Abstract

Systematic study of the family Tineidae (Lepidoptera) in Korea

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The family Tineidae belongs to the superfamily Tineoidea and is reported 15 subfamilies, 320 genera, and more than 3,500 known species in the world (Robinson & Nielsen, 1993). Commonly very small to medium-size. The family is classified by the following characters: head vestiture of erect piliform scales; labial palpi with stiff lateral bristles; proboscis very short or even absent, never strongly sclerotized, galeae only loosely associated; hind tibiae with erect and elongate scales on upper surface; adults resting with wings raised tent-like over the body, and with characteristic scuttling run. In the Korean Peninsula, Cho and Kim (Zool. Soc. Kor, 1968) first recorded four species of Tineidae, and 22 species (15 genera, 7 subfamilies) were added by Park (1983, 1990), Korean check list (1994) and Park & Ponomarenko (1996).

In the present study, 9 subfamilies 20 genera 32 species recognized from Korea. Of them, 10 species, *Monopis zagulajevi* Gaedike, *Monopis weaverella* (Scott), *Crypsithyris japonica* Petersen & Gaedike, *Opogona sacchari* (Bojer), *Morophagoides moriutii* Robinson, *Scardia amurensis* Zagulajev, *Amorophaga* sp., *Psychoides* sp. Meyrick, *Dryadaula* sp., *Erechthias sphenoschist*a (Meyrick) are reported for the first time from Korea. Of them, three species, *Amorophaga* sp., *Psychoides* sp. and *Dryadaula* sp. are not identified. Already known species, *Nemapogon granella* (Linnaeus), *Triaxomasia orientanus* (Ponomarenko & Park), *Cephitinea colonella* (Erschoff), *Gerontha ampliptera* Ponomarenko & Park, *G. borea* Moriuti, *G. namhaensis* Ponomarenko & Park, *Dasyses barbata* (Christoph), *M. monachella* (Hübner), *M. pavlovskii* Zagulajev, *M. laevigella* (Denis & Schiff.), *Niditinea baryspilas* (Meyrick), *Tinea translucens* Meyrick, *Trichophaga tapetzella* (Linnaeus), *Erechthias atriririvis* (Meyrick), *Opogona nipponica* Stringer, *O. thiadelta* Meyrick, *Wegneria cerodelpha* Meyrick, *Montescardia kurenzovi* (Zagulajev), *Morophaga bucephala* (Snellen), *M. fasciculata* Robinson, *M. formosana* Robinson, *Morophagoides ussuriensis* (Caradja) are redescribed. Through this study, we report systematic results of their species, host plants and some ecological information.

Historical Review

Table 1. A synopsis of the early reported Tineidae from the Korean peninsula.

Reference / Scientific name	Present study 2004	Park & Ponomareko 1996	Korean Check list 1994	Park 1990	Park 1983	Zool. Soc. Kor. 1968
Nemapogon granella (Linnaeus)	○		○		○	○
Triaxomasia orientanus (Ponomarenko & Park)	○	●				
Cephitinea colonella (Erschoff)	○		○		○	
Gerontha ampliptera Ponomarenko & Park	○	●				
Gerontha borea Moriuti	○	◎				
Gerontha namhaensis Ponomarenko & Park	○	●				
Dasyses barbata (Christoph)	○		○		○	
Monopis monachella (Hübner)	○		○		○	○
Monopis pavlovskii Zagulajev	○	◎				
Monopis zagulajevi Gaedike	◎					
Monopis weaverella (Scott)	◎					
Monopis laevigella (Denis & Schiff)	○	◎				
Niditinea baryspilas (Meyrick)	○	◎				
Tinea translucens Meyrick	○		○		○	○
Trichophaga tapetzella (Linnaeus)	○		○		○	○
Crypsithyris japonica Petersen & Gaedike	◎					
Erechthias atririvis (Meyrick)	○		○		○	
Erechthias sphenoschista (Meyrick)	◎					
Opogona nipponica Stringer	○		○		○	
Opogona sacchari (Bojer)	◎					
Opogona thiadelta Meyrick	○		○		○	
Wegneria cerodelpha Meyrick	○		○		○	
Montescardia kurenzovi (Zagulajev)	○	◎				
Morophaga bucephala (Snellen)	○		○	◎		
Morophaga fasciculata Robinson	○		○	◎		
Morophaga formosana Robinson	○		○	◎		
Morophagoides moriutii Robinson	◎					
Morophagoides ussuriensis (Caradja)	○	◎				
Scardia amurensis Zagulajev	◎					
Amorophaga sp.	◎					
Psychoides sp.	◎					
Dryadaula sp.	◎					

○ : reported
◎ : first reported
● : new recorded

Checklist of the family Tineidae in the Korean

Family Tineidae, Latreille, 1810 곡식좀나방과 **(9**아과 **20**속 **32**종**)**

Subfamily Dryadaulinae Bradley, 1966 꼬마버섯좀나방아과 **(**신칭**)**
Genus *Dryadaula* Meyrick, 1893
1. *Dryadaula* sp. 꼬마버섯좀나방

Subfamily Erechthiinae 썩은나무좀나방아과
Genus *Erechthias* Meyrick, 1880.
2. *Erechthias atririvis* (Meyrick, 1931) 썩은나무좀나방
3. *Erechthias sphenoschist*a (Meyrick, 1931) 점박이좀나방 (신칭)

Subfamily Hapsiferinae Zagulajev, 1968 껍질좀나방아과
Genus *Dasyses* Durrant, 1903
4. *Dasyses barbata* (Christoph, 1881) 껍질좀나방

Subfamily Hieroxestinae 고운머리좀나방아과
Genus *Opogona* Zeller, 1853
5. *Opogona nipponica* Stringer, 1930 두무늬좀나방
6. *Opogona thiadelpha* Meyrick, 1934 노랑머리좀나방
7. *Opogona sacchari* (Bojer, 1856) 바나나좀나방 (신칭)

Genus *Wegneria* Diakonoff, 1951
8. *Wegneria cerodelta* (Meyrick, 1911) 삼각무늬좀나방

Subfamily Myrmecozelinae C pu e, 1968 누더기좀나방아과 **(**신칭**)**
Genus *Cephitinea* Zagulajev, 1964
9. *Cephitinea colonella* (Erschoff, 1874) 긴날개좀나방

Genus *Gerontha* Walker, 1864
10. *Gerontha ampliptera* Ponomarenko & Park, 1996 점누더기좀나방 (신칭)
11. *Gerontha borea* Moriuti, 1977 누더기좀나방 (신칭)
12. *Gerontha namhaensis* Ponomarenko & Park, 1996 물결무늬좀나방 (신칭)

Subfamily Nemapogoninae Hinton, 1955 곡식좀나방아과
Genus *Nemapogon* Schrank, 1802
13. *Nemapogon granella* (Linnaeus, 1758) 곡식좀나방

Genus *Triaxomasia* Zagulyaev, 1964
14. *Triaxomasia orientanus* (Ponomarenko & Park, 1996) 갈색무늬좀나방 (신칭)

Subfamily Scardiinae 버섯좀나방아과
Genus *Morophagoides* Petersen, 1957
15. *Morophagoides moriutii* Robinson, 1986 표고버섯좀나방 (신칭)
16. *Morophagoides ussuriensis* (Caradja, 1920) 얼룩무늬좀나방 (신칭)

Genus *Montescardia* Amsel, 1952
17. *Montescardia kurenzovi* (Zagulajev, 1966) 점얼룩좀나방 (신칭)

Genus *Scardia* Treitschke, 1830
18. *Scardia amurensis* Zagulajev, 1965 잔나비걸상버섯좀나방 (신칭)

Genus *Amorophaga* Zagulajev, 1968
19. *Amorophaga* sp. 회색버섯좀나방

Genus *Morophaga* Herrich-Schäffer, 1853
20. *Morophaga bucephala* (Snellen, 1884) 큰점무늬좀나방
21. *Morophaga fasciculata* Robinson, 1986 결무늬버섯좀나방
22. *Morophaga formosana* Robinson, 1986 영지버섯좀나방

Subfamily Teichobiinae Heinemann, 1870 고사리좀나방아과
Genus Psychoides Bruand, 1853
23. *Psychoides* sp. 고사리좀나방

Subfamily Tineinae 옷좀나방아과
Genus *Trichophaga* Ragonot, 1894
24. *Trichophaga tapetzella* (Linnaeus, 1758) 털좀나방

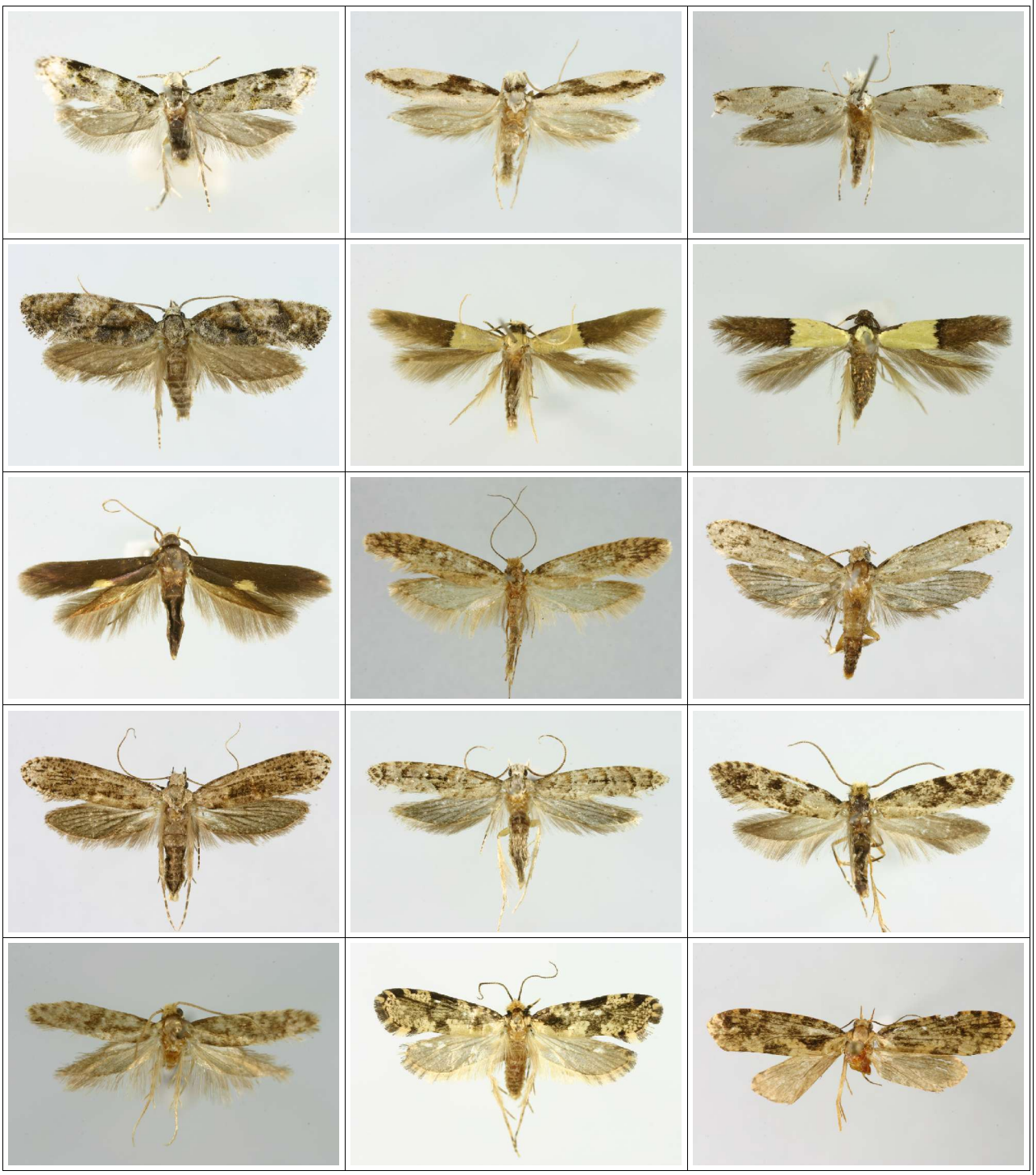
Genus *Tinea* Linnaeus, 1758
25. *Tinea translucens* Meyrick, 1917 옷좀나방

Genus *Niditinea* Petersen, 1957
26. *Niditinea baryspilas* (Meyrick, 1937) 암노랑까치머리좀나방 (신칭)

Genus Monopis Hübner, 1825
27. *Monopis monachella* (Hübner, 1796) 앞흰무늬좀나방
28. *Monopis pavlovskii* Zagulajev, 1955 점흰무늬좀나방 (신칭)
29. *Monopis laevigella* (Denis & Schiff.), 1775 검은유리창좀나방 (신칭)
30. *Monopis weaverella* (Scott, 1858) 노랑머리유리창좀나방 (신칭)
31. *Monopis zagulajevi* Gaedike, 2000 노란등줄좀나방 (신칭)

Genus *Crypsithyris* Meyrick, 1907
32. *Crypsithyris japonica* Petersen & Gaedike, 1993 이끼좀나방 (신칭)

Adult's plate of Korean Tineid



1. *Dryadaula* sp. 꼬마버섯좀나방, **2**. *Erechthias atririvis,* 썩은나무좀나방, **3**. *Erechthias sphenoschista,* 점박이좀나방, **4**. *Dasyses barbata,* 껍질좀나방, **5**. *Opogona nipponica,* 두무늬좀나방, **6**. *Opogona thiadelpha,* 노랑머리좀나방, **7**. *Wegneria cerodelta,* 삼각무늬좀나방, **8**. *Cephitinea colonella,* 긴날개좀나방, **9**. *Gerontha amplipterra,* 점누더기좀나방, **10**. *Gerontha borea,* 누더기좀나방, **11**. *Gerontha namhaensis*, 물결무늬좀나방, **12**. *Nemapogon granella,* 곡식좀나방, **13**. *Triaxomasia orientanus,* 갈색무늬좀나방, **14**. *Morophagoides moriutii,* 표고버섯좀나방, **15**. *Morophagoides ussuriensis,* 얼룩무늬좀나방

Http://www.tineid.wo.to

Adult's plate of Korean Tineid

16. *Scardia amurensis*, 잔나비걸상버섯좀나방, **17.** *Amorophaga* sp. 회색버섯좀나방, **18.** *Morophaga bucephala,* 큰점무늬좀나방, **19.** *Morophaga fasciculata*, 결무늬버섯좀나방, **20.** *Morophaga formosana,* 영지버섯좀나방, **21.** *Psychoides* sp. 고사리좀나방, **22.** *Tinea translucens,* 옷좀나방, **23.** *Niditinea baryspilas,* 암노랑까치머리좀나방, **24.** *Monopis pavlovskii,* 점흰무늬좀나방, **25.** *Monopis weaverella,* 노랑머리유리창좀나방, **26.** *Monopis zagulajevi,* 노란등줄좀나방, **27.** *Crypsithyris japonica,.* 이끼좀나방

Seasonal collecting data of family Tineidae from Korea

Table 2. Seasonal collecting data of family Tineidae from Korea.

Species	Feb.	Mar.			Apr.			May			Jun.			Jul.			Aug.			Sep.			Oct.
	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E
Nemapogon granella (L.)											○	○	○	○									
Triaxomasia orientanus (P & P.)											○												
Cephitinea colonella (E.)		○	○	○	○	○	○	○	○	○	○	○											
Gerontha ampliptera P & P.													○										
Gerontha borea Mo.												○	○	○	○								
Gerontha namhaensis P & P.														○	○	○	○						
Dasyses barbata (Ch.)															○	○	○						
Monopis monachella (H.)																							
Monopis pavlovskii Z.			○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Monopis zagulajevi G.												○	○	○	○	○	○	○	○				
Monopis weaverella (Sc.)									○														
Monopis laevigella (D. & Sc.)											○												
Niditinea baryspilas (M.)									○	○	○	○	○	○	○	○							
Tinea translucens M.																							
Trichophaga tapetzella (L.)																							
Crypsithyris japonica P & G.											○												
Erechthias atririvis (M.)														○	○	○	○	○	○	○			
Erechthias sphenoschista (M.)															○	○	○	○					
Opogona nipponica St.												○	○	○	○	○	○	○	○				
Opogona sacchari (Bo.)																							
Opogona thiadelta M.													○	○	○	○							
Wegneria cerodelpha M.	○										○	○	○	○	○	○	○						
Montescardia kurenzovi (Z.)										○													
Morophaga bucephala (Sn.)											○	○	○	○	○	○	○	○	○				
Morophaga fasciculata Ro.					○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○			
Morophaga formosana Ro.																○	○	○	○	○	○	○	
Morophagoides moriutii Ro.													○	○	○	○	○	○	○				
Morophagoides ussuriensis (Ca.)												○											
Scardia amurensis Z.																				○			
Amorophaga sp.													○										
Psychoides sp.																							
Dryadaula sp.								○	○	○	○	○											

※ **E**: early; **M**: middle; **L**: late.

Host relationships of Family Tineidae in Korea

Table 3. Host relationships of family Tineidae in Korea.

Class	Scientific names	Host plants
F	*Dryadaula* sp. 꼬마버섯좀나방	*Cerrena unicolor* (Fr.) Murr. (단색구름버섯)
P	*Erechthias atririvis* (Meyrick) 썩은나무좀나방	bark of *Castanea crenata* S. et S. et Z. (Fagaceae)(밤나무), bark of *Prunus×yedoensis* Mat. (Rosaceae)(왕벚나무), canker of *Sophola japonica* L. (Leguminosae)(회화나무) caused by rust fungus, bark of *S. japonica*, bark of *Robinia pseudo-acasia* L.(Leguminosae)(아까시나무), dead branch of *Rhus succedanea* L. (Anacarpdiaceae)(검양옻나무), dead branch of *Carica papaya* L. (Caricaceae)(파파야) (in Japan).
P	*Erechthias sphenoschista* (Meyrick) 점박이좀나방	bark of *Pinus densiflora* Siebold et Zuccarini, (Pinaceae)(소나무), decayed bark of *Prunus mume* Siebold et Zuccarini(매실나무), (Rosaceae), canker of *Sophora japonica* L., (Leguminaceae)(회화나무) caused by rust fungus (in Japan).
P	*Dasyses barbata* (Christoph) 껍질좀나방	bark of *Malus* spp., *Prunus* spp. (in NIAST)
P	*Opogona sacchari* (Bojer) 바나나좀나방	Cactaceae, *Dracaena*, *Strelitzia*, *Yucca, Alpinia*, *Begonia*, *Bougainvillea*, Bromeliaceae, *Chamaedorea*, *Cordyline*, Dieffenbachia, Poinsettia(*Euphorbia pulcherrima*), *Ficus*, *Gloxinia, Heliconia, Hippeastrum, Maranta, Philodendron, Sansevieria, Saintpaulia* and *Capsicum.* (cosmopolitan)
P	*Cephitinea colonella* (Erschoff) 긴날개좀나방	dried rice and gall of *Quercus acutissima* Carruth(상수리나무), old grain, fresh healthy grain (in NIAST)
D	*Gerontha borea* Moriuti 누더기좀나방	decayed wood (in Japan).
F, P	*Nemapogon granella* (L.) 곡식좀나방	*Lentinula edodes* (Berk.) Pegle(표고버섯) (in Japan & Korea), *Coriolus versicolor* (L.: F.) Quél.(구름버섯); various grains (cosmopolitan).
F	*Morophagoides moriutii* Robinson 표고버섯좀나방	*Lentinula edodes* (Berk.) Pegler(표고버섯), *Coriolus versicolor* (L.: F.) Quél.(구름버섯)
F	*Scardia amurensis* Zagulajev 잔나비걸상버섯좀나방	*Fomes fomentarius* (L.: Fr.) Fr.(말굽버섯), *Laricifomes officinalis* (Fr.) Kotl. et Pouz.(말굽잔나비버섯), *Ganoderma applanatum* (Pers.: Wallr.) Pat.(잔나비걸상(잔나비불로초)
F	*Amorophaga* sp. 회색버섯좀나방	*Cryptophorus volvatus*(C.)(한입버섯)(in type-series)
F	*Morophaga bucephala* (Snellen) 큰점무늬좀나방	*Tyromyces sambuceus* (Lloyd) Imaz.(명아주개떡버섯), **Inonotus tomentosus*(시루뻔버섯속)
F, P	*Morophaga fasciculata* Robinson 결무늬버섯좀나방	*Trametes kusanoana* Im.(벌레송편버섯), *Coriolus* sp.(구름버섯류), *Phellinus gilvus* (Schw.: Fr.)(마른진흙버섯). *Oligoporus caesius* (Sc. : Fr .) G. et R.(푸른손등버섯); *Malus pumilla*(사과), *Ficus carica* L.(무화과)(in NIAST)
F	*Morophaga formosana* Robinson 영지버섯좀나방	*Ganoderma lucidum* (Fr.) Karst(영지버섯)
S	*Psychoides* sp. 고사리좀나방	sporangia(*Dryopteris*, Aspidiaceae [족제비고사리류, 면마과])
A, K	*Trichophaga tapetzella* (L.) 털좀나방	textiles. animal pelts, stored guano (cosmopolitan).
A, K	*Tinea translucens* M. 옷좀나방	wool, feather, hides, skins, other materials of animal origin (cosmopolitan).
A, K	*Monopis laevigella* (Denis & Schiff.) 검은유리창좀나방	hides and skins, fur, guano and other materials of animal origin (cosmopolitan).
L	*Crypsithyris japonica* Petersen & Gaedike 이끼좀나방	the larvae of this genus are known to be lichenophagous (Fletcher, 1933) (in Japan).

Key to the genera of Korean Tineidae

(based on the external characters)

1. Scales of vertex appressed to head, broad, lamellate.....2
- Scales of vertex erect, piliform.....3

2. Apical half of the forewing dark or pale brown mark, the other half yellow.....
.....***Opogona***
- Forewing with a single yellow mark mostly .....***Wegneria***

3. Labial palpus with strong lateral bristles on second segment.....4
- Labial palpus without strong lateral bristles on second segment.....9

4. Forewing slightly curved outward at apical area .....***Erechthias***
- Forewing not curved outward.....5

5. Wingspan long (more than 34 mm) .....***Scardia***

- Wingspan short (13-29 mm).....6

6. Forewing with raised tufts of scale or rows of clusters of scales protruding.....
above the wing.....7
- Forewing with all scales appressed to wing surface..... 8

7. Scale of forewing tuft-shap.....***Gerontha***
- Scale of forewing lamellate .....***Dasyses***

8. Forewing and hindwing with well-developed fringe .....***Cephitinea***
- Forewing and hindwing with little-developed fringe .....***Morophaga***

9. Wingspan very small (8-8.5 mm).....10
- Wingspan is small or medium (10-22 mm).....11

10. Forewing brightly colored; antenna filiform; scale of frons erected .....***Dryadaula***
- Forewing with dark brown scale, deep colored in apical area; antenna not.....
filiform, scale of frons appressed .....***Psychoides***

11. Forewing with hyaline or subhyaline spot in discal cell.....12
- Forewing without hyaline or subhyaline spot in discal cell.....13

12. Forewing with hyaline spot in discal cell; R1 present .....***Monopis***
- Forewing with subhyaline spot in discal cell; R1 absent .....***Chrypsithyris***

13. Labial palpus short, approximately twice as long as diameter of eye.....14
- Labial palpus long, approximately three times as long as diameter of eye.....
.....***Morophagoides***

14. Vertex and frons with grayish scale .....*Amorophaga*
  - Vertex and frons with pale yellowish.....15

15. Forewing with three or six dots.....16
  - Forewing with many dots.....17

16. Forewing with one to three dots, rarely without such dot .....*Tinea*
  - Forewing with six dots .....*Niditinea*

17. Costal margin of hindwing without projection .....*Nemapogon*
  - Costal margin of hindwing with slight projection .....*Triaxomasia*

Results

From the result of this study, further 2 subfamilies 5 genera 10 species including a new species are recognized. Among them, three species, *Dryadaula* sp., *Amorophaga* sp., *Psychoides* sp. is described as new to science, and 7 species (*Erechthias sphenoschist*a (Meyrick, 1931), *Opogona sacchari* (Bojer, 1856), *Morophagoides moriutii* Robinson, 1986, *Scardia amurensis* Zagulajev, 1965, *Monopis weaverella* (Scott, 1858), *Monopis zagulajevi* Gaedike, 2000) are newly recorded from Korea.

The host plants in wild condition, *Scardia amurensis* injures to *Ganoderma applanatum* (잔나비걸상); *Morophaga fasciculata* injures to *Coriolus* sp. (구름버섯류), *Oligoporus caesius* (푸른손등버섯), *Phellinus gilvus* (마른진흙버섯); *Morophaga bucephala* injures to *Tyromyces sambuceus* (명아주개떡버섯), *Inonotus tomentosus* (시루뻔버섯속); *Nemapogon granella* injures to *Coriolus versicolor* (구름버섯); *Dryadaula* sp. injures to *Cerrena unicolor* (단색구름버섯); *Morophagoides moriutii* injures to *Coriolus versicolor* (구름버섯) and dead wood; Psychoides sp. injures to sporangia (*Dryopteris*, Aspidiaceae [족제비고사리류, 면마과]) are recognized for the first time. The species, *Morophagoides moriutii* Robinson, are described immature stage (larva, pupa) with illustrations (text-figure 7, 8). The morphological characters of adults, genitalia, wing venation of unknown three female (*Gerontha ampliptera, G. borea, G. namhaensis*) are also added newly. The species, *Tinea translucens* Meyrick is confirmed distribution in Korea through dissecting adults after collecting larvae and rearing. New subfamily (Dryadaulinae, Teichobiinae) are added from two species (*Dryadaula* sp., *Psychoides* sp.) emerged in laboratory. A total of 27 species except 5 species not examined in this study is dissected, adults and genitalia of both sexes are illustrated. Host plants are listed. Distribution map, a keys to all known species in Korea are provided. Also illustration of adults, venations, male and female genitalia and immature stages are provided.

Reference

Cho, B. S., & Kim, C. H., 1968. Nomina Animalium Koreanorum (2) *Insecta*, *Zool. Soc. Kor*. 334 pp.

Gaedike, R., 2000. New and interesting moths from the East Palaearctic (Lepidoptera: Tineidae) Co ntribution to the knowledge Eastern Palaearctic insects (11). *Beitr. Ent. Berlin*. pp. 357-384.

Issiki, S., 1957. Tineidae, pp. 15-17, pl. 2. *in* Esaki, T. (ed.). *Icon. Het. Jap. col. nat.* 1. xix + 318 pp. 6 4 pls, 98 figs, Osaka.

Lee, T. S., & Lee, J. Y., 2000. Rearranged List of Recorded Mushrooms in Korea. Korea forest resear ch institute, Seoul. 64 pp.

Moriuti, S., 1982. Tineidae *In*: Inoue, H. *et al*. *Moths of Japan* (2 vols), pp. 162-171, Pl. 2: 1-27. Koda nsha, Tokyo.

Moriuti, S., 1989. Eleven new species of *Gerontha* from Southeast Asia, with notes on others (Lepido ptera: Tineidae). *Microlepid. Thailand* 2: 87-112.

Park, K. T., and C. Y. Whang., 1990. *Morophaga formosana* Robinson (Lepidoptera, Tineidae), a pest o f *Ganoderma lucidum* (Fr.) Karst, and its two allied species. *Tyô to Ga* 41: 21-28.

Park. K. T., 1983a. Illustrated Flora & Fauna of Korea vol. 27 Insecta (IX), Samhwa pub. pp. 933-93 5, 549-559, Pl. 36: 628-637.

Ponomarenko, M. G., & Park, K. T., 1996. Notes on Some Tineids from Korea and Russia Far East, with Description of Four New Species (Lepidoptera: Tineidae), *Kor. Journ. Appl. Ent*. 35 (4): 273-27 9.

Robinson, G. S., & Nielsen, E. S., 1993. Tineid Genera of Australia (Lepidoptera). *Monographs on Austr alian Lepidoptera*, 2: i-xvi, 1-344, figs 1-733.

Robinson, G. S., 1980b. Cave-dwelling tineid moths: a taxonomic review of the world species (Lepi doptera: Tineidae). *Trans. Br. Cav. Res. Ass.* 7: 83-120.

Robinson, G. S., 1986. Fungus moths: a review of the Scardiinae (Lepidoptera: Tineidae). *Bull. Br. M us. nat. Hist*. (*ent*.) 52: 37-181, figs 1-200.

Robinson, G. S., 2003. Global taxonomic database of Tineidae (Lepidoptera). Website at http://ww w.nhm.ac.uk/entomology/tineidae/index.html. *Nat. Hist. Mus. Publ., Lond. Dep. Ent*.

Sakai, M., & Saigusa, T., 2002. Revisional study of the genus *Crypsithyris* Meyrick, 1907 (Tineidae, Ti neinae) in Japan. *Trans. lepid. Soc*. *Jap.* 53 (1): 69-82.

Yoshimatsu, S., 1992. Lepidopterous Insects Associated with Cankers of the Japanese Pagoda Tre e, *Sophora japonica* Caused by Rust Fungus, *Uromyces truncicola*. *Jpn. J. Ent*. 60 (4): 777-782.

Zagulajev, A. K., 1960. Tineidae; part 3 subfamily Tineinae. [In Russian.] Fauna SSSR, 78: 1-267, 2 31 figs, 3 pls. [Translation, 1975, New Delhi].

Zagulajev, A. K., 1964. Tineidae; part 2, subfamily Nemapogoninae. [In Russian.] Fauna SSSR, 86: 1 -424, 385 figs, 1 Pl. [Translation, 1968, Jerusalem].

Zagulajev, A. K., 1973. Tineidae; part 4. subfamily Scardiinae. Fauna SSSR, 104: 1-126, 99 figs, 2 pls. [In Russian].

Zimmerman, E. C., 1978. Microlepidoptera. Insects Hawaii vol. 9: ⅰ-xviii, 1-1903, figs. 1-1355, pl s. 1-8.

최신버섯병해충 방제도감, 2000. Diagnosis and control of Disease and Pest in Mushrooms, 한국버섯 연구회. pp. 200-205.