

珍奇櫃裡的推理劇：生痕化石的展覽詮釋——以「遺跡解謎特展」為例

A Natural History Drama in the Cabinet of Curoisities: The “Trace Fossil Detective” Exhibition

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生痕化石是過去生物活動所留下的痕跡，是天然的印記，將生物某些時刻的動態留存在地質環境中，這些自然史的證物透過生物、古生物及地質等領域專家抽絲剝繭的研究解讀，將過去的生物及環境變化脈絡梳理地更清晰。本展以國立臺灣大學地質科學學系 Löwemark 教授及其研究團隊對臺灣東北角魷魚與海蛞蝓活動所留下生痕化石研究成果為基礎，透過展示讓觀眾認識古代生物活動及臺灣東北海域陸棚地質歷史的演進，並於臺博館土銀展示館古生物展廳展出，希望觀眾可以藉由展示將今日所見的地質景觀與古代生態環境作連結，增進對臺灣自然環境的認識。

如何讓自然科學研究成果成為觀眾易懂的展示呢？博物館透過展覽詮釋將科學或歷史知識轉化為觀眾容易理解的敘事方式（張婉真，2014：17），也常運用劇場概念，以虛構的故事及場景（但具有科學根據）來建構觀眾的想像及傳遞特定的主題及訊息，如造景、模型、動畫等媒材，重建或演繹特定的自然時空或事件，而最重要的是博物館可以透過研究及展示真實物件，讓敘事的內容更為觀眾所信服。這些展覽詮釋的技術，不但可以吸引觀眾，也可以促進學習，例如臺博館土銀展示館的古生物常設展即是利用大型恐龍骨骼模型結合古蹟空間，創造沉浸式的劇場效果，加深觀眾對古代生物及環境的情境想像，豐富觀展經驗。

真實事件的虛擬故事： 敘事手法與展示素材

此次展出的生痕化石不但具生物、地質歷史等科學意義，也記錄了生物間至關生死存亡的互動關係——魷魚獵食海蛞蝓過程，雖然化石本身體積並不大，也不像實體化石具有明顯易辨識的形態，然而其精彩與獨特之處為戲劇化的背景故事，相當適合以劇場方式作展覽詮釋，將生痕化石形成原因及過程以推理劇般線性敘事方式，引發觀眾的想像，以說故事的方式加深對古代生物及環境的了解。

文案腳本以科學家在野外砂岩露頭上發現特殊的痕跡作為「犯罪現場」的物證為開場：這些痕跡是誰留下來的？發生了什麼事？為什麼會發生在這裡？接著採取倒敘方式發展情節，而生痕化石便成了推理的線索來源，也是展示發展的故事線。觀眾隨著情節進展循線推理，展示逐步加入生物行為線索，以利觀眾解開過去生物互動的謎團，最後再以重回「犯罪現場」方式，引領觀眾回到這些生痕化石的現存環境——野柳地質公園。

展覽說故事的方式除了腳本文字之外，挑選幫助說故事的展示素材（如標本文物、視覺媒材等）也相當關鍵，這些素材可以為虛擬故事建構出具說服力的想像空間，加深觀眾對故事的投入，同時也可以賦予相對靜態及抽象的重點展品——生痕化石——更多的生態背景厚度。以故事中的主角魷魚及海蛞蝓為

Trace fossils are natural evidence of past activities produced by organisms preserved in the sediment. This evidence is carefully studied by ichnologists, because it can help explain the organisms’ behaviour, or even the environmental variations of the past. This exhibition is based on Dr. Löwemark’s (Department of Geosciences, National Taiwan University) study on the sting-rays’ feeding trace fossils in coastal outcrops of north-eastern Taiwan. Visitors will learn about the ancient organisms’ activities as well as the geological history of the continental shelf. This exhibition was first on display in the Paleontology Hall of National Taiwan Museum. The exhibition creates a connection between the present geological landscape and the biological environment of the past, and aims to broaden

visitors’ understanding of the natural environment in Taiwan.

How to convert scientific research into an exhibition that is easy for visitors to understand? A museum can transform the relatively dry scientific or historical knowledge into an exhibition in a narrative style that can be more easily comprehended (Chang, 2014: 17). An often-used approach is that of a theatre where fic-



圖1 利用復古展櫃與現有展場開放空間作區隔，並以自動系統控制個別燈光明暗，引導觀展順序。
Figure 1. The antique-style cabinet differentiates itself from the existing exhibit space. The individual compartments with automatic lighting system indicates the intended sequence of the exhibits.

tional scientific scenes can be introduced. For example, landscapes, models, animations and etc., can be used to introduce some specific time, concept, or events. By doing so, the exhibition can tickle the imagination of visitors in order to convey particular messages. Most importantly, the museum can make the narrative content more convincing by displaying the real objects. Through various exhibiting approaches, the museum

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故事情節	展示主題	展示素材
開場佈局： 從地質學家的筆記中發現懸疑事件及「犯罪現場」線索	蛛絲馬跡：化石透露出生死存亡的生物活動訊息	地質學家的研究工具與資料、魷魚覓食生痕化石
角色出場： 事件製造者及受害者	魷魚：生物特性及其覓食方式 海蛞蝓、蠕蟲：居住環境與生存之道	魷魚標本、科學插畫、魷魚與海蛞蝓全息投影意象動畫
推理及破案過程： 推敲事件發生過程並找出關鍵證據	魷魚大戰海蛞蝓： - 魷魚獵捕及海蛞蝓的藏身方式模擬 - 魷魚覓食所留下的痕跡與碎屑	蛞蝓掘穴系統生痕化石、蠕蟲鑽孔生痕化石、掘穴系統3D 列印模型、魷魚獵捕海蛞蝓3D 模擬動畫
整理： 說明事件發生的原委	穿越時空的偵探：生痕化石的歷史軌跡及地理環境的變化	化石的成因說明、中新世到現代之地球板塊運動變化動態影像
結尾：回到當下	重回「犯罪現場」：野柳的地質公園	地質景觀照片

例：魷魚以透明骨骼的浸液標本作為展品，海蛞蝓則以科學插畫為主意象。兩種展品都具有科學或真實物件元素，同時也帶著超脫現實的視覺美感與神秘氣息，適合作為故事中如影隨行、無所不在的「靈魂」人物。除此之外，透過掘穴系統3D 列印模型展示，讓觀眾透視蛞蝓類在地底的生活空間，也是建構推理想像的重要展示素材。另外，本次由臺大研究團隊陳姿彤所製作的魷魚獵食海蛞蝓的動畫，更是讓此推理劇場進入高潮，揭開故事真相的重要陳述。

珍奇櫃裡的舞台

由於展品數量有限，且體積不大，但細節較多，因此展示設計刻意使用單一展櫃的「微劇場」凝聚展示效果，配合推理故事氛圍，吸引觀眾靠近並仔細觀看。為了讓生物標本、古代地理環境、化石標本，以及相關研究資料共同演出，選擇了自然史展示的雛型——「珍奇櫃」為概念來設計展演舞台。「珍奇櫃」是人們對自然事物的好奇所蒐集各式各樣的物件放置陳列的場所，而這樣的好奇心，正是開啟認

識自然及探索科學的鑰匙，也貼近本展所欲傳達博物學的精神。展示設計以復古形式的展櫃與現有展場空間區隔，轉換觀看的情緒。展櫃裡的視窗變成一幕幕的場景，展櫃內每一幕場景各以一件展品為主，櫃內照明就如同舞台上的聚光燈，聚焦在故事重要線索(展品)上。與常見的開放展示不同，本展考量文案敘事邏輯，在展示設計上採取「單一動線」的方式，依場景及出場順序，設定好適宜的觀看秒數，以自動系統控制個別燈光明暗，限制觀眾一次只看一格場景，隨著燈光變化將目光移轉到不同的場景，以此引導觀眾進入故事脈絡，發現線索來推展劇情。

另外，如同「實境解謎」遊戲，除了展櫃及展品外，觀眾仍然需要說明引導，才能理解遊戲規則，進入遊戲情境。情境式展示也需要語言的敘事框架，為了不干擾展櫃內的劇場展示效果，而將圖文版仿製為古文件收納在抽屜裡，另外亦以藏在書盒中的可攜式閱讀卡片方式呈現，讓觀眾可以逐一打開翻閱，或隨劇情變化閱讀字卡，增進解謎及閱讀的趣味，也是獲取主要知識內容的方式。



圖2 開場場景：以地質學家的研究圖表資料與野外調查工具佈置場景氛圍。
Figure 2. The opening scene with geologists' charts and laboratory tools.

not only can attract visitors, but also encourage learning. One good example is the permanent exhibit of paleontology in the National Taiwan Museum Land Bank Exhibition Hall, which is designed to combine large paleontological models within a historical space to create the immersive theatrical effect, and therefore enrich the visiting experience.

Virtual Story of a Real Event: Storytelling and Exhibit Objects

The trace fossils that were shown in the exhibition are not only of biological and geological significance, but also preserve a record of the fatal interaction between the stingray and the shrimp. Although the trace fossils are not like body fossils which usually have well-defined boundaries and distinct morphologies, their unique and dramatic contrast to the background sediment make them quite suited for a theatrical narrative. In a linear narrative to reveal the formation and evolution of trace fossils, we hope to provoke the visitors' imagination, and deepen their understanding of ancient organisms as well as the environment.

The script starts with evidence discovered at the “crime scene” in the field, where a scientist found spectacular traces in the sandstone outcrops. The questions are naturally raised: Who left the traces? What happened? Why were they here? The visitor develops the story in flashbacks, and trace fossils become clues for revealing the mysterious plot. Subse-

quently, as the storyline develops, more clues of biological behaviours are inserted to help the visitor to resolve the mystery. Finally, we lead the visitor back to the existing environment of these trace fossils, where the “crime” was committed on the continental shelf 20 million years ago. The sandstone was formed under water and later uplifted, becoming the Yehliu Geopark we see today.

Compelling scripts play a major role in telling the “story” of the exhibition, and the selection of the exhibit objects/items (such as specimens, visual media and etc.) is equally critical. These materials can be used to construct a convincing imaginary space for the virtual story. They can also provide the relatively static and abstract exhibits (trace fossils) with much richer ecological information. Take the main characters in this story for example, the cleared and stained stingray is displayed as an exhibit, and the character of the shrimp is demonstrated by scientific illustrations. Both exhibits contain scientific or real elements, and also perform surreal visual beauty and provide a sort of mysterious ambience. Both materials act as key figures in the whole story. Furthermore, the 3D printing burrow system model was also displayed so the visitor is able to observe the shrimp's living space under the seafloor. Apart from these materials, the story reaches a climax by playing a short animation produced by 3D animator Sassa Chen. The visitor is eventually closer to disclosing the mystery!

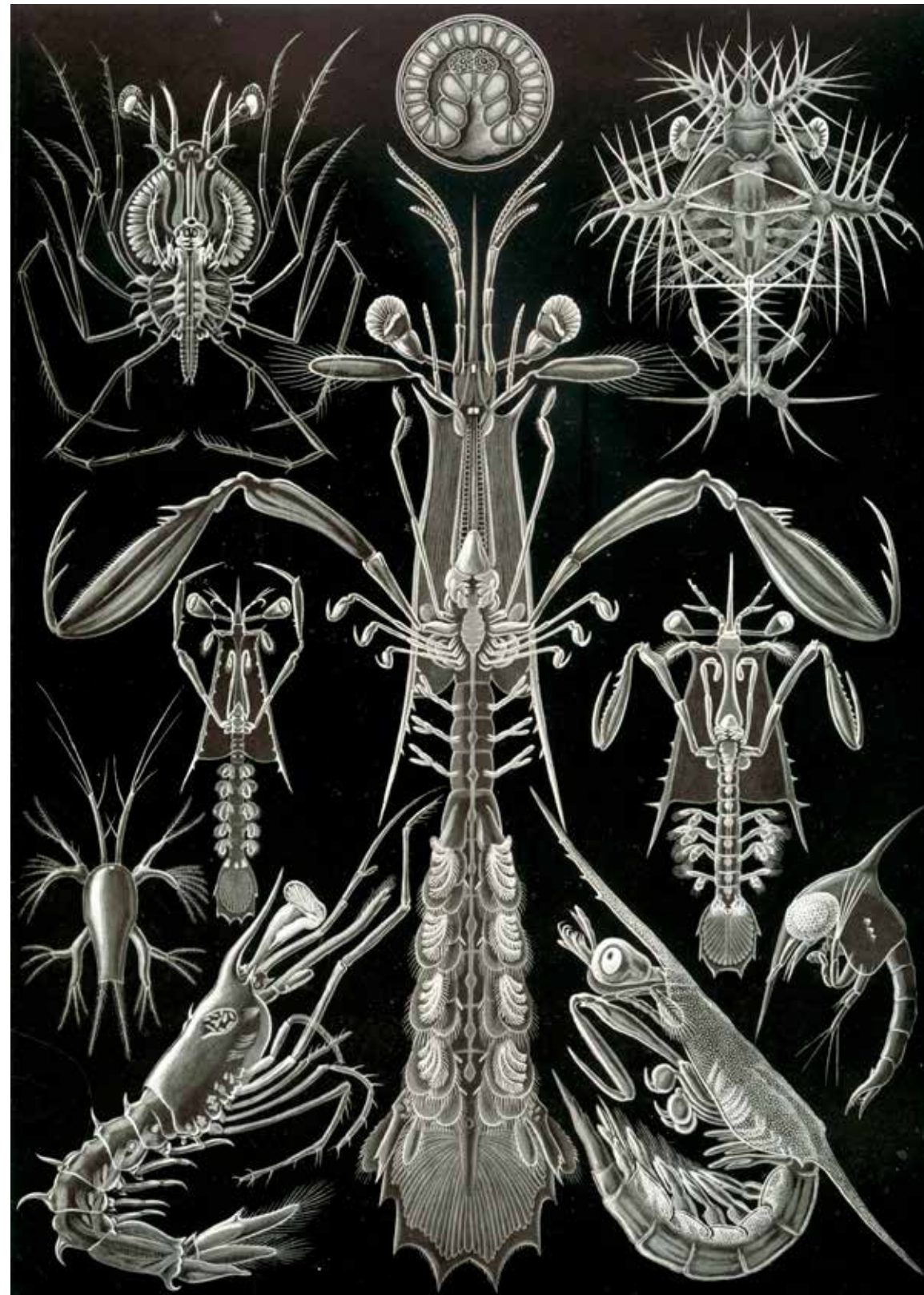


圖3 以科學插畫增進展示氛圍 (圖片來源: Ernst Haeckel, 1904, *Kunstformen der Natur*)
Figure 3. Introducing scientific illustrations is a good approach to expand the visitors' imagination (Picture from Ernst Haeckel, 1904, *Kunstformen der Natur*).

Plot	Topic	Exhibit Material
Opening: Discovering the event from the geologist's notes and clues appearing at the crime scene	Evidence Markers: The trace fossils reveal the signs of animals' survival and death	Geologists' study data and laboratory tools, stingray's feeding trace fossil
Key figures: Event producer and victims	Stingray: Feeding behaviour	Stingray specimen, scientific illustration, holographic animation
	Shrimp and worm: The living environment and survival strategy	
Inductive reasoning: Finding the evidences	Stingray hunting for shrimp	Shrimp burrow system trace fossil, worm burrow trace fossil, shrimp burrow system 3D printing, Stingray hunting shrimp animation
	•Simulation of the stingray's hunt for hidden shrimp •Feeding marks and debris	
Induction: The geological background	The detective going back in time: The evolution of trace fossils and paleogeographic variations	Flipping book (Paleogeographic reconstruction- Miocene to the present)
Ending: Return to the present	Back to the crime scene- Yehliu Geopark	Pictures of geological landscape

The Drama in the Cabinet of Curiosities

We deliberately chose a single stand-alone cabinet for this exhibition design, as there are many details to observe despite the limited number and size of the exhibits. This “micro theatre” creates a kind of convergent dramatic effect with mysterious ambience, and it successfully attracts the visitor to step closer and investigate the details. In order to demonstrate the whole exhibits, including biological specimens, fossil specimens, and related research materials in one place, we decided to use the archetype of the exhibition of natural history- “the Cabinet of Curiosities.” “The Cabinet of curiosities” comprises abundant collections of extraordinary natural objects which are often placed in interconnected compartments. Curiosity is the key to learning about the nature and exploring science, and it also conveys the spirit of this exhibition - natural history. The an-

tique-style cabinet differentiates itself from the existing exhibit space, thus it offers a different perspective compared to the other parts of the museum. When the visitor looks inside the cabinet, each compartment turns into a different scene with one exhibit presented in that specific space. The auxiliary lighting installed in the cabinet resembles the spotlights on a stage, with focus on the clues (exhibits). In contrast to the commonly used free-flowing display style, this exhibition has single-flow design: following the sequence of the story, the lighting is set to be automatically turned on/off with reasonable time duration for investigating the individual compartments. The visitor is encouraged to only look at one scene at one time, and guided to the next clue as the light shifts to another compartment. Finally, they should integrate the information into a scenario and disentangle the plot.

Besides, although this cabinet exhibition is designed for the visitor to explore themselves with the provided exhibits, the instructions and guides also play a necessary role to help the visitor comprehend the complete scenario of the story. Therefore, a narrative framework is required for the scenario. In order to avoid the texts from interfering with the theatre display in the cabinet, the narrative illustrations are hidden in the drawers and made to imitate vintage documents. In the book case, there are portable cards available for bringing along as the visitor progress through different exhibit. These reading materials are meant to increase the visitors' in-

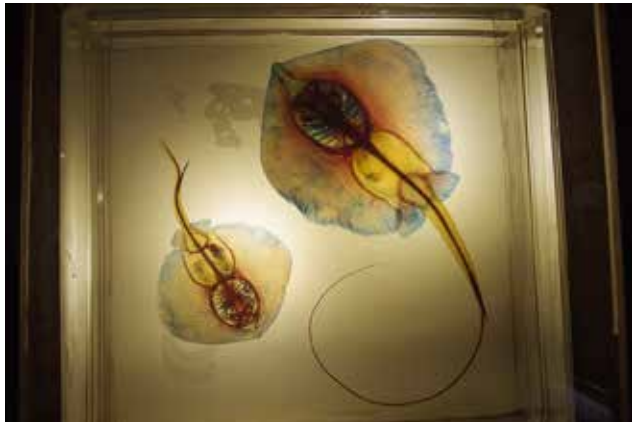


圖4 以背光表現紅魚浸液標本的特殊型態，加強戲劇效果。
Figure 4. The cleared and stained stingray specimen with backlight illumination creates a dreamy and dramatic effect.

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結語：微劇場的大效用

相較於實體標本或化石等具有立即可辨識的特性，生痕化石所蘊含的科學知識，較不容易透過直觀的方式解讀，本展對生痕化石的詮釋手法，更像是結合科學及歷史的展示手法，以科學為基礎，透過敘事方式建構虛擬故事。其敘事方式與以文物為主的展示不同，讓觀眾將注意力放在故事本身，而這虛擬故事是利用科學的細節描述、物件陳設而將情境立體化，觀眾在閱讀故事的同時，對照標本展品，自然地吸收了科學的內涵，可促進觀眾學習的動機與樂趣。另外，展覽以實體標本及多媒材視覺展演方式呈現，提供動態及多元的展覽閱讀方式。因其規模小及資訊量較少，可以減輕觀眾對科學主題展示在觀展及知識學習上的心理負擔，減少如Bitgood (2009)所述觀眾因為參觀時間、體力及注意力消耗所產生的「博物館疲勞」現象。另外，因其展櫃獨立，展覽準備及佈、卸展較具彈性，適合移展使用。本展於臺博館展出後，接續曾於國立臺灣大學校史館、臺南樹谷科學生活館，以及宜蘭縣立蘭陽博物館等館所搭配特展或常設展展出，是博物館在規劃小型獨立巡迴展可以參考之方式。

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圖5 砂質紋路效果的蝦類掘穴系統3D列印模型
Figure 5. The 3D printing model of a shrimp burrow system with realistic grainy sand-like texture.



圖6 將圖文說明版以抽屜式展示，降低展櫃中文字干擾，另一方面也回應策展理念中讓觀眾推理探索解謎的概念

Figure 6. By displaying the illustration/narration in the drawer, unnecessary interference with the exhibits in the cabinet is reduced, and also corresponds to this exhibition's idea of "resolving the mystery."

本展透過與臺灣大學地質系研究團隊的合作，不但讓博物館有機會可以將最新的科學研究帶給觀眾，而科學研究所產出的詮釋資料及標本等，也豐富了博物館的研究及收藏，擴展博物館的能量。另一方面，學界透過博物館場域及展示詮釋專業，提供觀眾更多接觸及理解最新的自然科學發展的管道，同時也增進觀眾對現今科學研究領域及主題的認識，藉由跨領域的合作，博物館得以發揮更大的教育功能。



terests in solving the mystery, and it is also the main approach for the visitor to acquire the exhibition-related knowledge.

Conclusion: Macro Effect of a Micro Theatre

Compared to body fossils and specimens which can be easily distinguished, the scientific information contained in trace fossils is, however, more difficult to interpret in an intuitive way. This exhibition comprises a combination of science and history, building up a virtual story through narration on a scientific basis. The narrative style is different from object-oriented exhibition, the visitors' focus will lie on the story itself. By adding scientific details and arranging displays, we create a scenario with three-dimensional views. Because the visitor can read the text and observe exhibits at the same time, it naturally helps them absorb information and prompt them to learn with motivation as well as fun! Furthermore, this exhibition provides real specimens and multi-media visual presentations, offering the visitor a dynamic and diverse way of visiting an exhibition. Because of its small scale and less-loaded information, it reduces the visitors' mental and physical exertion as they progress through the exhibits, a phenomenon described by Bitgood (2009) as the "museum fatigue" - that the visitors' tiredness and decreased attention to exhibits are induced over time. In addition, this exhibition itself as a stand-alone cabinet is flexible and easy to prepare, set up, and transport. Consequent-



圖7 蝦類掘穴生痕化石標本
Figure 7. Trace fossils of shrimp burrows.

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ly, this exhibition has travelled around Taiwan, starting at the National Taiwan Museum, the National Taiwan University History Gallery, the Tree Valley Life Science Museum, Yehliu Geopark, and is now placed at the final stop at the Lanyang Museum. This exhibition in the "cabinet of curiosities" style is an example of a practical way as museums plan for small touring exhibitions.

On one hand, this exhibition in cooperation with the research group at the Department of Geosciences at National Taiwan University not only allows the museum to have the opportunity to bring the latest scientific research to the general public, but also enriches the museum's collection with a great potential to benefit the society. On the other hand, the academic researchers are able to demonstrate their research through the display at museums, providing the visitors with more approaches to the latest developments in natural science, and also promotes the visitors' understanding of present scientific research through cross-field cooperation.



Reference:

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