



CHAPTER II

REVIEW OF LITERATURES

Taxonomic background

Choisy (1845) divided the family Convolvulaceae into 4 tribes as follows:

Tribe 1. Argyreia, composed of 7 genera : Rivea, Maripa, Marcellia, Argyreia, Humbertia, Legendera, Blinkworthia, Moorcroftia.

Tribe 2. Convolvuleae, composed of 26 genera : Quamoclit, Mina, Datatas, Pharbitis, Calonyction, Exogonium, Lepistemon, Ipomoea, Jacquemontia, Convolvulus, Aniseia, Polymeria, Calystegia, Shutterreia, Skinneria, Porana, Dupperreya, Neuropeltis, Prevostea, Breweria, Donamia, Cressa, Seddera, Evolvulus, Stylisma, Wilsonia.

Tribe 3. Dichondreae, composed of 2 genera: Dichondra, Falkia.

Tribe 4. Cuscutae, composed of 1 genus : Cuscuta.

Clarke (1885) divided 15 genera which occurred in British Burma into three tribes as follows:

Tribe 1. Convolvuleae, composed of 13 genera : Erycibe, Rivea, Argyreia, Lettsomia, Ipomoea, Lepistemon, Hewittia, Calystegia, Convolvulus, Evolvulus, Porana, Breweria, Neuropeltis.

Tribe 2. Cresseae, composed of 1 genus : Cressa.

Tribe 3. Cuscutae, composed of 1 genus : Cuscuta.

At present, Lettsomia and Breweria are treated as the synonyms of Argyreia and Donamia respectively. Many species of Ipomoea have been changed to the other genera such as Merremia and Operculina. (Van, Ooststroom, 1953)

Van Ooststroom (1953) subdivided the family Convolvulaceae into two subfamilies, Three tribes and nine subtribes, as follows:

subfamily 1. Cuscutoidae

Tribe 1. Cuscuteae

subtribe 1. Cuscutinae

subfamily 2. Convolvuloideae

Tribe 2. Convolvuleae

subtribe 2. Wilsoniinae

3. Dichondrinae

4. Dicranostylinae

5. Poraninae

6. Ericibinae

7. Convolvulinae

Tribe 3. Ipomoeae

subtribe 8. Ipomoeinae

9. Argyreiinae

Ten genera of Convolvulaceae which are studied in this thesis belong to two tribes, according to Van Ooststroom's system, as follows:

Tribe Cuscuteae

subtribe Cuscutinae, composed of one genus, Cuscuta.

Tribe Convolvuleae

subtribe Dicranostylinae : Bonamia, Evolvulus, Neuropeltis.

Convolvulinae : Aniseia, Hewittia, Jacquemontia,
Merremia, Operculina, Xenostegia.

Aniseia used to be classified as genus Ipomoea subgenus Aniseia (Clarke, 1883), then J.D. Choisy, Swiss botanist, separated it from the Ipomoea and grouped it into the new genus, Aniseia.

Bonamia was previously confused with Breweria, however, Breweria has become the synonym of Bonamia (Austin, 1980).

Cuscuta, the third largest genus of Convolvulaceae, was firstly published by Linnaeus. Some botanists placed Cuscuta in separated family, Cuscutaceae (Lawrence, 1963), because of its parasitic habit (Hutchinson, 1960),

Evolvulus was firstly published by Linnaeus. Its generic name distinctly pointed out the habit of this genus which is not twiner.

Hewittia was firstly published by Wight and Arnott. This is the monotypic genus (Van Ooststroom, 1953), composed of one species, Hewittia scandens (Milne) Mabberley. This species was known as H. sublobata (Linn.f.) O.Ktze. for a long time, until Mabberley found that this species was first described in the name, Convolvulus scandens Milne, in 1773 (Mabberley, 1980).

Jacquemontia was firstly published by Choisy. Some botanists considered this genus as synonym of Convolvulus (Austin, 1980).

The name Merremia was firstly published in 1818 by Dennstedt, based on the plate and the description of Rheede's Hortus Malabaricus, in the combination Merremia convolvulacea (Rheed) Dennstedt, so this name is nomen nudum, and not validly published by the International Rules of Botanical Nomenclature. In 1893, Hallier f. validated Merremia Dennstedt composed of several other species and changed the name M. convolvulacea to M. hederacea (Durm.f.) Hall.f. and divided this genus into 4 sections, as follows:

1. Skinneria (Choisy) Hall.f., Type Species : M. hirta (Linn.) Merrill.
2. Streptandra Hall.f., Type Species : M. tridentata (Linn.) Hall.f. .
3. Xanthips (Griseb.) Hall.f., Type Species : M. umbellata (Linn.) Hall.f. .
4. Hailale Hall.f., Type Species : M. peltata (Linn.) Merrill.

Section Skinneria was changed into section Eu-Merremia by Van Oostroom, because the name of the section Skinneria (Choisy) Hall.f. based on the genus Skinneria Choisy (1833) which was the synonym of Merremia and homonym of Skinneria Forst., a genus in Onagraceae, so the name Skinneria (Choisy) Hall.f. must be rejected. And this section included M. hederacea (Burm.f.) Hall.f., which is the type of the genus. He also suggested the fifth section:

5. Wavula van Ooststr., Type Species : M. similis Elmer. (Van Oostroom, 1939).

Neuropeltis was first published by Wallich in 1824. (Van Oostroom, 1938).

Operculina is very closely related to Merremia, and perhaps should be considered as a subdivision of Merremia, flowering specimens without fruits are difficult to separate from Merremia (Austin, 1980). Peter, I.c., subdivided this genus into 3 sections:

1. Pteropodae Peter, : leaves entire, peduncles winged.
2. Apterae Peter, : leaves entire, peduncles not winged.
3. Digitatae Peter, : leaves digitate, peduncles winged or not.

(Van Oostroom, 1939).

Xenostegia is the new genus, which was separated from Merremia by Austin and Staples in 1980. They used pollen morphology and other characters such as anther, stigma, cotyledon structure, as distinguished characters. M. tridentata (Linn.) Hall.f. and M. medium (Linn.) Hall.f. are the two species which were separated from Merremia and grouped into this new genus.

There are a few taxonomic paper of Thai Convolvulaceae. Schmidt recorded 1 species of Merremia - M. umbellata Hall.f. var. orientalis Hall.f.; 5 species of Ipomoea and 1 species of Erycibe, in Flora of Koh Chang. (Schmidt, 1904, 1916)

Gagnepain and Courchet (1915) reported 16 species of Ipomoea found in Indo-China and they also studied Thai specimens. Among these species, there are 6 species have been changed to Merremia and Operculina : I. chryseides Ker-Gawl [M. hederacea (Durm.f.) Hall.f.]; I. cymosa (Desr.) R.et S. [M. umbellata (Linn.) Hall.f.]; I. linifolia Bl. [M. hirta (Linn.) Merrill]; I. quinata R.Br. [M. quinata (R.Br.) Van Ooststr.]; I. polyantha Miq. [M. gemella (Durm.f.) Hall.f.] and I. petaloidea Choisy [O. petaloidea (Choisy) Van Ooststr.]. Further more, they reported 1 species of Blinkworthia, 2 species of Porana and Convolvulus, 5 species of Argyreia and 1 species of Evolvulus (E. alsinoides).

A.F.G. Kerr (1951, 1954) reported 22 genera 102 species of Convolvulaceae found in Thailand, in Flora Siamensis Enumeratio volume 3 part 1 and 2. He also described M.bambusetorum as a new species in Kew Bulletin 1941 (Kerr, 1951, 1954)

Tem Smitinand (1980) listed Thai Convolvulaceae with Thai names in "Thai Plants Names - Botanical Names - Vernacular Names".

Sermkiat (1984) reported 32 species of Ipomoea found in Thailand in his thesis. However, he could not find 5 species of them either fresh materials or herbarium specimens in Thailand.

จุฬาลงกรณ์มหาวิทยาลัย

Palynological background

There are a few data about pollen morphology of Convolvulaceae. Almost of the data deal with the general characters of pollen morphology of family level, but the details of the genera or species level are very rare.

Hallier may be the first taxonomist who used pollen morphology as a taxonomic character in his extensive revision of Convolvulacea, in "Versuch einer natürllichen Gliederung der Convolvulaceen auf morphologischer und anatomischer Grundlage.", in Engler, Bot. Jahrb. 16, 1893. (Ferguson, Verdcourt & Poole, 1977)

Hallier used the spines on exine to separate the genera of Convolvulaceae into two groups, namely Echinoconiae which pollens have spines and Psiloconiae which pollens have no spines. (Erdtman, 1971)

Erdtman (1952) studied pollen of 50 species from 20 genera of Convolvulaceae. He reported that pollen grains of Convolvulaceae are colpate, rugate, rupate or forate and the size of grains vary from 20 micron (small) to 200 microns (very large). He separated the pollens of this family into two types, according to Hallier's system :-

1. The Ipomoea-type

Grains (without exception ?) polyforate very large (diameter 90-210 microns), crassinexinous, spiniferous. The sexine consists of more or less rodlike elements. These rods often coalesce with the spines to form basal rootlets. The length of the actual spines varies from 7 microns to 14 microns, for examples:- Argyreia, Ipomoea.

2. Other types

Grains 20-90 microns, as a rule distinctly punctitegillate, neither crassinexinous nor spiniferous (or at least not provided with large spines), for examples:- Aniseia, Convolvulus, Cuscuta, Porana,

Cardiochlamys (now change to Cordisepalum - present author).

Erdtman (1969) also added that pollen grains of Convolvulaceae are usually "entomophilous" type.

Van Campo (1976) suggested that

"...the Convolvulaceae appear to exhibit a distinct feature. Their pollen types belong to the successiform pattern; however, the ornamentation in this family seem to originate in a sculptured matrix made by the inner surface of the mother cell wall this result emerges from an examination of the species Ipomoea purpurea by Waterkeyn & Dienfait (1970). The formation of pollen ornamentation in the Convolvulaceae in a matrix seems to be verified when a section of pollen of Convolvulus sepium is examined with TEM. ..."

The successiform pattern or successiformy is one of the patterns of variation in pollen grains which show the succession of pollen type : tricolpate-pericolpate-periporate. This succession belongs to the "trichistoclastic system" of Wodehouse.

Ferguson et al (1977) studied pollen morphology of some 55 species of the genera Merremia and Operculina, they recognized five main pollen types

1. tricolpate
2. 5-6 colpate
3. 9-12 colpate
4. 12-rugate
5. pantoporate

They also discussed that

"...the tricolpate type occur quite widely in the family, very similar to Merremia occurring in Convolvulus, Jacquemontia, Bonamia, Dicranostyles, Falkia and Neuropeltis for example. The penta-hexacolpate type is also widely found in other genera for example Convolvulus, Hewittia, Maripa, Jacquemontia, Breweria and Evolvulus. ..."

Austin and Staples (1980) used the same data as Ferguson et al did in 1977. They placed the species of Merremia with pantoporate pollen type to the new genus, Xenostegia.

Recently, Hodges (1984) showed the figure of pollen grains of Convolvulus arvensis and Calystegia sepium, found in pollen load and their morphology are in the other type of Hallier, 1971.

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