore classification was limited to broader taxonomic levels, such as Domain or Phylum.

The identified organisms were then compared with known fossil inclusions in amber and mineralized skeletal remains to assess possible correlations between artistic forms and paleontological data (Figures 2–4). Authenticity of the amber specimens used in this comparison was confirmed through multiple standard tests, including ultraviolet light fluorescence, saltwater flotation, resistance to acetone, and heat exposure, which produced the characteristic pine resin odor. Bone representations present in the selected artworks were also examined in relation to fossil mineralized tissues, with reference to specific skeletal and amber inclusions (Figure 5).

All artworks and fossil specimens included in the study are part of the KGJ Collection (Ciudad Real, Spain). For artworks by Salvador Dalí (Figures 1B, 2A, 2B, 3A, 4A, and 5A), copyrights are held by “© Salvador Dalí, Fundació Gala-Salvador Dalí, VEGAP, Ciudad Real, 2025,” and image licenses were granted by the VEGAP Image Bank (<https://bi.vegap.es/home.aspx>). The photographic image of Salvador Dalí (Figure 1A) is similarly licensed and reserved by the Fundació Gala-Salvador Dalí, Figueres, 2025. Cuban artworks included in the analysis (Figures 5B and 5C), having been created before 1963, are no longer protected by copyright, as the 28-year protection term has expired.

Therefore, through a combined analysis of visual, morphological, and comparative paleontological data, this methodological framework aims to demonstrate the potential of surrealist art to inform scientific interpretation, thereby expanding the conceptual and empirical tools available for the study of prehistoric life.

Table 1: Art pieces selected for the study.

Salvador Dalí		
Title. Figure No.	Description	References
Salvador Dalí out of his house, November 1957. Figure 1A.	By Adalberto Guarnerio (1937-) for the Agency Farabola. Printed using Epson Stylus Pro and UltraChrome HDR colour inks on fine art paper Hanehmühle Photo Rag Ultrasmooth 305 g. Mounted on aluminium Dbond. Printed by Fotogramma24sas, Rome, Italy. Print No. 1, January 13, 2017. Dimensions: 40 x 40 cm.	From Archivio Farabola, Cartolinedal 900, Bcd Srl, Piazza Margana 39, 00186 Rome, Italy. Source: Certificate of authenticity (COA) with a hologram No. 208635.
The fossil automobile of Cape Creus. Figure 1B.	Lithograph based on the original oil by Salvador Dalí. Printed on 300 g heavy cream Linen Paper.	Gala-Salvador Dalí Foundation, Cat. No. P 409 (heritageobject/621-a73c/).

Salvador Dalí		
Title. Figure No.	Description	References
	Dimensions: 50 x 35 cm. Limited Edition: 350 (numbered 122/350). Embossing Stamp. Year: unknown. The sheet is signed and numbered by hand and stamped in the paper - not signed by Dalí personally, only used as an identification.	Original piece: The fossil automobile of Cap Creus, 1936, oil on wood panel, 31 x 37 cm. Nahmad collection, Switzerland.
The Earth Goddess (The Chef). Figure 2A.	Lithograph, paper Arches (France). Atelier Dumas Inc., New York, Dalart N. V. Copyright 1980. Dimensions: 57 x 45.5 cm images on 74 x 53.5 cm paper. Edition: 30/350. Year: 1980.	Field, 1996, p. 186, No. 80-5. Michler and Lopsinger, 1995, p. 178, No. 1578. Acquired from Art Link International Corporation, Lake Worth, FL 33463, USA (www.artlinkinternational.com). Certificate of authenticity from Bruce Hochman, Salvador Dalí Gallery, Inc., California, USA (https://www.daligallery.com).
Sirenas peinadas con coral y hormigas (Mermaids haired with coral and ant). Part of a table service. Figure 2B.	Plate produced by Schirnding Bavaria, Germany in fine porcelain. Part of a table setting of 83 pieces. Dimensions: Diameter 26 cm, Depth 2 cm. Edition: 463/500. Year: 1978. Copy of Dalí signature on the reverse.	Disclosure on the back of the pate: "Con decoración Dalí (With Dalí decoration)". Notaria de D. José Luis Espinosa Anta, Vigo.
L'Unicorne laser désintègre les cornes de rhinocéros cosmiques (The unicorn laser disintegrates the horns of cosmic rhinoceroses). From series La Conquete du Cosmos. Figure 3A.	Drypoint etching on chromolithograph. Arches woven paper. Publisher: Jean Lavigne. Dimensions: Image size 74.5 x 55 cm, Paper size 99.5 x 71 cm. Edition: E/A. Year: 1974. Hand signed by the artist.	Field, 1996, p. 99, No. 74-12H. Michler and Lopsinger, 1994, pp. 220-221, No. 646. Certificate of authenticity by TiopArt (tiopiss@gmail.com), Vilnius, Lithuania, 2025-03-31.
Ceci n'est pas une assiette (This is not a dish). Figure 4A.	Glass paste, deep purple and gold. Transesophageal Echocardiogram (TEE) technique. Dimensions: Diameter 26 cm, Depth 2.5 cm. Edition: 1150/2000. Daum, France. Year: 1970.	Descharnes, R. and Descharnes, N., 2004, p. 130, No. 323. Etched signed by Daum on the base with Dalí's signature is in the mold. During the Art Nouveau period Daum became a family run company and the leaders in decorative glass.
God in the creation of the world. From the series, "The 7 days of creation". Figure 5A.	Sculpture in pure silver 999 ingot (law 1000/1000). Dimensions: 4 x 3 cm (ca. 25 g). Edition No. 0047. Year: 1979. Spain. Signed with a design on the back.	Set of seven silver ingots showing the different days of creation interpreted by Dalí. Durán Arte y Subastas, Subasta 590, February 2021 (https://www.duran-subastas.com/en/subasta-lote/salvador-dali-la-creacion-en-plata-s-xx/598-217).
Roberto Jesús Álvarez Ríos		
Title. Figure No.	Description	References
3 Orígenes (3 Origins). Figure 5B.	Oil on canvas signed and dated lower left, titled and dated on the back. Dimensions: 56 x 47.5 cm. Year: 1962.	Invaluable (https://www.invaluable.com/auction-lot/roberto-alvarez-rios-ne-en-1932-3-origenes-1962-4-c-b932b1f291). de la Fuente et al., 2021. de la Fuente et al, 2023.
Jorge Camacho Lazo & Agustín Cárdenas Alfonso		
Title. Figure No.	Description	References
Exquisite Corpse, also known as Cadavre Exquis. Figure 5C.	Ink drawings on French Gitanes cigarette packs Dimensions: 22.5 x 7.5 cm and 21 x 7.5 cm. Year: 1960.	The drawings were made during a meeting in the studio of Cuban artist Gina Pellón (1926-2014). Provenance: Gina Pellón Collection.

Source: By the author

4. Data Analysis

4.1. Salvador Dalí as a Reference of Surrealism

Salvador Felipe Jacinto Dalí y Domenech (1904–1989), widely known as Salvador Dalí, remains one of the most iconic and provocative figures in surrealist art (Fig. 1A). As noted by Kritsky et al. (2013), Dalí is "arguably the most flamboyant and disturbing Surrealist artist of emerging twentieth-century Modernism." His prolific output included thousands of creative works, ranging from paintings and engravings to sculptures, books, films, holograms, and entire immersive environments (Michler and Lopsinger, 1994; 1995; Field, 1996).

While classical surrealism emphasized spontaneous expression drawn from the unconscious mind (Breton, 1962), Dalí consciously rejected this automatist technique. Instead, between 1929 and 1930, he developed his own method, the "paranoiac-critical method," which he described as producing "irrational knowledge" through a "delirium of interpretation." This approach eventually led to his dissociation from the Surrealist group in 1939 (Kritsky et al., 2013). Nevertheless, Dalí's works continue to exemplify surrealist aesthetics and remain central to the movement's visual language.

Dalí's art frequently integrates scientific motifs, including fossils and insects, as part of his symbolic and psychological explorations. He introduced the term "fossil" in several of his pieces (Fig. 1B) and recurrently depicted insects such as ants, butterflies, flies, grasshoppers, beetles, and caterpillars (Figs. 2A–2B, 3B–3C). These organisms were often symbolic of decay, death, desire, and psychological fear. For example, ants, one of his most frequently illustrated insects, represented both death and sexual anxiety. As Kritsky et al. (2013) observed, Dalí associated ants with decay and guilt-laden eroticism. Furthermore, Nuwer (2013) proposed that Dalí experienced tactile and visual hallucinations involving insects, suggesting a phobia manifesting in his art.

Dalí's depictions were not limited to insects alone; other arthropods such as spiders and mites, as well as skeletal forms and bone structures, also appear throughout his work (Figs. 4A–C, 5A, 5D, 5E). These visual elements reflect both his fascination with natural history and his unique contribution to visualizing paleontological concepts through symbolic and surreal forms.



Figure 1: Dalí and inspired paleontology. (A) Salvador Dalí out of his house, November 1957 (image rights of Salvador Dalí reserved. Fundació Gala-Salvador Dalí, Figueres, 2025). Nature and science are an essential component of Dalí's representations. (B) Salvador Dalí (After). The fossil automobile of Cape Creus. This piece introduces the term "fossil" in artist's work. Refer to Table 1 for detailed provenance and classification.



Figure 2: Dalí ants. (A) Salvador Dalí. The Earth Goddess (The Chef). The piece contains representations associated with a fossil ant and bones. Ant representation classified as a small ant (*Linepithema* sp., Hymenoptera:Formicidae) and identified in an inclusion in Burmese amber, Cretaceous (66 – 143.1 Mya; ca. 99 Mya). (B) Salvador Dalí (After). Sirenas peinadas con coral y hormigas (Mermaids haired with coral and ant). Part of a table service. The piece contains an ant representation classified as putative Weaver of green ant (*Oecophylla* sp., Hymenoptera:Formicidae) and identified in an inclusion in Baltic amber, Eocene (33.9 – 55.8 Mya). Refer to Table 1 for detailed provenance and classification.

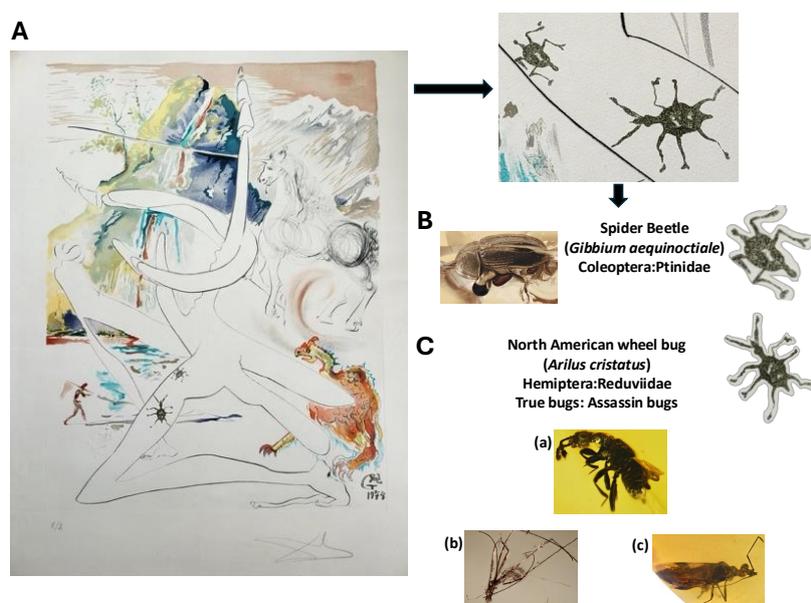


Figure 3: Dalí, beetle and bug. (A) Salvador Dalí. L'Unicorne laser désintègre les cornes de rhinocéros cosmiques (The unicorn laser disintegrates the horns of cosmic rhinoceroses). The piece contains representations associated with two fossil insects and bones. Additional information in Table 1. (B) Insect representation classified as Spider beetle (*Gibbium aequinoctiale*) Coleoptera:Ptinidae and identified in an inclusion in Baltic amber, Eocene (33.9 – 55.8 Mya). (C) Insect representation classified as North American wheel bug (*Arius cristatus*) Hemiptera:Reduviidae (True bugs: Assassin bugs) and identified in inclusions in (a) Dominican amber (Miocene, ca. 15 – 20 Mya), (b) Baltic amber (Eocene, 33.9 – 55.8 Mya) and (c) Burmese amber (Cretaceous, 66 – 143.1 Mya; ca. 99 Mya). Refer to Table 1 for detailed provenance and classification.

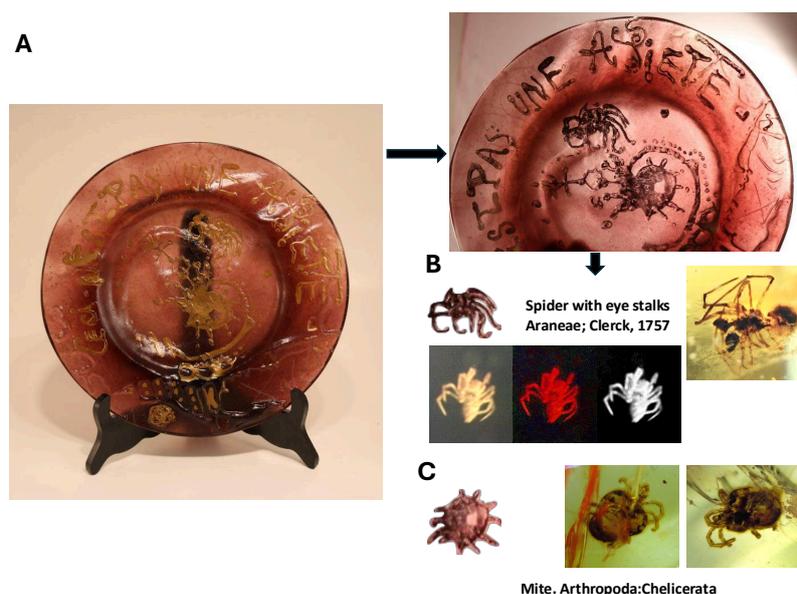


Figure 4: Dalí, spider and mite. (A) Salvador Dalí. Ceci n'est pas une assiette (This is not a dish). The piece contains representations associated with fossil spider and mite. Additional information in Table 1. (B) Spider representation classified as spider (Class Arachnida, Order Araneae; Clerck, 1757) with eye stalks identified in Burmese amber (Cretaceous, 66 – 143.1 Mya; ca. 99 Mya) and without eye stalks identified in Dominican amber (Miocene, ca. 15 – 20 Mya). (C) Acari representation classified as mite (Phylum: Arthropoda, Subphylum: Chelicerata) (soft tick, Family Argasidae; C. L. Koch, 1844 not discarded) and identified in Dominican amber (Miocene, ca. 15 – 20 Mya). Refer to Table 1 for detailed provenance and classification.

4.2. Surrealism in Cuban Art

The influence of surrealism extended deeply into Latin American visual culture, particularly in Cuba, where artists embraced its language to explore indigenous identity, folklore, and evolutionary symbolism (de la Fuente, 2023a). Among the leading Cuban surrealists examined in this study is Roberto Jesús Álvarez Ríos (1932–2005), whose work presents a unique visual interpretation of the origins of life (Fig. 5B). His paintings often raise ontological questions about the evolutionary trajectory and relationships between species (Art Cubain Contemporain, 1961; de la Fuente et al., 2021).

Jorge Camacho Lazo (1934–2011), another central figure in Cuban surrealism, incorporated a rich bestiary of animals into his compositions. His work reflects ecological consciousness and a vision of symbiosis between humans and animals (Camacho and Arrabal, 1992; de la Fuente, 2020). His collaboration with sculptor Agustín Cárdenas Alfonso (1927–2001)

produced notable joint pieces such as *Exquisite Corpse* (Fig. 5C) and exhibitions like “Pilgrimage to the Sources of the Marvelous” (Camacho and Cárdenas, 1998), which emphasize hybrid forms and collective creativity.

Agustín Cárdenas remains one of the most globally recognized surrealist sculptors. In 1995, he became the first and only surrealist to receive Cuba’s National Prize for Fine Arts, acknowledging his contribution to the national and international art scene (Power, 2024). His sculptural works, grounded in Afro-Cuban folklore and myth, explore the morphogenesis of life forms and speculate on the origins of biodiversity (Cárdenas, 1971; Power, 2024).

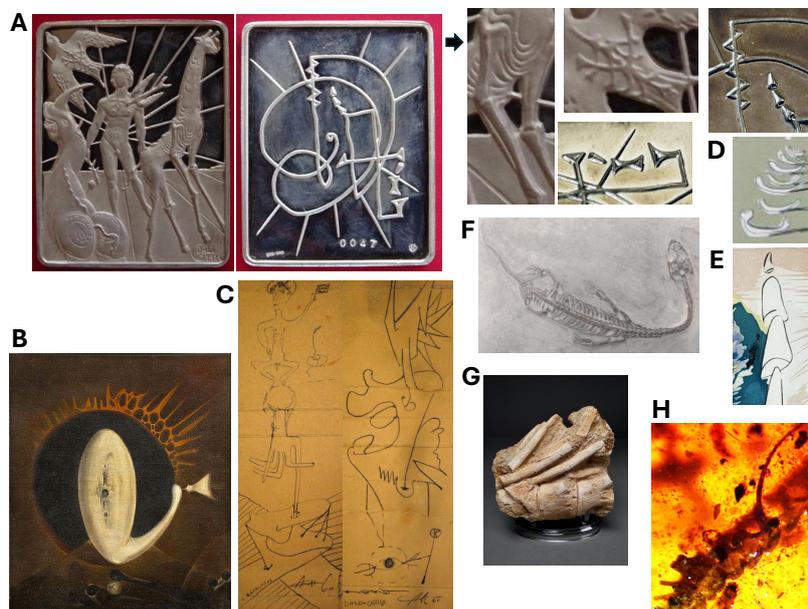


Figure 5: Bone representations inspired by Dalí and Cuban Surrealism art. (A) Salvador Dalí. Sculpture, God in the creation of the world. From the series, “The 7 days of creation”. (B) Roberto Jesús Alvarez Ríos. 3 Orígenes (3 Origins). (C) Jorge Camacho Lazo and Agustín Cárdenas Alfonso. *Exquisite Corpse*, also known as *Cadavre Exquis*. (D) Salvador Dalí. From *The Earth Goddess (The Chef)* (Fig. 2A). (E) Salvador Dalí. From *L'Unicorne laser désintègre les cornes de rhinocéros cosmiques (The unicorn laser disintegrates the horns of cosmic rhinoceroses)*. (Fig. 3A). (F) Dinosaur (*Keichousauris hui*) mudstone and silts of found in Guizhou, China fossil (Middle Triassic, ca. 245 Mya; length in stretched position, 11 cm; plate height x with x depth, 7.9 x 12.3 x 1 cm). (G) Mosasaurus (*Prognathodon solvayi*) aquatic squamate reptile vertebrae and ribs found in Morocco fossil (Cretaceous, ca. 145 - 66 Mya; height x with x depth, 12 x 11.5 x 4 cm; weight, 416 g). *Prognathodon* had massive jaws and strong skeletal structure and was a top predator of Cretaceous time. (H) Animal bone identified in Burmese amber (Cretaceous, 66 – 143.1 Mya; ca. 99 Mya; height x with x depth, 1.8 x 1.0 x 0.5 cm). Refer to Table 1 for detailed provenance and classification.

5. Results

Surrealism evolved into a global artistic movement characterized by intercultural expressions that varied across continents, each adaptation reflecting local cultural, philosophical, and historical perspectives. Within Latin America, surrealist artists such as Frida Kahlo (Mexico, 1907–1954), Agustín Cárdenas (Cuba, 1927–2001), and Wifredo Lam (Cuba-France, 1902–1982) integrated pre-Columbian symbolism and indigenous cosmologies into their works, creating a distinct regional surrealist discourse.

Collaboration between scientists and artists has served to address scientific challenges through innovative approaches in areas such as molecular biology, biotechnology, and biomedicine, with potential implications for the control of infectious diseases such as the COVID-19 pandemic (de la Fuente et al., 2015; 2020; Eldred, 2016; de la Fuente, 2018; 2020; 2022; 2023b; Artigas-Jerónimo et al., 2020; Contreras et al., 2022; 2025). The results of these collaborations between science, visual arts, and music support the development of new methodological approaches to inspire scientists to address scientific challenges and previously unexplored research areas (de la Fuente et al., 2015; Eldred, 2016; Artigas-Jerónimo et al., 2020; de la Fuente, 2020; 2022).

In the context of art-science collaboration, this study examined how surrealistic artworks, particularly those of Salvador Dalí and Cuban surrealists, inspire paleontological interpretation. Specifically, the study sought to answer the research question: *How do intercultural surrealistic artistic representations inspire and inform paleontological inquiry, particularly in the morphological study of fossil arthropods and skeletal remains?*

The findings demonstrate a visual and conceptual convergence between surrealistic motifs and paleontological forms. For example, Dalí’s artwork *Sirenas peinadas con coral y hormigas* featured ant imagery closely resembling *Oecophylla* (weaver ants), which are known from Baltic amber inclusions dating to the Eocene epoch (Fig. 2B). Similarly, in *The Earth Goddess (The Chef)*, another ant figure was linked to *Linepithema* species preserved in Burmese amber from the Cretaceous period (Fig. 2A). These connections suggest a remarkable alignment between Dalí’s artistic imagination and fossilized arthropod morphology.

Further examples include Dalí’s *L'Unicorne laser désintègre les cornes de rhinocéros cosmiques*, which appears to depict two insects: a spider beetle (*Gibbium aequinoctiale*) and a wheel bug (*Arilus cristatus*). Both have fossil records in amber deposits across the Miocene, Eocene, and Cretaceous periods (Figs. 3B–C). In addition, representations of spiders and mites in Dalí’s *Ceci n’est pas une assiette* (Fig. 4A) were tentatively matched with known arachnid fossils found in amber (Figs. 4B–

C). The study also explored how skeletal and bone motifs, present in both Dalí's and Cuban surrealists' work, paralleled vertebrate fossil specimens such as *Keichousauris* and *Prognathodon* (Figs. 5F–H).

6. Discussion

The visual associations between surrealist representations and paleontological specimens offer new interdisciplinary insights. Surrealist artists, particularly Salvador Dalí, developed a lexicon of symbols that coincidentally or intuitively aligned with scientifically documented fossils. These aesthetic choices, while not anatomically precise, evoke morphological similarities that may serve as conceptual bridges between scientific illustration and artistic imagination.

One compelling methodological parallel is the surrealist technique *Cadavre Exquis* (Exquisite Corpse), which emphasizes spontaneous and collective visual interpretation. Originating as a game among Surrealists, it involves successive artists adding to a composition without knowing what came before, often resulting in strange and composite creatures (de la Fuente, 2020; Rose, 2016). This approach mirrors the way scientists reconstruct extinct organisms from incomplete fossil records, combining partial evidence to form holistic representations. Thus, *Cadavre Exquis* can metaphorically represent the fragmented and interpretive nature of paleontological reconstruction.

Moreover, paleoart, defined as scientifically informed artistic depictions of prehistoric life, serves as a formal intersection between scientific visualization and creative representation (de la Fuente, 2023b). While paleoart typically adheres to anatomical accuracy, surrealistic paleo-imagery provides freedom to explore symbolic meanings and intercultural interpretations. In this way, surrealism enriches scientific narratives by embedding them within broader philosophical and cultural contexts.

The representation of *Oecophylla* ants in Dalí's work, despite their present absence in Europe, aligns with fossil evidence of their presence in Baltic amber (Wilson and Taylor, 1964; Rastogi, 2011). Additionally, Dalí's depiction of these ants in association with fish may allude to their role in entomophagy and trophic interactions, reflecting ecological behaviors documented in both modern and fossil records (Raksakantong et al., 2010; Migani et al., 2017). Such symbolic associations, though speculative, provoke scientific curiosity and invite reinterpretation of fossil data through new lenses.

The depiction of assassin bugs, such as *Arilus cristatus*, in Dalí's art also aligns with fossil evidence from multiple amber deposits. These insects, known for their predatory behavior and painful bites, have been extensively documented in evolutionary biology and public health literature (Hwang and Weirauch, 2012; Boswell and Elston, 2023). Their inclusion in surrealist art underscores the visceral and psychological impact of these species, resonating with Dalí's themes of anxiety, fear, and decay.

Furthermore, non-insect arthropods such as spiders and mites, tentatively identified in Dalí's work, also correspond to fossil records found in Dominican and Burmese amber (Magalhaes et al., 2020; Kolesnikov et al., 2024; Villar et al., 2025). These representations demonstrate how surrealism, despite its abstract and subconscious nature, can reflect biological diversity and evolutionary themes.

The integration of skeletal and fossil forms in both Dalí's and Cuban surrealists' artworks, especially those by Roberto Alvarez Ríos, Jorge Camacho, and Agustín Cárdenas, demonstrates a consistent visual interest in the origins, transformations, and coexistence of life forms. These themes resonate with contemporary paleontological efforts to reconstruct the phylogeny and ecological roles of extinct organisms, including dinosaurs and other vertebrates (Maidment and Butler, 2025; Zhou, 2022).

The surrealist representations examined in this study do not only reflect imaginative interpretations of natural forms; they also serve as cognitive triggers for scientific inquiry. For example, Dalí's portrayal of ants and beetles provokes questions about evolutionary behavior, insect morphology, and ecological roles. Similarly, representations of skeletal structures in Cuban surrealism raise hypotheses about phylogenetic relationships and the morphological variability of extinct species. These visual metaphors thus act as speculative models, inspiring scientists to explore paleontological questions from novel angles. Therefore, the interdisciplinary intersection of intercultural surrealism and paleontology reveals untapped potential for generating new scientific questions, promoting visual thinking, and expanding the communicative reach of science through artistic expression.

7. Conclusions

This study explored the intersection between surrealist art and paleontology by examining how intercultural artistic representations, particularly those by Salvador Dalí and Cuban surrealists, can inform and inspire scientific inquiry into fossilized life. Through the lens of surrealism, the research aimed to understand how symbolic, imaginative depictions align with paleontological forms, especially arthropods preserved in amber and skeletal remains of extinct species. The guiding research question was: *How do intercultural surrealistic artistic representations inspire and inform paleontological inquiry, particularly in the morphological study of fossil arthropods and skeletal remains?*

The analysis revealed that certain surrealist motifs bear striking morphological and conceptual similarities to scientifically documented fossil specimens. These visual resonances suggest that artistic imagination, while not grounded in scientific methodology, may serve as a catalyst for novel forms of inquiry and interpretation. Moreover, the integration of symbolic art with scientific frameworks, such as those used in paleoart, opens up new interdisciplinary pathways for visualizing, understanding, and communicating evolutionary processes. Therefore, this study confirms the value of art-science collaborations in advancing both empirical knowledge and cultural engagement with scientific themes.

It is important to recognize the interpretive limitations when translating surrealist and intercultural art into scientific discourse. Artistic symbolism is often subjective and context-dependent, shaped by cultural narratives, historical moments, and individual vision. Therefore, while such representations can inspire paleontological hypotheses, they should not be mistaken for empirical data. Future collaborations between scientists and artists must remain attentive to these epistemological boundaries and engage in culturally sensitive dialogue that respects the origins and meanings embedded in artistic expression.

8. Future Research

Further research should build upon the foundational insights of this study by promoting deeper, interdisciplinary collaborations between scientists and artists, particularly within paleontology and evolutionary biology. Future investigations could expand the scope of intercultural surrealist representations beyond the works of Dalí and Cuban artists to include other regional surrealist traditions, thereby broadening the cultural and symbolic vocabulary applied to fossil interpretation.

Additionally, research could focus on integrating computational techniques, such as image recognition, morphometric analysis, and semantic annotation, with paleoart and surrealist imagery. This fusion could lead to the development of hybrid methodologies that bridge traditional scientific analysis with creative visualization techniques. Furthermore, studies may explore how public engagement with paleontology can be enhanced through culturally embedded visual narratives, enabling more inclusive and participatory forms of science communication.

9. Recommendations

To advance this interdisciplinary field, it is recommended that institutions and funding bodies actively support joint initiatives between scientific researchers and visual artists. Such collaborations should be designed with explicit objectives, ensuring both scientific rigor and artistic freedom. Educational programs, workshops, and symposia that integrate both disciplines can cultivate shared methodologies and mutual respect between practitioners.

Moreover, the incorporation of intercultural perspectives should be prioritized in future art-science projects. This approach not only enriches the interpretive scope of paleontological research but also enhances its societal relevance by aligning scientific narratives with diverse cultural expressions and worldviews. Finally, journals and academic platforms should encourage the publication of interdisciplinary studies that include both scientific findings and artistic interpretations, thereby legitimizing the contributions of art to scientific discovery.

Acknowledgement Statement: VEGAP Image Bank provided a license by for the publication of Salvador Dalí pieces. Salvador Dalí photograph licensed and reserved by Fundació Gala-Salvador Dalí, Figueres, 2025. Art pieces and fossils are part of the KGJ Collection (Ciudad Real, Spain).

Conflicts of interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' contribution Statement: The author was solely responsible for the conceptualization, methodology, data collection, analysis, and interpretation of this study.

Funding Statement: This research was partially supported by V International ZENDAL award 2024 (grant ZENDAL-2025-AYUDA-38326).

Data availability: The author has contained all sources of the data used in the research paper.

Disclaimer: The views and opinions expressed in this article are those of the author(s) and contributor(s) and do not necessarily reflect JICC's or editors' official policy or position. All liability for harm done to individuals or property because of any ideas, methods, instructions, or products mentioned in the content is expressly disclaimed.

References

- Art Cubain Contemporain. (1961). *14 artistes choisis et presentes par Robert Altmann* [Exhibition catalog]. Galerie du Dragon - Galerie Eiller.
- 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>
- Bai, F., He, W., Gao, Y., Ping, W. J., & Fu, Q. M. (2025). Ancient genomes revealed the genetic history and interaction of prehistoric populations in the Ngari region of the western Tibetan Plateau. **Yi chuan = Hereditas*, 47*(5), 501-512. <https://doi.org/10.16288/j.ycz.24-368>
- Balanoff, A. M. (2024). Dinosaur palaeoneurology: An evolving science. *Biology Letters*, 20(12), 20240472. <https://doi.org/10.1098/rsbl.2024.0472>
- Ball, P. (2008). Quantum weirdness and surrealism. *Nature*, 453(7195), 983-984. <https://doi.org/10.1038/453983a>
- Boswell, N. D., & Elston, D. M. (2023). What's eating you? *Triatoma* and *Arilus cristatus* bugs. *Cutis*, 111(6), 289-291. <https://doi.org/10.12788/cutis.0793>
- Breton, A. (1962). *Manifeste du Surréalisme* (Original work published 1924). Jean-Jacques Pauvert Editeur.
- Brooks, K. R. (2017). Depth perception and the history of three-dimensional art: Who produced the first stereoscopic images? **i-Perception*, 8*(1), 2041669516680114. <https://doi.org/10.1177/2041669516680114>
- Camacho, J., & Arrabal, F. (1992). *El sueño de los insectos* [The dream of the insects]. Imprenta de la Diputación Provincial de Huelva.
- Camacho, J., & Cárdenas, A. (1998). *Pèlerinage aux sources du merveilleux* [Exhibition catalog]. Galerie Thessa Herold.
- Cárdenas, A. (1971). *La sculpture de Cardenas*. La Connaissance.
- Cohen, M. M., Jr. (1991). Picasso and the art of distortion and dislocation: The artist as researcher and experimentalist. *Journal of Craniofacial Genetics and Developmental Biology*, 11(2), 61-95.
- Colomb, D. (1986). Portraits d'artistes des années 50-60 [Exhibition catalog, Paris, France]. Studio 606.
- Contreras, M., Artigas-Jerónimo, S., Pastor Comín, J. J., & de la Fuente, J. (2022). A quantum vaccinomics approach based on protein-protein interactions. *Methods in Molecular Biology*, 2411, 287-305. https://doi.org/10.1007/978-1-0716-1888-2_17
- Contreras, M., Rafael, M., Sobrino, I., Almazán, C., Pastor Comín, J. J., Valdés, J. J., Prudencio, C. R., de Lima Neto, D. F., Borin, V. A., Agarwal, P. K., Kasajja, P. D., Fernández-Melgar, R., Rutaisire, J., & de la Fuente, J. (2025). Modelling

- protein-protein interactions for the design of vaccine chimeric antigens with protective epitopes. *PLoS ONE*, 20(2), e0318439. <https://doi.org/10.1371/journal.pone.0318439>
- De la Fuente, J. (2003). The fossil record and the origin of ticks (Acari: Parasitiformes: Ixodida). *Experimental and Applied Acarology*, 29(3-4), 331-344. <https://doi.org/10.1023/A:1025824702816>
- De la Fuente, J. (2022). Art-science multidisciplinary collaborations to address the scientific challenges posed by COVID-19. *Annals of Medicine*, 54(1), 2535-2548. <https://doi.org/10.1080/07853890.2022.2123557>
- De la Fuente, J. (2018). Anaplasmosis: What we can learn from Lam's surrealist animalarium. *Hektoen International*. <http://hekint.org/2018/08/23/anaplasmosis-what-we-can-learn-from-lams-surrealist-animalarium/>
- De la Fuente, J. (2020). The exquisite corpse for the advance of science. *Art and Science*, 4(3), 43. <https://doi.org/10.21494/ISTE.OP.2020.0506>
- De la Fuente, J. (2023a). El surrealismo en la plástica cubana [Surrealism in Cuban visual arts]. *International Journal of Humanities, Social Sciences and Education*, 10(2), 48-60. <https://doi.org/10.20431/2349-0381.1002005>
- De la Fuente, J. (2023b). Connecting fossil inclusions with artistic representations to approach scientific questions. *International Journal of Humanities, Social Sciences and Education*, 10(5), 36-43. <https://doi.org/10.20431/2349-0381.1005004>
- De la Fuente, J., Artigas-Jerónimo, S., & Pastor Comin, J. J. (2020). Collaboration between scientists and artists: A research methodological approach to advance science. *Merit Research Journal of Microbiology and Biological Sciences*, 8, 41-46.
- De la Fuente, J., Artigas-Jerónimo, S., & Villar, M. (2021). Akirin/Subolesin regulatory mechanisms at host/tick-pathogen interactions. *microLife*, 3, uqab012. <https://doi.org/10.1093/femsml/uqab012>
- De la Fuente, J., Estrada-Peña, A., Cabezas-Cruz, A., & Brey, R. (2015). Flying ticks: Anciently evolved associations that constitute a risk of infectious disease spread. *Parasites & Vectors*, 8, 538. <https://doi.org/10.1186/s13071-015-1154-1>
- De la Fuente, J., Estrada-Peña, A., Rafael, M., Almazán, C., Bermúdez, S., Abdelbaset, A. E., Kasaija, P. D., Kabi, F., Akande, F. A., Ajagbe, D. O., Bamgbose, T., Ghosh, S., Palavesam, A., Hamid, P. H., Oskam, C. L., Egan, S. L., Duarte-Barbosa, A., Hekimoğlu, O., Szabó, M. P. J., Labruna, M. B., & Dahal, A. (2023). Perception of ticks and tick-borne diseases worldwide. *Pathogens*, 12(10), 1258. <https://doi.org/10.3390/pathogens12101258>
- Descharnes, R., & Descharnes, N. (2004). *Salvador Dalí: Catalogue Raisonné of Sculpture and Objects "The hard and the soft"*. ECCART.
- Eldred, S. M. (2016). Art-science collaborations: Change of perspective. *Nature*, 537(7618), 125-126. <https://doi.org/10.1038/nj7618-125a>
- Field, A. (1996). *The official catalog of the graphic works of Salvador Dalí*. The Salvador Dalí Archives.
- Galeyev, B. M. (2005). Are "cognitive fossils" significant for art? Studies of synesthesia in normal and abnormal cases. *Leonardo*, 38(4), 365-366. <https://doi.org/10.1162/0024094054762025>
- Hwang, W. S., & Weirauch, C. (2012). Evolutionary history of assassin bugs (Insecta: Hemiptera: Reduviidae): Insights from divergence dating and ancestral state reconstruction. *PLoS ONE*, 7(9), e45523. <https://doi.org/10.1371/journal.pone.0045523>
- Jiménez, V. (2014). *Memoria del Surrealismo en Cuba*. Aduana Vieja.
- Kolesnikov, V. B., Vorontsov, D. D., & Sidorchuk, E. A. (2024). Seven new species from Eocene Baltic amber reveal surprising diversity and suggest possible speciation scenarios in the relictual family Collohmanniidae (Acari: Oribatida). *Zootaxa*, 5553(1), 1-78. <https://doi.org/10.11646/zootaxa.5553.1.1>
- Kritsky, G., Mader, D., & Smith, J. J. (2013). Surreal entomology: The insect imagery of Salvador Dalí. *American Entomologist*, 59(1), 29-37. <https://doi.org/10.1093/ae/59.1.28>
- Lipinski, L. (2022). Surrealism. In V. P. Glăveanu (Ed.), *The Palgrave encyclopedia of the possible*. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-90913-0_150
- Luis, C. M. (2007). Prismas de Wifredo Lam: Negritud y surrealismo. *Agulha Revista de Cultura*, 60, 1-17.
- Luis, C. M. (2008). Los surrealistas en la América [Surrealists in America]. *Agulha Revista de Cultura*, 62, 1-19.
- Magalhaes, I. L. F., Azevedo, G. H. F., Michalik, P., & Ramírez, M. J. (2020). The fossil record of spiders revisited: Implications for calibrating trees and evidence for a major faunal turnover since the Mesozoic. *Biological Reviews*, 95(1), 184-217. <https://doi.org/10.1111/brv.12559>
- Maidment, S., & Butler, R. J. (2025). New frontiers in dinosaur exploration. *Biology Letters*, 21(4), 20250045. <https://doi.org/10.1098/rsbl.2025.0045>
- McDermott, A. (2020). Science and culture: Dinosaur art evolves with new discoveries in paleontology. *Proceedings of the National Academy of Sciences*, 117(6), 2728-2731. <https://doi.org/10.1073/pnas.2000784117>
- Michler, R., & Lopsinger, L. W. (Eds.). (1994). *Salvador Dalí: Catalogue raisonné of etchings and mixed-media prints, 1924-1980*. Prestel.
- Michler, R., & Lopsinger, L. W. (Eds.). (1995). *Catalogue raisonné of prints II: Lithographs and wood engravings 1956-1980*. Prestel.
- Migani, V., Ekesi, S., Merkel, K., & Hoffmeister, T. (2017). At lunch with a killer: The effect of weaver ants on host-parasitoid interactions on mango. *PLoS ONE*, 12(2), e0170101. <https://doi.org/10.1371/journal.pone.0170101>
- Miller, E. (2021). The dinosaur from 600 BCE! Interpreting the dragon of Babylon, from archaeological excavation into fringe science. *Endeavour*, 45(4), 100798. <https://doi.org/10.1016/j.endeavour.2021.100798>
- Nadeau, M. (1975). *La historia del Surrealismo* [History of surrealism]. Editorial Ariel.
- Nuwer, R. (2013, October 30). Salvador Dalí suffered from the irrational fear that insects were crawling all over his skin. *Smithsonian Magazine*. <https://www.smithsonianmag.com/smart-news/salvador-dali-suffered-from-the-irrational-fear-that-insects-were-crawling-all-over-his-skin-6730867/>
- Paterson, R. S., Madupe, P. P., & Cappellini, E. (2025). Paleoproteomics sheds light on million-year-old fossils. *Nature Reviews Molecular Cell Biology*, 26(1), 1-2. <https://doi.org/10.1038/s41580-024-00803-2>
- Peñalver, E., Arillo, A., Delclòs, X., Peris, D., Grimaldi, D. A., Anderson, S. R., Nascimbene, P. C., & Pérez-de la Fuente, R. (2017). Parasitised feathered dinosaurs as revealed by Cretaceous amber assemblages. *Nature Communications*, 8(1), 1924. <https://doi.org/10.1038/s41467-017-01550-z>

- Poli, D. B., & Stoneman, L. (2020). Drawing new boundaries: Finding the origins of dragons in Carboniferous plant fossils. *Leonardo*, 53(1), 50-57. https://doi.org/10.1162/leon_a_01576
- Power, S. L. (2024). The sculpture of Agustín Cárdenas at the confluence of surrealism in Latin American artistic currents. *CECIL (Cahiers d'études des cultures ibériques et latino-américaines)*, 10*, 1-22. <https://doi.org/10.4000/cecil.5029>
- Raksakantong, P., Meeso, N., Kubola, J., & Siriamornpun, S. (2010). Fatty acids and proximate composition of eight Thai edible terricolous insects. *Food Research International*, 43(1), 350-355. <https://doi.org/10.1016/j.foodres.2009.10.014>
- Rastogi, N. (2011). Provisioning services from ants: Food and pharmaceuticals. *Asian Myrmecology*, 4, 103-120. http://www.asian-myrmecology.org/publications/am04_103-120_ragosti_2011.pdf
- Rose, J. R. (2016, September 8). Surrealism, an introduction. *Smarthistory*. <https://smarthistory.org/surrealism-intro/>
- Rossiyou, E., & Orolagas, A. (2018). Artistic expression and psychiatry in Greece: Prominence highlights (1950-2011). *Psychiatrike = Psychiatriki*, 29*(4), 349-358. <https://doi.org/10.22365/jpsych.2018.294.349>
- Silvio, J. R. (2005). Federico Garcia Lorca's Yerma: The use of a vitalizing fantasy self-object to survive trauma. *Journal of the American Academy of Psychoanalysis and Dynamic Psychiatry*, 33(1), 177-190. <https://doi.org/10.1521/jaap.33.1.177.65883>
- Villar, M., Estrada-Peña, A., Tormo, L., Parabela, C., González-García, A., Fernández-Castellanos, D., & de la Fuente, J. (2025). Paleoproteomics characterization of proteins in fossil arthropod parasitiformes amber inclusions. *Research Square*. <https://doi.org/10.21203/rs.3.rs-6123337/v1>
- Vršanský, P., Sendi, H., Kotulová, J., Szwedo, J., Havelcová, M., Palková, H., Vršanská, L., Sakala, J., Puškelová, L., Golej, M., Biroň, A., Peyrot, D., Quicke, D., Néraudeau, D., Uher, P., Maksoud, S., & Azar, D. (2024). Jurassic Park approached: A coccid from Kimmeridgian cheirolepidiacean Aintourine Lebanese amber. *National Science Review*, 12(3), nwae200. <https://doi.org/10.1093/nsr/nwae200>
- Wall, G., & Hale, A. (2020). Art & archaeology: Uncomfortable archival landscapes. *International Journal of Art & Design Education*, 39(4), 770-787. <https://doi.org/10.1111/jade.12316>
- Wilson, E. O., & Taylor, R. W. (1964). A fossil ant colony: New evidence of social antiquity. *Psyche: A Journal of Entomology*, 71(2), 93-103. <https://doi.org/10.1155/1964/17612>
- Zhou, Z. (2022). The rising of paleontology in China: A century-long road. *Biology*, 11(8), 1104. <https://doi.org/10.3390/biology11081104>

About the Author(s).



José de la Fuente is a professor at The Spanish National Research Council (CSIC) on the Group of Health and Biotechnology (SaBio) at Instituto de Investigación en Recursos Cinegéticos (IREC), Spain and at Center for Veterinary Health Sciences (CVHS), Department of Veterinary Pathobiology, Oklahoma State University (OSU), USA. de la Fuente coordinates the area of Genomics, Proteomics and Biotechnology. His research interests are in the fields of Molecular Biology, Biotechnology, Vaccinology and Biomedicine with methodological approaches promoting the collaboration between art and science.