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On Butterflies and the Carpenter Bees (*Xylocopa caffra*): Perceived Ecological Roles and Description of Traditional Children's Games in Mayotte (French island, Indian Ocean of East Africa)

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Abstract With over a million described species, insects are the most diverse group of animals on Earth. Insects, particularly those responsible for pollination, play a major ecological role that is often overlooked or even ignored. Indeed, apart from honeybees, many species are not recognized for the services they provide. What is more, all pollinating insects do not attract the same affection. Some, such as butterflies, enjoy a very positive image, while others are feared or hated, often because they can sting. During a semi-structured interview study (N = 35) on the island of Mayotte, we confirmed these views. On the other hand, butterflies and one species of carpenter bee were the subject of many children's play and games, which have now been abandoned. Those who played with them in the past, and more simply enjoyed watching children play, seem to bitterly regret it.

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Introduction

People frequently express fear toward insects and spiders, along with a strong aversion towards invertebrates, but not all insects are viewed equally (Lockwood 2013). Butterflies which are important pollinating insects, along with dragonflies, and ladybirds are highly regarded due to their well-known, attractive, and harmless characteristics (Nathan et al. 2017; van Huis 2019). Hymenoptera insect's negative perception can be explained by their memory of a painful sting or their awareness of the risk of stinging, on the other hand (Christ and Dreesmann 2022). The pollination services offered by the numerous species in this insect order are almost unnoticeable, as only honeybees are visible. Research suggests that school curricula fail to emphasize the significance and diversity of pollinating insects, and the decrease in their numbers (Sitar et al. 2023).

Social representations of good and bad insects are often conveyed by using highly anthropomorphized insects in children's media and literature (Boileau and Russell 2014). Children can encounter these good insects and will naturally interact with them, either by observing or playing with them. For centuries, insects have been involved in games, such as rhinoceros beetle fighting in Thailand (Rennesson et al. 2012), or answering questions in the truth game with a mantis in Cameroon (Seignobos et al. 1996). Japanese children enjoy playing with insects (crickets and beetles) and many consider them cute (Laurent 2000).

Games are regulated by rules that vary in complexity, unlike play, which is spontaneous activity (Bailly 2001). Playing is viewed in developmental psychology as a means of encouraging children's emotional, sensory-motor, cognitive, moral, intellectual, and social growth (Gaussot 2001). Piaget (1945) suggests that children can assimilate the external world by playing and their ability to transform and symbolize what they perceive (Aucouturier 2017). As children age, they begin to concentrate more and more on realistic play activities, transitioning from functional or symbolic games to social ones (Garaigordobil et al. 2022). The expression of reality in children's games is influenced by cultural

Figure 1 Geographic location of the island of Mayotte (France).

values, which inform the relationship between societies and the environment in which they develop. Traditional games, which are seen as the embodiment of customs passed down from generation to generation, are under threat due to globalization (Huizenga et al. 2017). The fact that they are often passed down verbally supports the idea that these games will be lost forever if a generation of children ceases to play them. Several countries, including Indonesia, have implemented programs to encourage children to play traditional games (Arlinkasari et al. 2020).

Our study's main objective was to gain a better comprehension of the relationship between the inhabitants of the island of Mayotte in the Indian Ocean and pollinating insects. First, we evaluated their comprehension of the ecological significance of Lepidoptera and Hymenoptera as pollinators. We then asked for additional information about the social representations and uses associated with various insect species. The focus of our attention has been on children's play with butterflies and carpenter bees, among all the uses cited by respondents. Children on the island played many games with these insects until recently. We want to highlight these traditional children's play and games because they are either already gone or in the process of disappearing today.

Methods

Study Location

Mayotte is a small volcanic archipelago in the Indian Ocean, 300 km north-west of Madagascar and 450 km off the coast of Mozambique (Figure 1). Covering an area of 374 km², it comprises two main islands: Grande-Terre (363 km²) and Petite-Terre. Two thirds of the surface area of Grande-Terre where our survey was carried out is marked by slopes of more than 15% and is located above 300 meters in altitude (Oberlinkels 2007). Four mountain ranges structure this area, including the Bénara massif, whose eponymous peak is the highest point on the island (653 m). Forests and agroforestry systems cover 10,792 ha, the equivalent of 30% of the island's surface area, but only 8% of this area corresponds to forests little disturbed by human activity. Traditional agroforestry systems cover 5,400 ha, of which 2,200 ha are dedicated to banana production (41%).

Human settlements began to develop in the Comoros from the 8th century onwards. The population originated from the east coast of Africa and was descended from Bantu communities. Between the eleventh and sixteenth centuries, the influence of the Shirazian elite (modern-day Iran) led to the gradual conversion of the Bantu populations to Islam. Today's population (estimated at 300,000) is overwhelmingly of Afro-Malagasy origin, with an animist cultural background and a high degree of Islamic syncretism (Dauphin and Thibault 2011). Shimaoré, or the language of Mayotte, is the local Comorian language. However, a significant proportion of the island's population speak Kibushi (Austronesian language), a dialect of Malagasy, as their mother tongue. French is the official language, and is mainly spoken by young people, graduates and people from mainland France. Arabic is the primary religious language.

Data Collection

Surveying a population or group and collecting information relevant to a research object can be done using a range of techniques. We chose a methodology that combines photo sorting by preferences and additional interviews called the Q Methodology, a common technique for analyzing the subjective nature of viewpoints (Dieteren et al. 2023; Rost 2020). Five themes were highlighted in the photos we picked,

Figure 2 Data collection. **A** An example of Q-sort, and **B, C** Respondents discuss his Q-sort. Photo credits: Lisa Fabris (FMAE).

which included pollinating insects and their environment, anthropogenic threats to pollinating insects, honey gathering and modern beekeeping, honey, wax and pollen, and insect stings. Respondents were asked to rank 39 photos by preference in a forced Gaussian distribution. The photos on the right of the image (Figure 2A) correspond to preferred photos, those on the left to least preferred. The photos were placed on the floor without the respondent's knowledge during the sorting process. Only when all the photos were on the floor did the respondent discover the result of his sorting (discussed in Perichon 2024). An additional interview (Figures 2B–C) aimed at understanding preferences: aesthetic, symbolic and spiritual dimensions. Here, we discuss the information on butterflies and carpenter bees collected during those interviews.

Among the 39 photos, 12 had close-ups of pollinating insects (Table 1), with most of them appearing on the flower. Three pollinating insect orders have been chosen. Lepidoptera is the most represented taxon in the images, with seven photos, five of which show Rhopalocera (butterfly) and two of which show Heterocera (moth). These are *Junonia rhadama* (Brilliant blue, the female), *Papilio demodocus* (Christmas butterfly), *Acraea ranavalona*, and *Danaus chrysippus* (African monarch). *Coeliades forestan*, the fifth species, is a butterfly that is easily observed and identified by its horizontal stripes on its white abdomen, which has given it the common name Striped Policeman. Two Heterocera species, which have different appearances and are among the most common in Mayotte, were chosen. *Achaea violaceofascia* has forewings that are all brown and hindwings that are light brown in the upper half, and black with a white stripe in the lower half. Lymantriinae sp. have quite attractive patterns on their wings, with a range

Table 1 Presented insect pollinator species (n = 12) during identification tasks with their scientific, French common, and Shimaoré or Kibushi names.

Scientific	French common	Shimaoré dialect	Kibushi dialect
Junonia rhadama		*Matso; Matsou*	*Kamaïsu*
Papilio demodocus	Papillon de Vinson; Voilier des citronniers	*Mosoungo*	
Acraea ranavalona			
Danaus chrysippus	Petit Monarque; Monarque africain	*Karane*	
Coeliades forestan			
Achaea violaceofascia	Papillon de nuit		
Lymantriinae	Papillon de nuit		
Protaetia fusca	Cétoine	*Chonga*	*Madbelua*
Aphex torridus	Guêpe fouisseuse	*Mauvu*	
Delta emarginatum	Guêpe maçonne	*Niamo*	*Fanentri; Faraka*
Apis mellifera	Abeille mellifère	*Nyoshi*	*Anteli*
Xylocopa caffra	Abeille charpentière	*Gwé-gwé* (m.); *Gwé-gwé dzilou* (f.)	*Vougovoug* (m.); *Madjabilaé* (m.); *Madjabivavé* (f.)

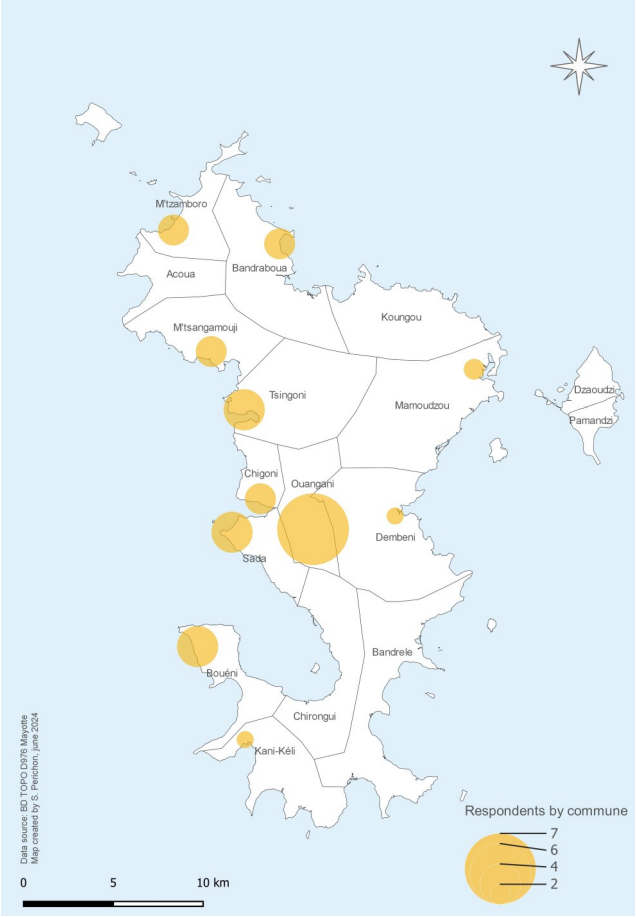

Figure 3 Distribution of respondents by commune in the island of Mayotte.

of colors from beige to dark brown. Four Hymenoptera species were selected: *A. mellifera* (honeybee), *X. caffra* (carpenter bee), *Delta emarginatum* (mason wasp) and *Sphex torridus* (burrowing wasp). *Protaetia fusca* (Mango flower beetle) was selected as the Coleoptera.

The study focused on eight specific types of respondents: religious representatives, elders, shopkeepers, honey gatherers, farmers, beekeepers, young people, and environmental professionals. As honey-gathering is not a professional activity, a honey gatherer interviewed would likely also belong to another target profile. Our sample was created based on the relative heterogeneity of viewpoints, not necessarily based on proportionality. The interviews were conducted face to face and recorded using a digital voice recorder. In the same way, we allowed interviewees to express themselves in French, Shimaoré, or Kibushi. The presence of a translator, in addition to a moderator, and an assistant was necessary for this.

All audio-recorded interviews were transcribed. The analysis was conducted by calculating the occurrence of items that we deemed essential for describing an object, subject, or situation. An Excel spreadsheet was used to enter the data. Every column was associated with a respondent, and the rows displayed key words that the respondent spoke and were linked to a particular photo. Some words were grouped together because they had similar meanings, but others remained isolated. To make reading easier, we sometimes organized many keywords generated by a photo into different categories. The analysis was done using the number of identified keywords, their frequency, the percentage of the total sample of respondents and the total number of respondents who expressed their opinions on the photo in question.

Results

Our sample comprised 35 people (23 men and 12 women). In total, we recorded 28.6 hours of exchanges. The average age of the respondents was 50.4. The youngest was 16, the oldest 95. Our sample included 23 working people, six of whom were shopkeepers (in food shops or traditional markets), five farmers (four of whom were beekeepers working in a second job), and four civil servants working in departments responsible for the environment in the broadest sense. We also met seven retired people, two high school students, two university students, and a young job-seeker (blue-collar worker). Fifteen of the thirty-five respondents spoke Shimaoré or Kibushi, and twenty French. They represent 11 of the islands 17 communes (Figure 3).

The State of Knowledge About the Role of Insects in Pollination

Insects, particularly honeybees (Shimaoré *nyoshi* and Kibishi *anteli*), are seen as beneficial to entomophilous plants by nearly 50% of respondents (N = 16). Even so, only nine respondents linked this benefit to pollination. Nectar is described as sugar (Shim. *sukari*), a sweet and liquid substance that insects use to feed on flowers. This is not always seen in a positive light. Some respondents (N = 5), who are typically older, believed that butterflies were being selfish by taking nectar promptly, or even worse, they were wasting sugar. Other respondents (N = 2) state that butterflies can deprive bees and humans of honey (Shim. and Kib. *ngizi*) by eating nectar. The transportation and

storage of pollen by insects is almost never mentioned by respondents, except for those with higher education or who are beekeepers. Given this, respondents must clearly have some understanding of the concept of pollination. Pollinating insects are frequently linked to agriculture. The respondents acknowledge that insects are not solely linked to agricultural environments, but they are not the only ones providing services to forest ecosystems, in particular. The role of pollinating insects is not fully understood in taxa except for honeybees and butterflies. Only beekeepers respond that a mango flower beetle (Shim. *chonga*, Kib. *madbelua*) covered in pollen on jasmine inflorescences is a pollinating insect. Three farmers argue that foraging has a negative impact on the plant as insects consume the sugar, resulting in premature drying of the fruit. No respondents consider moths to be insect pollinators because they do not see them foraging at night. Some who think that they eat waste or dead animals, while others think that they are not ecologically significant. We were unsuccessful in finding a name for moths in Shimaoré and Kibushi languages, but an older person called them Light Extinguishers. She named them that is because her parents used a candle to light their home when she was young, and the moths would jump into the flame and extinguish it.

Butterflies, A Symbol of Beauty

The butterflies in Shimaore language are now commonly known as *spelapelaka* or the diminutives *spepi* and *spaleca*. *Tsipelapelaka* is the name given to these insects in Kibushi language. The oldest respondents reported that all butterflies had a distinctive common name in the Shimaoré language, which may be based on mimics like *J. rhadama*. It is possible that the knowledge of these species is decreasing, and there is probably less interest in them. Butterflies were considered the most beautiful pollinating insects by the respondents. The bright colors and patterns on their wings appear to be an emotional trigger (Table 2). The verb *papillonner* in French (to flutter, in English) is named after their lighthearted nature, which also enhances their visual appeal by representing their fragility. *J. rhadama* was the most talked about, and it may have been due to the ocelli on its hind wings (in the female). *Matso* or *matsou* is the name given to this butterfly for the rounded spots on its wings, which mean eye or eyes in Shimaoré. Some respondents claim that ocelli is meant to intimidate and deter potential predators. Occasionally, they link blue to danger (toxic) in nature. The most favored butterfly is the African monarch butterfly, which is common in Mayotte and known as the *karane* (Shim.).

Respondents rarely mention the caterpillar stage when discussing butterflies. The appearance of butterfly caterpillars in photos was not described by any of them. There are two main reasons why caterpillars are commonly known: their stinging hairs and the fact that they are pests of field and garden plants. Those who own or cultivate an agricultural plot are usually familiar with pest caterpillar butterflies. The issue of cocoons and pupae was forgotten because metamorphosis was not mentioned.

The Carpenter Bee, An Insect Feared for Its Sting as the Other Hymenoptera

Table 3 indicates that most respondents have no specific remarks about the carpenter bee (Shim. g*wé-*

Table 2 The 10 most frequently cited items in the photo of a butterfly.

Item (N = 50, Σ = 120)	Respondents (N)	Respondents (%)	Response expressed (%)
Children's play and games	14	40%	48%
Beauty	12	34%	41%
Colorful	9	26%	31%
Fly	8	23%	28%
Childhood	6	17%	21%
Blue	4	11%	14%
Caterpillar	4	11%	14%
Orange (color)	3	9%	11%
Nectar	3	9%	11%
Village	3	9%	11%
Other items (N = 40)			
Does not express	6	17%	
Total	35	100%	

Table 3 The 10 most frequently cited items in the photo of a carpenter bee.

Item (N = 26, Σ = 53)	Respondents (N)	Respondents (%)	Response expressed (%)
Bee stings	7	20%	70%
Children's play and games	5	14%	50%
Ear	5	14%	50%
Sexual dimorphism	5	14%	50%
Pain (of a bee sting)	4	11%	40%
Yellow	3	9%	30%
Buzzing sound (loud)	2	6%	20%
Flowers	2	6%	20%
Male (bee)	2	6%	20%
(sewing) Thread	2	6%	20%
Other items (N = 16)			
Does not express	25	71%	
Total	35	100	

gwé m., *gwé-gwé dzilou* f.; Kib. *vougovoug*, *madjabilaé* m., *madjabivavé* f.). Those who recognize the insect in the picture talk about the stings they can cause (Shim. *sindzano*, Kib. *mtisongu*). Respondents mentioned using a pain and sting risk assessment scale in interacting with these insects. Mason wasps do not usually sting, and their stingers are the least painful among all the local Hymenoptera. Under staircases and sloped roofs, they commonly build small nests out of mud. The pain that comes from a honeybee sting is described as intense, but not as intense as that from a carpenter bee. The carpenter bee's stinging risk is greatly reduced by its sonorous buzz and massive, black body, which make it easily spotted when approaching. The burrowing wasp's sting is the most terrible (Shim. *mauvu*, Kib. *poumpoumdrê*).

Although it is common knowledge that the female honeybee stings while the male bee does not, respondents wondered if that was also the case for the carpenter bee. The insect's yellow, harmless appearance was not compatible with their idea of masculinity, particularly if it implied that the dangerous, black with two white or yellow bands over the hind thorax carpenter bee was a bee's female (Figure 4). Amused, lightly disparaging comments are sometimes made when we say that the yellow bee is the male. When talking about children's play and games where the carpenter bees was the object, sexual dimorphism is a subject that all respondents discuss. The children were able to recognize the bee's male and capture it with their hands without any danger. They chose not to pursue the female carpenter bees as they knew they would be stung by the insect immediately.

Children's Play and Games with Butterflies and the Carpenter Bees

Childhood memories are triggered by butterflies and carpenter bees, and respondents often share these memories with us with emotion. The use of pollinating insects in children's play and games is no longer happening. Mango flower beetles were not mentioned, even though beetles are commonly used in children's games in other areas of the world. This Coleoptera species in Mayotte is not widely appreciated; its vernacular name can even be

Figure 4 *Xylocopa caffra* (carpenter bee). **A–C** Male and the **D** female bees. Photo credits: Corné Vermaak, Ian Junor, Nicolas Vereecken and Mariane Harmand.

translated as bad beast. It is said to be a pest for agriculture, but the reasons behind it are unclear. The reaction to seeing an insect is often to crush it.

The most straightforward play activities with insects were watching butterflies and running after them without catching them (Table 4). Triggering the flight of many butterflies on a pond is also mentioned. Some respondents recall being reprimanded by their parents for following butterflies into cultivated fields which shows the child's fascination with insects.

Depending on the butterfly species, it takes different levels of skill to capture them with your bare hands. A species of Pieridae, possibly *Eurema floricola* (Figure 5A), was believed to be elusive according to a 35-year-old man:

> In the past, we played in the fields. We were trying to catch butterflies. There's something beautiful about them that makes you want to catch them. During that time, there were many of them. The meadows were covered in low grass and lots of flowers! Numerous insects were present in these meadows. There was also a tiny yellow butterfly. Catching this one was impossible! [laughs]. They were so fast and agile that a net would have been needed, and even then it's not certain we

Table 4 List of children's play and games with butterflies and carpenter bees that respondents described in Mayotte.

Insect Pollinator	Attitude	Play	Age Range	Gender	Location	Game Play
Butterflies	Contemplative	Individual	6 to 8 years	Mixed	Garden, fields	Observe butterflies on a flower
		Individual (or group)	4 to 8 years old	Mixed	Garden, fields, village	Run after butterflies without necessarily to catch them
	Active	Individual	8 to 12 years old	Mixed	Garden, fields, village	Catch a butterfly and closely observe its body or certain parts like its head or wings
						Catch a butterfly and observe or count its wing beats
						Ty a sewing thread around the thorax of the butterfly, keep it on a leash and take it for a walk around the house
		Group	6 to 12 years old	Mixed	Fields, beach	Catch butterflies to participate in a race that awards the fastest (highest flight or longest distance covered) winner
						Catch and release butterflies at the same time to observe their float away
						Grab the legs of butterflies with their thumb and forefinger and walk or run with them
Carpenter bee	Active	Group	6 to 10 years old	Mixed	Fields, beach	Hold the carpenter bee prisoner in your hands to better hear its buzzing sound
			8 to 12 years old	Male	Fields	Ty a sewing thread around the thorax of the bee, keep it on a leash and observe its hovering
			8 to 14 years old	Male	Fields, beach	Slip a carpenter bee under someone's clothes, and watch them to try to remove the insect

Figure 5 Butterfly species often mentioned in children's games. **A** *Eurema floricola*, **B** *Danaus chrysippus*, and **C** *Papilio demodocus*. Photo credits: Allan Hopkins, and B–C Quentin Esnault.

would have caught them! [laughs].

The children caught the African monarch (Figure 5B) and Christmas butterfly (Figure 5C) more often than any other species, possibly because they were present in greater numbers in the fields. The butterflies were usually snared while foraging for flowers. After the butterfly has folded its wings, the child would grasp it by gripping the upper wings between thumb and forefinger. The alternative method involved holding it in his hands and slowly closing them over the insect and flower. Children appear to use different methods of capture depending on both the butterfly species and their age. Although they were familiar with the places where butterflies gather at specific times of the year, it appears that they were not there for that specific reason. These games were improvised by them when they observed a significant number of butterflies in one area.

Respondents described three games that had butterflies captured:

1. The first game, which is a group game, has three variants. In the first variant, children who had captured a butterfly stood in a line in an open field, sometimes on a beach, while the other children watched. As soon as the signal (a loud countdown) was given, they gave up on their butterflies and all the children ran after them. The game was won by the child who had their insect cross an imaginary finishing line first. The winner in the second variant was the one who had either gone the furthest or the highest in the sky within a given time. Once enough children had caught a butterfly, the races

began. To make the game run smoothly and foster competitiveness among the group, a restricted number of children were allowed to release butterflies simultaneously. For small groups, there was a range of two or three children while for large groups, there was a range of five or six children. The referees could be the other children. There was no real competition in the third variation of the game. The captured butterflies were all released at once and the children watched as they flew away.

2. The children played the second game by grabbing the insect's legs with their thumb and forefinger and walking or running in that way. Usually, there were multiple children playing together. It seems that some of them had fun observing (or counting) the flapping wings of their butterflies.
3. Real skill is needed to play this game. The task involved tying a sewing thread around the thorax of the captured butterfly without causing any harm to it. The children used a thread that measured around 1 meter to keep their butterfly on a leash. While this game was more of a solo activity, the children appeared to make sure that as many people as possible saw them. Emotional memories of walking with butterflies in their village often come to mind for those who played this game as children. The insect was brought home. The game ended when the child became disinterested in following their butterfly or if their parents asked for lunch, dinner, or to do some household chores. For all of them, the rule of giving their butterflies back their freedom was a requirement, despite the possibility that the insect may have been injured or crippled.

For the carpenter bee, the same game is explained with the insect on a lead. Boys are the only ones who play this game, unlike the butterfly games. A 35-year-old respondent mentioned a children's cartoon from the late 1980s:

> One stings while the other doesn't. The one that was all yellow was the one that was not dangerous. We tied it to a wire around the body and watched them flutter around us, making noise. Vrammm... We nicknamed them the Transformers! The Transformers, a children's cartoon featuring airplanes that turned into robots, you know. [laughs] We could either hold them in our hands, shake them a bit, and instantly feel a buzz. Vrammm... vrammm. We placed them close to our ears.

Generations of children have been delighted by the insect's buzzing, which was amplified when it was kept captive in their hands. Any child who successfully caught a carpenter bee was immediately surrounded by other children who pushed one another to hear the amplified buzzing sound more closely. The insect produces a sound that is commonly called beautiful music, and some have compared it to a violin tune. One respondent joked with us that the carpenter bee stuck in their hands was analogous to the Walkman that nobody had. Another game, the Vibrations, was mentioned by a 45-year-old man:

> And the Vibrations… [laughs] One of my cousins used to put gwé-gwé [carpenter bee] under our clothes and under our underwear! The gwé-gwé tickled you all over until you caught it… Catching it under our clothes proved to be a challenge. We had a great time playing with it!

Discussion and Conclusion

In our survey in Mayotte, it very quickly became apparent that butterflies and a species of carpenter bee were the subjects of traditional children's play and games. According to the respondents, these play activities, which were still practiced by children ten years ago, are no longer of interest to them today. This seems to be a source of regret for them, even more so because they have happy memories associated with it, and these activities have shaped unchanging images of village life. Seignobos et al. (1996) reported that children in the Mofu (Cameroon) had stopped playing with insects. Soccer had already become more popular by that time. Like children in Mayotte, Mofu children were accustomed to insects from an early age. In the fields, young children used to tie a thread around their wrists, with a beetle at the end. Fascinated by the flight and noise of the insect, they would not take its eyes off it until it fell asleep. Their mothers were able to work without any crying interruptions.

Recent international publications that focus on traditional games in Asia and Africa frequently address

the question of how digital games impact children's development. The increased awareness of the overuse of smartphones tends to lead to more acute concerns. The reason why parents and educators are worried about digital games is that they can lead to sedentary behavior, confinement to a room, and isolation from the real world (Showkeen 2023; Yücel and Elçin 2015). Therefore, traditional games are highly valued by them as they believe they are vital for children to expend their energy, learn how to channel it, and socialize (Mutema 2013). Outdoor play activities promote the development of children's motor skills by allowing them to walk, run, jump, and hold objects, among other activities. Butterfly hunting is an outstanding example. The children's games with insects that we identified in Mayotte illustrate the three stages of social development, as per Parten (Williams 2015). Firstly, there is the so-called non-social activity, in which the child observes insects alone. The butterflies' wings fluttering, colors, and hum of carpenter bees are all likely to pique their attention and induce emotions. It should be noted that this spectator behavior is applicable to any age group. Later, they develop a type of social involvement, such as playing with insects in groups, but their individual behavior is not influenced by the other children. When respondents recall memories of chasing butterflies as children to capture them, this is what happens. In the third stage, children work together or collaborate to achieve a common objective. This can be observed during insect races.

Traditional games are commonly associated with a local culture that has been weakened by Western systems in many publications. Madondo and Tsikira (2022) in Zimbabwe believe that children are abandoning the games of yesteryear due to information and communication technologies and globalization. Mutema (2013) feels that the school curriculum, starting from early childhood, lacks sufficient indigenous knowledge that can be used as learning tools. Adom (2022) made a similar observation in Ghana and encouraged teachers to include more indigenous ecological knowledge in their children's education. He believes that games are equally important to knowledge as language, values, stories, songs, and so on. Suhra (2023) in Indonesia makes a connection between the maintenance of children's access to a wide range of land, particularly agricultural plots (e.g., rice fields), and the continuation of traditional games. The author's observation is that the perpetuation of these traditions is more susceptible to changes in society because they are passed on orally.

From childhood onwards, people tend to distance themselves from insects, which can lead to negative attitudes and misconceptions that can further complicate the acceptance of conservation actions in favor of entomofauna (Cardaso et al. 2011). In environmental education, it is a major challenge to restore informal and playful childhood interactions with insects (Shipley and Bixler 2016). It has been observed by Sitar et al. (2023) that children are more likely to be fascinated by insects if they interact with them early in life. The authors choose butterflies as their main species because they convey positive images. Nevertheless, insects are often overlooked as flagship species, despite their importance in local biodiversity and the ecosystem services they provide (Schlegel et al. 2015). Weeks and Oseto (2018) propose that children learn about ecosystems through the use of the many insects found in nature for educational purposes.

The effectiveness of a playful approach in creating a lasting bond with insects can be demonstrated by our survey in Mayotte. Regardless of age, anyone who claims to have played with butterflies and carpenter bees as children still feels real emotions when talking about them. Their fascination is clearly evident in the fact that the games vary based on the child's age, but are still completely focused on these insects. It is suggested that the use of these two taxa as part of environmental education initiatives in Mayotte would be pertinent. Enhancing the value of the carpenter bee would be a unique educational experience that links to local traditions that are now facing extinction. Educational activities can benefit from the male bee carpenter's harmless nature, large size, loud buzzing, and all-yellow appearance. Both young and old are immediately captivated by the presence of this insect.

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