SUMMARY

*Freycinetia* was firstly described by Gaudichaud in 1824. Currently there are about 200 species recognized. The centre of distribution of this genus is in New Guinea, where at least 60 species have been recognized (Stone 1976; 1983). This number is much higher compared to Borneo (24) and the Malay Peninsula (8). The majority of herbarium specimens of *Freycinetia* from New Guinea are deposited only in few Herbaria such as Herbarium Bogoriense (BO) in Bogor-Indonesia, Herbarium Manokwariense (MAN) in Manokwari-Indonesia, Herbarium Lae in Lae-Papua New Guinea, the National Herbarium of the Netherlands in Leiden (L)-the Netherlands, and Herbarium Kewensis in Kew-UK. Unfortunately, due to the incomplete nature of the specimens most are labelled as unknown species. From time to time deposit specimens increase in numbers but many of them are still unidentified. Therefore, it need taxonomical study to find out how many species of New Guinea *Freycinetia* especially in the west area.

First serious molecular study of the family was proceeded by Callmander et al. (2003). Unfortunately, the infrageneric classification of the genus is still unresolved. So the aims of this study were to unravel the diversity of *Freycinetia* in the western part of New Guinea, revision of the genus particularly the infrageneric classification and knowing the species distribution in western part of New Guinea in relation with New Guinea as a whole.

Method of the study using both morphological and molecular approach. The research was carried out from July 2005 until Maret 2009. Taking and collecting specimens were done at several area in west New Guinea such as Timika (2005), Manokwari (2006), Sarmi (2006) and Jayapura (2006, 2008), followed by ecological observation in the field and morphological observation in herbarium BO (2006, 2008), MAN (2006), LAE (2006), L (2008) and K (2009). Molecular work using sequence non coding cpDNA: *trnL*-F, *trn*-L and *atpB* – *rbcL* was done at Plant Biology and Biotechnology Laboratorium IPB (Bogor Agricultural University) on August to October 2008 and van der Klauw Molecular Laboratory in Leiden on November 2008 until January 2009.

The result showed that 92 species of *Freycinetia* occur in the area. All species can be divided into 4 groups namely *F. macrostachya*, *F. funicularis*, *F. oblanceolata* and *F. angustissima* groups.

The *F. macrostachya* group have robust habit and are high climbers. Stem robust, hard, rarely branched, 2-4 cm diameter. Leaf imbricate, linear or lanceolate, margin with sharp and hard spines, 20-120 cm long, 1.5-7 cm wide; cauline leave colorfull in common, basically leaf with yellow, orange, red or mixed color, consist of 2-3 whorls; Infructescence terminal, ternate, sometimes with 4, 8 to 12 cephalia, spirally to umbelly arranged. Prophyll bracts never found. Cephalium large, 3-20 cm long, 2-6 cm wide. Berries numerous, thin, stout; stigmatic remains 1-3 or 5-6, rarely 8 or 12, one species with 32. Seeds linear or ellipse, usually longitudinally arranged.

The *F. funicularis* group have leafless stem from basal part up to the half part of the stem, laterally branching, and leaves found only on the terminal part of stem. Stem 2-3 cm diameter. Leaf semi imbricate, linear or lanceolate, margin usually with sharp and hard spines, 13-50 cm long, 1.5-3 cm wide; Prophyll bracts consist of 4 to more than 8 whorls; bracts mostly consist 3 parts exterior, middle and interior bracts Infructescence
axillary, ternate or rarely quaternate, umbelly arranged. Cephalium oblong or cylindrical, 3-10 cm long, 1.5-3 cm wide. Berries few, a berry usually formed through fusion of smaller berries giving an impression of a larger berry; stigmatic remains 5-8, rarely 3, 12, 14 or 18, stigmatic position usually changes from transversal to longitudinal, some species with marginal stigmatic remains. Seed usually flat, transversally arranged.

The *F. oblaneolata* group possess slender stem, 0.5-2 cm diameter, numerously branching, branch short, less than 50 cm long. Leaf non imbricate, elliptical to oblong and oblanceolate, margin with spines on terminal and basal parts only, 2-15 cm long, 0.5-4 cm wide; Cauline leaves usually green; Prophylly only in both terminalia and axillary inflorescence, if present only consist of 2 whorls; Infructescence usually terminal, rarely both terminal and axillary. Cephalium minute, 2-7 cm long, 1-3 cm wide. Berry numerous or few, some species with flat tips, fusion or self-changing areola present; stigmatic remains 1-3 or 5-6. Seed linear or oblong-flat, usually arranged transversally, in some species longitudinally.

The *F. angustissima* group have slender stem, less than 0.5 cm in diameter, usually numerously branched, branch short, less than 20 cm long. Leaves pseudo-rosette in appearance, each linear or lanceolate, in some members observed elliptical, margin with spines on terminal and basal parts, 2-8 cm long, 0.2-1 cm wide. Prophyll bracts never found. Infructescence terminal, usually binate, rarely single or ternate, arranged in umbel. Cephalium small, 2-4 cm long, 1-2 cm wide. Berry usually few in numbers, some species with flat-tipped berries; stigmatic remains 1 or 2, rarely 3, self-changing areola present giving variation in stigmatic areola. Seeds linear, transversally or longitudinally arranged.


The F. angustissima group have 8 species and 1 species are regarded as a new species namely F. pauciberria Sinaga. The previous species here are F. angusta Huynh, F. angustissima Ridl., F. brachyclada Huynh, F. linearis Merr. & Perry, F. polyclada Merr. & Perry, F. pseudoangustissima Huynh and F. stenophylla Warb. F. macrostachya & F. oblaceolata groups living from forest beach to 1700 m above sea level. But F. macrostachya group are found alone in secondary forest. on the other hand, the F. funicularis and F. angustissima groups prefer living on mountain area and both of them are found up to 3000 m asl. Despite share with F. angustissima group, the F. funicularis group also share habitat with F. oblaceolata group, especially in the forest beach where F. angustissima group never is found, but this group has ability living on the wet area. West New Guinea Freycinetia have 35 species that are limited distribution, because these species are only occur in the area. But West New Guinea Freycinetia share 52 species with PNG, and 5 species remains are widely distribution species that spread through out Malesia region until Australia.

Analysis phylogenetic through PAUP program using both morphological and molecular data support the groups with CI (Coefficient Index) = 0.7, HI (Homoflashy Index) = 0.3 for morphology characters and CI =0.930; 0.868; 0.890 and HI = 0.07; 0.132; 0.110 for molecular data by trnL-F; atpB-rbcL and trn-L sequencing of Chloroplast DNA. According to morphological data F. macrostachya group is a primitive one, It is followed by F. funicularis, F. oblaceolata and F. angustissima group as an advance one. But in the trnL-F sequencing cpDNA data F. macrostachya group as a primitive one separate from 3 other derivate groups and this data strongly support ecological situation. On the other hands, atpB–rbcL sequencing strongly support the groups but advance one is not belong to the F. angustissima group anymore but F. funicularis groups, it is same way to the trn-L sequencing data. Therefore trnL-F sequencing had given more conservative characters but atpB-rbcL showed both conservative and advance characters while trn-L had given more advance characters.