Revista Científica de Ciencias Sociales y Humanidades
ISSN: 2307-6100 (Print) | 2706-9559 (Online)

Analysis of motif 3 rock painting from sector D at Quilla Rumi, Huánuco

Análisis de la pintura rupestre del motivo 3 del sector D de Quilla Rumi, Huánuco

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Received: 24-10-2024
Accepted: 28-12-2024
Online: 04-01-2025

Article available by scanning QR

Cite as
Alomía-Lucero, J. M., y Sixto-Dávila, L. (2025). Analysis of motif 3 rock painting from sector D at Quilla Rumi, Huánuco. *Desafíos, 16*(1), 29-35. https://doi.org/10.37711/desafios.2025.15.1.437

ABSTRACT

The objective of this research was to reinterpret Motif 3 in Sector D of the Quilla Rumi rock paintings (Huánuco), previously identified as bird-shaped. Images of the pictograph were compared with detailed photographs of the brown wasp *Polistes* sp., taken from frontal, lateral, and dorsal angles, as well as images of the paper nest built by these insects. The analysis revealed that the figure represented a paper wasp (*Polistes* sp.) depositing an egg into a cell of its nest, with features such as a curved mandible, bent antenna, prominent eyes, and two pairs of slender wings. The paper nest displayed shapes including circles, squares, and rhombuses, though not complete hexagons. A dot outside the circle symbolized the egg, associated with the beginning of the insect's biological cycle. The study concludes that the figure is not bird-shaped but insect-shaped, and specifically represents a *Polistes* wasp. This finding challenges previous interpretations and contributes to a deeper understanding of Andean rock art.

Keywords: *wasp; cell; egg; bird-shaped; rock painting; documentation.*

RESUMEN

El objetivo de esta investigación fue reinterpretar el motivo 3 del sector D de las pinturas rupestres de Quilla Rumi (Huánuco), antes considerado ornitomorfo. Se compararon imágenes de la pictografía con fotografías detalladas de la avispa marrón *Polistes* sp., tomadas desde ángulos frontales, laterales y dorsales, así como imágenes del nido de papel que construyen estos insectos. El análisis mostró que la figura representaba una avispa papelera *Polistes* sp. depositando un huevo en una celda de su nido, con rasgos como mandíbula curvada, antena curvada, ojos prominentes y dos pares de alas delgadas. El nido, hecho de papel, incluyó formas como círculos, cuadrados y rombos, aunque no hexágonos completos. Un punto fuera del círculo simbolizó el huevo, ligado al inicio del ciclo biológico del insecto. Se concluye que la figura no era ornitomorfa, sino entomomorfa, identificada como una avispa *Polistes* sp. Este hallazgo cuestionó interpretaciones previas y enriqueció la comprensión del arte rupestre andino.

Palabras clave: *avispa; celda; huevo; ornitomorfo; pintura rupestre; documentación.*

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INTRODUCCTION

Rock art, understood as an ancient cultural manifestation, transcends mere visual representation to become a symbolic language laden with meanings; an eloquent reflection of the worldview, beliefs, and complex interactions of ancient societies with their natural and spiritual environments.

In the Peruvian context, the Huánuco region houses an exceptional testament to this artistic expression at the archaeological site of Quilla Rumi, where over 200 rock art representations have captured the attention of researchers such as Morales and Echevarría (2012), Palacios Jiménez (2020), and Echevarría López (2016). As noted by Onuki (1999) and Rubina López (2017), Quilla Rumi dates back to the Archaic period in Huánuco, characterized by hunting, fishing, and gathering activities.

Regarding rock art, Palacios Jiménez (2020) highlights its significance and impact as a communicative form in its early evolutionary phase, serving as the seed for the development of thought and writing. Works by Pérez Maestro (2020), Ordóñez Inga (2013), and Núñez (2012), though focused on other aspects of Andean art, could serve as a foundation to expand this line of inquiry.

Peru boasts abundant rock art. For instance, Rodríguez Cerrón (2006) conducted a historical-interpretative study of rock art in the San Martín department, specifically on the pictographs of Aucapata (Moyobamba). Pérez Maestro (2020) notes that numerous pictographs were documented in the Nepeña valley, Ancash department; and Ordóñez Inga (2013) investigated a large cliff known as Incanäni.

Núñez (2012) suggests that sites with rock art were likely considered sacred places in the past. From a philosophical and hermeneutic perspective, Echevarría López (2016) indicates that the paintings express a system of thought and language, knowledge, and wisdom. Furthermore, Echevarría López (2019) provides a historical overview of Peruvian rock art studies and concludes that the way this cultural evidence is valued is very archaic. Echevarría López (2012) also states that the epistemological value of knowledge is based on a thorough understanding of conceptual categories.

According to Tello (1960), the origin of native Peruvian culture, such as Chavín, was Amazonian, due to the cultural diversity in that region. This was corroborated by Ordóñez (2014), who mentions that the Wamalli migrated from the jungle edge and occupied the Alto Marañón basin.

The fragmented appreciation of rock paintings in Peru, according to Echevarría López (2019), reveals a lack of understanding of the material nature of rock art and little scientific interest in establishing a technical definition based on formal categories with epistemological value. For Echevarría López (2012), four categories are proposed: figurative image, support, immediate environment, and landscape.

According to Plasencia (2021), this cognitive effort has implications throughout the Huallaga basin and is related to various other sites with *quilcas* (rock art), such as Marabamba or Letra Machay. Pulgar Vidal (2014) states that the meaning of the name "Quilla-Rumi" corresponds to a large stone located near the summit of a high hill. Morales and Echevarría (2012) indicate that Quilla Rumi is one of the most relevant examples of rock art.

Morales and Echevarría (2012) emphasize Quilla Rumi, stating that some of the brightest ideas in Peruvian rock art research originated here. In this regard, Echevarría López (2019) highlights keys for its conservation, protection, and especially for providing social value to this important cultural evidence.

Alomía-Lucero and Sixto-Dávila (2024) make the first current scientific interpretations of some motifs at Quilla Rumi, concluding that motifs 20, 21, and 19 represent the quinary system. Additionally, the most important figure is the circular-shaped one with a central drawing, which Morales and Echevarría (2012) refer to as motif 3. It consists of a completely red figure with two figurative fields: the outer one comprising a band with square or circular spaces with a central dot; and the inner one composed of a central figure, apparently bird-like, surrounded by dots.

To analyze each figure, auxiliary sciences like biology are needed, with wasps being a significant group. Sarmiento (1994) refers to collections of social wasps (*Hymenoptera: Vespidae*) since 1960 in various regions and localities of Peru, while also explaining the architecture of nests and colony organization.

Regarding the taxonomy of the wasp *Polistes sp.*, the Reserva Ecológica Costanera Sur (2006) indicates that it belongs to the order *Hymenoptera*, family *Vespidae*. Brito et al. (2024) state that *Polistes Latreille*, 1802 is a genus with a cosmopolitan distribution. Concerning

the habits of this species, Oliveira et al. (2017) mention that they are eusocial insects, considered valuable biological control agents.

Mora-Rubio and Pérez-Bote (2024) report that in Iberia, 90.44% of people claim to have been stung. Sumner and Hurtado Yow (2024) indicate that the primitive tropical wasp *P. canadensis*, reddish-brown in color, is known as the paper wasp. Amaru-Castelo et al. (2023) add that the subfamily *Polistinae* (*Hymenoptera: Vespidae*) is a group of social wasps.

In another study, García Sánchez (2024) mentions predatory wasps as biological control agents. Regarding morphology, Ribeiro Júnior (2021) emphasizes that the antennae of *P. simillimus* wasps are very sensitive; likewise, Silveira and Santos Jr. (2011) conclude that the mandibles of *Polistinae* are adapted for cutting fibers.

Concerning wasp habits, Rusina et al. (2007) note that *Polistes* females tend to found nests in a peculiar manner, either individually or in groups. Pérez-Bote and Mora-Rubio (2020a) found that the mortality of *Polistes* colonies is due to anthropic activity, nest abandonment, and the natural decline of the colony. Beingolea (1986) mentions that it is natural for the wasp, armed with a potent sting and warning colors, to react defensively to protect the nest. Stabentheiner et al. (2022) observed that *P. biglumis* and *P. gallicus* build nests outdoors. Kovac et al. (2022) add that some *Polistes* species are very careful in choosing their nesting sites. Pérez-Bote and Mora-Rubio (2020b) confirm that wasps are currently more abundant in less urbanized areas.

Given all the above, the objective of this research was to analyze the most important pictograph of Quilla Rumi, identified as motif 3 of sector D, to determine whether it is not a bird-like figure but rather an insect-like one.

METHODOLOGY

This study was conducted under a qualitative approach, of a basic type, and with a descriptive level, aiming to reinterpret motif 3 of sector D of the Quilla Rumi rock paintings in the Huánuco department (Peru), by comparing its iconographic characteristics with the morphology and biological context of the wasp genus *Polistes sp*. A cross-sectional design was adopted, as the analysis focused on a specific moment, without variable manipulation or temporal tracking, allowing the examination of the object in its current state, using descriptive methods that facilitated a detailed characterization of the observed elements.

To obtain information, direct observation and visual comparison techniques were employed, applied to both the rock painting and *Polistes sp.* specimens and their natural environment. *In situ* observations and archival images of motif 3 from sector D were conducted, recording its formal characteristics, including shape, color, contours, and adjacent elements present in the pictograph. This phase focused on identifying patterns and details that could relate to zoomorphic representations, particularly of insects. Subsequently, observations of live *Polistes sp.* wasp specimens in their natural habitat were carried out, with special attention to their morphology and behavior. A high-resolution digital camera was used to capture precise details.

The analysis technique centered on detailed visual comparison between photographic images of *Polistes sp.* and the rock representation.

To contextualize the findings and enrich critical judgment, an exhaustive bibliographic review of scientific articles on rock paintings was conducted, emphasizing Andean iconography and zoomorphic representations. This theoretical framework supported the study's deductions, providing background on the artistic and symbolic practices of the region's ancestral cultures.

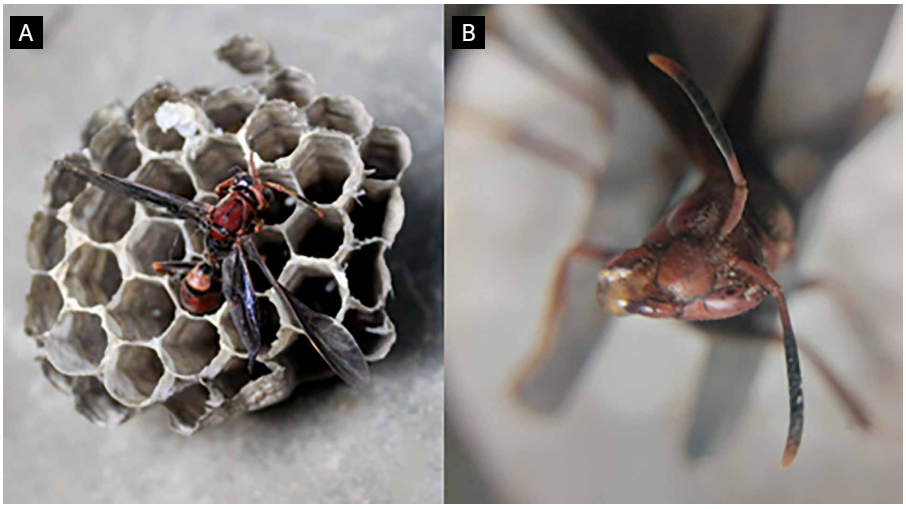
RESULTS

Figure 1 depicts the famous *quilca* of Quilla Rumi, recorded as motif 3 of Sector D at Quilla Rumi, according to the studies by Morales and Echevarría (2012). This processed photograph serves as the basis for the interpretation developed in this study. It represents the most emblematic and enigmatic figure of Quilla Rumi, having inspired numerous interpretations to date—none of which have succeeded in providing any precise explanation. Without a doubt, it stands as the oldest artistic expression of the people

Figure 1
Photograph of the rock painting of motif 3 from sector D of Quilla Rumi

Source: Adapted from Barrantes Zamora (2012).

Figure 2
Photographs of the wasp Polistes sp. tending to its brood in its nest, Huánuco–Peru



Note. A. Polistes wasp in its nest. B. Frontal view of the wasp's head.

of Kotosh; a refined painting when compared to the grotesque figures typical of the pre-Inca period.

During the phase of observation and photographic documentation of *Polistes sp.*, frontal and lateral views of the wasp's head were obtained, highlighting features such as the antennae, compound eyes, and mandibles, as well as a dorsal view of the entire body, captured while the insect was on its nest. These perspectives allowed for an analysis of the wasp's body structure and wings in relation to its immediate environment. The resulting images provided a solid foundation for visual comparison with the rock painting, emphasizing similarities in the shape and arrangement of elements.

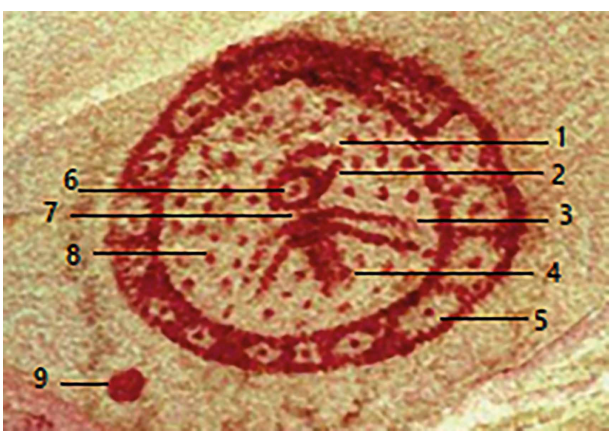
In analyzing the nest of *Polistes sp.*, attention was paid to the paper nest structure built by the wasp, described as having a bell shape that, from a bottom view, takes on a circular appearance. This characteristic was directly compared with the predominant circular shape in the rock painting. Additionally, the presence of eggs within the nest cells was noted, allowing for a symbolic or representative exploration of the circular dots or spaces found in the pictograph.

The visual comparison between the photographic images of *Polistes sp.* and the rock art representation allowed for the identification of morphological similarities, such as the silhouette of the body, the positioning of the limbs, and the shape of the head. Furthermore, a small dot located next to the main figure in the painting was interpreted as a contextual element related to the larger drawing. This detail suggested the possibility of a broader visual narrative in which the central figure—proposed as a wasp—interacts with other components of the depicted environment.

Figure 2A shows the wasp with part of its abdomen inside a cell, a globose thorax with two pairs of slender wings, and antennae extending from its head and curving toward the cells. A small white egg can be seen inside each cell, which are hexagonal in shape. The cells are proportional to the size of the insect's body. Figure 2B highlights the features of the wasp's head, including prominent oval eyes, short curved mandibles, and curved antennae that are longer than the mandibles.

Figure 3 shows nine clearly defined components: (1) represents the long antenna, (2) the short mandible, (3) the thin forewing, (5) the hexagonal cell, (6) the insect's eye, (7) the wasp's narrow neck, (8) secondary eggs, and (9) the primary initial egg.

Figure 3
Analysis of the rock painting of motif 3 in Sector D of Quilla Rumi



Source: Adapted from Barrantes Zamora (2012).

It is evident that, based on the figures and the analysis in Figure 3, the most plausible interpretation is that the rock painting depicts a *Polistes sp.* wasp, a species abundant in the Huánuco region and the highlands of Quilla Rumi, where these wasps and their nests can still be found. The dot beside the main figure likely represents an egg, which could give rise to a new individual and, in turn, a nest with numerous offspring. The round, quadrangular, pentagonal, and rhomboidal cells symbolize the compartments for each egg or larva.

It is possible that the people of Kotosh were unable to draw a true hexagon due to cognitive limitations and a lack of geometric knowledge at the time, as well as the absence of fine brushes for more precise representation. Nevertheless, this artwork is immensely valuable and arguably represents the finest figure they could produce in those remote times. The dots within each cell correspond to eggs laid by the wasp, suspended by a silk thread to prevent them from falling. At the center is the mother wasp guarding the eggs and larvae, which she nourishes initially with flower nectar and later with monarch butterfly (*Danaus plexippus*) larvae—an insect that also feeds on the host plant *Asclepias curassavica*, a herbaceous species from the Euphorbiaceae family still abundant in the area.

DISCUSSION

The analysis of Quilla Rumi's rock art, understood as a cultural manifestation in line with Montes Gutiérrez (2012), invites us to explore its pictographs through a hermeneutic lens—one that reveals the systems of thought and lived experiences of its creators. Within a scientific framework that integrates entomological and insect morphological knowledge, a reinterpretation of Motif 3 in Sector D is proposed. This figure has traditionally been viewed by Morales and Echevarría (2012) as bird-shaped—depicting a bird or hummingbird flapping its wings, as suggested in Figure 27 of their report. In contrast, our study suggests that the depiction corresponds to a *Polistes sp.* wasp laying an egg inside a nest cell, a hypothesis that dismisses the avian interpretation and instead posits an insect-shaped identity.

This reinterpretation is grounded in precise morphological and behavioral evidence. Silveira and Santos Jr. (2011) describe the curved mandibles of *Polistinae* wasps, adapted for cutting wood fibers—a trait visible in the rock painting. Likewise, Ribeiro Júnior (2021) emphasizes the curved antenna of *Polistes simillimus*, a distinctive feature that reinforces our identification. Regarding nesting habits, Rusina et al. (2007) report that female *Polistes* often found nests individually (haplometrosis), a behavior reflected in the solitary wasp beside its nest, suggesting a founding female. Stabentheiner et al. (2022) support this, noting that species like *Polistes biglumis* and *Polistes gallicus* build exposed nests without protective coverings—a detail evident in the painting's nest depiction. These features, coupled with the abundance of *Polistes* in the Huánuco Valley documented by Sarmiento (1994), reinforce our interpretation.

The figure includes a dot in the lower-left quadrant, previously misinterpreted as the moon orbiting Earth. Echevarría López (2016), in his epistemological critique, warns against anachronistic readings that impose foreign meanings onto cultural representations. In this case, the dot does not refer to celestial bodies but rather forms part of the nest's immediate surroundings, possibly symbolizing a cell or an egg—elements consistent with the biology of paper wasps. This insect, known for its venom and aggression (Mora-Rubio & Pérez-Bote, 2024), builds hexagonal-cell nests under rocks, a behavior likely to have impressed ancient peoples. Engaged in hunting, fishing, and gathering with nascent agricultural practices (Onuki, 1999), these communities might have seen in *Polistes* colonies a model for social organization, representing them as symbols of cohesion and learning.

Our findings resonate with the pioneering research of Alomía-Lucero and Sixto-Dávila (2024), who analyzed other Quilla Rumi motifs from numerical and zoomorphic perspectives. Nevertheless, interpretations associating the site with an astronomical calendar or 'flying saucers' are dismissed, as critiqued by Echevarría López (2019), who considers them subjective and lacking scientific validity. He attributes the fragmented appreciation of Peruvian rock art to a lack of understanding of its material nature and insufficient scientific rigor.

Indeed, the Kotosh people, as described by Onuki (1999), lacked the advanced astronomical knowledge that such theories presume. While Rubina López (2017) suggests that Andean *runa* (people) paid great attention to astronomy, our observations of the engravings—dominated by animals, hunting scenes, and natural elements like the sun—point instead to connections with daily life and the immediate environment, aligning with Echevarría López's (2012) "landscape" category.

Calero's (2023) categories of "figurative image," "immediate environment," and "landscape" are adopted to anchor the analysis within the natural and cultural context of Quilla Rumi. The wasp's depiction not only

reflects its habitat but also complements Pulgar Vidal's (2014) recognition of the site as an ideographic canvas. While this study focuses on a single motif, it opens possibilities for examining other figures through an insect-shaped or zoomorphic lens—identifying local fauna and their role in ancestral worldviews.

The scarcity of detailed studies and the ongoing degradation of pictographs—lamented by Morales and Echevarría (2012)—underscore the urgency of reevaluating and digitizing this heritage, as recommended by Echevarría López (2019). Such efforts preserve material evidence and foster cultural identity among younger generations, helping them understand their ancestral legacy. Palacios Jiménez (2020), for his part, emphasizes rock art as a primordial form of communication, while Pérez Maestro (2020) and Rodríguez Cerrón (2006) document its diversity in regions like Nepeña and San Martín, reinforcing its value as historical testimony.

Although Montes Gutiérrez (2012) suggests interpretive frameworks such as shamanism, totemism, or structuralism, these do not appear to fully align with the material context of Quilla Rumi. Morales and Echevarría (2012) suggest the paintings were made at different times without a strict thematic plan, reflecting immediate experiences more than supernatural knowledge. Núñez (2012) and Ordoñez Inga (2013) associate rock art with sacred sites or Incaic affiliations, but at Quilla Rumi, most representations appear accessible and scientifically explainable. Thus, our reinterpretation of Motif 3 in Sector D as a *Polistes sp.* paper wasp provides not only a refutation of the bird-shaped reading but also a scientifically grounded and hermeneutically enriched perspective on Peruvian rock art.

CONCLUSIONS

It is reasonable to propose that Motif 3 from Sector D at Quilla Rumi represents a paper wasp of the genus *Polistes sp.* (*Hymenoptera: Vespidae*)—a dark brown wasp depicted laying an egg inside a cell, with a curved mandible and antenna shown in profile view, prominent eyes, and two pairs of slender wings. The circle surrounding the central figure represents the paper nest built by the wasp, composed of hexagonal structures clearly symbolized by circles, squares, rectangles, rhombuses, and pentagons—yet without any actual hexagons rendered. The dot outside the circle represents a wasp egg, marking the beginning of the insect's life cycle and challenging previous ornithic interpretations.

REFERENCES

Alomía-Lucero, J. M., & Sixto-Dávila, L. (2024). Sistema de numeración quinario, en los motivos 19, 20 y 21 del sector D en Quilla Rumi, Huánuco. *Investigación Valdizana*, *18*(2), e2159. https://doi.org/10.33554/riv.18.2.2159

Amaru-Castelo, J., Marquina-Montesinos, E., Bautista-Challco, B., Quispe-Saenz, C., Herrera-Huayhua, C. M., & Colan-Rodríguez, R. (2023). Contribución al conocimiento de la subfamilia Polistinae (Hymenoptera: Vespidae) en la Reserva de la Biosfera del Manu, Madre de Dios, Perú. *Graellsia, 79*(1), e188-e188. doi: 10.3989/graellsia.2023.v79.351

Barrantes Zamora, M. (2012). La investigación toponímica y el hallazgo de los centros pictográficos en la cuenca del río Huallaga – Informe. *Boletín APAR*, *3*(11), 372–376. https://revistas.coarpe.org.pe/index.php/BoletinApar/article/view/207

Beingolea, O. D. (1986). Grandes conglomerados de nidos de la avispa Polistes peruvianus en Bella Unión (Arequipa-Perú). *Revista Peruana de Entolomogía, 29*(1), 25-28. https://sisbib.unmsm.edu.pe/BVRevistas/entomologia/v29/pdf/a04v29.pdf

Brito, S., Oliveira, M. L., Carpenter, J. M., & Somavilla, A. (2024). The genus Polistes Latreille, 1802 (Hymenoptera: Vespidae) of Brazil: morphological diagnoses, identification key, and geographical distribution. *Zootaxa*, *5496*(4), 509-545. https://doi.org/10.11646/zootaxa.5496.4.3

Calero, R. (2023). Factores determinantes de la demanda turística en la provincia de Huánuco, región Huánuco, Perú. *Desafíos, 14*(1),10-15. https://doi.org/10.37711/desafios.2023.14.1.383

Echevarría López, G. T. (2012). Las cuatro categorías técnico -materiales del arte rupestre peruano. *Investigaciones Sociales*, *16*, 379–387. https://doi.org/https://doi.org/10.15381/is.v16i28.7411

García Sánchez, C. L. (2024). *Véspidos como agente de control biológico de Spodoptera frugiperda Smith, (1797) en el cultivo de maíz* [Undergraduate thesis, Universidad técnica de Babahoyo]. UTB repository. http://dspace.utb.edu.ec/handle/49000/16032

Echevarría López, G. T. (2012). Las cuatro categorías técnico-materiales del arte rupestre peruano. *Investigaciones sociales, 16*(28), 379-387.

Echevarría López, G. T. (2016). "Quilca" y "arte rupestre", disquisiciones en el contexto del arte, la arqueología y la ciencia peruana. *Arqueología y Sociedad*, (31), 011-022. doi: 10.15381/arqueolsoc.2016n31.e13171

Echevarría López, G.T. (2019). Las cuatro categorías técnico materiales del arte rupestre peruano. *La Vida & La Historia*, (3), 38–47. https://doi.org/10.33326/26176041.2014.3.368

Kovac, H., Käfer, H., Petrocelli, I., Amstrup, A. B., & Stabentheiner, A. (2022). Energetics of paper wasps (Polistes sp.) from differing climates during the breeding season. *Insects, 13*(9), 800. doi: 10.3390/insects13090800

Montes Gutiérrez, R. (2012). Teorías interpretativas del arte rupestre. *Tiempo y Sociedad*, (9), 5–22. https://dialnet.unirioja.es/servlet/articulo?codigo=4193609

Mora-Rubio, C., y Pérez-Bote, L. (2024). Unveiling people's aversion to wasps: the case of Polistes Latreille, 1802 (Hymenoptera, Vespidae) species in southwestern Iberia. *Boletín de la Asociación Española de Entomología, 48*(1-2), 95-101. https://dialnet.unirioja.es/servlet/articulo?codigo=9698914

Morales D., y Echevarría G. T. (2012). *El sitio arqueológico de Quilla Rumi, Huánuco, Perú*. Boletín Apar. https://www.researchgate.net/publication/307594759_El_sitio_arqueologico_de_Quilla_Rumi_Huanuco_Peru

Núñez, Q. O. (2012). Arte rupestre en la cuenca del Marañón, regiones de Amazonas y Cajamarca, Perú. *Investigaciones sociales, 16*(28), 397-402. https://www.researchgate.net/publication/332191728_Arte_rupestre_en_la_cuenca_del_Maranon_regiones_de_Amazonas_y_Cajamarca_Peru

Oliveira, M. M., Gomes, F. B., Somavilla, A., & Krug, C. (2017). Polistes canadensis (Linnaeus, 1758) (Vespidae: Polistinae) in the Western Amazon: a Potential Biological Control Agent. *Sociobiology, 64*(4), 477–483. https://doi.org/10.13102/sociobiology.v64i4.1936

Onuki, Y. (1999). El periodo arcaico en Huánuco y el concepto del arcaico. *Boletín de Arqueología PUCP*, (3), 325–333. https://doi.org/10.18800/boletindearqueologiapucp.199901.016

Ordóñez Inga, C. J. A. (2014). *Incas, ancestros y apropiación territorial en Huánuco*. http://repositorio.cultura.gob.pe/handle/CULTURA/247

Ordoñez Inga, C. J. A. (2013). Incanäni: un complejo funerario Wamalli con indicios de arte rupestre Inca en el Alto Marañón, Huánuco-Perú. *Revista Haucaypata, investigaciones arqueológicas del Tahuantinsuyo*, (7), 33-44. https://es.scribd.com/doc/280645321/INCANANI-UN-COMPLEJO-FUNERARIO-WAMALLI-CON-INDICIOS-DE-ARTE-RUPESTRE-INCA-EN-EL-ALTO-MARANON-HUANUCO-PERU

Palacios Jiménez, D. (2020). El arte rupestre y la perspectiva comunicacional. *Comunifé, 20*(XX), 49–56. https://doi.org/10.33539/comunife.2020.n20.249

Pérez-Bote, J. L., & Mora-Rubio, C. (2020a). Causas de mortalidad de colonias de Polistes dominula (Christ, 1791) (Hymenoptera, Vespidae) en zonas urbanas del suroeste de la Península Ibérica. *Graellsia, 76*(1), e109-e109. https://graellsia.revistas.csic.es/index.php/graellsia/article/view/619

Pérez-Bote, J. L., & Mora-Rubio, C. (2020b). Nesting ecology of polistes species (Hymenoptera, Vespidae) in urban areas of South-western Iberian Peninsula. *Sociobiology, 67*(3), 462-468. https://doi.org/10.13102/sociobiology.v67i3.4885

Pérez Maestro, C. (2020). Arqueología del arte rupestre de los Andes Centrales: contextos paisajísticos, culturales y temporales de las manifestaciones pintadas del valle de Nepeña, Ancash, Perú. http://hdl.handle.net/10017/42926

Plasencia, R. (2021). *Minería, comunidades y dinámicas sociales: aproximaciones antropológicas*. Horizonte.

Pulgar Vidal, J. (2014). Las ocho regiones naturales del Perú, *Terra Brasilis, 3* https://doi.org/10.4000/terrabrasilis.1027

Reserva Ecológica Costanera Sur. (2006). *Avispa papelera colorada - Polistes sp*. https://www.reservacostanera.com.ar/avispa-papelera-colorada---polistes-sp

Ribeiro Júnior, C. (2021). *Sensilas antenais em Vespidae: estudo comparado entre espécies com hábitos diurno e noturno* [Doctoral thesis, Universidade Federal de Viçosa]. LOCUS UFV. https://locus.ufv.br//handle/123456789/29632

Rodríguez Cerrón, M. (2006). *Arte rupestre en el departamento de San Martín* [Undergraduate thesis, Universidad Nacional de San Marcos]. UNMSM repository. https://alicia.concytec.gob.pe/vufind/index.php/Record/UNMS_66998154ea30b5039ec45fd1df253dc2

Rubina López, A. (2017). Interpretación filosófica de las pinturas rupestres de la región Huánuco. *Investigación Valdizana, 10*(2), 65–71. https://revistas.unheval.edu.pe/index.php/riv/article/view/63

Rusina, L. Y., Rusin, I. Y., Starr, C. K., Fateryga A. B., & Firman L. A. (2007). Modes of colony foundation by females of different morphotypes in the paper wasps (Hymenoptera, Vespidae, Polistes Latr.). *Entomological Review, 87*, 1155–1173. https://doi.org/10.1134/S0013873807090060

Sarmiento, C. E. (1994). Lista de las avispas sociales (Hymenoptera: Vespidae) de Colombia. *Revista de Biología Tropical*, 42(1-2), 357-363. https://sisbib.unmsm.edu.pe/BVRevistas/entomologia/v21/pdf/a01v21.pdf

Silveira, O. T., & Santos Jr., J. N. A. D. (2011). Comparative morphology of the mandibles of female polistine social wasps (Hymenoptera, Vespidae, Polistinae). *Revista Brasileira de Entomologia, 55*(4), 479-500. https://doi.org/10.1590/S0085-56262011000400004

Stabentheiner, A., Nagy, J. M., Kovac, H., Käfer, H., Petrocelli, I., & Turillazzi, S. (2022). Effect of climate on strategies of nest and body temperature regulation in paper wasps, Polistes biglumis and Polistes gallicus. *Scientific reports, 12*(1), 3372. https://www.nature.com/articles/s41598-022-07279-0

Sumner, S., & Hurtado Yow, J. (2024). Influencia del entorno: ¿cómo puede ser interpretado el comportamiento social de las avispas? *Revista Semilla del Este, 4*(2), 124-141. https://doi.org/10.48204/semillaeste.v4n2.5046

Tello, J. C. (1960). *Chavín: Cultura matriz de la civilización andina*. Universidad Nacional Mayor de San Marcos. https://www.google.com.pe/books/edition/Chav%C3%ADn_cultura_matriz_de_la_civilizaci/VlNlAAAAMAAJ?hl=es&gbpv=0

Authorship contribution

JMA-L: Investigation, supervision, writing – original draft.
LS-D: Methodology, conceptualization, writing – review & editing.

Funding sources

This research was self-funded.

Conflict of interest statement

The authors declare no conflicts of interest.

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