PHYTOGEOGRAPHICAL AFFINITIES BETWEEN THE MOSSFLORAS OF FORMOSA AND HER NEIGHBOURING DISTRICTS

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INTRODUCTION

Ever since Dr. Merrill's publication of an illuminating essay on the phytogeographical relations between the Philippines and Formosa in 1923, the phytogeographic position of Formosa has attracted the interest of many phytogeographers. In discussing the floristic relationships between Formosa and her adjacent regions, various authors have considered the vascular floras of these areas, but very few have noted an equivalent geographic relationship in the mossfloras of Formosa and her neighbouring regions. Interest in the problem geographically correlating the bryophyte floras of these regions was started by Dr. Horikawa through a very short note in 1936, in which only 246 species in 76 genera of liverworts and 315 species in 117 genera of mosses in the Formosan bryophyte flora were made known. Ever since Dr. Horikawa's publication of this summarized paper in 1936, the relationships between the mossflora of Formosa and that of her neighbouring districts have, just in recent years, been briefly discussed in the monographic works on taxonomy by few of the Japanese bryologists. In fact, investigations and findings on this subject have exposed controversial opinions and led to the diverse conclusions. However, such a critical study which involves at least some scrutiny of the mossfloras of these regions and an examination of the distributions of the genera in the mossflora of Formosa may be a profitable contribution to the general problem of phytogeography concerning Formosa as well as her adjacent floristic regions.

In this study I have treated the problem of the phytogeographic position of Formosa by taking the geographical distributions of her genera of mosses into consideration. In doing so, I took one family after another and then examined and compared the distributions of these genera in Formosa with that of the same genera in her adjacent districts, including China, Philippines, Ryukyu, and Japan.

ANALYSIS OF THE GEOGRAPHICAL DISTRIBUTIONS OF FORMOSAN MOSSES

Results of the analysis of distributions of these genera common to the neighbouring districts of Formosa are set forth in the following tables.*

*The figures in brackets denote the number of species common to Formosa and her neighbouring district.

1. Andreaeaceae

Genus	China	Philippines	Ryukyu	Japan
Andreaea	+	•	•	+ (1)
Totals	1	0	0	1 (1)

In this family Formosa has a close affinity with Japan.

2. Fissidentaceae

Genus	China	Philippines	Ryukyu	Japan
Fissidens	+ (3)	+ (7)	+ (2)	+ (10)
Totals	1 (3)	1 (7)	1 (2)	1 (10)

In Fissidentaceae Formosa is more related to Japan and Philippines than to the other regions.

3. Ditrichaceae

Genera	China	Philippines	Ryukyu	Japan
Ceratodon	+ (1)	+ (1)	•	+ (1)
Ditrichum	+ (1)	+ (1)	+ (1)	+ (1)
Garckea	+ (1)	+ (1)	•	+ (1)
Pleuridium	+	•	•	+ (1)
Totals	4 (3)	3 (3)	1 (1)	4 (4)

In Ditrichaceae the flora of Formosa is more strongly Sino-Japanese than Philippine in affinity.

4. Dicranaceae

Genera	China	Philippines	Ryukyu	Japan
Aongstroemia	+ (1)	+ (1)	•	+
Campylopodium	•	+ (1)	•	+ (1)
Campylopus	+	+	•	+ (3)
Dicranella	+ (1)	+ (1)	•	+ (2)
Dicranodontium	+	+ (1)	•	+ (2)
Dicranoloma	+	+ (2)	•	+ (2)
Dicranum	+ (1)	•	•	+ (4)
Holomitrium	+	+	+	+
Leucoloma	+ (1)	+ (1)	•	+ (1)
Oncophorus	+ (1)	•	•	+ (1)
Oreoweisia	+	•	•	+
Orthodicranum	+ (1)	•	•	+ (1)
Paraleucobryum	+ (1)	•	•	+ (2)

Symblepharis	+ (1)	+ (1)	•	•
Thysanomitrium	+ (1)	•	•	+ (1)
Trematodon	+ (1)	+ (1)	+ (1)	+ (1)
Totals	14 (10)	10 (9)	2 (1)	15 (21)

In Dicranaceae the affinity of the flora of Formosa is more with Japan than the rest three regions.

5. Leucobryaceae

Genera	China	Philippines	Ryukyu	Japan
Exodictyon	+ (1	+ (1)	+ (1)	•
Leucobryum	+ (5)	+ (2)	•	+ (5)
Leucophanes	+	+ (1)	•	•
Octoblepharum	+ (1)	+ (1)	•	•
Totals	4 (7)	4 (5)	1 (1)	1 (5)

In this family, Leucobryaceae, Formosa is more related to China and Philippines than to the rest two regions.

6. Calymperaceae

Genera	China	Philippines	Ryukyu	Japan
Calymperes	+	+	+	•
Syrrhopodon	•	+ (1)	+ (1)	+ (2)
Totals	1	2 (1)	2 (1)	1 (2)

In the family Calymperaceae the flora of Formosa has less relation to that of China.

7. Encalyptaceae

Genera	China	Philippines	Ryukyu	Japan
Encalypta	+	•	•	+ (1)
Totals	1	0	0	1 (1)

In Encalyptaceae the flora of Formosa has a close affinity with that of Japan.

8. Pottiaceae

Genera	China	Philippines	Ryukyu	Japan
Anoectangium	+	+	•	+
Barbula	+ (4)	+ (2)	+ (1)	+ (1)
Hymenostomum	+	+ (1)	•	+ (2)
Hymenostylium	+	+	•	+
Hyophila	+ (2)	+ (3)	+	+ (2)
Leptodontium	•	•	•	+

Merceyopsis	•	+	•	+
Pleurochaete	+ (1)	•	•	+ (1)
Pottia	+ (1)	•	•	+ (1)
Tortella	+ (1)	•	•	+ (1)
Tortula	+ (1)	•	•	+ (2)
Trichostomum	+	+	•	+ (1)
Weisia	+ (1)	+	•	+ (5)
Weisiopsis	+	•	•	+ (1)
Totals	12 (11)	8 (6)	2 (1)	14 (17)

In this family the affinity of the flora of Formosa is more with Japan than the rest three regions.

9. Grimmiaceae

Genera	China	Philippines	Ryukyu	Japan
Glyphomitrium	+	•	•	+
Grimmia	+ (1)	•	•	+ (2)
Ptychomitrium	+	•	•	+
Rhacomitrium	+ (3)	•	•	+ (5)
Totals	4 (4)	0	0	4 (7)

In Grimmiaceae the flora of Formosa is largely a combination of Sino-Japanese types.

10. Funariaceae

Genera	China	Philippines	Ryukyu	Japan
Funaria	+ (2)	+ (2)	+	+ (3)
Physcomitrium	+ (1)	•	•	+ (2)
Totals	2 (3)	1 (2)	1	2 (5)

In the family Funariaceae the affinity of the Formosan flora is more with Japan than China.

11. Splachnaceae

Genera	China	Philippines	Ryukyu	Japan
Gymnostomiella	•	+ (1)	+ (1)	•
Tayloria	+ (1)	+	•	+ (1)
Totals	1 (1)	2 (1)	1 (1)	1 (1)

In Splachnaceae the Formosan flora has affinity with any of her neighbouring districts but a close affinity with that of the Philippines.

12. Tetraphidaceae

Genera	China	Philippines	Ryukyu	Japan
Tetraphis	+ (1)	•	•	+ (1)
Totals	1 (1)	0	0	1 (1)

In the family Tetraphidaceae, Formosa has no affinity with Ryukyu and Philippines.

13. Bryaceae

Genera	China	Philippines	Ryukyu	Japan
Anomobryum	+	+	•	+
Brachymenium	+	+ (1)	+ (1)	+ (1)
Bryum	+ (3)	+ (4)	+ (1)	+ (5)
Pohlia	+ (2)	+ (2)	•	+ (2)
Rhodobryum	+ (2)	+ (1)	•	+ (2)
Totals	5 (7)	5 (8)	2 (2)	5 (10)

In Bryaceae the flora of Formosa has affinities with the neighbouring regions in the following order, viz., Japan, Philippines, China, and Ryukyu.

14. Mniaceae

Genera	China	Philippines	Ryukyu	Japan
Mnium	+ (6)	+ (1)	+	+ (9)
Orthomniopsis	+ (1)	+ (1)	•	+ (1)
Orthomnium	+	+	•	•
Totals	3 (7)	3 (2)	1	2 (10)

In this family the flora of Formosa is more strongly Chinese than Japanese when the genera are concerned but vice versa when species are taken into consideration.

15. Rhizogoniaceae

Genera	China	Philippines	Ryukyu	Japan
Rhizogonium	+ (2)	+ (1)	+ (1)	+ (4)
Totals	1 (2)	1 (1)	1 (1)	1 (4)

In Rhizogoniaceae the flora of Formosa has a close affinity with that of Japan.

16. Hypnodendraceae

Genera	China	Philippines	Ryukyu	Japan
Hypnodendron	•	+	•	•
Totals	0	1	0	0

In Hypnodendraceae the flora of Formosa may be described as of Philippine affinity.

17. Bartramiaceae

Genera	China	Philippines	Ryukyu	Japan
Bartramia	+ (3)	•	•	+ (4)
Fleischerobryum	+ (1)	+	•	+ (1)
Philonotis	+ (6)	+ (2)	•	+ (8)
Totals	3 (10)	+ (2)	0	3 (13)

In the family of Bartramiaceae, the Formosan flora is chiefly composed of Sino-Japanese types although it is more strongly Japanese than Chinese in affinity.

18. Spiridentaceae

Genera	China	Philippines	Ryukyu	Japan
Spiridens	+	+ (1)	•	•
Totals	1	1 (1)	0	0

In Spiridentaceae the flora of Formosa has no relation to Ryukyu and Japan, but a close affinity with that of the Philippines.

19. Orthotrichaceae

Genera	China	Philippines	Ryukyu	Japan
Amphidium	+	+	•	+ (1)
Macrocoma	+ (1)	•	•	+ (1)
Macromitrium	+ (3)	+	+ (1)	+ (8)
Schlotheimia	+	+	+ (1)	+ (2)
Ulota	+ (1)	•	•	+ (1)
Zygodon	•	+	•	•
Totals	5 (5)	4	2 (2)	5 (13)

In Orthotrichaceae the flora of Formosa has a much closer affinity with that of Japan.

20. Rhacopilaceae

Genus	China	Philippines	Ryukyu	Japan
Rhacopilum	+ (1)	+ (1)	+ (1)	+ (2)
Totals	1 (1)	1 (1)	1 (1)	1 (2)

In the family of Rhacopilaceae, the flora of Formosa has a closer affinity with that of Japan than the rest three neighbouring regions.

21. Hedwigiaceae

Genus	China	Philippines	Ryukyu	Japan
Hedwigia	+ (1)	•	•	+ (1)
Totals	1 (1)	0	0	1 (1)

With reference to the distribution of Hedwigiaceae, the Formosan flora may be described as of Sino-Japanese affinity.

22. Cryphaeaceae

Genera	China	Philippines	Ryukyu	Japan
Cryphaea	+	•	•	+
Forsstroemia	+	•	•	+
Pilotrichopsis	+ (1)	+ (1)	•	+ (1)
Totals	3 (1)	1 (1)	0	3 (1)

In this family the flora of Formosa is mainly Sino-Japase in affinity but no relation to Ryukyu.

23. Leucodontaceae

Genus	China	Philippines	Ryukyu	Japan
Leucodon	+ (1)	•	•	+ (1)
Totals	1 (1)	0	0	1 (1)

In the family Leucodontaceae the flora of Formosa is Sino-Japanese in affinity, but it is not related to that of any of the four neighbouring districts in *Antitricia*.

24. Ptychomniaceae

Genus	China	Pqilippines	Ryukyu	Japan
Glyptothecium	•	+ (1)	•	•
Totals	0	1 (1)	0	0

In Ptychomniaceae the flora of Formosa has no relation to that of the adjacent regions except the Philippines.

25. Prionodontaceae

Considering Prionodontaceae the Formosan flora has no affinity with any of her neighbouring districts. The famiy is represented in Formosa by a single genus, *Taiwanobryvm*, which is endemic to the island.

26. Trachypodaceae

Genera	China	Philippines	Ryukyu	Japan
Duthiella	+ (1)	+	•	+ (2)

Pseudospiridentopsis	+	(1)	+	(1)	•		•	(1)
Trachypodopsis	+	(1)	+	(1)	•		•	
Trachypus	+	(2)	+	(2)	•		+	(3)
Totals	4	(5)	4	(4)	0		3	(6)

In the family Trachypodaceae, the flora of Formosa has a close affinity with that of her neighbouring districts excluding Ryukyu.

27. Pterobryaceae

Genera	China		Philippines		Ryukyu		Japan	
Endotrichella	•		+	(1)	+	(1)	+	(1)
Garovaglia	•		+	(1)	•		•	
Meteoriella	•		•		•		+	(1)
Myuriopsis	+	(1)	•		•		+	(1)
Myurium	+	(1)	+		•		+	(1)
Pterobryopsis	+		+		•		•	
Pterobryum	•		•		•		+	(2)
Trachyloma	•		+	(1)	•		•	
Totals	3	(2)	5	(3)	1	(1)	5	(6)

In Pterobryaceae the flora of Formosa is related to that of her neighbouring districts in the following order, viz., Japan, Philippines, China, and Ryukyu, although it has no affinity with any of them in *Pireella*.

28. Meteoriaceae

Genera	China		Philippines		Ryukyu		Japan	
Aerobryidium	+		•		•		•	
Aerobryopsis	+	(1)	+		+	(1)	+	(1)
Aerobryum	+	(1)	+	(1)	•		+	
Barbella	+	(1)	+	(2)	•		+	(3)
Chrysocladium	+	(1)	•		•		+	(1)
Floribundaria	+	(2)	+	(2)	•		+	(2)
Meteoriopsis	+		+	(1)	•		+	(2)
Meteorium	+	(2)	+	(2)	•		+	(3)
Neobarbella	•		•		•		+	
Papillaria	+	(1)	+	(1)	•		+	(1)
Pseudobarbella	+	(1)	•		+	(1)	+	(2)
Totals	10	(10)	7	(9)	2	(2)	10	(15)

In the family Meteoriaceae the Formosan flora has an affinity with that of her adjacent districts in the following order, viz., Japan, China, Philippines, and Ryukyu.

29. Phyllogoniaceae

In this family no relation can be found between the flora of Formosa and that of any of the four adjacent regions. In Formosa, the family is represented only by a single genus, *Horikawaea*, which is also endemic to the island.

30. Neckeraceae

Genera	Chlna	Philippines	Ryukyu	Japan
Calyptothecium	+	+ (1)	+ (1)	+ (2)
Himantocladium	•	+ (3)	+ (1)	•
Homalia	+	•	•	+ (1)
Homaliadelphus	+ (1)	•	•	+ (2)
Homaliodendron	+ (3)	+ (4)	+ (1)	+ (4)
Neckera	+ (1)	•	+ (1)	+ (3)
Neckeropsis	+ (1)	+ (1)	+ (2)	+ (2)
Pinnatella	+ (1)	+	•	+ (1)
Thamnium	+ (1)	+ (2)	+ (1)	+ (3)
Totals	8 (8)	6 (11)	6 (7)	8 (18)

In the family Neckeraceae the Formosan flora has affinities with that of her nighbouring regions in the following order, viz., Japan, China, Philippines, and Ryukyu, but in *Porotrichum* it has no affinity with any of these regions.

31. Lembophyllaceae

Genera	China	Philippines	Ryukyu	Japan
Dolichomitra	+ (1)	•	•	+ (1)
Elmeriobryum	•	+	•	•
Isotheciopsis	+	•	•	•
Isothecium	•	•	•	+ (1)
Totals	2 (1)	1	0	2 (2)

In Lembophyllaceae the Formosan flora has a closer affinity with that of Japan but no relation to that of Ryukyu.

32. Hookeriaceae

Genera	China	Philippines	Ryukyu	Japan
Callicostella	•	+ (1)	•	•
Chaetomitriopsis	•	+ (1)	•	•
Cyclodictyon	•	+ (1)	•	•
Distichophyllum	+	+ (2)	+ (2)	+ (1)
Eriopus	•	+	•	+ (1)
Hookeria	+ (1)	•	+ (1)	+ (1)

Hookeriopsis	•	+	•	+
Totals	2 (1)	6 (5)	2 (3)	4 (3)

In Hookeriaceae the flora of Formosa is related to that of the neighbouring regions in the following order, viz., Philippines, Japan, Ryukyu, and China.

33. Hypopterygiaceae

Genera	China	Philippines	Ryukyu	Japan
Cyathophorella	+ (1)	+ (1)	+ (2)	+ (2)
Dendrocyathophorum	•	•	•	+ (1)
Hypopterygium	+	+ (1)	+ (2)	+ (2)
Lopidium	•	+ (1)	+ (2)	+ (2)
Totals	2 (1)	3 (3)	3 (6)	4 (7)

In the family Hypopterygiaceae the flora of Formosa has affinities with that of her adjacent districts in the following order, viz., Japan, Ryukyu, Philippines, and China.

34. Theliaceae

Genus	China	Philippines	Ryukyu	Japan
Fauriella	+	•	•	+ (1)
Totals	1	0	0	1 (1)

In this family the Formosa flora may be described as Sino-Japanese.

35. Fabroniaceae

Genera	China	Philippines	Ryukyu	Japan
Fabronia	+	+	•	+
Schwetschkea	+ (1)	•	•	+ (1)
Schwetschkeopsis	•	•	•	+
Totals	2 (1)	1	0	3 (1)

In Fabroniaceae the affinity of the Formosan flora is more with Japan than China, and no relation can be found between Formosa and Ryukyu.

36. Leskeaceae

Genera	China	Philippines	Ryukyu	Japan
Ishibaea	•	•	•	+ (1)
Leskea	+	•	•	+
Pseudoleskea	+	•	•	+ (1)
Pseudoleskeopsis	+	+	•	+ (1)
Totals	3	1	0	4 (3)

The floristic relationship between Formosa and her neighbouring districts in Leskeaceae is just the same as in Fabroniaceae.

37. Thuidiaceae

Genera	China	Philippines	Ryukyu	Japan
Abietinella	+ (1)	•	•	+ (1)
Actinothuidium	+ (1)	•	•	•
Claopodium	+ (2)	+ (1)	+ (1)	+ (3)
Haplocladium	+ (3)	•	+ (1)	+ (2)
Haplohymenium	+ (1)	•	+ (1)	+ (2)
Herpetineurum	+ (1)	+ (1)	•	+ (1)
Miyabea	•	•	•	+ (1)
Thuidium	+ (4)	+ (5)	+ (1)	+ (5)
Totals	7 (13)	3 (7)	4 (4)	6 (15)

In Thuidiaceae the flora of Formosa has affinities with that of her four neighbouring districts in the following order, viz., China, Japan, Ryukyu, and Philippines.

38. Amblystegiaceae

Genera	China	Philippines	Ryukyu	Japan
Amblystegium	+	•	•	+
Campylium	+	•	•	+
Cratoneurum	+	•	•	+
Leptodictyum	+ (1)	•	•	+ (1)
Platyhypnidium	+	•	•	+ (1)
Totals	5 (1)	0	0	5 (2)

In the family Amblystegiaceae the Formosan flora also may be described as of Sino-Japanese affinity, and there is no relation between Formosa and Philippines or Ryukyu.

39. Brachytheciaceae

Genera	China	Philippines	Ryukyu	Japan
Brachythecium	+ (3)	+ (2)	•	+ (4)
Camptothecium	+	•	•	+ (1)
Eurhynchium	+ (2)	+ (1)	+ (1)	+ (2)
Homalothecium	+ (2)	+	+ (1)	+ (1)
Pleuropus	+ (1)	+ (1)	+ (1)	+ (2)
Rhynchostegiella	•	+	•	+
Rhynchostegium	+	+ (1)	•	+ (1)
Totals	6 (8)	6 (5)	3 (3)	7 (11)

In the family Brachytheciaceae the Formosan flora has affinities with that of her four neighbouring regions in the following order, viz., Japan, China, Philippines, and Ryukyu, although it is not related to any of them in *Pseudisothecium*.

40. Entodontaceae

Genera	China	Philippines	Ryukyu	Japan
Entodon	+ (3)	+ (1)	•	+ (3)
Erythrodontium	+ (1)	+ (1)	•	•
Totals	2 (4)	2 (2)	0	1 (3)

In Entodontaceae the flora of Formosa is more strongly Chinese than Philippine in affinity, and it has no affinity with that of Ryukyu.

41. Plagiotheciaceae

Genera	China	Philippines	Ryukyu	Japan
Plagiothecium	+ (1)	+	•	+ (4)
Stereophyllum	•	+ (1)	•	+
Totals	1 (1)	2 (1)	0	2 (4)

In Plagiotheciaceae the Formosan flora has a close affinity with that of Japan but no relation to Ryukyu.

42. Sematophyllaceae

Genera	China	Philippines	Ryukyu	Japan
Acanthocladium	•	+	•	+
Acanthorrhynchium	•	+ (1)	•	•
Acroporium	+	+	•	+ (1)
Aptychella	+	+ (1)	•	•
Brotherella	+	+	•	+ (3)
Chionostomum	+	+ (1)	•	+ (1)
Clastobryella	•	+	•	+ (1)
Glossadelphus	•	+	+ (1)	+ (1)
Heterophyllium	+	+	•	+ (1)
Palisadula	•	•	•	+ (2)
Rhaphidostichum	•	+ (1)	•	+
Sematophyllum	+ (2)	+ (1)	+ (1)	+ (3)
Trichosteleum	+	+ (1)	+ (2)	+ (1)
Trismegistia	•	+	•	•
Totals	7 (2)	13 (6)	3 (4)	11 (14)

In Sematophyllaceae the flora of Formosa has a very close affinity with that of Philippines and Japan but an affinity in less degree with the rest two districts.

43. Hypnaceae

Genera	China	Philippines	Ryukyu	Japan
Ctenidium	+ (1)	+	•	+ (3)
Dolichotheca	•	•	•	+ (1)
Ectropotheciella	•	+ (1)	•	•
Ectropothecium	+ (1)	+ (1)	+ (1)	+
Hypum	+ (2)	•	•	+ (5)
Isopterygium	+ (1)	+ (3)	+ (2)	+ (5)
Ptilium	+ (1)	•	•	+ (1)
Taxiphyllum	+ (1)	+ (1)	•	+ (3)
Vesicularia	+	+ (2)	•	+ (2)
Totals	7 (7)	6 (8)	2 (3)	8 (20)

In Hypnaceae the affinity of Formosan flora is much more with Japan than China or Philippines.

44. Hylocomiaceae

Genera	China	Philippines	Ryukyu	Japan
Gollania	+	+	•	+ (2)
Hylocomium	+ (1)	•	•	+ (2)
Macrothamnium	+	+ (1)	•	+ (1)
Microthamnium	•	•	•	+ (1)
Okamuraea	+	•	•	+ (1)
Pleurozium	+ (1)	•	•	+ (1)
Pseudoscleropodium	+	•	•	+ (1)
Rhytidium	+ (1)	•	•	+ (1)
Totals	7 (3)	2 (1)	0	8 (10)

In the Hylocomiaceae the flora of Formosa has a perticularly close affinity with that of Japan but no relation to that of Ryukyu.

45. Diphysciaceae

Genus	China	Philippines	Ryukyu	Japan
Diphyscium	+	+ (1)	+	+ (1)
Totals	1	1 (1)	1	1 (1)

In this family the flora of Formosa has affinities with each of the four neighbouring regions only that the affinity is more with Japan and Philippines than Ryukyu and China.

46. Polytrichaceae

Genera	China	Philippines	Ryukyu	Japan

Atrichum	+	(1)	+	(1)	•		+	(2)
Oligotrichum	+		+	(1)	•		+	(1)
Pogonatum	+	(9)	+	(4)	•		+	(5)
Polytrichum	+	(2)	•		•		+	(2)
Rhacelopodopsis	•		•		+	(1)	•	
Totals	4	(12)	3	(6)	1	(1)	4	(10)

In the family Polytrichaceae the flora of Formosa is chiefly Sino-Japanese in affinity.

In order to bring together in conveniently abbreviated form all that has been shown in the foregoing tables about the distributions of the Formosan mosses common to her neighbouring districts, it is desirable to conclude the analysis with a summary of figures in the form of the following table.

Families	China		Philippines		Ryukyu		Japan	
1. Andreaeaceae	1		•		•		1	(1)
2. Fissidentaceae	1	(3)	1	(7)	1	(2)	1	(10)
3. Ditrichaceae	4	(3)	3	(3)	1	(1)	4	(4)
4. Dicranaceae	14	(10)	10	(9)	2	(1)	15	(21)
5. Leucobryaceae	4	(7)	4	(5)	1	(1)	1	(5)
6. Calymperaceae	1		2	(1)	2	(1)	1	(2)
7. Encalyptaceae	1		•		•		1	(1)
8. Pottiaceae	12	(11)	8	(6)	2	(1)	14	(17)
9. Grimmiaceae	4	(4)	•		•		4	(7)
10. Funariaceae	2	(3)	1	(2)	1		2	(5)
11. Splachnaceae	1	(1)	2	(1)	1	(1)	1	(1)
12. Tetraphidaceae	1	(1)	•		•		1	(1)
13. Bryaceae	5	(7)	5	(8)	2	(2)	5	(10)
14. Mniaceae	3	(7)	3	(2)	1		2	(10)
15. Rhizogoniaceae	1	(2)	1	(1)	1	(1)	1	(4)
16. Hypnodendraceae	•		•		•		•	
17. Bartramiaceae	3	(10)	2	(2)	•		3	(13)
18. Spiridentaceae	1		1	(1)	•		•	
19. Orthotrichaceae	5	(5)	4		2	(2)	5	(13)
20. Rhacopilaceae	1	(1)	1	(1)	1	(1)	1	(2)
21. Hedwigiaceae	1	(1)	0		•		1	(1)
22. Cryphaeaceae	3	(1)	1	(1)	•		3	(1)
23. Leucodontaceae	1	(1)			•		1	(1)
24. Ptychomniaceae	•		1	(1)	•		•	
25. Prionodontaceae	•		•		•		•	
26. Trachypodaceae	4	(5)	4	(4)	•		3	(6)
27. Pterobryaceae	3	(2)	5	(3)	1	(1)	5	(6)

28. Meteoriaceae	10	(10)	7	(9)	2	(2)	10	(15)
29. Phyllogoniaceae	•		•		•		•	
30. Neckeraceae	8	(8)	6	(11)	6	(7)	8	(18)
31. Lembophyllaceae	2	(1)	1		•		2	(2)
32. Hookeriaceae	2	(1)	6	(5)	2	(3)	4	(3)
33. Hypopterygiaceae	2	(1)	3	(3)	3	(6)	4	(7)
34. Theliaceae	1		•		•		1	(1)
35. Fabroniaceae	2	(1)	1		•		3	(1)
36. Leskeaceae	3		1		•		4	(3)
37. Thuidiaceae	7	(13)	3	(7)	4	(4)	6	(15)
38. Amblystegiaceae	5	(1)	•		•		5	(2)
39. Brachytheciaceae	6	(8)	6	(5)	3	(3)	7	(11)
40. Entodontaceae	2	(4)	2	(2)	•		1	(3)
41. Plagiotheciaceae	1	(1)	2	(1)	•		2	(4)
42. Sematophyllaceae	7	(2)	13	(6)	3	(4)	11	(14)
43. Hypnaceae	7	(7)	6	(8)	2	(3)	8	(20)
44. Hylocomiaceae	7	(3)	2	(1)	•		8	(10)
45. Diphysciaceae	1		1	(1)	1		1	
46. Polytrichaceae	4	(12)	3	(6)	1	(1)	4	(10)
Totals	154	(158)	123	(123)	46	(48)	165	(282)

CONCLUSION

An analysis of the geographical distributions of the above-listed genera in 46 families represented in Formosa shows that the mossflora of Formosa has affinities in various degrees with that of her neighbouring districts. It is only in two families, Prionodontaceae and Phyllogoniaceae, that the Formosan flora has no affinity with any of her neighbours. Besides, Hypnodendraceae and Ptychomniaceae are also noteworthy, since they are present else only in the Philippines among the rest adjacent regions of Formosa. The remaining families that are present in Formosa are all common to the mainland of China. However, the majority of these families are not represented in Ryukyu, such as Andreaeaceae, Encalyptaceae, Grimmiaceae, Tetraphidaceae, Bartramiaceae, Spiridentaceae, Hedwigiaceae, Cryphaeaceae, Leucodontaceae, Trachypodaceae, Lembophyllaceae, Theliaceae, Fabroniaceae, Leskeaceae, Amblystegiaceae, Entodontaceae Plagiotheciaceae, and Hylocomiaceae. Of these families not represented in Ryukyu, eight are also absent from the Philippines, namely andreaeaceae, Encalyptaceae, Grimmiaceae, Tetraphidaceae, Hedwigiaceae, Leucodontaceae, Theliaceae, and Amblystegiaceae, and one, Spiridentaceae, is also not present in Japan. Thus, according to the presence of the families, which are represented in Formosa, in the neighbouring districts of Formosa, a close floristic relationship exists between Formosa and China. However, this may not be true when the distributions of the species and genera in

these families are taken into consideration.

As a matter of fact, the foregoing account discloses the floristic relationships between Formosa and each of her neighbouring districts in the following ways.

1. The Ditrichaceae, Grimmiaceae, Tetraphidaceae, Bartramiaceae, Hedwigiaceae, Cryphaeaceae, Leucodontaceae, Theliaceae, Amblystegiaceae, and Polytrichaceae are mainly Sino-Japanese in affinity.

2. Andreaeaceae, Encalyptaceae, Pottiaceae, Rhizogoniaceae, Rhacopilaceae, hypopterygiaceae, and Plagiotheciaceae exhibit a close affinity between Formosa and Japan.

3. Three families, Mniaceae, Entodontaceae and Thuidiaceae, show a close affinity with those of China.

4. Families like Funariaceae, Orthotrichaceae, Lembophyllaceae, Fabroniaceae, Leskeaceae, and Hylocomiaceae are more strongly Japanese than Chinese in affinity.

5. With reference to the distributions of Dicranaceae, Meteoriaceae, Neckeraceae, Brachytheciaceae and Hypnaceae, the floristic relationships between Formosa and her four neighhouring districts appear to be in the following order, viz.. Japan, China, Philippines, and Ryukyu.

6. The flora of Formosa has a close affinity with that of the Philippines in families like Splachnaceae, Hypnodendraceae, Spiridentaceae, Ptychomniaceae, Hookeriaceae, and Sematophyllaceae.

7. The affinity of Formosan flora is more with Japan and Philippines than China and Ryukyu in regard to the distributions of the species in Fissidentaceae, Pterobryaceae and Diphysciaceae, but it is more with China than Philippines in Leucobryaceae and Trachypodaceae.

8. The flora of Formosa has an affinity in least degree with that of China in Calymperaceae, and the same is true with Ryukyu in Bryaceae. Finally, as was already pointed out above, the two families which do not show any affinity between the Formosan flora and that of any of her neighbouring districts are Prionodontaceae and Phyllogoniaceae,

However, with reference to the above described facts, the floristic relationships are proved to be existed between Formosa and her neighbouring districts, and this relationship is particularly significant between Formosa and Japan.

Perhaps the most striking feature in the distribution of the Formosan mosses is the presence of a great number of Japanese types in her flora. From the data presented in the last abbreviated table it is amazing that out of the total number of 564 species, including 156 endemics, of Formosan mosses, 282 species, or 50%, are common to Japan. In other words, more than two thirds, or 68%, of the total number of the nonendemic species of Formosan mosses are also found in Japan. The presence in the island flora of so many Japanese types is remarkably out of expectation from the distance between the two areas.

As is known, 206 genera in 46 families of mosses occur in Formosa. From the data presented in the tables shown in the foregoing pages, it is perfectly evident that

among these genera of Formosan mosses 80% are common to Japan, 75% to China, 60% to Philippines, and 22% to Ryukyu. In this connection I can not help coming to the conclusion that the mossflora of Formosa has a close affinity with that of Japan, and this close floristic relationship between Formosa and Japan would be notably re-enforced in regard to the presence of a great number of Japanese types of mosses in the mossflora of Formosa.

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臺灣與其隣近地區間苔類植物地理之關係

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臺灣之地理位置跨熱暖兩帶。境內地形複雜，氣候不常，故而植物種類龐雜，致使臺灣與其隣近地區間植物地理關係亦因之趨向複雜。自本世紀廿年代以來，曾有中外學者多人，根據臺灣天然繁生之種子植物及羊齒植物之地理分佈，對此問題詳加探討，惟其結論則莫衷一是。著者因對苔類植物一時稍有偏好，故願以個人對臺灣苔類植物粗淺之認識，以及對其地理分佈之瞭解爲基礎，研討臺灣與中國大陸、菲律賓、琉球以及日本間之植物地理關係。

本篇係就著者四年來在臺灣各地採集觀察，並參考各種文獻資料和鑑別實際標本之結果，進而研討其地理分佈之初步報告。惜限於個人經歷不够，學識淺薄和時間短促誠難求其圓滿。錯誤和缺欠之處，至希各方多多指正。