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Forensic Pollen Evidence from Clothes by the Tape Adhesive Method*

Chun-Liang Wu[(1)], Chiou-Herr Yang[(2)], Tseng-Chieng Huang[(3,5)] and Su-Hwa Chen[(4)]

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ABSTRACT: Collection and identification of pollen is becoming important in forensic applications. Many criminal cases have been reported to link suspects to the crime scene by analysis of pollen. Several methods have been used in the pollen collection and analysis, but they are expensive and tedious. Therefore, it is important to develop a simple method to collect pollen grains from clothes. We tried to recover pollen from clothing surface by using the sticky tapes method. The tape adhesive method has been widely used for sample collection for various purposes, but the efficiency of recovery of invisible pollen from clothes has rarely been reported. Therefore, to test the efficiency of the tape adhesive method in recovering pollen from clothes is important. The first author wore clothes that were made from textile S made by the mixture of cotton 60% and polyester fiber 40% to collect pollen from 26 different areas mostly in the northern part of Taiwan and then used cellophane tape D (Sirchie Finger Print Lab., Inc-No. 131LT4) to recover them from different body parts. Twenty-six pollen taxa were detected in different parts of clothes depending upon what kind of plant the first author stayed near. From the results, we concluded that the tape adhesive method is suitable in recovering pollen from clothes. We have suggested that the tape adhesive method could be part of methods for collecting pollen from clothes of suspects. It is simpler, faster and less expensive than other methods.

KEY WORDS: Forensic Science, Pollen Evidence, Textile, Criminal Environment, Taiwan.

INTRODUCTION

Forensic palynology is a study of pollen grains and fern spores including the study of other microorganisms as evidence in the court of law (Bryant et al., 1990). In Taiwan, the evidence derived from forensic palynology is still not used as evidence in the court of law, but there are several successful cases reported in other countries, e.g., Sweden (Erdtman, 1963), Australia (Erdtman, 1963), New Zealand (Bryant et al., 1990), United States of America (Bryant et al., 1990) and Germany (Szibor et al., 1998). The above complicated examples of the application of Palynology in Criminology are abstractd below. A criminal case in Sweden in 1959 was the solving of a murder place at the herbarium of the Swedish Museum of Natural History based on the pollen grains of *Trifolium pratense* as well as spores of *Endogene*, a hypogeia, phycomycete recovered from the dirty samples of corpse (Erdtman, 1963). A criminal case in Australia in 1959 was the solving of a murder and the conviction of the criminal based primarily on the evidence recovered from a pollen sample associated with the crime (Erdtman, 1963). Four criminal cases in New Zealand were mentioned by Bryant et al. (1990). Two cases described the solution of cultivation areas of toxic drug plants, i.e., hashish (*Cannabis* sp.) and marijuana plants based primarily on the evidence recovered from a pollen sample associated with the cultivation areas of toxic drug plants, and the other two cases described linking suspects to the crime scene by analysis of pollen assemblages. Four criminal cases in United States of American were mentioned by Bryant et al. (1990). These cases reported the solution of the death of bees, the illegally importing bee hives, suspicious honey sources and the source region of marijuana plants on the bases of pollen studies by forensic palynologists. In February 1994, a common grave containing 32 male skeletons was discovered in Magdeburg in Germany. Pollen analysis on 21 skulls rinsing fluids of the nasal cavities of seven skulls contained a high content of pollen species that are

1. National Highway Police Bereau, National Police Agency, Ministry of Interior, 70-2, Banshanya RD., Taishan Township, Taipei 243, Taiwan.
2. Graduate School of Forensic Science, Central Police University, 56, Shujen Rd., Takang Village, Kueishan Hsiang, Taoyuan 143, Taiwan.
3. Institute of Plant Biology, National Taiwan University, 1, Roosevelt Rd., Sec. 4, Taipei 106, Taiwan.
4. Department of Life Science, National Taiwan University, 1, Roosevelt Rd., Sec. 4, Taipei 106, Taiwan.
5. Correspondence author. Email: Huangtc@ntu.edu.tw
* MS thesis of Mr. Chun- Liang Wu at Central Police University, Taoyuan Taiwan.

typical of the summer. The results of pollen analysis, the findings support the murder victims were Soviet soldiers killed by the Soviet secret police following the revolt in the German Democratic Republic on 17 June, 1953 (Szibor et al., 1998).

Frei-Sulzer (1951) is credited with suggestion to employ the adhesive tape in forensic science. Flinn (1992) reviewed the roller device and adhesive lifts method for collection of fiber evidence. The pollen extraction from clothes or fibers was conducted previously by Martin (1965) and Pounds (1975). The introduction of a simple, fast and inexpensive method of obtaining pollen evidence for forensic purposes has been attempted in our work. This study was intending to clarify the possibility of adherence of the pollen from body surfaces and to elucidate the relationship between pollen on body surfaces and their natural environmental condition, especially the relationship with vegetation types where pollen grains were obtained. Therefore, body surface pollen was collected by the cellophane tape method mentioned above from clothes after a certain period of pedestrian activity in a given area. The pollen collected from tape was placed on glass slides for examination. Different kinds of commercial tapes and textiles and pollen of different species were included in the testing. But in this paper, we exclude the report of our test of the adhesion capacity from different kinds of cellophane tapes and the test of adhesion from different kinds of textiles to save space.

MATERIALS AND METHODS

Materials

Cloth fabrics

Weaved textile cloth S (made by the mixture of cotton 60% and polyester fiber 40%) was selected as the pollen receiver in the reported test, because it has better adhesion of more pollen than other weaved textiles. The clothes were deposited in a clean bag container per sample.

Cellophane tape

Three pieces of Cellophane tape D (Sirchie Finger print Lab., Inc-No. 131LT4) with dimensions 6 × 9 cm each were used to adhere the pollen grains from clothes, because it has higher recovery efficiency than other tapes.

Other tools

Several rollers, six pieces of glass slides for each locality, timer (Casio Timer PQ-129), wind velocity recorder (Hola AK-668 model), humidity and temperature recorder (Hola AK-600 model), and geographical location by GPS (Silva GPS compass XL1000) were used.

Methods

Collection of pollen taxa

The collection localities were confined to Taiwan Island proper (Fig. 1). The first author wore clothes that were made from dressed weaved textile clothes S to obtain adherence of atmospheric pollen from 26 localities mostly in the northern part of Taiwan. The geographical location was determined by GPS. He walked around the target flowering plants with wind blowing from the rear to obtain adherence of atmospheric pollen in a one hour period using a timer. He then used the Cellophane tape D on roller to recover the pollen from different parts of the body. Cities with few dominant flowering species were intentionally chosen. Weather conditions including high temperatures, relative humidity and wind velocity on a day without rain were recorded by using wind velocity, humidity and temperature recorders respectively. The size of the locality for the flowering plant(s) was 25 m^2 (5 m × 5 m) from the center of the flowering plants. However, additional surveys were made also for incidental flowering plants within the test localities of 100 m^2 (10 m × 10 m) from the center of the flowering plants in order to eliminate possible foreign pollen sources.

Identification and statistical analysis of pollen taxa

Two pollen slides were prepared at each location from different parts of the body surface, i.e., shoulder, central body, and under the knees. The Cellophane tape D were cut into same size of glass slides and placed on them for examination. Examination and microphotograph of pollen grains were taken for all areas of glass slides under Leica light microscope. Pollen and Spore Flora of Taiwan (Huang, 1972, 1981) and Airborne Pollen Grains and Spores in Taiwan (Huang et al., 1998) were mainly used for the identification of pollen species in this study.

The collection data were recorded in six categories as follows (Table 1). (1) Basic units for political administration listed as county or city. (2) Geographical location indicated by latitude and longitude. (3) Survey of local environment and flowering plants around test localities. (4) Collection time was one hour's exposure. (5) Weather data were expressed by temperature, relative humidity and wind velocity. (6) Flowering plants were listed.

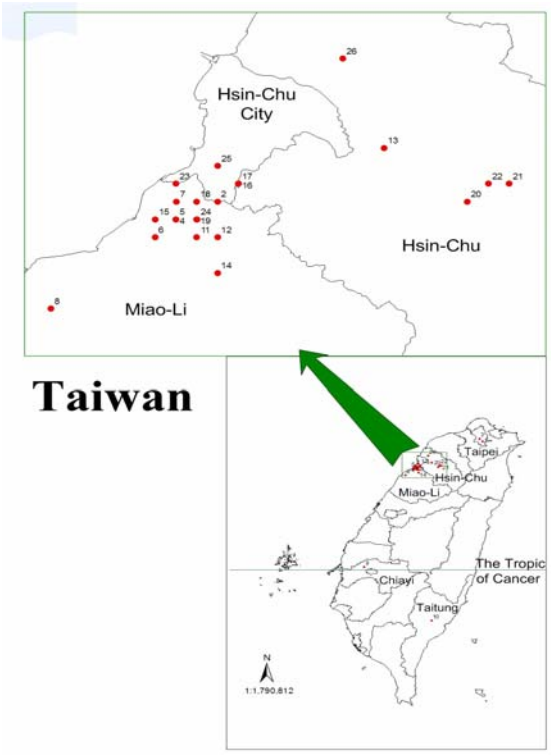

Fig. 1. Geographical location of test localities.

RESULTS

Test of pollen taxa recovering from different parts of body surface

Twenty-six test localities, their environment, weather condition and flowering plants are shown in Table 1. Twenty-six pollen taxa and their percentages obtained from three different parts of body surface at each locality are shown as Table 2, excluding those of incidental taxa. The most abundant pollen grains which belong to *Mallotus japonica*, was recovered from plot 23 with total numbers of 1166 grains; and the least pollen grains which belong to *Bauhinia purpurea*, were recovered from locality 14 with a total number of 8 grains. Plants with acquired pollen grains more than 500 are *Koelreuteria henryi* (locality 1), *Eucalyptus robusta* (locality 2), *Melaleuca leucadendron* (locality 3) and *Mallotus japonica* (locality 23). Pollen morphology of *Bauhinia purpurea* and *Digitaria sanguinalis* is shown in Figs. 2 and 3, respectively.

Total acquired pollen grains

The total amount of pollen grains collected at each locality is different. They can be classified into ten classes according to the total amount of acquired pollen grains as shown in Table 3. Class 1 defined as the recovery of pollen grains from 0 to 50, was found in 11 localities. Class 2 defined as the recovery of pollen grains from 51 to 100, was found in six localities. Class 3 defined as the recovery of pollen grains from 101 to 150, was found in two localities. Class 4 defined as the recovery of pollen grains from 151 to 200, was found in one locality. Classes 5, 6 and 7 defined as the recovery of pollen grains from 201 to 250, 251 to 300 and 301 to 350, respectively, were not found in any locality. Classes 8 and 9 defined as the recovery of pollen grains from 351 to 400 and 400 to 450 were found each in only one locality. And Class 10 defined as the recovery of pollen grains over 451 were found in four localities.

DISCUSSION AND CONCLUSION

1. Relationship between pollen obtained from test localities and their environment

The recovery of pollen grains from body surfaces at each test locality (Table 2) gave us confidence for the use as a possible tool for acquiring additional evidence for forensic purposes

2. Amount of pollen grains acquired

In addition to the climatic factors which influence the amount of pollen grains acquired, the number and kind of inflorescence types, pollen production of each flower in different plants, pollination and dispersion mechanism and plant height in different plant species also influenced the results of pollen collection. Therefore, a few comments for these factors follow.

(1) Pollination mechanism

Generally speaking, in our 26 test localities, plants with insect pollinated flowers, such as *Cassia glauca* (locality 6), *Bauhinia purpurea* (locality 14) and *Duranta repens* (locality 22) allowed the acquisition of less pollen grains, the remaining 23 localities belong to either wind pollinated flowers or both wind and insect pollinated flowers allowed acquisition of more pollen grains.

(2) Height of dispersion source

(a) Tall plants showed a higher percentage of acquired pollen grains on shoulders than other parts of body surfaces, e.g., *Koelreuteria henryi* (locality 1) with 53.1%, *Eucalyptus robusta* (locality 2) with 73.7%, *Melaleuca leucadendron* (locality 3) with 62.3%, *Cinnamomum camphora* (locality 15) with 78.6%, *Lagerstroemia subcostata* (locality 21) with 64.8% and *Duranta repens* (locality 22) with 54.5%, *Mallotus japonica* (locality 23) with 44.4%. Perhaps taller plants with height more than 1.5 m tall disperse

Table 1. Test localities and their environment.

Ln	Administrative location	Geographical location	Local environment	Collection time	Weather condition	Flowering plant
1	Choushan Road, Taipei City	25°01'667''N, 121°56'67''E	Roadside	AM 9:40-10:40	T: 28.4℃; RH: 64.5%; WV: 2.8 m/sec	*Koelreuteria henryi*
2	Chunan, Miaoli County	24°71667N, 120°99167'E	Roadside near agriculture land	AM 8:20-9:20	T: 30.4℃; RH: 61.7%; WV: 0.6 m/sec	*Eucalyptus robusta*; incidental, *Bidens pilosa* var. *radiata*
3	TienChun street, Taipei City	25°05'N, 121°5333'E	Roadside along 4-storied building	AM 10:30-11:30	T: 31.7℃; RH: 53.5%; WV: 1.8 m/sec	*Melaleuca leucadendron*; incidental, *Conyza sumatrensis*
4	Chunan, Miaoli County	24°70'N, 120°8833'E	Wasteland	PM 4:00-5:00	T: 0.7℃; RH: 65.5%; WV: 1.2 m/sec	*Miscanthus floridulus*
5	Chunan, Miaoli County	24°70'N, 120°8833'E	Industrial area, near 3 storied building	AM 9:30-10:30	T: 31.8℃; RH: 68.8%; WV: 1.7 m/sec	*Bougainvillea spectabilis*
6	Chunan, Miaoli County	24°68333'N, 120°8667'E	Primary School Campus	PM 4:00-5:00	T: 28.0℃; RH: 72.8%; WV: 2.2 m/sec	*Cassia glauca*
7	Shimen Primary School, Hsinchu City	24°8'N, 120°8833'E	Primary School Campus	AM 10:00-11:00	T:28.4℃; RH: 64.5%; WV: 0.3 m/sec	*Youngia japonica*
8	Holung Town, Miaoli County	24°61667'N, 120°7833'E	Open clay yard	PM 2:00-3:00	T: 28.74℃; RH: 61.7%; WV: 2.2 m/sec	*Ixora stricta*
9	Hsinkan Town, Chayi County	23°53333'N, 120°3667'E	Open agriculture land	PM 2.30:00-3:30	T:30.2℃; RH: 54.7%; WV: 0.7 m/sec	*Ocimum basilicum*
10	Foengyeh Town,Taitung County	22°90'N, 121°05'E	Roadside near secondary forest	AM 11:00-12:00	T: 26.1℃; RH: 58.1%; WV: 5.1 m/sec	*Tithonia ersifolia*
11	Tofeng Town, Miaoli County	24°68333'N, 120°90'E	Street roadside	AM 9:00-10:00	T: 28.7℃; RH: 62.4%; WV: 0.5 m/sec	*Portulaca grandiflora*
12	Tofeng Town, Miaoli County	24°68333'N, 120°9167'E	Street roadside	AM 9:30-10:30	T: 28.37℃; RH: 62.7%; WV: 1.2 m/sec	*Setereasea purpurea*
13	Chutung Town, Hsinchu County	24°76667'N, 121°05'E	Nursery inside of Industrial plant	AM 10:20-11:20	T: 32.1℃; RH: 61.5%; WV: 0.6 m/sec	*Digitaria radicosa;* incidental, *Oxalis corniculata*
14	Tofeng Town, Miaoli County	24°65'N, 120°9167'E	Roadside on hill	PM 1:30-2:30	T: 28.4℃; RH: 64.5%; WV: 2.8m/sec	*Bauhinia purpurea;* incidental, *Bidens pilosa* var. *var.radiata and Oxalis corymbosa*
15	Chunan Town, Miaoli County	24°70'N, 120°8667'E	Open concrete garden	PM 5:10-6:10	T: 28.4℃; RH: 64.5%; WV: 2.8 m/sec	*Cinnamomum camphora*
16	Hsian shan district, Hsinchu City	24°73333'N, 120°9333'E	Corn field	AM 9:30-10:30	T: 32.7℃; RH: 70.7%; WV: 1.0 m/sec	*Zea mays*; incidental, *Amaranthus viridis*
17	Hsian shan district, Hsinchu City	24°73333'N, 120°9333'E	Agriculture land	PM 0:00-1:00	T: 37.6℃; RH: 49.9%; WV: 0.5m/sec。	*Anredera cordifolia;* incidental, *Eleusine indica*
18	Chunan, Miaoli County	24°71667'N, 120°90'E	Roadside of agriculture land	PM 2:10-3:10	T: 26.1℃; RH: 61.5%; WV: 0.3 m/sec	*Acacia confusa*
19	Chunan, Miaoli County	24°70'N, 120°90'E	Open garden	PM 3.40-4.40	T: 27.3℃; RH:61.8 %; WV:0.5 m/sec	*Ixora philippinensis*
20	Hengshan Town, Hsinchu County	24°71667'N, 121°1167'E	along roadside	AM 10:00-11:00	T: 31.9℃; RH: 79.2%; WV: 0.1 m/sec	*Cyathea lepifera*; incidental, *Dicranopteris linearis*
21	Sakeng Town, Hsinchu County	24°73333'N, 121°15'E	along roadside of agricultural land	AM 11:20-12:20	T: 33.7℃; RH: 60.7%; WV: 0.1 m/sec	*Lagerstroemia subcostata*
22	Hengshan Town, Hsinchu County	24°73333'N, 121°1333'E	along roadside in mountainous area	PM 0:00-1:00	T: 34.5℃; RH: 66.5%; WV: 0.5 m/sec	*Duranta repens*
23	Chunan, Miaoli County	24°73333'N, 120°1333'E	along roadside in mountainous area	AM 11:00-12:00	T: 32.6℃; RH: 62.9%; WV: 0.4 m/sec	*Mallotus japonicus*
24	Chunan, Miaoli County	24°70'N, 120°90'E	along roadside of agricultural land	PM 0:20-1:20	T:30.1℃; RH: 60.5%; WV: 0.4 m/sec	*Hibiscus rosa-sinensis*; incidental*Oxalis corniculata*
25	Hsianghan Town, Hsinchu County	24°75'N, 121°9167'E	garden	PM 1:20-2:20	T: 29.8℃; RH: 62.1%; WV: 0.6 m/sec	*Zephyranthes candida*
26	Chupei Town, Hsinchu County	24°85'N, 121°0167'E	garden	AM 10:30-11:30	T: 32.1℃; RH: 61.5%; WV: 0.6 m/sec	*Digitaria sanguinalis*

Note: Ln: Locality number; T: Temperature; RH: Relative humidity; WV: Wind velocity

Fig. 2. *Bauhinia purpurea* L. (locality 14). A: Habit. B: A fresh pollen grain. C: An adhesive pollen grain. (Bar = 10 μm)

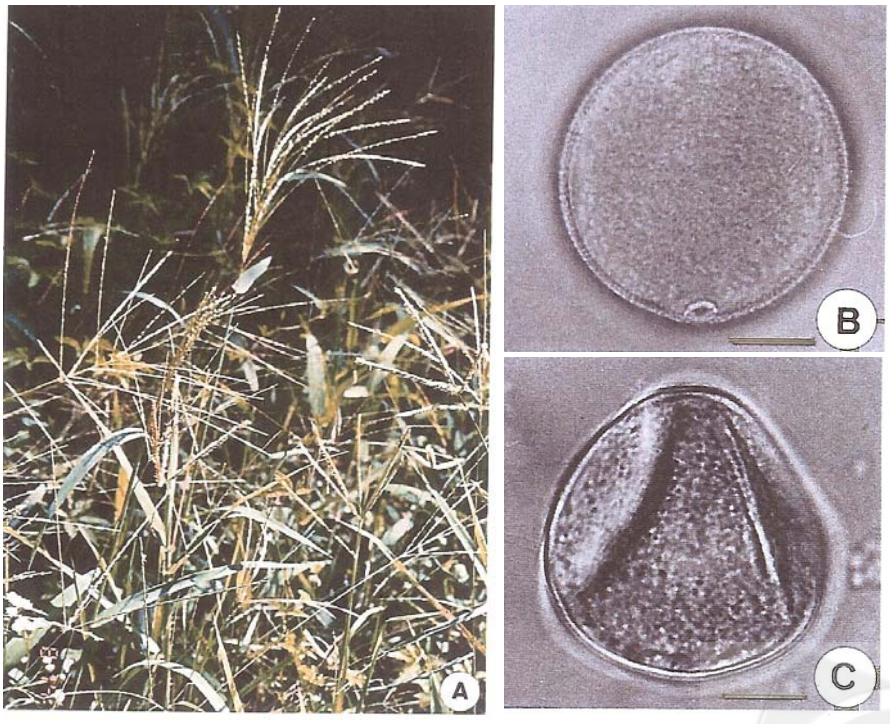

Fig. 3. *Digitaria sanguinalis* (L.) Scop. (locality 26). A: Habit. B: A fresh pollen grain. C: An adhesive pollen grain. (Bar = 10 μm)

Table 2. Number (No.) and percentage (%) of pollen taxa.

Ln	Pollen species \ Body portion	Habit	Shoulder		Central part of body		Under knee		Total no.
			No.	%	No.	%	No.	%	
1	*Koelreuteria henryi* Dummer	Tree	423	53.1	348	43.7	25	3.2	796
2	*Eucalyptus robusta* Smith	Tree	524	73.7	173	24.3	14	2.0	711
3	*Melaleuca leucadendra* L	Tree	437	62.3	245	34.9	20	2.8	702
4	*Miscanthus floridulus* (Labill.) Warb.	Herb	73	46.8	75	48.1	8	5.1	156
5	*Bougainvillea spectabilis* Willd	Vine	25	73.5	9	26.5	0	0	34
6	*Cassia glauca* Lam.	Tree	2	18.2	4	36.4	5	45.4	11
7	*Youngia japonica* (L.) DC.	Herb	0	0	0	0	52	100	52
8	*Ixora stricta* Roxb.	Herb	2	5.4	35	94.6	0	0	37
9	*Ocimum basilicum* L.	Herb	7	38.9	9	50.0	2	11.1	18
10	*Tithonia ersifolia* (Hemsl.) A.Gray	Herb	29	20.7	111	79.3	0	0	140
11	*Portulaca grandiflora* Hook.	Herb	0	0	0	0	37	100	37
12	*Setcreasea purpurea* Boom	Herb	0	0	15	20.8	57	79.2	72
13	*Digitaria radicosa* (J. Presl) Miq.	Herb	0	0	0	0	25	100	25
14	*Bauhinia purpurea* L.	Tree	1	12.5	2	25.0	5	62.5	8
15	*Cinnamomum camphora* (L.) Presl	Tree	11	78.6	3	21.4	0	0	14
16	*Zea mays* L.	Herb	9	30.0	21	70.0	0	0	30
17	*Anredera cordifolia* (Tenore) van Steenis	Vine	67	41.1	89	54.6	7	4.3	163
18	*Acacia confusa* Merr.	Tree	128	36.4	192	54.5	32	9.1	352
19	*Ixora philippinensis* Merr.	Herb	1	1.9	52	98.1	0	0	53
20	*Cyathea lepifera* (J. Sm. ex Hook.) Copel	Tree	26	30.2	59	68.6	1	1.2	86
21	*Lagerstroemia subcostata* Koehne	Tree	35	64.8	19	35.2	0	0	54
22	*Duranta repens* L.	Shrub	6	54.5	5	45.5	0	0	11
23	*Mallotus japonicus* (Thunb.) Muell.-Arg.	Tree	518	44.4	632	54.2	16	1.4	1166
24	*Hibiscus rosa-sinensis* L.	Shrub	202	44.3	249	54.6	5	1.1	456
25	*Zephyranthes candida* (Lindl.) Hn erb.	Herb	0	0	0	0	59	100	59
26	*Digitaria sanguinalis* (L.) Scop	Herb	0	0	4	17.4	19	82.6	23

Note: Ln: Locality number; Seven incidental pollen taxa in samples 2, 3, 13, 14, 16, 17, 20 and 24 (Table 1) were excluded in the table 2 above.

Table 3. Pollen grains numbers and test locality.

Pollen class	Pollen grains no.	Target flowering plants	Test locality number
1	0-50	*Bougainvillea spectabilis*; *Cassia glauca*; *Ixora stricta*; *Ocimum basilicum*; *Portulaca grandiflora*; *Digitaria radicosa*; *Bauhinia purpurea*; *Cinnamomum camphora*; *Zea mays*; *Duranta repens*; *Digitaria sanguinalis*	5, 6, 8, 9, 11, 13, 14, 15, 16, 22, 26
2	51-100	*Youngia japonica*; *Setcreasea purpurea*; *Ixora philippinensis*; *Cyathea lepifera*; *Lagerstroemia subcostata*; *Zephyranthes candida*	7, 12, 19, 20, 21, 25
3	101-150	*Tithonia ersifolia*; *Anredera cordifolia*	10, 17
4	151-200	*Miscanthus floridulus*	4
5	201-250	0	0
6	251-300	0	0
7	301-350	0	0
8	351-400	*Acacia confusa*	18
9	401-450	*Hibiscus rosa-sinensis*	24
10	≥451	*Koelreuteria henryi*; *Eucalyptus robusta; Melaleuca leucadendra; Mallotus japonicus*	1, 2, 3, 23

the pollen grains over a wider area and facilitate more chances for body surface adhesion. But there were exceptions, for *Acacia confusa* (locality 18) and *Cyathea lepifera* (locality 20) with higher percentages in the central part of body surface as 54.5% and 68.6% respectively. *Bauhinia purpurea* (locality 14) and *Cassia glauca* (locality 6) were taller than 4 m, yet allowed acquisition of pollen grains under the knees (62.5% and 45.4%) more than on shoulders (12.5% and 18.2%), which did not correlate with plant height. This might be caused by its insect pollinated flowers as well as by the open location along an asphalt roadside and strong wind velocity which caused the secondary pollen to be acquired under knees.

(b) Dwarf plants under knee-height gave a higher percentage of acquired pollen grains below knees than other parts of body surfaces, e.g., *Youngia japonica* (locality 7), *Portulaca grandiflora* (locality 11), *Digitaria sanguinalis* (locality 13), and *Zephyranthes candida* (locality 25) 100% each.

(c) Scandent plants climbing up as high as a tree. Those plants that climbed higher than a human being allowed acquisition of pollen grains on shoulders more than on other body surfaces, e.g., *Bougainvillea spectabilis* (locality 5) with 73.5%; Another vine pollen of *Anredera cordifolia* (locality 17) could be acquisited on central part of body (54.5%) more than on shoulder (41.4%) or under knee (4.3%).

(3) Problem of identification of pollen taxa

Large pollen grains often shows the equatorial view and rarely the polar view could be observed, which might cause difficulty in the determination of pollen shape. It is also true that large grains might cause bubbles during the preparation of pollen slides obstructing observation of the grains.

3. Pollen identification ability

Identification might be difficult when the pollen features were not prominent and also when the total acquired pollen was not sufficient to give conclusions. But for forensic application, at the present time, it is possible for the identification of the taxa at least to the level of family. Identification of the pollen to family could supply the scope of plant distribution as well as certain special environmental information from the pollen. Such information could provide clues for criminal investigation.

4. Caution for forensic application

(1) Avoid contamination and pollution before collection

The instruments must be clean before the collection. Pollen grains are too mall to be seen by the naked eye so that the blank test must be done to ascertain that there was no pollution of the instruments and tools.

(2) Avoid contamination during collection of pollen grains

Collection of atmospheric pollen grains from clothes must take several different steps so that the contamination can be avoided at each step.

(3) Documentation of pollen evidence

Acquired pollen grains on slides might be oxidized due to cellophane tape with moisture, water or other oxidation elements and lost during the course of deposit. Therefore microscopic photos should be done to keep the pollen evidence permanent.

(4) Keep the clothes for evidence

Important clothes of the criminal must be kept in a cold condition to maintain the useful evidence long enough for further investigation.

(5) Explanatory ability

Pollen evidence can furnish the plant habitat and pollen dispersion data including climatic conditions and pollen dehiscence time, so that the criminal scene could be obtained from pollen data. But the data should be treated carefully before application.

From these results we can conclude that the tape adhesive method is suitable for recovering pollen from clothes. We suggest that the tape adhesive method could be one of the methods for collecting pollen from clothes of suspects. It is simpler, faster and less expensive than other methods.

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以膠帶黏取法取得衣物上之孢粉證物*

吳俊良[1]、楊秋和[2]、黃增泉[3,5]、陳淑華[4]

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摘　　要

孢粉之蒐集與鑑定在刑事鑑識界逐漸受到重視，一些犯罪案件研究報告說明孢粉分析能將嫌犯與犯罪現場連結。目前幾種孢粉蒐集與分析的方法，過於昂貴或耗時，因此，研發一種簡易的衣物孢粉蒐集法更顯重要。本研究嘗試利用膠帶黏取法蒐集衣物表面之孢粉，膠帶黏取法早已被廣泛使用在不同標的簡易蒐集，但其在蒐集細微孢粉之使用效率，則鮮有研究發表。是故，研究膠帶黏取法蒐集衣物上孢粉的效率是重要的。作者以常用之紡織材料進行實驗比較後，使用混紡梭布料 S (棉 60%、多聚酯纖維 40% 之梭織布料) 製成之衣物在以北台灣為主的 26 處地區採樣，並以黏取效果較佳之膠帶 D (Sirchie Finger Print Lab., Inc-No. 131LT4)，從身體上不同的部位取得孢粉。經實驗獲得 26 組樣區孢粉與樣區現生植物種類相符。我們建議可以使用膠帶黏取法採取嫌犯衣物上的孢粉，比較其他方法，更為簡單、快速及成本低廉。

關鍵詞：鑑識科學、孢粉證物、紡織物、犯罪環境、臺灣。

1. 內政部警政署國道公路警察局，243 台北縣泰山鄉半山雅路 70-2 號，臺灣。
2. 中央警察大學鑑識研究所，143 桃園縣龜山鄉大崗村樹人路 56 號，臺灣。
3. 國立臺灣大學生命科學院植物科學研究所，106 台北市羅斯福路 4 段 1 號，臺灣。
4. 國立臺灣大學生命科學院生命科學系，106 台北市羅斯福路 4 段 1 號，臺灣。
5. 通信作者。Email: Huangtc@ntu.edu.tw

* 吳俊良先生在臺灣桃園中央警察大學鑑識研究所提出之碩士論文。