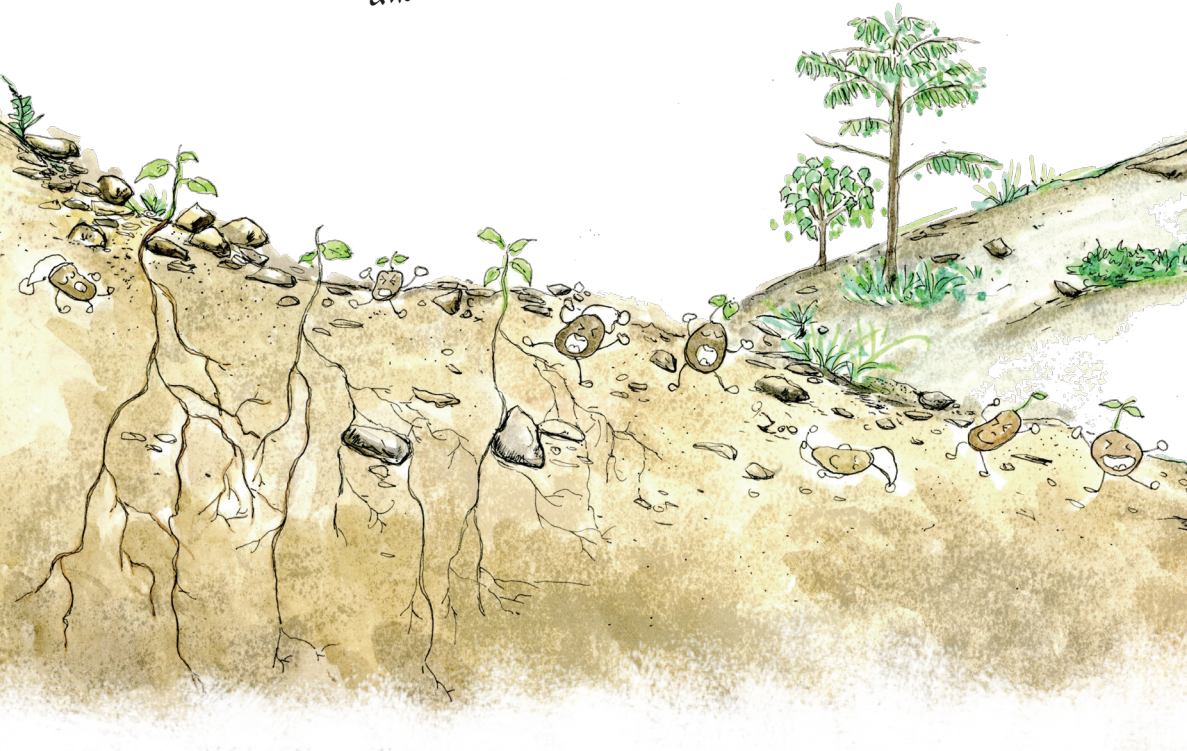


2020

# 崩毀 與重生

Collapse  
and Rebirth



行政院農業委員會林業試驗所 發行  
TAIWAN FORESTRY RESEARCH INSTITUTE

# 序

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對人類而言，崩場地一詞也許是負面的，  
但對於生態中的眾多動植物而言，崩場地代表機會與重生

臺灣為位處亞洲東緣僅約六百萬年的年輕島嶼，地形陡峭不安定。其西側與南側分別與菲律賓板塊及南中國海板塊相鄰，為現今地球板塊活動最劇烈與頻繁的區域，因此經常有地震發生。加上近年來天候異常，強風與豪雨都超乎了人們的想像，例如民國 98 年的莫拉克颱風在六龜試驗林御油山測站，5 天的累積雨量共測得超過 2,500mm，對臺灣中南部造成了極大的危害，形成了許多的崩場地。

為了要讓崩場地恢復到有植被覆蓋的相對穩定狀態，在局部重點區域經常採取混凝土硬體工程手段、打樁編柵、撒播造林等作業方式治理。但若放任這些裸露的崩場地隨著時間自然演替，亦可緩慢恢復到森林覆蓋的綠色景觀，然其缺點是先驅樹種在崩場地的分布異質性大；之後若要從先驅樹種再演變至複層林的狀態，則視種子是否可散播至崩場地來決定，需要耗費較長的時間。



# 崩毀 Collapse and Rebirth 與 重生

森林研究學者為了解崩場地植被的生長特性及演替過程，設置了樣區、調查植物的種類組成與大小，並藉由分析崩場地附近天然林及人工林下的耐陰樹種耐陰特性，於適當時機以人為方式進行崩場地造林試驗，研發加速崩場地演替的技術，此將有利於爾後以人工方式加速崩場地複層林的恢復。

對人類而言，崩場地一詞也許是負面的，但對於生態中的眾多物種而言，崩場地代表機會，也代表著資源崩毀後的重新分配，新的生命再次展開，不同特性的物種將大展身手，讓我一起來看看研究人員的成果及生命的成長故事吧。

行政院農業委員會林業試驗所 所長

張 彬

謹識

2019年11月



# Preface

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*—To us mankind, the word “landslide” perhaps always conjures up a negative impression. However, to numerous other animals and plants, a landslide often represents opportunities and rebirth.—*

Taiwan is a young island only about 6 million-year-old and situated at the eastern fringe of Asiatic Continent. It has steep and unstable landscapes. To the west and south of the island, it abuts respectively the Philippine Plate and South China Sea Plate. These are some of the most violent and frequent plate tectonic activity regions of the earth. Earthquakes are therefore common occurrence. These, coupled with the unusual freak weathers of recent years, often with strong winds and torrential rains beyond our imagination. For instance, in 2009, during the strike of Typhoon Morakot, the five-day cumulative rainfalls at the Yuyoushan observatory of the Liouguei Experimental Forest reached more than 2500 mm. This kind of rainfalls brings humungous damages to the central and southern Taiwan, and large numbers of landslides were formed in the wakes of the typhoons.

In an effort to return landslide areas to a relatively stable condition with suitable plant cover, we often adopt certain operational methods such as engage concrete hardware engineering measures, pound live staking or construct wattle fences, or spray seeds for afforestation at important slide localities. However, if we just leave these bare slide grounds



# 崩毀 Collapse and Rebirth 與 重生

to be healed by natural succession over time, they will eventually and slowly return to forest covered landscapes. The major shortcoming is that pioneering tree species have great disparaging distributions near the slide areas; and if we expect the landscapes to transform from the pioneering species to multistoried forest condition, all would depend on whether the seeds can properly distribute onto the landslides. Often very long period of time is required.

In order to understand the growth and succession of plant cover on landslide areas, forestry researchers has established experimental plots to investigate the types and sizes of plant composition. And through analyzing the shade-tolerant characteristics of the shade tolerant tree species in nearby natural and manmade forests, to manually conduct afforestation experiments on the slide areas, so as to study techniques for hasten plant succession on slide areas. These studies would be beneficial to soil and water conservation and be conducive to quickly restore multistoried forests on the landslide areas.

To us mankind, the word “landslide” perhaps always conjures up a negative impression. However, to numerous other animals and plants, a landslide often represents opportunities and also redistribution of natural resources after their crush and destruction. New lives would reappear, and species with different natures would again do their best to compete. Let us observe together the marvelous results of our researchers and the story of growth for different lives.

*Bin chang*

Director General, Taiwan Forestry Research Institute  
November, 2019



## 壹、研究歷程

為了解颱風及山崩等災害後，裸露的黃土大地（或稱為崩塌地）如何演變回復成為鬱鬱蔥蔥的森林，研究人員在災害發生後進入崩塌地設置樣區並長期監測植物、動物及環境的變化，收集足夠的資料以了解生態的變化，以下就是研究人員的研究點滴：

### I. Research Process

In order to understand how barren and exposed land is restored into lush forest after disasters such as typhoons and landslides after the occurrence of a disaster, researchers entered the landslide-affected area to set up a sample plot, as well as carry out long-term monitoring of changes to the plantlife, wildlife, and environment, to collect sufficient data to understand ecological changes. The following are the research details of the researchers:

## 木本植物調查

在樣區內針對胸高直徑（離地面 1.3 公尺高度的植物主幹直徑）大於 1 公分的植物進行鋁牌標定作業，如此才能長期監測植物的生長狀況，記錄植物種類、胸高直徑及相關生長狀況。並可以將這些資料轉換成各種植物的重要數值（利用分析後可得 IVI 指數（重要值指數）），此一數值可表示其掌控此一環境的能力。

## Woody Plant Investigation

Plants with a diameter at breast height (DBH; tree trunk diameter measurement at 1.3 m above ground) of more than 1 cm in the sample plot were tagged with aluminum labels. This enables the long-term monitoring of the plants' growth condition so that data such as the plant species, DBH, and other related growth conditions can be recorded. Furthermore, these data can be converted into important values for various plants (using the IVI index (importance value index) after analysis), which can indicate how dominant these plants are in this environment.



## 草本植物調查

我們使用點框法監測草本植物的覆蓋狀況，利用  $1 \times 1$  公尺的框架，並用線將其分成平均的 100 格，每格  $10 \times 10$  公分。調查其中草本植物的覆蓋度及頻度，了解其在下層環境中的支配能力。

## Herbaceous Plant Investigation

We used the point frame method to monitor the coverage of herbaceous plants. String was used to divide a  $1 \times 1$  meter frame equally into 100 cells, at  $10 \times 10$  cm per cell. We investigated the coverage and frequency of herbaceous plants in the frame to understand their dominance in the undergrowth environment.



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## 先驅陽性植物的根系特性調查

在崩塌地上初期沒有植物遮蔭陽光強烈，地面也沒有落葉腐植層覆蓋，使得土壤乾燥水份缺乏，此時先驅陽性植物的根系如何如何從土壤中取得水份呢？研究人員針對數種先驅樹種小苗進行挖掘作業，了解植物地下部根系的分佈情形及深度與地上部莖葉的分配比率。

### Investigation of the Root System Characteristics of Pioneer Sun Plants

In the initial period of the affected area, there was harsh solar exposure with no shade from plants, and the ground was not covered by fallen leaves or a humus layer, which made the soil dry and lacking in moisture. How did the root systems of the pioneer sun plants obtain water from the soil during this period? The researchers targeted a number of saplings from pioneer tree species to undergo excavation, in order to understand the plants' root system distribution and depth underground, as well as the distribution ratio of the stems and leaves aboveground.





## 微環境資料收集

先驅植物在逐漸佔據崩場地時，樹冠的不斷擴張會直接改變該區域的微環境，營造其它非先驅植物及動物的進駐，因此研究人員設置了光度計、溫溼度計及土壤水份計等設備，長期監測微環境的變化情形，藉以分析環境變化與動植物間的關聯。

## Microenvironment Data Collection

The continuous expansion of the canopy of pioneer plants during their gradual occupation of affected ground will directly change the microenvironment of the area, creating habitats suitable for other non-pioneer plants and animals. Therefore, the researchers set up instruments, including photometers, hygrothermographs, and soil moisture sensors, for long-term monitoring of changes in the microenvironment, to analyze the relationship between environmental changes and the plants and animals.



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## 動物監測

崩塌地中的微環境不斷變化，持續進入的植物提供了棲息地及食物來源，吸引動物進來居住或活動。

為了解有哪些動物在此活動，研究人員設置了自動感測相機，拍攝動物與植物間的活動情形。

## Animal Monitoring

The microenvironments of landslide-affected areas are constantly changing; the plants that enter continuously provide habitat and food sources that attract animals that enter to live or carry out living activities. To find out which animals are active in the area, researchers set up an automatic sensor camera to capture the interactivity between animals and plants.



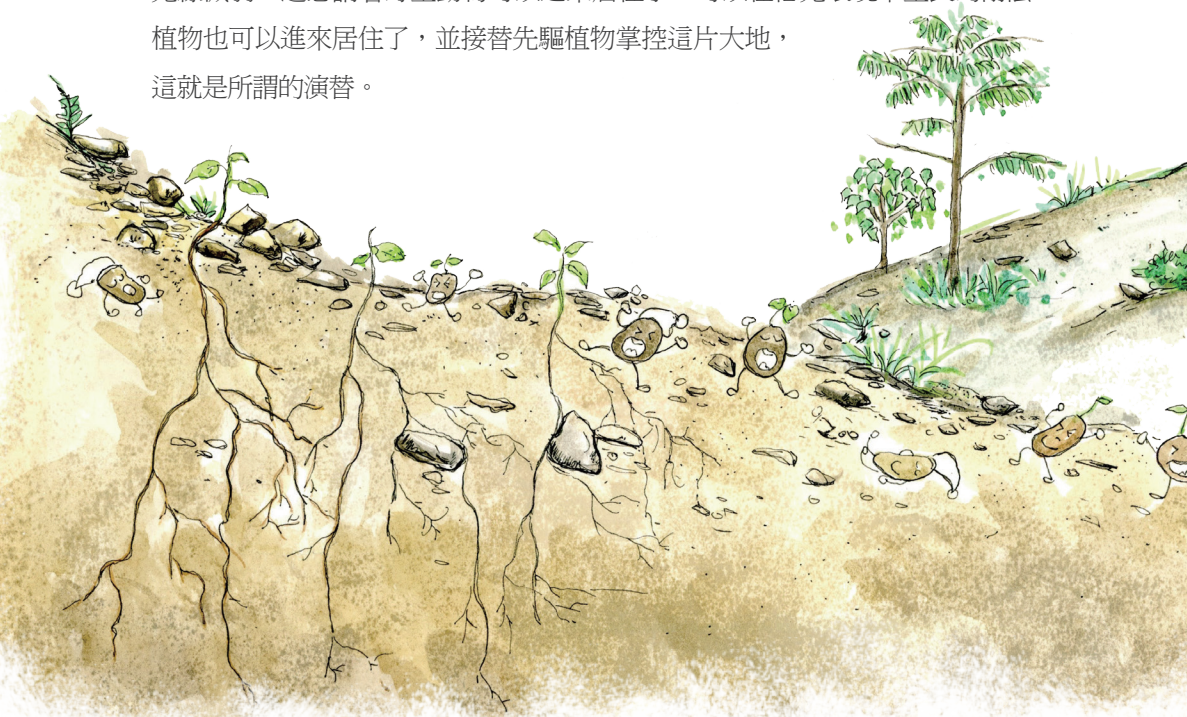


## 貳、先驅植物概述

在自然環境中，因為地震、山崩、洪水、颱風或人為破壞等因素，使得原本的植物消失，大地裸露成一片黃土岩石，此時最先進駐的植物即稱為「先驅植物」。

先驅植物必需在強光下生長，因此亦稱為陽性植物，通常具有能耐受乾旱的根系及耐土壤貧瘠且葉面具有較高的光合作用速率，能充份利用陽光而快速生長，很快的他們就佔領覆蓋了整塊裸露的大地，並掌控植物最重要的資源—陽光。

大地在再次受到覆蓋後產生了變化，先驅植物的枯枝落葉增加了土壤的肥力及保水力，樹冠減少了雨水直接衝擊，防止土壤流失，且提供了遮蔭使得林下的光線減弱，這意謂著野生動物可以進來居住了，可以在低光環境下生長的耐陰植物也可以進來居住了，並接替先驅植物掌控這片大地，這就是所謂的演替。



# 崩毀 Collapse and Rebirth

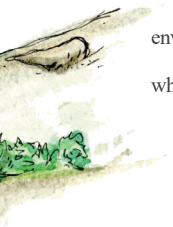
# 與 重生

## Overview of Pioneer Plants

In the natural environment, when an area becomes barren exposed land due to earthquakes, landslides, floods, typhoons, or man-made damage, causing the original vegetation to disappear, the first plants to re-populate the area are called “pioneer plants”.

Pioneer plants must be capable of growing under strong sunshine, so they are also called sun plants. These plants usually have drought-tolerant roots and are tolerant of barren soil, while their leaves have a high rate of photosynthesis and can fully utilize sunlight to grow rapidly. They will be able to quickly occupy the entire area of bare land and dominate the most important resource for plants—sunlight.

Changes occur when the land is once again covered, the fallen leaves and branches of pioneer plants increase the fertility and water retention capability of the soil, the canopies reduce the direct impact of rainfall, which can prevent soil loss, and also provide shade that decreases the light-exposure to the under-forest. This means that wildlife will move into and live in the area, while shade-tolerant plants that can grow in low-light environments will also be able to grow here, taking over control of the land from the pioneer plants. This is what is meant by succession.



# 2020 Calendar

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# 2021 Calendar

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崩毀  
與  
Collapse  
and Rebirth  
重生

2020 Calendar

# 先驅者

Pioneers

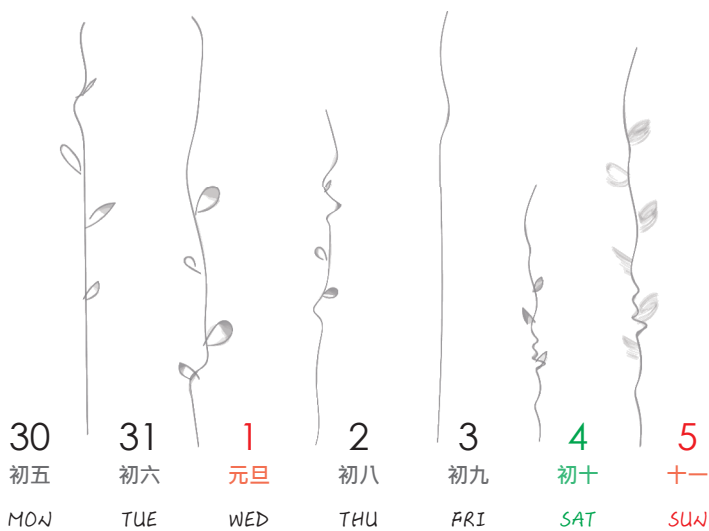
善於等待的人，一切都會及時來到。

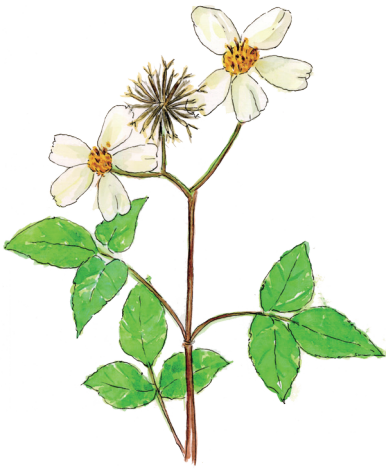
—巴爾札克

*Everything comes in time for those who are able to wait*

—Balzac







大花咸豐草 學名：*Bidens pilosa* var. *radiata* 俗名：鬼針草

外觀形態特徵、生態習性、棲地分布：一至二年生草本，莖直立可達1公尺高，三至五出複葉，花白色，果實為黑色細長形，數量多可以沾粘在動物身上，傳播至其它地區。

*Bidens alba* Scientific Name: *Bidens pilosa* var. *radiata* Common Name: Shepherd's needles

External morphological characteristics, ecology and habits, habitat distribution: annual or biennial herbaceous plants, upright height of stems up to 1 meter, with three to five compound leaves, white flowers, numerous fruits are black in color and slender and long in shape, which can get stuck to animals and spread to other areas.

6	7	8	9	10	11	12
小寒	十三	十四	十五	十六	十七	十八
MON	TUE	WED	THU	FRI	SAT	SUN

笑顏逐開的天空是什麼顏色？

睡不著的星星到底有幾顆？

旅行者白雲最後落腳何處？

如果你知道，請告訴我。

我是住在地底下的先驅者

*What is the color of the sky that gradually breaks into a smile?*

*Exactly how many stars are there that cannot sleep?*

*Where does the traveler's white cloud finally land?*

*If you know, please tell me.*

*I am the pioneer that lives underground.*



13	14	15	16	17	18	19
十九	二十	廿一	廿二	廿三	廿四	廿五
MON	TUE	WED	THU	FRI	SAT	SUN





羅氏鹽膚木 學名：*Rhus chinensis* 俗名：山鹽菁

外觀形態特徵、生態習性、棲地分布：落葉小喬木，樹高可達約7公尺。奇數羽狀複葉，對生，小葉卵狀披針形，有鋸齒。雌雄異株，核果扁球形。常見於臺灣2,000公尺以下的山麓叢木地區。

20	21	22	23	24	25	26
大寒	廿七	廿八	廿九	除夕	春節	初二
MON	TUE	WED	THU	FRI	SAT	SUN

**Chinese sumac**    Scientific Name: *Rhuschinensis*    Common Name: Nutgall tree

External morphological characteristics, ecology and habits, habitat distribution: Small deciduous tree whose height can be up to 7 meters. Odd-pinnate compound leaves in pairs, small ovate-lanceolate leaves with serrated edges. Dioecious, with oblate stone fruits. Commonly found in the brushland of foothills under 2,000 meters in Taiwan.

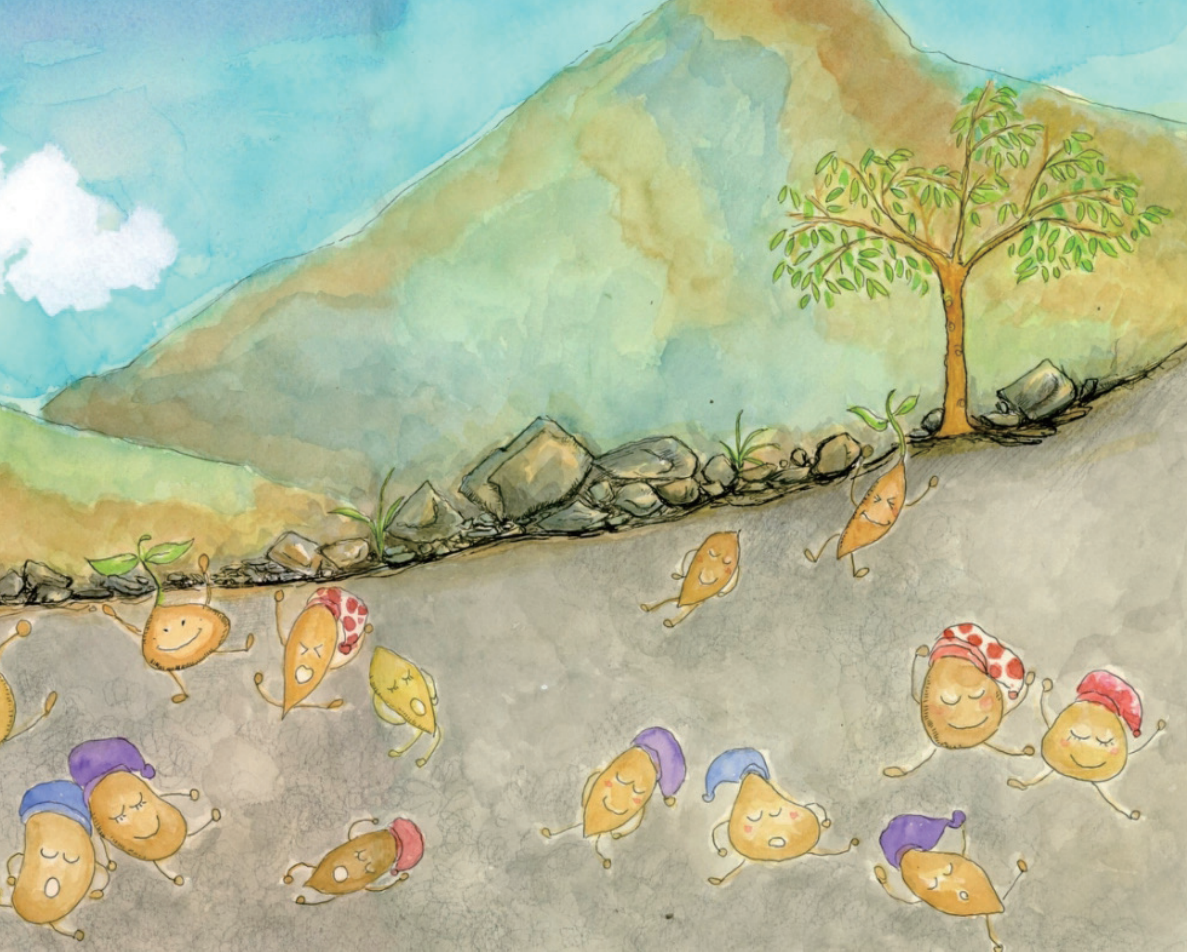


數以萬計的先驅者，  
住在地下的土壤種子庫中，  
沉睡著 沉睡著

沒有紫丁香仙子的祝福，王子吻不醒我們，  
沒有善與惡的分界，黑暗騎士找不著地下門。

*Hundreds and thousands of pioneers,  
living in underground soil seed banks,  
sleeping deeply,*

*We do not have the blessing of the Lilac Fairy; the prince cannot wake us with a kiss,  
There is no line between good and evil; the dark knight cannot find the gate to the underground.*



27  
初三

MON

28  
初四

TUE

29  
初五

WED

30  
初六

THU

31  
初七

FRI

1  
初八

SAT

2  
初九  
世界溼地日

SUN



2月



山胡椒 學名：*Litsea cubeba* 俗名：馬告

外觀形態特徵、生態習性、棲地分布：落葉小喬木，樹高可達約7公尺。單葉互生，披針形，全緣。花單性，雌雄異株，果實為核果，球形。常見於海拔1,000公尺以上的高山向陽地。

**Aromatic litsea** Scientific Name: *Litsea cubeba* Common Name: Maqaw

External morphological characteristics, ecology and habits, habitat distribution: Small deciduous tree whose height can be up to 7 meters. Alternating simple leaf, lanceolate, full leaf margin. Unisexual flowers, dioecious, with round stone fruits. Commonly found in high mountains of 1,000 meters or more with direct exposure to sunlight.

3	4	5	6	7	8	9
初十	立春	十二	十三	十四	元宵節	十六
MON	TUE	WED	THU	FRI	SAT	SUN



一天一天

一年一年

我們閉著雙眼，張開耳朵，

聆聽大地心跳的聲音。

*Day after day*

*Year after year*

*We close our eyes and open our ears,*

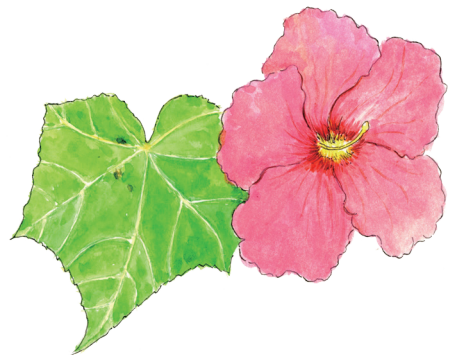
*Listening to the heartbeat of the earth.*

10 十七	11 十八	12 十九	13 二十	14 廿一 情人節	15 廿二	16 廿三
MON	TUE	WED	THU	FRI	SAT	SUN



## 臺灣山芙蓉 學名：*Hibicus taiwanensis*

外觀形態特徵、生態習性、棲地分布：灌木，密被剛硬刺毛，葉單葉互生，略呈圓形，3~5裂。雌雄同株，有單體雄蕊的特徵，花色一日數變。果實為蒴果，密被毛茸。常見於海拔1,500公尺以下的山麓叢木地區。



### Taiwan cotton-rose Scientific Name: *Hibicus taiwanensis*

External morphological characteristics, ecology and habits, habitat distribution: Shrub densely covered with hard spines, simple leaf with alternating arrangement, slightly ovate, 3-5 lobed. Monoecious, with monadelphous stamen characteristics, color of flowers changes throughout the day. The fruit is in capsule form, densely covered in down. Commonly found in the brushland of foothills under 1,500 meters.

17

廿四

MON

18

廿五

TUE

19

雨水

WED

20

廿七

THU

21

廿八

FRI

22

廿九

SAT

23

二月六

SUN

2月

山豬的腳步聲，  
捎來暴風雨來臨的信息，  
輕輕的，略帶急促：  
就在今晚  
就在今晚  
大家都躲起來吧！  
躲進大自然的庇護中。

地底下的先驅者，  
靜待難得的新契機，  
屏息的，交頭接耳：  
過了今晚  
過了今晚  
大家都醒過來吧！  
衝破土壤層而發芽重生

The steps of the wild boars,  
Bring the news of the coming storm,  
lightly, slightly rushed:  
It's tonight  
It's tonight  
Let us all hide away!  
Hide in the embrace of Mother Nature.

The pioneers underground,  
Quietly awaits the rare new opportunity,  
With bated breath, in whispered wonder:  
After tonight  
After tonight  
Let us all wake up!  
Break through the soil and germinate to be reborn



24	25	26	27	28	29	1
初二	初三	初四	初五	初六	初七	初八
			國際北極熊日	和平紀念日		
MON	TUE	WED	THU	FRI	SAT	SUN



白匏仔 學名：*Mallotus paniculatus* 俗名：白背樹、白葉仔

外觀形態特徵、生態習性、棲地分布：中喬木，樹高可達約 10 公尺。單葉互生，葉菱形，葉基部鈍形具 2 腺點，先端漸尖，全緣或頂端 3 淺裂，葉背密被白色星狀絨毛。雌雄異株或同株，花單性，蒴果近球形，密被羽狀軟刺。多分布於臺灣全島海拔 1,000 公尺以下之次生林，喜生長於陽光強烈之處。生理等特殊特性：二年生的植栽即可開花結果產生種子，並再次發芽生長成另一批植物或形成另一批的土壤種子庫。

備註：土壤種子庫：指存在於土壤中或土壤表層之有活力的種子，且包括腐植層，因為其中亦有許多有活力的種子。

*Mallotus paniculatus* Scientific Name: *Mallotus paniculatus* Common Name: Turn-in-the-wind

External morphological characteristics, ecology and habits, habitat distribution: Medium tree whose height can reach up to 10 meters. Simple leaf with alternating arrangement, leaf rhomboid in form, two flat glands on the leaf blade at its junction with the petiole, the apex acuminate, the margin is 3-lobed entirely or apically, underside of leaf densely covered in white stellate hairs. Dioecious or monoecious, flowers unisexual, capsules echinate, densely covered in pinnate spines. Mainly distributed in the secondary forests below an altitude of 1,000 meters around Taiwan. Special physiological characteristics: Flowering and fruit-bearing with seeds after biennial planting, which will then germinate again to grow into another batch of plants or form another batch of soil seed bank.

Remarks: Soil seed bank: Refers to viable seeds in the soil or on the surface of the soil, including the humus layers, as there are also many viable seeds within.

2	3	4	5	6	7	8
初九	初十 世界野生動物日	十一	驚蟄	十三	十四	十五 婦女節
MON	TUE	WED	THU	FRI	SAT	SUN

## 登場

狂風用最突出的短笛音色，發出尖吼：  
烏雲用圓號的阻塞音，產生陰暗的戲劇性效果：  
大鼓和小提琴交流奏出暴雨雷鳴：  
這個氣勢磅礴的交響樂團，  
在樹木搭建出來的舞臺中，  
痛快演奏！

It's here  
Raging winds sound the harshest piercing note of the piccolo, screaming shrilly.  
Storm clouds blow out the call of the horn, creating dark theatrical effects.  
Drums and violins take turns playing the part of a thunderstorm.  
In this grand symphony,  
on this stage made from trees,  
play to your heart's content!



9 十六	10 十七	11 十八	12 十九 植樹節	13 二十	14 廿一	15 廿二
MON	TUE	WED	THU	FRI	SAT	SUN

3月



暴風雨後，

四處瀰漫沉靜的氣息，

只剩下 崩落的山丘，

為 脆弱大地 下註解：

*After the storm,  
calmness permeates the atmosphere,  
only the fallen hills are left,  
leaving a note for the fragile earth;*

只剩下 堆疊的碎石，

為 秩序重整 下註解：

*only the stacked broken rocks are left,  
leaving a note for order to be regained;*

只剩下 傾倒的樹木，

為 生命無常 下註解。

*only the toppled trees are left,  
leaving a note for the impermanence of life.*



16  
廿三

MON

17  
廿四

TUE

18  
廿五

WED

19  
廿六

THU

20  
春分

FRI

21  
廿八  
國際森林日

SAT

22  
廿九  
世界水資源日

SUN

3月

傾倒樹木的遺書：

上天啊！請看看我內心深處，  
那裡有對大自然的熱愛和呵護的願望。  
哦！地底下的先驅者們，  
佔領這片裸露的大地，  
繼承這份熱情，過得幸福、自在。

*The will of the toppled trees:  
Oh, Creator! Look deep within my heart,  
there is my great love for Mother Nature and my wish to care for Her.  
Oh! The pioneers underground,  
take over this barren land,  
inherit my love, and live in fortune and freedom.*



23 三十 世界氣象日	24 三月大	25 初二	26 初三	27 初四	28 初五	29 初六 青年節
MON	TUE	WED	THU	FRI	SAT	SUN



山黃麻 學名：*Tremaorientalis* 俗名：白背樹、山油麻

外觀形態特徵、生態習性、棲地分布：大喬木，樹高可達約 15 公尺。單葉互生，葉卵形，有細齒。花多為兩性，果實為核果，熟時成黑色。為臺灣海拔 1,000 公尺以下最常見的先驅樹種。生理等特殊特性：二年生的植栽即可開花結果產生種子，並再次發芽生長成另一批植物或形成另一批的土壤種子庫。

*Trema tomentosa* Scientific Name: *Tremaorientalis* Common Name: Poison peach

External morphological characteristics, ecology and habits, habitat distribution: Large tree whose height can reach up to 15 meters. Simple leaf with alternating arrangement, leaf ovate with serrulation. Flowers bisexual, fruits are stone fruit, which turn black when ripe. Most commonly seen pioneer tree species below an altitude of 1,000 meters in Taiwan. Special physiological characteristics: Flowering and fruit-bearing with seeds after biennial planting, which will then germinate again to grow into another batch of plants or form another batch of soil seed bank.

30 初七	31 初八	1 初九	2 初十	3 十一	4 清明節 兒童節	5 十三
MON	TUE	WED	THU	FRI	SAT	SUN

4月

荒蕪中

先驅者迸出

伸展枝葉

沐浴日光

享受 此時此刻

全新視野

In the barren waste land  
Pioneers arrive  
Spreading out their branches and leaves  
Bathing in the sunlight  
Enjoying this moment  
This brand new view



6

十四

MON

7

十五

TUE

8

十六

WED

9

十七

THU

10

十八

FRI

11

十九

SAT

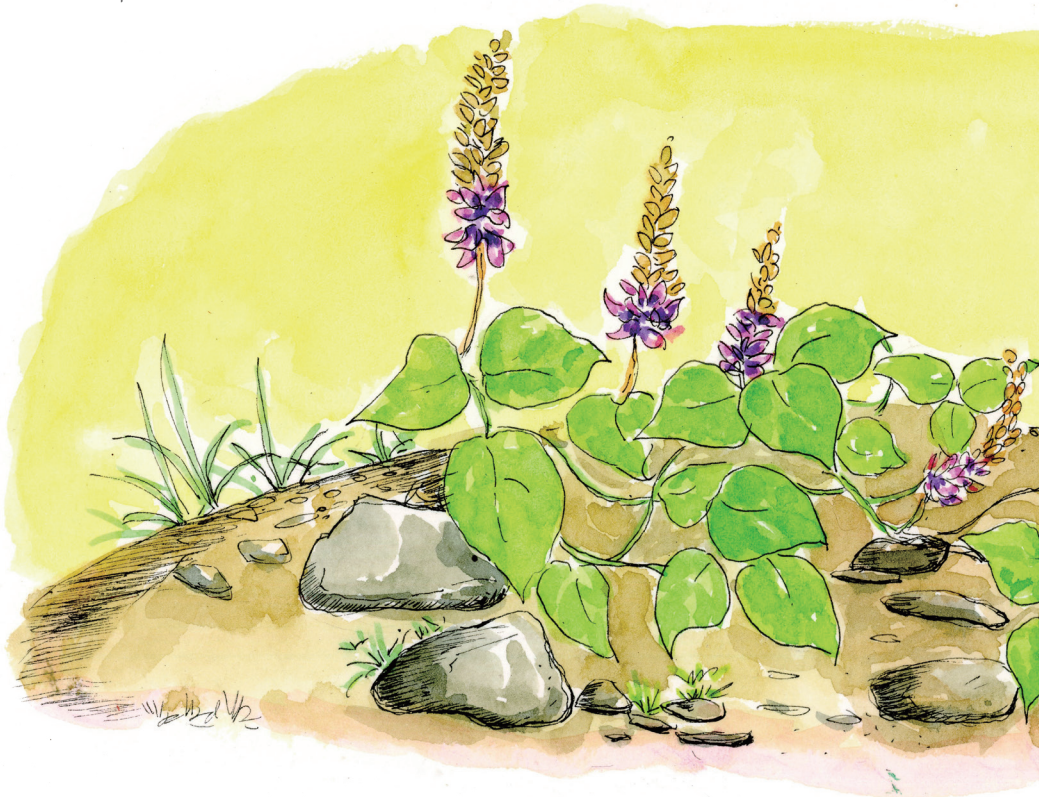
12

二十

SUN

我們是從崩塌地長出來的，  
先驅者。  
不畏陽光照耀，  
能耐土壤貧脊，  
因為積蓄了多年等待的力量，  
因為有著胼手胝足的開墾精神，  
為了日後重現茂密的樹林，  
打下第一步根基。

We grew from the collapsed land,  
We are the Pioneers.  
We are not afraid of the brilliance of the sun,  
We can stand the barren soil,  
Because we have stored much energy throughout our long years waiting,  
So we have the pioneering spirit to give our all.  
To bring forth the future verdant forest,  
We will lay down the first piece of the foundation.



13	14	15	16	17	18	19
廿一	廿二	廿三	廿四	廿五	廿六	穀雨
MON	TUE	WED	THU	FRI	SAT	SUN





小花蔓澤蘭 學名：*Mikania micrantha* 俗名：微甘菊

外觀形態特徵、生態習性、棲地分布：一年生蔓性草本植物，單葉對生，基部心型，先端漸尖。花白色，兩性花，每年10月至隔年2月為開花結果期，可產生大量種子，開花結果時每平方公尺可產生約17萬顆種子可無性繁殖，在全臺灣海拔1,000公尺以下生長快速，因此擴張迅速，常覆蓋其它植物使其接收不到陽光而死亡。

**Bitter vine** Scientific Name: *Mikania micrantha* Common Name: Climbing hemp vine

External morphological characteristics, ecology and habits, habitat distribution: Annual creeper, simple leaf in pairs with a heart-shaped base and a pointed apex. Flowers white in color and bisexual; flowering and fruit-bearing season runs every year from October to February of the following year, a large number of seeds can be produced, and around 170,000 seeds per square meter can be asexually produced during flowering and fruit-bearing season. The plant grows rapidly below an altitude of 1,000 meters everywhere around Taiwan; it therefore spreads quickly, often covering other plants so that they cannot receive sunlight and die as a result.

20	21	22	23	24	25	26
廿八	廿九	三十 世界地球日	四月小	初二	初三	初四
MON	TUE	WED	THU	FRI	SAT	SUN

4月



血桐 學名：*Macaranganarius* 俗名：流血樹

外觀形態特徵、生態習性、棲地分布：中喬木，樹高可達約 10 公尺。單葉，枝端叢生，橢圓形，掌狀脈。花單性，雌雄異株，蒴果雙球形。為臺灣海拔 500 公尺以下常見的陽性樹種。

**Parasol leaf tree** Scientific Name: *Macaranganarius* Common Name: Blush macaranga

External morphological characteristics, ecology and habits, habitat distribution: Medium tree whose height can reach up to 10 meters. Simple leaf, branches grow in clusters ending in rosettes, palmate veins. Unisexual flowers, dioecious, fruits are bicocccus capsules. Commonly seen sun plant species below an altitude of 500 meters in Taiwan.

27	28	29	30	1	2	3
初五	初六	初七	初八	初九 勞動節	初十	十一
MON	TUE	WED	THU	FRI	SAT	SUN

5月

創造者  
Creator

崩毀  
與  
Collapse  
and Rebirth 重生

2020 Calendar





# 創造者

Creator

考驗使人茁壯 破壞帶來重生

Challenges make one stronger; destruction brings rebirth

4  
十二

5  
立夏

6  
十四

7  
十五

8  
十六

9  
十七

10  
十八  
母親節

MON

TUE

WED


THU

FRI

SAT

SUN





有人說我是宙斯的第 108 代子孫，  
我說我是一個多愁善感的創造者。

一棵樹木代表一個家，  
我用歲月之流打造一座樹林 --- 一個族群，  
在創造中追尋一份歸屬感。

*Some say I am the 108<sup>th</sup> generation descendant of Zeus.  
I say I am a creator full of the feelings of the world.*

*One tree represents one home;  
I use the years to create a forest, a population,  
through creation, I find where I belong.*



11  
十九

12  
二十

13  
廿一

14  
廿二

15  
廿三

16  
廿四

17  
廿五

MON

TUE

WED

THU

FRI

SAT

SUN



臺灣山茶 學名：*Camellia formosensis* 俗名：山茶

外觀形態特徵、生態習性、棲地分布：中喬木，樹高可達約 10 公尺，為臺灣山茶屬植物中唯一製成茶製品的原生樹種。葉長可達 15 公分以上，分布臺灣中南部 600 公尺以上山區。早在 300 年前，文獻上即已記錄臺灣人民飲用此種茶飲。

Taiwan tea Scientific Name: *Camellia formosensis* Common Name: Camellia

External morphological characteristics, ecology and habits, habitat distribution: Medium tree whose height can reach up to 10 meters; the only native tea species in Taiwan under the camellia genus to be produced into tea products. Leaves can reach a length of more than 15 cm; the plant is distributed in the mountainous areas 600 meters above sea level in central and southern Taiwan. As early as 300 years ago, it was already recorded in literature that the Taiwanese people were drinking tea made from this tea plant.

18 廿六	19 廿七	20 小滿	21 廿九	22 三十 國際生物多樣性日	23 閏四月小	24 初二
MON	TUE	WED	THU	FRI	SAT	SUN

5月



## 艾氏樹蛙

形態特徵：艾氏樹蛙體型小型纖細約長4公分，吻端圓鈍，鼓膜不明顯。體色多變，以淺褐色及綠色系為主。皮膚粗糙，有許多顆粒狀突起。指端有吸盤，前肢內掌突大而明顯。公蛙具咽下單一外鳴囊。

生態習性：艾氏樹蛙的叫聲為規律的「嗶、嗶、嗶」聲，很特別。喜於積水的樹洞或竹筒中產卵，雄蛙會在卵的附近守護，雌蛙則會定期回來產下未受精的卵粒，在積水洞中的蝌蚪。

25	26	27	28	29	30	31
初三	初四	初五	初六	初七	初八	初九
MON	TUE	WED	THU	FRI	SAT	SUN

## Eiffinger's Tree Frog

Morphological characteristics: Eiffinger's tree frog is a small size frog of around 4 cm in length, with a rounded blunt snout, while the tympanic membrane is not obvious. The skin color has many variations, mainly light brown and green. The skin texture is rough and has many protruding granules. The toes have suction cups and the palms of the forelimbs are protuberant and prominent. Male frogs have a single external vocal sac.

Ecology and habits: The sound that Eiffinger's tree frog makes is a regular “beep, beep, beep”, which is very unique. The frog prefers to lay eggs in tree holes or bamboo tubes that contain water; the male frog will stand guard in the vicinity of the eggs, and the female frog will periodically return to produce unfertilized eggs to feed the tadpoles in the water-filled hole.



動物們遠渡重洋 遷徙而來，  
落腳在這新的家，  
也賦予我的作品多層次的意義：  
獵食的標記  
繁衍的結晶  
微觀的驚喜  
生活的軌跡  
生生不息的大家庭。

*Animals come all over from far and wide,  
across the ocean,  
Settling down in this new home.  
Giving my works multi-layered meanings:  
Mark of the hunt  
Crystallization of reproduction  
Microscopic surprises  
Signs of life  
The flourishing big family.*



1  
初十

MON



2  
十一

TUE



3  
十二

WED



4  
十三

THU



5  
芒種  
世界環境日

FRI



6  
十五

SAT

7  
十六

SUN

6月

沉迷在創作：

一棵又一棵獨一無二的家，

一座又一座風格迥異的樹林。

直到有天，

大冠鷲問：哪一件是你最滿意的作品？

我開始沉思……

*I am mesmerized by my creation:*

*One tree after another, one unique home after another,*

*Forest after forest, each with its own unique style.*

*Until one day,*

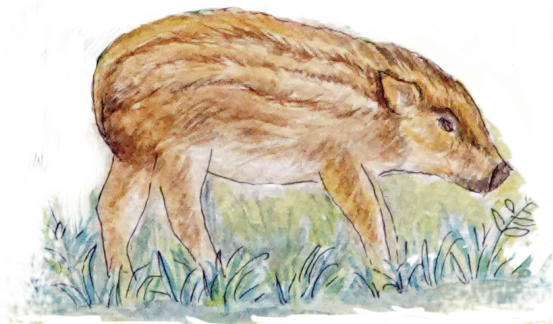
*The crested serpent eagle asked: Which work are you most proud of?*

*I began to wonder...*





8	9	10	11	12	13	14
十七	十八	十九	二十	廿一	廿二	廿三
世界海洋日						
MON	TUE	WED	THU	FRI	SAT	SUN



山豬 學名：*Susscrofa* 俗名：野豬

形態特徵：成年豬毛色為黑褐色或黑色，毛很硬。幼豬體側有數條黃褐色縱帶紋路。頭軀幹長可達 200 公分，尾長約 30 公分，高度可達約 110 公分，體重可達 300 公斤。

生態習性：可分布於平地至 3,000 公尺的各種森林、草原、廢耕地、次生林地內，習性上會以草莖鋪在地上做窩；屬於雜食性，食物包括厥類、植物的塊根、莖葉、穀粒、堅果、蚯蚓、小型脊椎動物，也經常會侵入山邊的農地吃農作物，為常見的山區動物。

15	16	17	18	19	20	21
廿四	廿五	廿六	廿七	廿八	廿九	五月大/夏至
MON	TUE	WED	THU	FRI	SAT	SUN

**Wild boar** Scientific name: *Sus scrofa* Common Name: Wild pig

**Morphological characteristics:** The adult pigs have bristly brown-black or black hair. The juvenile animals have several yellow-brown longitudinal stripes on the sides. The head and torso can reach up to 200 cm in length, with a tail length of about 30 cm, a height of up to 110 cm, and a weight up to 300 kg.

**Ecology and habits:** They are found distributed across different types of forests, grasslands, abandoned farmlands, and secondary forests ranging from plains up to an altitude of 3,000 meters. The animals lay grass stems on the ground to serve as nests. Wild boars are omnivorous, their diet including ferns, roots, stems, and leaves of plants, grains, nuts, earthworms, and small vertebrates. They also often invade farmland on the mountainside to eat crops, and are commonly seen mountain wildlife.

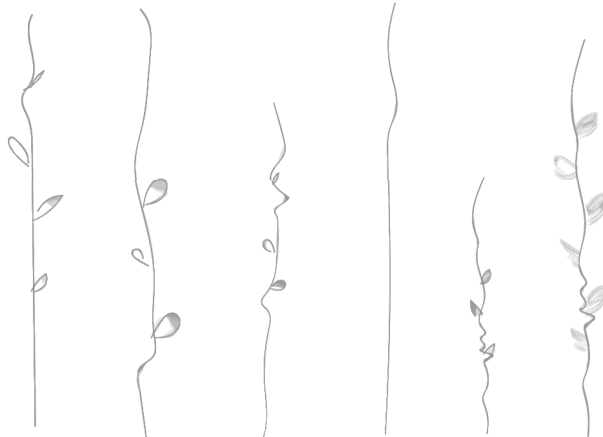


為了找尋答案，  
我化身一隻兔子，隱身於樹林之中。  
豎起耳朵 聽  
貼緊地面 聞

大地蓋婭的聲音和土壤層下蠢蠢欲動的能量，  
令我震驚，  
種子庫的秘密。

To seek the answer,  
I transformed into a rabbit, hidden amongst the trees.  
Raising my ears to listen  
Pressing against the ground to sniff

The voice of Mother Gaia and the ever-moving energy  
beneath the soil  
astounds me;  
it is the secret of the seed bank.



22	23	24	25	26	27	28
初二	初三	初四	端午節	初六	初七	初八
MON	TUE	WED	THU	FRI	SAT	SUN



**大冠鷲** 學名：*Spilornis cheela* 俗名：蛇鷹

形態特徵：體長可達約 75 公分，成鳥頭頂有黑白相間的冠羽，體色黑至深棕色，胸及腹部有白色斑點，嘴及腳均呈黃色。飛行時羽翼下緣及尾羽有明顯白色橫帶。

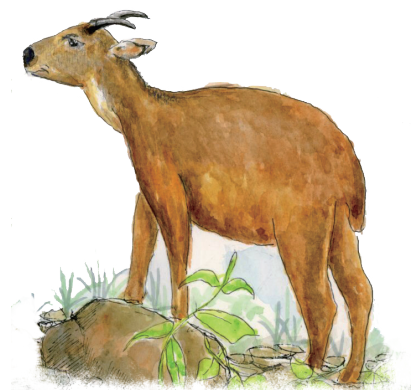
生態習性：常見於海拔 2,000 公尺以下區域，喜隨氣流升空盤旋尋找地面獵物，並長發出「忽溜～忽溜」的長鳴聲，不注意也難，亦常定點駐立於枯木頂端守候獵物出現，喜食蛇類故有蛇鷹之稱。

29	30	1	2	3	4	5
初九	初十	十一	十二	十三	十四	十五
MON	TUE	WED	THU	FRI	SAT	SUN

**Crested serpent eagle**    Scientific name: *Spilornis cheela*    Common Name: Serpent eagle

Morphological characteristics: The body length can reach up to 75 cm; adult birds have black and white crown feathers on the top of the head; the color of the body ranges from black to dark brown, while the chest and abdomen have white spots, and the beak and feet are yellow. A prominent white horizontal bar can be seen on the underside of the wings and the tail feathers when in flight.

Ecology and habits: Commonly found in areas below an altitude of 2,000 meters, they prefer to hover on air currents to search for prey on the ground. Their call is a distinctive long “Kluee-wip-wip” sound and they call frequently, which is very noticeable. The birds also spend a lot of time on their perches waiting for prey; they like to eat snakes, hence the name serpent eagle.



**臺灣野山羊** 學名：*Naemorhedus swinhoei* 俗名：臺灣羚羊

形態特徵：體長可達 110 公分，高度約 70 公分，體重約 30 公斤。體毛為褐黑色，公母頭上均有一對錐狀長角。

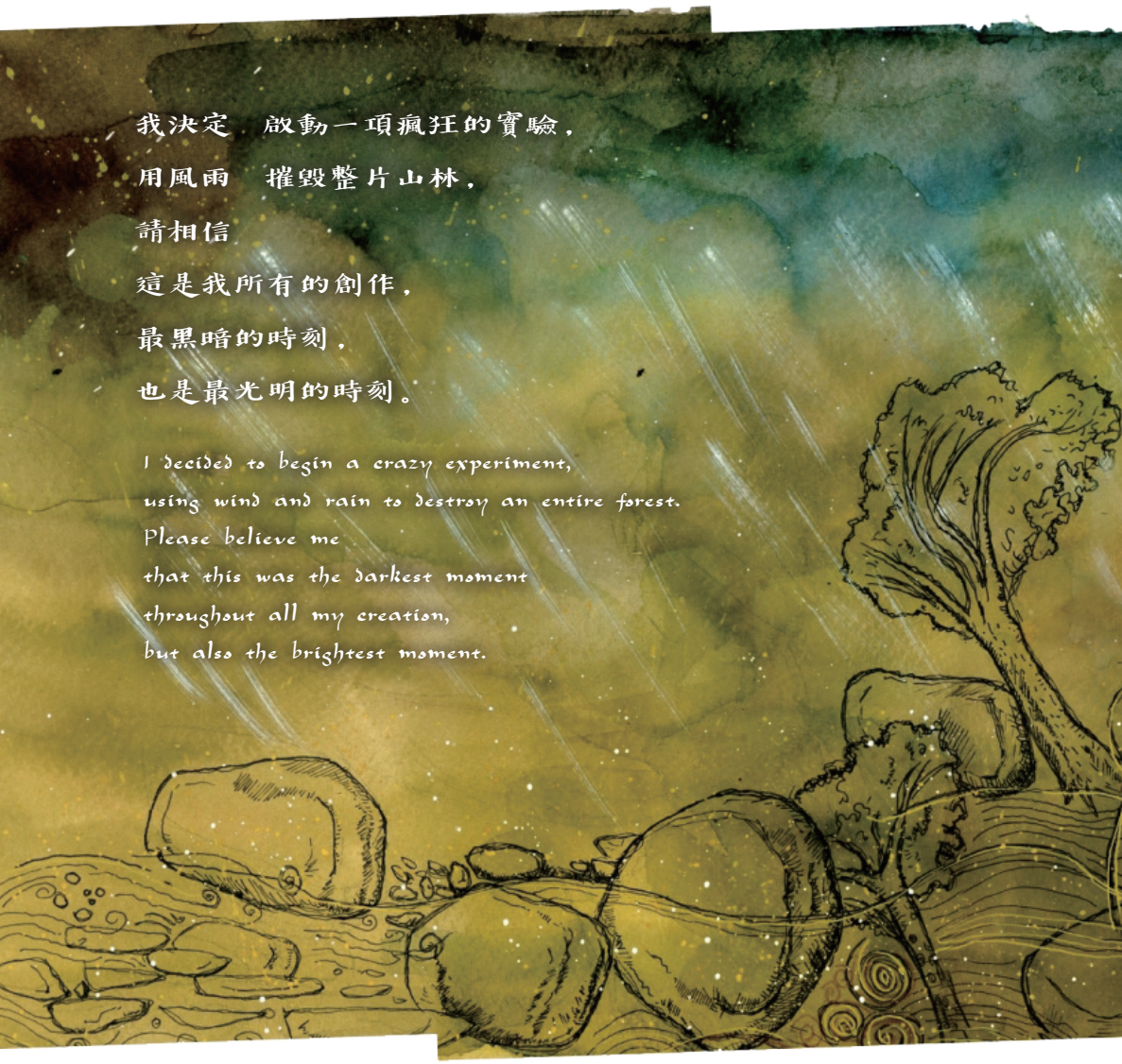
生態習性：低海拔 200 公尺至高海拔 3,000 公尺都有其蹤跡。多單獨行動，跳躍力強且擅長於陡坡行走，在陡坡上可以如輕功高手般的快速活動。以日間活動為主，喜食樹葉、嫩芽等，有磨角的習性，常在樹幹上留下明顯的痕跡。

6	7	8	9	10	11	12
小暑	十七	十八	十九	二十	廿一	廿二
MON	TUE	WED	THU	FRI	SAT	SUN

**Taiwan serow** Scientific name: *Naemorhedus swinhoei* Common Name: Formosan serow

Morphological characteristics: The body can reach up to 110 cm in length, with a height of up to 70 cm, and a weight up to 30 kg. The color of the fur is brown-black, and both sexes bear conical horns.

Ecology and habits: Their tracks can be found in low altitude regions of 200 meters above sea level to high altitude regions up to 3,000 meters. They mostly move around in singles; they are extremely agile jumpers and can easily navigate steep inclines; they can move and jump about on slopes effortlessly. They are diurnal and prefers a diet of leaves and young shoots, they have the habit of grinding their horns and leave clear marks on tree trunks.



我決定 啟動一項瘋狂的實驗，

用風雨 摧毀整片山林，

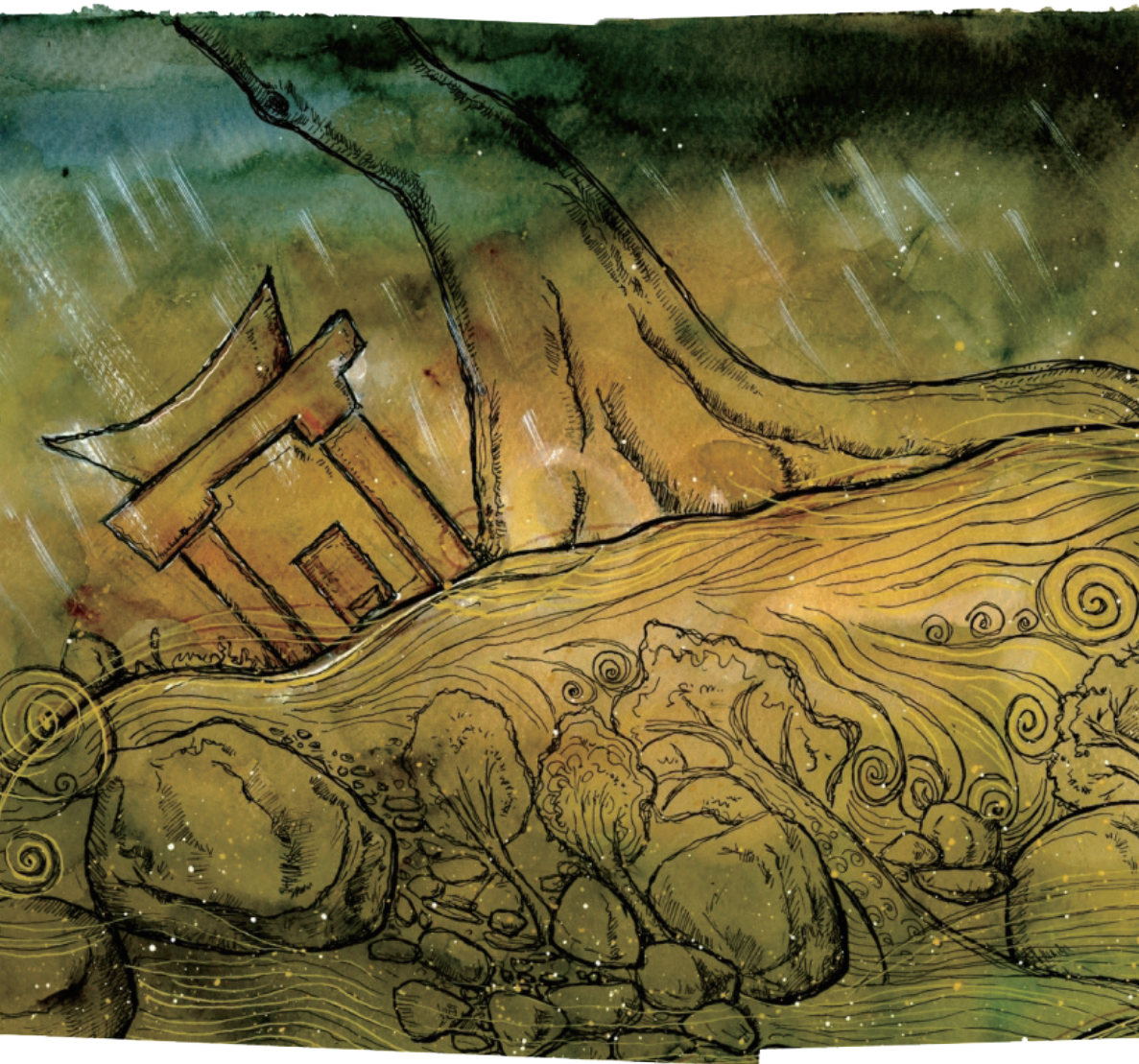
請相信

這是我所有的創作，

最黑暗的時刻，

也是最光明的時刻。

I decided to begin a crazy experiment,  
using wind and rain to destroy an entire forest.  
Please believe me  
that this was the darkest moment  
throughout all my creation,  
but also the brightest moment.



13  
廿三  
MON

14  
廿四  
TUE

15  
廿五  
WED

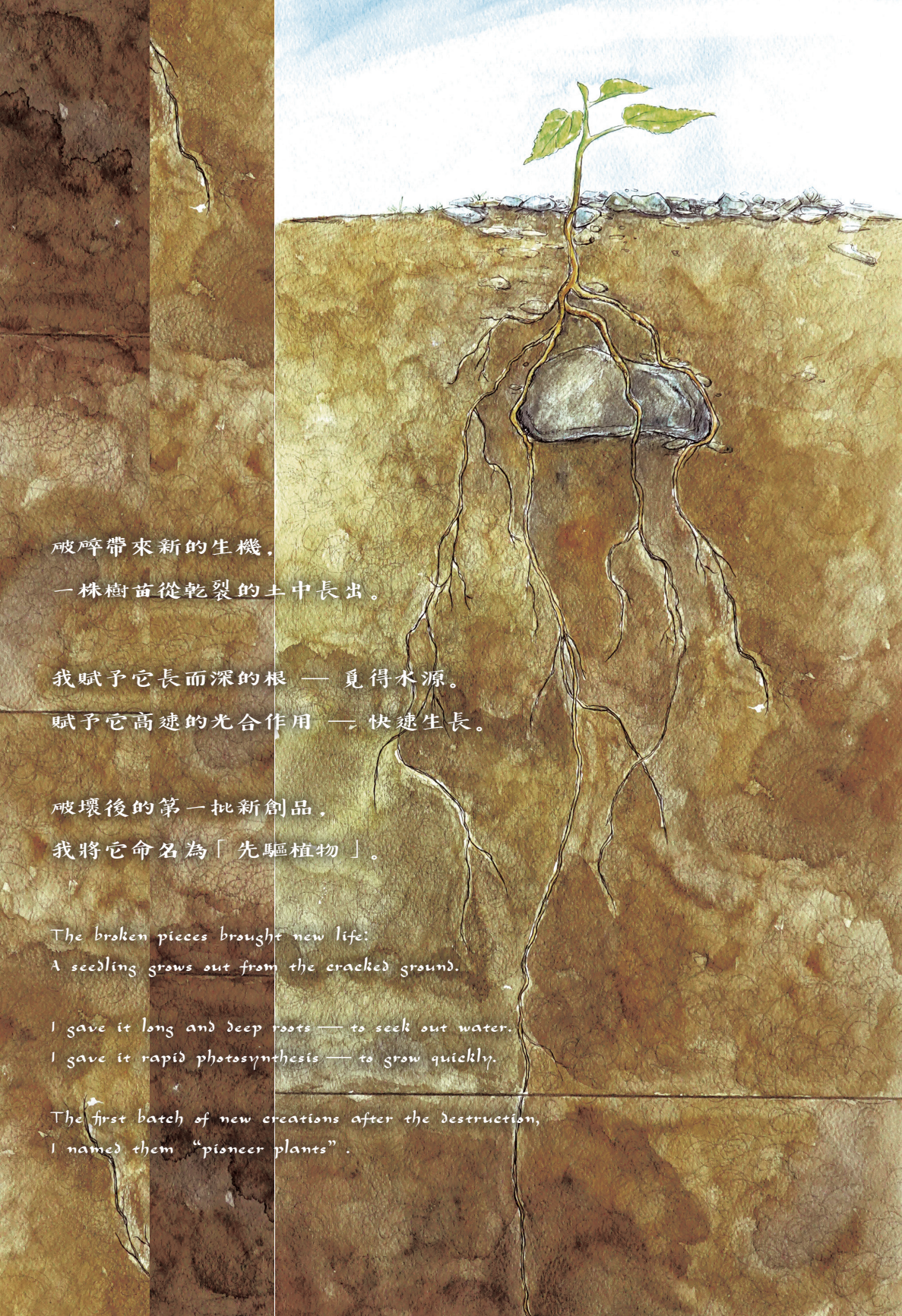
16  
廿六  
THU

17  
廿七  
FRI

18  
廿八  
SAT

19  
廿九  
SUN

7月



破碎帶來新的生機，  
一株樹苗從乾裂的土中長出。

我賦予它長而深的根——覓得水源。  
賦予它高速的光合作用——快速生長。

破壞後的第一批新創品，  
我將它命名為「先驅植物」。

*The broken pieces brought new life:  
A seedling grows out from the cracked ground.*

*I gave it long and deep roots — to seek out water.  
I gave it rapid photosynthesis — to grow quickly.*

*The first batch of new creations after the destruction,  
I named them “pioneer plants”.*

20	21	22	23	24	25	26
三十	六月小	大暑	初三	初四	初五	初六
MON	TUE	WED	THU	FRI	SAT	SUN



27  
初七

MON

28  
初八

TUE

29  
初九

WED

30  
初十

THU

31  
十一  
世界巡護員日

FRI

1  
十二

SAT

2  
十三

SUN

這一棵棵強固的先驅植物，  
承受自然環境的考驗，  
耐住掠食動物的糾纏，  
它們 悄悄在我眼底下，

蔓延 蔓延

蔓延 蔓延

蔓延

覆蓋住周圍的土地。



Each strong and resilient pioneer plant,  
They withstand the tests of nature,  
They resist troubles from predators,  
Quietly, under my eyes,

They grow and grow  
They grow and grow  
And grow  
Covering the surrounding land.



3  
十四

4  
十五

5  
十六

6  
十七

7  
立秋

8  
十九  
父親節

9  
二十

MON

TUE

WED

THU

FRI

SAT

SUN

8月

不久，  
一片熱鬧的樹林又誕生。

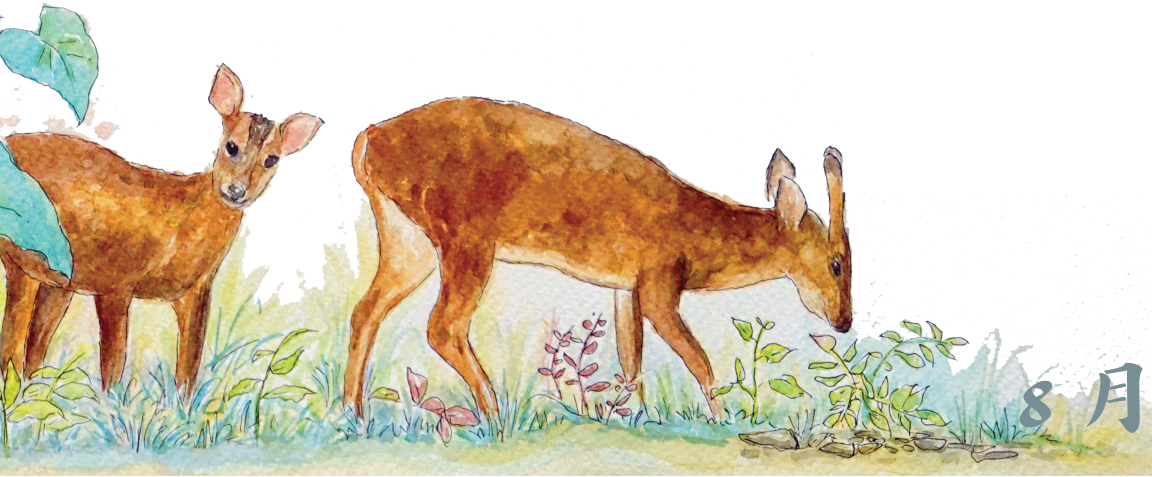
看著它們，會心一笑，  
我愛我創造的每一棵樹木、每一座樹林，  
更愛那些歷經破壞後重生的森林，  
象徵堅韌的生命力，  
在地球上存在著。



Soon,  
a bustling forest is once again born.

Looking at them, I smile,  
I love every tree, every forest that I created,  
But I love the forests reborn after destruction even more,  
those lives that symbolize resilience,  
existing on earth.

10	11	12	13	14	15	16
廿一	廿二	廿三	廿四	廿五	廿六	廿七
MON	TUE	WED	THU	FRI	SAT	SUN





17	18	19	20	21	22	23
廿八	廿九	七月小	初二	初三	處暑	初五
MON	TUE	WED	THU	FRI	SAT	SUN



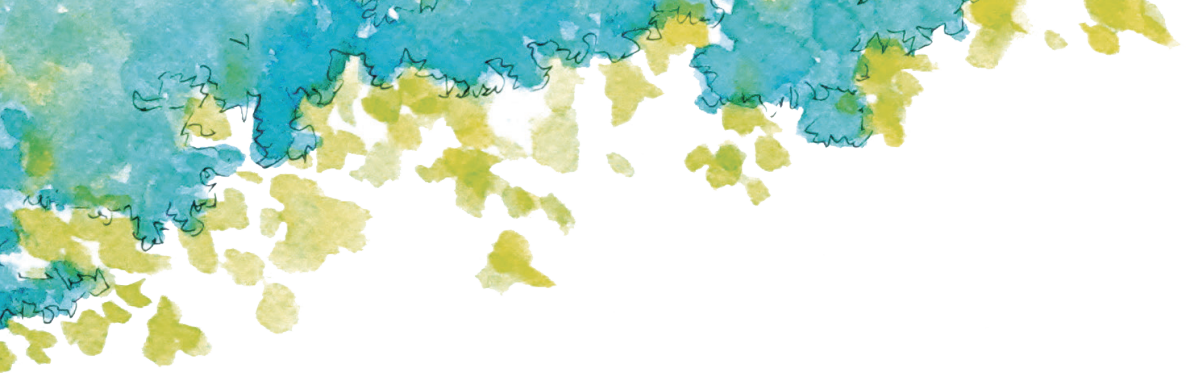
24	25	26	27	28	29	30
初六	初七	初八	初九	初十	十一	十二
MON	TUE	WED	THU	FRI	SAT	SUN

守護者  
Guardian

# 崩毀 與 重生

2020 Calendar





# 守護者 Guardian

孤單時，仍要守護心中的思念，  
有陰影的地方，必定有光

— 幾米《星空》



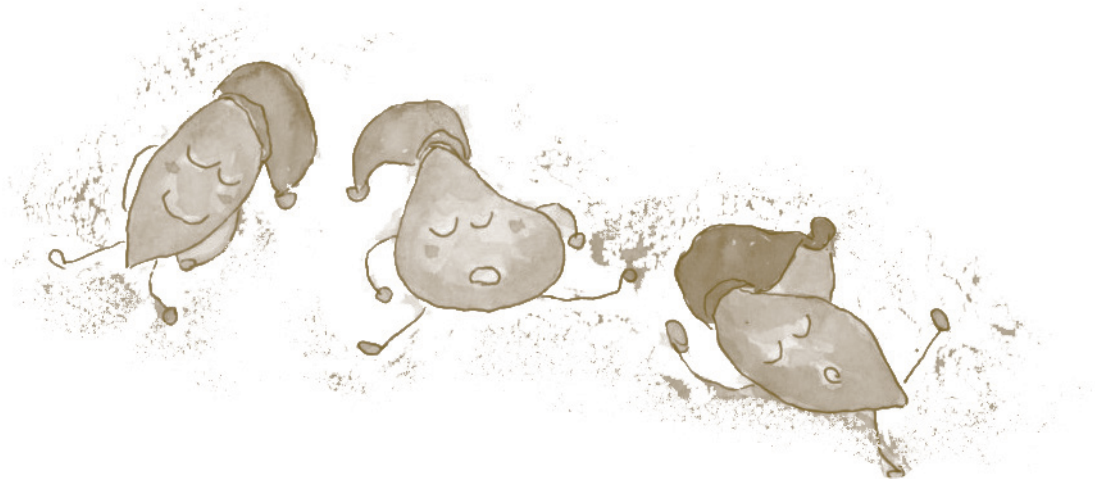
31	1	2	3	4	5	6
十三	十四	十五	十六	十七	十八	十九
MON	TUE	WED	THU	FRI	SAT	SUN

守護者

釀一口思念 用黑暗守護背後的光明

Guardian

Take a sip of the fond memories, using darkness to guard the light behind me



7	8	9	10	11	12	13
白露	廿一	廿二	廿三	廿四	廿五	廿六
MON	TUE	WED	THU	FRI	SAT	SUN

每天走入山林，是老爺爺的例行公事。

和著啁啾的鳥鳴，

嘴裡哼著小曲兒，

腳步不知不覺輕鬆許多。

*Going to the forest everyday is a part of grandpa's daily routine.*

*Humming a lighthearted tune*

*Together with the singing birds,*

*Without noticing, his steps become light and relaxed.*



14	15	16	17	18	19	20
廿七	廿八	廿九	八月大	初二	初三	初四
MON	TUE	WED	THU	FRI	SAT	SUN





21	22	23	24	25	26	27
初五	秋分 國際無車日	初七	初八	初九	初十	十一
MON	TUE	WED	THU	FRI	SAT	SUN



花一個上午或一個下午的時間，  
欣賞大自然的傑作，  
並在本子上記下當天的觀察：

瓢蟲飛起來開心的弧度，  
蝸牛沾黏在葉片上訊息。

這是老爺爺和老奶奶的默契，  
每天寫篇日記記錄，  
這座共同關愛的樹林。

28	29	30	1	2	3	4
十二	十三	十四	中秋節	十六	十七	十八
教師節						世界動物日
MON	TUE	WED	THU	FRI	SAT	SUN



He spends a whole morning or afternoon  
To observe the masterpiece of nature,  
And records the day's observation in his notebook:

The happy angle of the ladybug's flight,  
The message left behind on the leaf by the trail of the snail.

This is the rapport between grandpa and grandma,  
writing a daily journal entry,  
about this forest they both love.

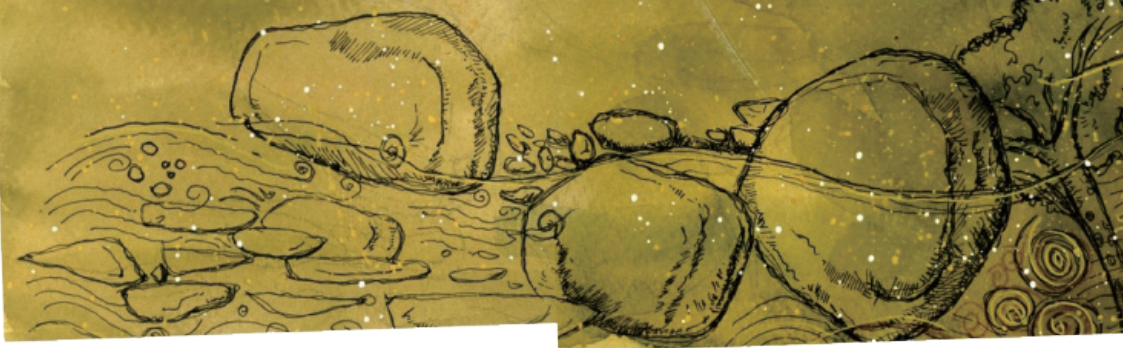


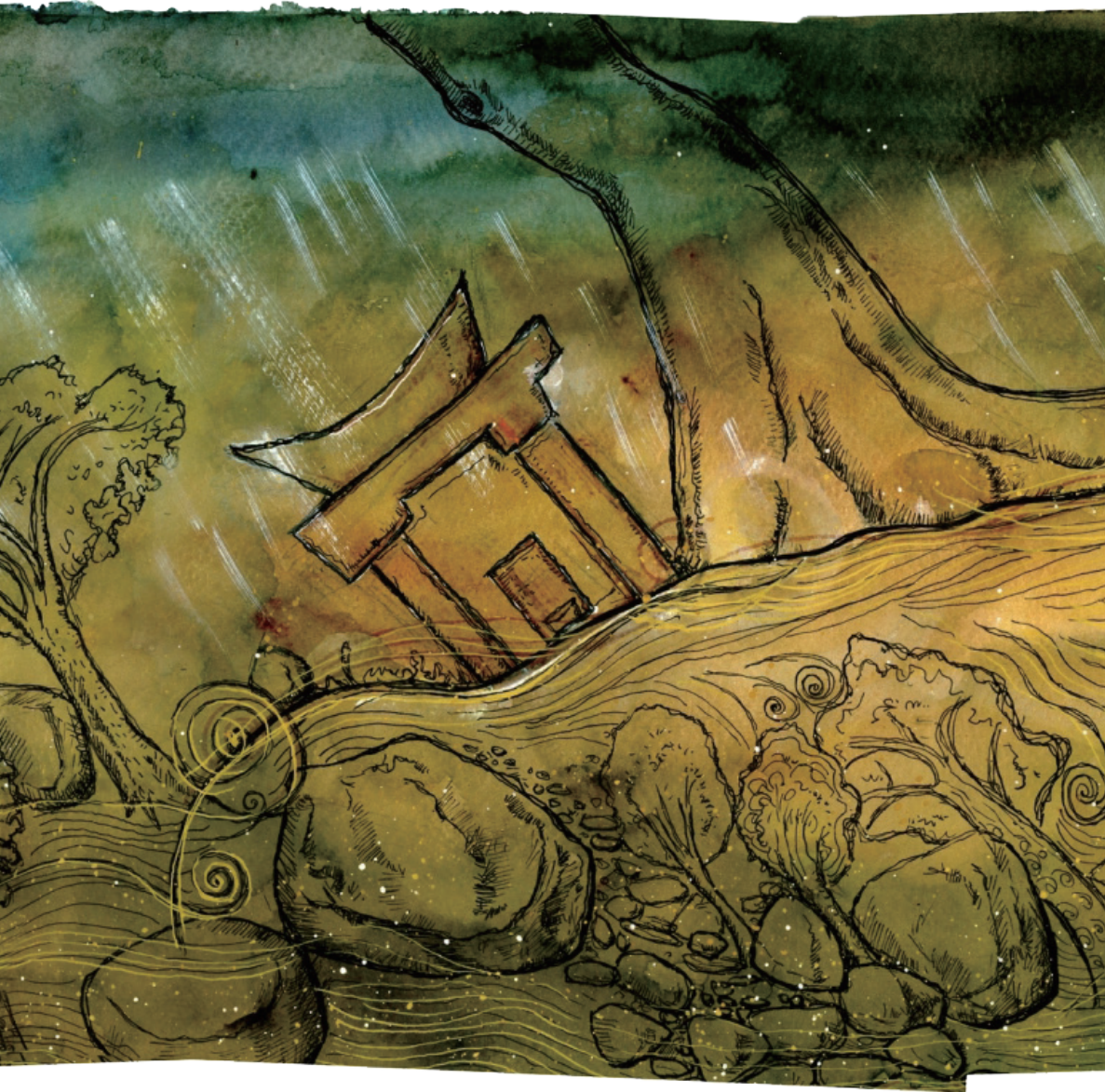
5	6	7	8	9	10	11
十九	二十	廿一	寒露	廿三	廿四 國慶日	廿五
MON	TUE	WED	THU	FRI	SAT	SUN

10月

暴風雨突襲式的降臨，  
刮了三天三夜的風雨，  
無情的土石流，  
帶走熟悉的山景，  
留下滿地的瘡痕。

The storm arrives in a sudden assault,  
three days and nights of wind and rain,  
the cruel landslide  
took away the familiar landscape  
and left behind the pitted and scarred  
earth.





12  
廿六

13  
廿七

14  
廿八

15  
廿九

16  
三十  
世界糧食日

17  
九月小

18  
初二

MON

TUE

WED

THU

FRI

SAT

SUN

10月



19  
初三

20  
初四

21  
初五

22  
初六

23  
霜降

24  
初八

25  
初九  
臺灣光復節

MON

TUE

WED

THU

FRI

SAT

SUN

10月

望著這片崩場地，

老爺爺同時聽見心碎的聲音……

*Looking at the collapsed land,*

*Grandpa also heard the sound of heartbreak at the same time...*



26	27	28	29	30	31	1
初十	十一	十二	十三	十四	十五	十六
MON	TUE	WED	THU	FRI	SAT	SUN



11月



2	3	4	5	6	7	8
十七	十八	十九	二十	廿一	立冬	廿三
MON	TUE	WED	THU	FRI	SAT	SUN



6月13日(四) 陰

昨晚，我又夢見那片美麗的樹林，

窸窣窸窣 窸窣窸窣

從腳下蔓延至耳朵，

啾啾啾啾

從耳朵迴盪至心中，

揮之不去的是孤單還是思念？

June 13<sup>th</sup> Thu Cloudy

Last night, I dreamed again of that beautiful forest,  
the gentle rustling sounds,

from under my feet to my ears,

the tweeting of birds

echoes from my ears to my heart,

Is it loneliness or longing that I cannot forget?



9	10	11	12	13	14	15
廿四	廿五	廿六	廿七 國父誕辰	廿八	廿九	十月大
MON	TUE	WED	THU	FRI	SAT	SUN

11月



16	17	18	19	20	21	22
初二	初三 自來水節	初四	初五	初五	初七	小雪
MON	TUE	WED	THU	FRI	SAT	SUN





23	24	25	26	27	28	29
初九	初十	十一	十二	十三	十四	十五
MON	TUE	WED	THU	FRI	SAT	SUN

6月20日(四) 晴

地上出現一株一株新的樹苗，  
我彎下腰撫摸著它，  
感受到新的生命在手掌中呼吸，  
這是多麼意志堅強的植物啊！  
從石堆中長出來，  
彷彿在鼓勵我：別沮喪，我們還在！

June 20<sup>th</sup> Thu Sunny

New seedlings have appeared from the ground one after another,  
I bent down to feel them,  
to feel the new life breathing in my palm,  
What strong-willed plants they are!  
Growing out from the piles of rock,  
It's as if they are encouraging me: Don't be sad, we are still here!



30 十六	1 十七	2 十八	3 十九	4 二十 野生動物保育日	5 廿一	6 廿二
MON	TUE	WED	THU	FRI	SAT	SUN



7月26日(五)晴

最近來了一批研究人員，  
他們監測著新生植物的生長情況，  
用網格的框架，調查草的覆蓋度；  
觀察植物的根，看如何取得水分。  
有了他們的協助，  
我相信花草樹木會恢復的更快。



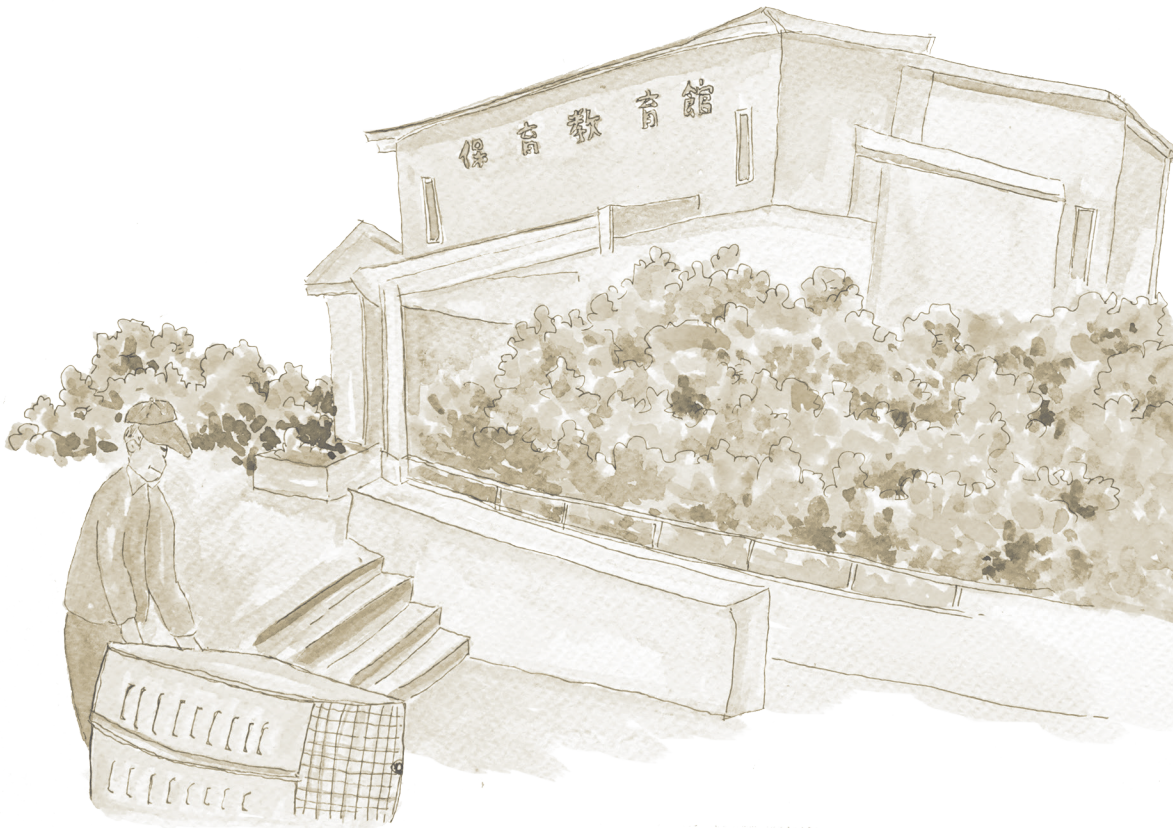
7	8	9	10	11	12	13
大雪	廿四	廿五	廿六	廿七 國際山岳日	廿八	廿九
MON	TUE	WED	THU	FRI	SAT	SUN

July 26<sup>th</sup> Fri Sunny

Recently a group of researchers have arrived,  
 who are monitoring the growth of the new plants,  
 using frames to investigate the converge rate of grass;  
 observing the roots of the plants to see how they absorb water.  
 With their assistance,  
 I am sure the plants will be able to recover even faster.



12月



14	15	16	17	18	19	20
三十	十一月小	初二	初三	初四	初五	初六
MON	TUE	WED	THU	FRI	SAT	SUN



老爺爺仰頭看著矗立面前的樹，  
感覺自己也經歷一次的重生，  
從內心 散發出相依相存的喜悅。

往後，他仍會繼續守護這片樹林，  
就像樹林用最真的樣態守護著他一樣。

Grandpa looked up at the tree towering before him,  
he felt as if he himself had also been reborn.  
The joy of living together and caring for each other fills his heart.

In the times to come, he will continue to guard this forest,  
in the same way that the forest guards him using its truest self.



21	22	23	24	25	26	27
冬至	初八	初九	初十	十一 行憲紀念日	十二	十三
MON	TUE	WED	THU	FRI	SAT	SUN



28	29	30	31	1	2	3
十四	十五	十六	十七	元旦	十九	二十
MON	TUE	WED	THU	FRI	SAT	SUN

memo





# 2020 崩毀與重生 *Collapse and Rebirth*

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The scientific names of the species mentioned in this calendar are mainly adopted on the basis of the Catalogue of Life in Taiwan (<http://taibnet.sinica.edu.tw/home.php>).