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—Publ. February 8th, 1909.

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Publ. June 15th, 1909.





## Flora Koreana.

Pars Prima

*Auctore*

**T. Nakai.**

*Cum descriptionibus novarum specierum  
et quindecim iconibus.*

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### PRÆFATIO.

Ex æstate anni 1906, floram Koreanam ductu Prof. MATSUMURE studui. Korea olim, ut est fama, intimam historicalem et geographicalem affinitatem cum Japonia habuit, sed illius regionis plantæ nobis potius obscuræ erant.

Prima exempla floræ Koreanæ a Baron Alexander Schlippenbach anno 1854 collecta sunt, et ex illo tempore, amplius quinqueginta anni jam transerunt.

Anno 1898, descriptio Floræ Koreanæ in Vol. I. Pallibiniæ imprimis edita est, inde in Vol. II. anno 1900, sequenti anno in Vol. III, postea quedam partes hujus floræ ad nos venuerunt.

In præfatione hujus libri, descripsit de omnibus quæ attinent ad floram Koreanam usque in illum diem, et ea iterum dicere esset supervacaneum. Maximus numerus plantarum in hoc libro enumeratus est, tamen, quæ in Kyōng-geui (京畿道) collectæ sunt,

## POLYPETALÆ.

## RANUNCULACEÆ.

## Clavis generum.

- A. Sepala valvata .....*Clematis* L.
- B. Sepala imbricata.
- a) Carpella uniovulata.
- a) Ovulum pendulum.
- Petala 0 v. minima non flava.
- Involucrum 0 .....*Thalictrum* L.
- Involucrata .....*Anemone* L.
- Petala conspicua, flava .....*Adonis* L.
- β) Ovulum ascendens .....*Ranunculus* L.
- b) Carpella pluriovulata.
- a) Petala parva v. deformia v. desunt.
- Folia palmatinervia v. palmatisecta.
- Petala 0; sepala flava. ....*Caltha* L.
- Petala parva v. deformia.
- △ Flores regulares, petala parva v. angusta.
- \* Petala angusta integra.....*Trollius* L.
- \*\* Petala parva, squama aucta .....*Eranthis* SALISB.
- △△ Flores irregulares, petala deformia.
- \* Sepalum summum posticum calcaratum ...*Delphinium* L.
- \*\* Sepalum summum galeatum. ....*Aconitum* L.
- Folia ternatim subpinnatimve decomposita.
- Petala calcarata .....*Aquilegia* L.
- Petala ecalcarata.
- △ Planta humilis, flores axillari-v. terminali-solitarii.
- .....*Isopyrum* L.
- △△ Planta elata, racemus simplex v. decompositus.
- \* Carpellum I, baccatum .....*Actaea* L.

- \*\*\* Carpellum 1-∞, follicula dehiscencia ..... *Cimicifuga* L.  
 β) Petala ampla ..... *Paeonia* L.

**CLEMATIS** LINN.**Clavis specierum.**

## A. Caulis scandens.

## a) Sepala 6-8.

- α) Sepala 6 ..... *Cl. florida* THUNB.  
 β) Sepala 8 ..... *Cl. patens* MORR. et DCNE.

## b) Sepala 4-5.

## a) Flores nutantes.

- Pedunculi perulati.  
 □ Petala linearia ..... *Cl. alpina* MILL, var. *ochotensis* PALL.  
 □□ Petala spatulata..... *Cl. alpina* var. *koreana* (KOM.) NAKAI.  
 ○○ Pedunculi eperulati.  
 □ Sepala glabra, caudæ carpellorum albobarbatæ.  
 △ Petiolis volubilibus... *Cl. orientalis* L. var. *serrata* MAXIM.  
 △△ Petiolis nunquam volubilibus.  
 ..... *Cl. orientalis* var. *Wifordi* MAXIM.  
 □□ Sepala pubescentia, caudæ carpellorum flavescens-barbatæ.  
 ..... *Cl. fusca* TURCZ.

## β) Flores erecti.

- Folia ternata.  
 □ Segmenta foliorum incisa v. dentata ..... *Cl. apiifolia* DC.  
 □□ Segmenta foliorum integra.  
 ..... *Cl. hedysarifolia* DC. var. *Meyeniana* WALP.  
 ○○ Folia trisecta v. pinnatisecta.  
 □ Folia trisecta v. simplicia ..... *Cl. spectabilis* PALIB.  
 □□ Folia pinnatisecta v. bipinnatisecta.  
 △ Planta debilis paulo scandens.  
 ..... *Cl. recta* L. var. *manshurica* MAXIM.  
 △△ Planta elata scandens.

- \* Connectivo staminis haudo producto, folia serrata.  
.....*Cl. vitalba* L. var *brevicaudata* DC.
  - \*\* Connectivo staminis paulo producto.
    - † Folia plurima pinnata.
      - (( Folia dilatata (1:1 vel 1:2).
        - \* Folia supra, venis non elevatis, rhacheis robustioribus.  
.....*Cl. paniculata* THUNB.
        - \*\* Folia lucida supra, venis conspicuis paulum elevatis, rhacheis gracilioribus.  
.....*Cl. recta* L. var. *koreana* NAKAI.
      - (( ( Folia angusta (1:3), utrinque acuminata.  
.....*Cl. recta* L. var. *koreana* NAKAI.  
*forma lancifolia* NAKAI.
    - †† Folia plurima flammuliformia.....*Cl. flammula* L.
- B. Caulis erectus.
- a) Folia glabra.
    - α) Folia simplicia.....*Cl. coreana* LÉVE'L.
    - β) Folia ternata v. pinnatisecta.
      - Folia ternata .....*Cl. brachypura* MAXIM.
      - Folia pinnatisecta ...*Cl. angustifolia* JACQ.
  - b) Folia pubertula.
    - α) Inflorescentia brevipaniculata.  
.....*Cl. heracleifolia* DC. var. *tubulosa* DCNE.
    - β) Inflorescentia ad apicem ramis v. axillari glomerata.  
.....*Cl. heracleifolia* DC. var. *Davidiana* DCNE.

*Clematis florida* THUNB. Léve'l. Bull. l'Acad. Int. Geo. Bot. (1902). p. 298.

NOM. JAP. Tessen.

HAB. Prope Chinampo Sept. 1901. Prope oppido Pouk-han 1000 m.  
Jun. 1901. (Faurie).

DISTR. China et Japonia.

*Clematis patens* MORR. et DCNE. Palib. Consp. Fl. Kor. I. p. 12.

NOM. JAP. Kazaguruma.

HAB. Kyöng-geui: Prope Seoul (京城附近) Mai. 1886. defl. (Kalinowsky). Van-tang-san, Jun. 2. 1895. *Mai 1895 ster.* (Sontag).

DISTR. China et Japonia.

*Clematis alpina* (L.) MILL. L'éve'l Bull. l'Acad. Int. Geo. Bot. (1902) p. 298.

NOM. JAP. Miyama-hanshōzuru.

HAB. Interior Koreæ: in lapidoso fluminis loco Sept. 1901., in loco dumoso et in saepe Aug. 1901. (Faurie).

var. *ochotensis* PALL. Kom. Fl. Mansh. II. p. 276.

HAB. In Korea bor. (Komarov).

var. *koreana* (KOM.) NAKAI emend.

Cl. *koreana* Kom. Fl. Mansh. II. p. 278. Tab. VI.

HAB. In Korea bor. (Komarov).

DISTR. Speciei: Per totam reg. bor. temp. plerumque in montibus.

*Clematis orientalis* L. Sp. Pl. (ed. II). p. 765. DC. Prodr. I. p. 3. Ledeb. Fl. Ross. I. p. 3. Maxim. in Mém. Biol. IX. p. 583. O. Kuntze Monogr. Cl. p. 123.

var. *serrata* MAXIM. in Mém. Biol. IX. p. 583.

Cl. *instricta* Bunge var. *serrata* Maxim. in Kom. Fl. Mansh. II. p. 289.

HAB. In Korea bor. (Komarov).

Kang-uön: Kan-bal-ko-ryöng (干葵告嶺) Aug. 11. 1902. Meuk-Kai-Dong (墨浦洞) Aug. 12. 1902. Chyang-Yön-Ri (長淵里) Aug. 13. 1902. (T. Uchiyama).

var. *Wilfordii* MAXIM. Kom. Fl. Mansh. II. p. 289.

HAB. In Korea bor. (Komarov).

DISTR. Speciei: Europa et Asia.

*Clematis fusca* TURCZ. Ledeb. Fl. Ross. I. p. 725. Maxim. Prim. Fl. Amur. p. 10. in Mém. Biol. IX. p. 587. Regel. Pl. Radd. I. p. 8. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 1. Fr. Schmidt. Reis. in Amur. u. Insl. Sachl. p. 29. O. Kuntze Monogr. Cl. p. 132. Miyabe Fl. Kurile Isl. p. 213. Huth in Bull. du l'Herb. Boiss. (1897). p. 1064. Schneider Handb. der Laubholz. I. p. 277.

NOM. JAP. Kurobanano-hanshōzuru.

HAB. Korea sine loco indicato (M. Emma).

Kang-uön: In dumoso et humidoso loco Jul. 1901. (Faurie).

DISTR. Asia bor. orient.

*Clematis apiifolia* DC. Prodr. I. p. 6. Hook. et Arn. Bot. Beech. Voy p. 258. Sieb. et Zucc. Fl. Jap. Fam. Nat. p. 176. Benth. Fl. Hongk. p. 7. Maxim. in Mém. Biol. IX. p. 593. Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 2. Fran. et Sav. Enum. Pl. Jap. I. p. 2. Engl. in Bot. Jahrb. VI. p. 58. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 2. Henry List. Pl. Formos. in Trans. Asiat. Soc. XXIV. Suppl. p. 14. Ito et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 269. Palib. Consp. Fl. Kor. I. p. 11. YABE in Tokyo Bot. Mag. XVII. p. 195. Matsum. et HAYATA Enum. Pl. Formos. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 4.

NOM. JAP. Botan-zuru.

HAB. Archipelago Koreano (Oldham).

Kyōng-geui: Peuk-han-San (北漢山). Oct. 14. 1900 fr.

Kang-uön: Ha-syōn-ri (下仙里). Aug. 8. 1902 fl. (T. Uchiyama).

DISTR. China et Japonia.

*Clematis hedyarifolia* DC.

var. *Meyeniana* WALP. Léve'l. Bull. du l'Acad. Int. Geo. Bot. (1902). p. 299.

HAB. Collibus sterilibus prope Chinampo. Jun. 1901.

Coll. interioris Koreanæ. Jun. 1901. (Faurie).

DISTR. India orient. China et Japonia.

*Clematis spectabilis* PALIB. Consp. Fl. Kor. I. p. 12.

HAB. Kyöng-geui: Prope Seoul (京城附近). Mai. et Jun. 1886.

(Kalinowsky).

Planta endemica.

*Clematis recta* L.

var. *mandschurica* MAXIM. in Mél. Biol. IX. p. 594. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 7. Korsch. Act. h. Petrop. XII. p. 290. O. Ktze. Monogr. Cl. p. 114. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 332. Palib. Consp. Fl. Kor. I. p. 12.

Cl. *mandschurica* Rupr. in Pl. Maack. in Bull. Petersb. XV. p. 514. Maxim. Prim. Fl. Amur. p. 10. Kom. Fl. Mansh. II. p. 282.

Cl. *recta* Regel (non L.) Tent. Fl. Uss. n. 2. Pl. Radd. p. 8. n. 2.—ex Kom.

HAB. Kyöng-geui: Seoul, Pauk-Han Mai 9, 1894. fl. incip., *Peking-Puss. Mai.* 25. 1894. fl. (Sontag)—ex Palib.

Chöl-la: Sine loco indicato, fl. (M. Enuma).

DISTR. Manshuria et China.

var. *koreana* NAKAI. Caule elato, scandente, longitudinaliter striato, glabro; striis valde elevatis; folia pinnata v. ternata; segmentis ovatis v. late-lanceolatis, inferioribus vulgo 10 c.m. excedentibus, supra lucidis venis conspicuis, subtus pallidioribus, venis conspicuis, basi truncatis v. acutis v. rotundatis, nunquam cordatis (in forma acuminatis), ad petiolum subito cuspidatis; infl. cymoso-paniculata multiflorifera, racheis gracilioribus; sepalis oblanceolatis, extus margine dense pubescentibus, intus glabris,

connectivo haudo producto, antheris elongatis, filamentis paulo brevioribus.

A generali viso foliorum, hæc varietas ad var. mandshuricam proxima est, sed planta valde elata, et ejus inflorescentia cymoso-paniculata, a quibus modis hæc etiam ad *Cl. paniculatam* accedit.

HAB. Kyöng-geui: M'te Nam-San (南山). Julio 18, 1902 fl. (T. Uchiyama).

Kang-uön: M'te Kum-gang-san (金剛山). Aug. 17. 1902 fl. (T. Uchiyama).

forma *lanceifolia* NAKAI. folia lanceolata utrinque acuminata, flores pauciores sed majores quam præced., sepala vulgo 12–16 m.m. longa.

HAB. Kang-uön: M'te Kum-gang-san (金剛山). Aug. 18. 1902 fl. (T. UCHIYAMA).

*Clematis Vitalba* L. Léve'l. Bull. du l'Acad. Int. Geo. Bot. (1902). p. 299.

HAB. Dumoso loco prope Nai-piang Jul. 1901. Dumoso loco et sepe prope Naipiäng Aug. 1901. Interior Koreae Sept. 1901. (Faurie).

var. *brevicaudata* DC.

*Cl. brevicaudata* DC. in Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 3. Palib. Consp. Fl. Kor. I. P. 11.

HAB. Korea: Sine loco speciali (Carles).—ex Hemsl.

DISTR. Europa, Asia, Java et Japonia.

*Clematis paniculata* THUNB. Fl. Jap. p. 239. DC. Prodr. I. p. 3. Maxim. in Mém. Biol. IX. p. 595. Sieb. et Zucc. Fl. Jap. p. 176. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 1. Fran. et Sav. Enum. Pl. Jap. I. p. 1. Baker et Moore in Journ. Linn. Soc. XVII. p. 375. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 6. Huth in Bull. du l'Herb.



Boiss. (1897). p. 1060. Ito et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 270. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 332. L  ve'l. in Bull. du l'Acad. Int. Geo. Bot. (1902). p. 298. YABE in Tokyo Bot. Mag. XVII. p. 195. Schneider l. c. p. 289.

Cl. recta L. var. paniculata Thunb. in O. Kuntz. Monogr. Cl. p. 115.

NOM. JAP. Sennins  .

HAB. Korea: Sine loco indicato (M. Enuma) ster.

Kang-n  n: dumoso loco, Julio 1901 (Faurie)—ex L  ve'l.

Ky  ng-geui: Chyang-ny  ng-ri (清凉里) Julio 27. 1902 fl.; Inchon (仁川) Nov. 31. 1900 fr. (T. Uchiyama); Insula Pung-to (豊島) fl. (M. Enuma)

DISTR. China et Japonia.

*Clematis flammula* L. L  ve'l. Bull. du l'Acad. Int. Geo. Bot. (1902) p. 299.

HAB. Phy  ng-ang: Colle et trajectu. Jun. 1901. (Faurie).—ex L  ve'l.

DISTR. Europa et Asia.

*Clematis coreana* L  VE'L. Bull. du l'Acad. Int. Geo. Bot. (1902). p. 298.

HAB. Mons Nai-Piang, 1208 m. Jul. 1901 (Faurie).—ex L  ve'l.

*Clematis brachyura* MAXIM. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 2. Palib. Consp. Fl. Kor. I. p. 11.

HAB. Sine loco speciali (Carles). Archipelago Koreano: Long reach (Oldham).—ex Hemsl.

DISTR. Caucasus, China et Manshuria.

*Clematis angustifolia* JACQ. DC. Prodr. I. p. 7. Ledeb. Fl. Ross. I. p. 2. Regel Pl. Radd. I. p. 8. Maxim. Prim. Fl.

Amur. suppl. Ind. Fl. Pek. p. 468. et Ind. Fl. Mong. p. 479. in Mém. Biol. IX. p. 594. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 2. Palib. Material Fl. Kwan-tung-penn. p. 16. O. Kuntz. Monogr. Cl. p. 112. L'évêl. Bull. du l'Acad. Int. Geo. Bot. (1902). p. 299.

HAB. herboso loco prope Chinampo (鎮南浦). Jun. fl. Jul. fr. 1901 (Faurie).

Hoang-hai: Inter Syö-heung (瑞興) et Phung-syu-uön (風壽院). Sept. 8. 1902. Inter Hoang-jyu (黃州) et Phyöng-yang (平壤). Sept. 10. 1902 (T. Uchiyama).

Phyöng-an: Phyöng-yang (平壤). Sept. 12. 1902. (T. UCHIYAMA).

Kan-tö: Circa Rokudohkoh (六道溝). Sept. 1. 1907. fl. (K. MAEDA).

DISTR. China bor. Sibiria orient. et Manshuria.

*Clematis heracleifolia* DC. O. Kuntz. Monogr. Cl. p. 182. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 4. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 332. L'évêl. Bull. du l'Acad. Int. Geo. Bot. (1902). p. 299. Kom. Fl. Mansh. II. p. 285.

HAB. Colle prope Ouen-san (元山). Aug. 1901. (Faurie).

var. *tubulosa* TURCZ.

*Clematis tubulosa* Turcz. in Mém. Biol. IX. p. 589.

*Clematis tubulosa* Dene. Rev. Cl. p. 204. Pl. 9. Schneider l.c. p. 281.

*Cl. heracleifolia* DC. var. *normalis* O. Kuntz. Monogr. Cl. p. 183.

HAB. Kang-uön: Prope Chyang-yön-ri (長淵里). Aug. 13. 1902.

Kum-gang-san (金剛山). Aug. 14. 1902. (T. UCHIYAMA).

var. *Davidiana* DCNE. Revis. Cl. tubulensis p. 205. pl. 10. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 4. O. Kuntz. Monogr. Cl. p. 183.

## Cl. Davidiana Schneider l.c. p. 281.

HAB. Kyōng-geui: Peuk-han-san (北漢山). Oct. 14. 1900. fr.;  
 Ibidem. Jul. 28. 1902. fl. Nam-san (南山). Jul. 25 et 18.  
 1902. fl. Nam-han-san (南韓山). Aug. 1. 1902. fl. (T. UCHIYAMA).  
 DISTR. duarum varietatum. China bor. et Manshuria.

**THALICTRUM L.****Clavis specierum.**

- A. Foliis peltatis ..... *T. coreanum* LÉVE'L.
- B. Folia nunquam peltata.
- a) Filamenta clavata v. dilatata.
- a) Folia stipulata.
- Akenia exstipitata ..... *T. petaloideum* L.
- Akenia longe-stipitata ..... *T. aquilegifolium* L.
- β) Folia exstipulata.
- Carpella longitudinaliter sulcata.
- Stipes carpellis subæquilongi, folia bi-ternata.  
 ..... *T. tuberiferum* MAXIM.
- Stipes carpellis multo breviores.
- \* Caulis elatus circa 70 c.m.; folia radicalia biternata.  
 ..... *T. akanense* HUTH.
- \*\* Caulis circa 40 c.m.; folia radicalia 2-3 ternata.  
 ..... *T. Uchiyamai* NAKAI.
- Carpella reticulato-nervosa ..... *T. sparsiflorum* TURCZ.
- b) Filamenta filiformia.
- a) Sepala magna.
- Sepala 2-4 m.m. lata ..... *T. Rochebrunnianum* FR. et SAV.
- Sepala 7-10 m.m. lata ..... *T. grandisepalum* LÉVE'L.
- β) Sepala parva.
- Caulis simplex ..... *T. simplex* L. var. *strictum* REGEL et TIL.
- Caulis ramosus ... *T. minus* L. var. *elatum* LEC.

*Thalictrum coreanum* LÉVE'L. (TAB. V. f. A.) Bull. du l'Acad. Int. Geo. Bot. (1902). p. 297.

Caule glabro lucido; foliis radicalibus biternatis, caulinalibus ternatis, segmentis peltatis, subrotundatis, marginibus crenatis, glabris lucidisque, inflorescentia subcymoso-paniculata; akeniis compressis, fusiformibus, glabris, nervosis, sessilibus, ad ventrum incurvatis.

HAB. Korea sine loco indicato (Faurie).

Kang-uön : Chhyang-do (昌道). Aug. 9. 1902 (T. Uchiyama).

Planta endemica.

*Thalictrum petaloideum* L. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 9. Palib. Consp. Fl. Kor. I. p. 13.

HAB. Kyöng-sang : Port Fusan (釜山). (Wilford).

DISTR. Sibiria, Mongolia, China bor. et Manshuria.

*Thalictrum aquilegifolium* L. DC. Prodr. I. p. 11. Ledeb. Fl. Ross. I. p. 5. Regel Pl. Radd. I. p. 12. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 3. Fr. Schmidt Reis. in Amur. u. Insl. Sachal. p. 29. Fran. et Sav. Enum. Pl. Jap. I. p. 3. Lecoy. Monogr. Thal. p. 75. Miyabe Fl. Kuril. Isl. p. 214. Huth in Bull. du l'H. Boiss. (1897). p. 1019. E de Halácsy Consp. Fl. Graec. I. p. 3.

NOM. JAP. Karamatsusō.

HAB. Kyöng-geui : Peuk-ham-san (北漢山). Jul. 28. 1902. (T. Uchiyama).

Kang-uön : Chhyang-dō (昌道). Aug. 9. 1902. (T. Uchiyama).

DISTR. Europa, Asia med. et bor. et Japonia.

*Thalictrum akanense* HUTH in Bull. du l'H. Boiss. (1897). p. 1069. Léve'l. Bull. du l'Acad. Int. Geo. Bot. (1902). p. 297.

HAB. Ham-gyöng: Ouen-san (元山). Jul. et Aug. 1901. (Faurie).

DISTR. Japonia.

*Thalictrum tuberiferum* MAXIM. in Mél. Biol. IX. p. 607. Fran. et Sav. Enum. Pl. Jap. II. p. 264. Lec. Monogr. Th. p. 86. Huth in Bull. du l'Herb. Boiss. (1897). p. 1066. Léve'l. l.c. p. 297. Kom. l.c. p. 307.

NOM. JAP. Miyama-Karamatsusō.

HAB. Kang-uön; in montibus et in loco silvæ humidoso. Jul. 1901. (Faurie).

Kum-gang-san (金剛山). Aug. 14. 1902. Chho-mok-dong (草木洞)  
Aug. 11. 1902 (T. Uchiyama).

Korea bor. (Komarov).

DISTR. Manshuria et Japonia.

Cl. Lecoyer in Monographia Thalictri describit hanc plantam plus minus a pilis vestitam esse, sed specimina nostra æque, ac japonia sunt semper glaberrima.

*Thalictrum Uchiyamai* NAKAI sp. nov. Planta glaberrima, radice T. tuberifero simile, caule solitario v. subcæspitoso glaberrimo ramoso, ad nodos incrassato; foliis radicalibus 2-3 ternatis, segmentis cordato-orbiculatis v. cordato-ovatis, nunc ovatis, nunc rotundatis, grosse-serratis v. trilobatis, subtus subglaucis; infl. sparce-paniculata; bracteis minutis, pedicellis gracillimis, sepalis purpureis, staminibus numerosis, filamentis apice clavatis, pallide purpureis, antheris oblongis purpureis, pistilis 3-5, stigmatibus sessilibus, demum subuncinatis, carpellis brevistipitatis subnucantibus, compressis semiobovatis, longitudinaliter 6-nervatis.

Inter Th. tuberiferum et Th. akanense intermedia; a primo differt foliis radicalibus sæpe triternatis, caule valde ramoso, carpellis brevistipitatis, a secundo caule humiliore, foliis radicalibus triternatis, foliolis basi sæpissime cordatis etc.

HAB. Kyöng-geui : Peuk-han-san (北漢山), Jul. 28. 1902. Nam-san (南山), Jul. 18. 1902. (T. Uchiyama).

*Thalictrum sparciflorum* TURCZ. Kom. Fl. Mansh. II. p. 306.

HAB. In Korea bor. (Komarov).

DISTR. Dahuria, Manshuria et America bor.

*Thalictrum Rochebrunnianum* FRAN. et SAV. Enum. Pl. Jap. II. p. 264. Lec. Monogr. Th. p. 145. Huth in Bull. du l'H. Boiss. (1897). p. 1067.

NOM. JAP. Shikin-Karamatsu.

HAB. Kang-uön : Ha-syön-ri (下仙里), Aug. 8. 1902. fl. Chhyang-dö (昌道) Aug. 9. 1902. (T. Uchiyama).

DISTR. Japonia.

*Thalictrum grandisepalum* LÉVE'L. l.c. p. 297.

HAB. Ripa fluminis aut radicibus montibus interioris Koreanæ. Aug. 1901. (Faurie).

*Thalictrum simplex* L. DC. Prodr. I. p. 15. Ledeb. Fl. Ross. I. p. 10. Lec. Monogr. Th. p. 129. Palib. Mat. Fl. Mong. sept. p. 18. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 335. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 9. Kom. Fl. Mansh. II. p. 312. E De Halácsy Consp. Fl. Græc. I. p. 4.

var. *strictum* (LEDEB.) REGEL et TILING. Fl. Ajan. p. 24. n. 6. Regel Fl. Uss. n. 10. Pl. Radd. p. 14. n. 22. Palib. Consp. Fl. Kor. I. p. 14.

T. *strictum* Ledeb. Fl. Ross. I. p. 10.

HAB. Korea : sine loco indicato (M. Enuma).

Kyöng-geui : Yöng-deung-pho (永登浦) Julio 24. 1902. fl. (T. Uchiyama).

DISTR. Europa, Asia bor. et temp.

*Thalictrum minus* L. DC. Prodr. I. p. 13. Ledeb. Fl. Ross. I. p. 8. Fran. et Sav. Enum. Pl. Jap. I. p. 4. Lec. Monogr. Th. p. 124. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 8. Maxim. Pl. Chin. p. 19. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Coll. Imp. Univ. Tokyo XII. p. 273. Léve'l. l.c. p. 297. Kom. l.c. II. p. 309.

HAB. Loco herboso et humidoso collium in Chinampho (鎮南浦) Jun. 1901. (Faurie).

var. *elatum* LEC. Monogr. Th. p. 127. Miyabe Fl. Kuril. Isl. p. 214. Huth in Bull. du l'Herb. Boiss. (1897). p. 1071. Palib. Consp. Fl. Kor. I. p. 13. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 335. Palib. Mat. fl. Mong. Sept. p. 18.

Th. coraiense Matsum. in Tokyo Bot. Mag. IX. p. 276.

Th. elatum Jacq. in DC. Prodr. I. p. 13. Ledeb. Fl. Ross. I. p. 8. Regel Pl. Radd. I. p. 13.

Th. minus var. majus Léve'l. l.c.

NOM. JAP. Aki-Karamatsu.

HAB. Korea sine loco indicato (Carles) in archipelago Koreano (Oldham).

Phyōng-an: in fossis prope opp. Witschu Sept. 1883. fruct. (Enuma).

Ham-Gyōng: Gensan Jul. 18. 1889. fr. (Dr. Epow.)

Kyōng-geui: Yōng-deung-pho (永登浦) Jul. 24. 1902.; (T. Uchiyama); Colle in Chemulpo (仁川) Sept. 28. 1901 (Faurie).

Hoang-hai: Inter Ka-chyang-ko-ri (加將去里) et Nam-Chhyōn (南川). Sept. 7. 1902. fl. et fr. (T. Uchiyama).

Kang-uōn: Meuk-kai (墨浦) Aug. 12. 1902. (T. Uchiyama).

Interior Coreæ Sept. 1. 1901 (Faurie) ex Léve'l.

DISTR. Europa, Asia et Afr. bor.

**ANEMONE L.****Clavis specierum.**

- A.* Lobis foliorum integerrimis.....*A. Hepatica* L.  
*B.* Lobis foliorum dentatis v. incis.  
 a) Floribus nutantibus.....*A. cernua* THUNB. var. *koreana* YABE.  
 b) Floribus erectis.  
 a) Pedunculis multifloribus.  
   ○ Foliis radicalibus palmato 3-5 sectis...*A. narcissiflora* L.  
   ○○ Foliis radicalibus 3 partitis .....*A. dichotoma* L.  
 β) Pedunculis unifloribus.  
   ○ Sepalis 5-6.  
     □ Sepalis oblongo-linearibus .....*A. reflexa* STEPH.  
     □□ Sepalis ellipticis .....*A. umbrosa* C. A. MEX.  
     □□□ Sepalis ovatis.  
       △ Segmentis foliorum pinnatisectis...*A. nikoensis* MAXIM.  
       △△ Segmentis foliorum 5-6 lobatis...*A. Rossi*, S. MOORE.  
   ○⊙ Sepalis 6-7 oblongis.....*A. amurensis* (KORSH) KOM.  
   ○○○ Sepalis 10-15 lineari-ellipticis...*A. Raddeana* REGEL.

*Anemone Hepatica* L. Bot. Mag. I. Pl. 10. Sieb. et Zucc. Fl. Jap. fam. nat. p. 179. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 3. Fran. et Sav. Enum. Pl. Jap. I. p. 6. Baker et Moore l.c. p. 375. Forbes et Hemsl. l.c. p. 11. Huth in Bull. du l'H. Boiss. (1897). p. 1076. Palib. Consp. Fl. Kor. I. p. 15. Kom. l.c. p. 268.  
*Hepatica triloba* in DC. Prodr. I. p. 22. Ledeb. Fl. Ross. I. p. 22. A. Gray et S. Watson Syn. Fl. N. Am. I. p. 13. Thomè Fl. Deuts. Öst. u. Schw. II. p. 128.

NOM. JAP. Suhamasō.

HAB. Korea sine loco speciali (Carles).



Kyöng-geui: Seoul (京城) Schin-ku-kai Apr. 18. 1894. fl. et defl.  
Thee-Mun-Tai-Kul. Apr. 29. 1894. defl.; Hut-Tschai-Meo. Mai 1.  
1894. fl. in ditione Seoulensi; Pauk-Han Mai 9. 1894. defl.  
(Sontag) Phung-to (豊島) 1900 defl. Peuk-Ham-San (北漢山)  
Jul. 28. 1902 ster. (T. Uchiyama).

Kang-uön: Kum-gang-san (金剛山) Aug 14. 1902. (T. Uchiyama).

DISTR. Europa, Asia et Am. bor.

*Anemone cernua* THUNB. Fl. Jap. p. 238. DC. Prodr. I. p. 16.  
Sieb. et Zucc. Fl. Jap. fam. nat. p. 178. Sieb. Fl. Jap. p. 14.  
tab. 4. Miq. Prol. Fl. Jap. in Annal. Mus. Bot. Lugd. Bat.  
III. p. 2. Fran. et Sav. Enum. Pl. Jap. I. p. 4. Baker et  
Moore l.c. p. 376. Forbes et Hemsl. l.c. p. 10. Huth l.c. p.  
1076. Palib. Consp. Fl. Kor. I. p. 14.

var. *koreana* YABE in SCHEDULÀ. Segmenta foliorum quam Japonensis multæ latiora; petalis angustioribus.

HAB. Korea: Sine loco speciali (Carles et Webster). 1902. (T. Uchiyama).

Kyöng-geui: Seoul (京城). Apr. 1886. fl. et defl. (Kalinowsky).  
Mabon Mai 4. 1896. fl. Hut-Schu-Mian Mai 19. 1894. fl. Declivitate bor. montis Namsan Mai 28. 1894. fl., Schin-Ku-Kai  
Apr. 18. 1894. fl., in ditione Seoulensi: in monte Yisan. Mai 28.  
1894. fl. Tun-Kwan-Tai-Kul Apr. 24. 1895. (Sontag.) Chemulpo  
Apr. 10. 1889. fl. (Dr. Bunge.) Seoul. Mai. 1908. fl. (K. Jyo).  
Chyöl-la: Sine loco speciali (Enuma).

Planta endemica?

Aliquot viva specimina cum multis aliis plantis, etiam a dom. T. UCHIYAMA reportati sunt, et in nostro Horto Botanico coluntur: florent in omne verno tempore.

*Anemone narcissiflora* L. Léve'l l.c. p. 300.

NOM. JAP. Hakusan-Ichigesō.

HAB. Monte Ouen-san (元山). 1500. m. Sept. 2. 1901. (Faurie).

DISTR. Europa, Asia bor; et Am. bor.

*Anemone dichotoma* L. Kom. l.c. p. 261.

NOM. JAP. Ōshikina.

HAB. in Korea bor. (Kom.)

DISTR. Asia bor. et Am. bor.

*Anemone reflexa* STEPH. Kom. l.c. p. 266.

HAB. in Korea bor. (Komarov).

DISTR. Sibiria et Manshuria.

*Anemone umbrosa* C. A. MEYER. Kom. l.c. p. 264.

HAB. in Korea bor. (Kom.)

DISTR. Sibiria et Manshuria.

*Anemone nikoensis* MAXIM. Forbes et Hemsl. l.c. p. 11. Palib.

Consp. Fl. Kor. I. p. 15.

NOM. JAP. Ichirin-sō.

HAB. Korea: Sine loco speciali (Carles).

DISTR. Japonia et China.

*Anemone Rossi* S. MOORE. Forbes et Hemsl. l.c. p. 12. Palib.

l.c. p. 16.

HAB. Korea: Sine loco speciali (Carles).

Phyōng-an: Jugam Schang-pei-shan (長白山), in trajectu Laoling  
2800. p. s. m. (Webster).

DISTR. China.

*Anemone amurensis* (KORSCH). Kom. l.c. p. 262.

HAB. in Korea bor. (Kom.)

DISTR. Asia bor.

*Anemone Raddeana* REGEL. Forbes et Hemsl. l.c. p. 12. Palib.

Consp. Fl. Kor. I. p. 15.

NOM JAP. Kikuzaki-ichigesō.

HAB. Kyōng-geui: Seoul (京城). Hut-Tschai-Meo. Mai 1. 1894. fl.;  
Schin-Ku-Kai Apr. 18. 1894. fl. (Sontag).

DISTR. China, Manshuria et Amur.

### ADONIS L. (sp. 1.)

*Adonis appennina* L. Palib. l.c.

NOM. JAP. Fukuju-sō.

HAB. Korea: Sine loco speciali (Carles).

DISTR. Europa et Asia.

### RANUNCULUS L.

#### Clavis specierum.

- A. Planta submersis .....*R. aquatilis* L.  
 B. Planta non submersis.  
 a) Foliis biternatisectis.  
 a) Segmentis foliorum latilobatis  
 .....*R. pensylvanicus* L. var. *japonicus* MAXIM.  
 β) Segmentis foliorum linearilobatis.  
 ○ Receptaculis elongatis, carpellis longe unguiculatis.  
 .....*R. pensylvanicus* L. var. *chinensis* MAXIM.  
 ○○ Receptaculis brevibus, carpellis brevi-unguiculatis.  
 .....*R. Tachiroei* FRAN. et SAV.  
 b) Foliis palmatisectis.  
 a) Stolonifera.  
 ○ Planta robusta, folia ternata .....*R. repens* L.  
 ○○ Planta humilis, folia palmatilobata.....*R. hyperboreus* ROTTB.  
 β) Non stolonifera.  
 ○ Plantæ debiles, 10–12 cm. alte .....*R. ternatis* THUNB.  
 ○○ Plantæ mediocres, robustiores.  
 .....*R. acris* L. var. *japonica* MAXIM.

*Ranunculus aquatilis* L. Léve'l. l.c. p. 298.

NOM. JAP. Baikwa-mo ; Umebachi-mo.

HAB. Prope Chemulpo Mai. 1901. in rivulo Kang-uön Jul. 1901.  
(Faurie).

DISTR. Reg. temp. per totam orb.

*Ranunculus pensylvanicus* L.

var. *japonicus* MAXIM. Palib. l.c. p. 17.

NOM. JAP. Kitsuneno-botan.

HAB. Ham-gyöng : Ouen-san (元山) Jul. 18. 1889. fr. (Dr. Epow).

DISTR. Asia bor. et Japonia.

var. *chinensis* MAXIM. Palib. l.c. p. 17.

R. *chinensis* Bunge Léve'l. l.c. p. 298. Kom. l.c. p. 300.

NOM. JAP. Kō-Kitsuneno-botan.

HAB. Kyöng-geui : Seoul (京城) Jun. 1886. fl. (Kalinowsky).

Phyöng-an : herboso loco Jun. 1901. (Faurie).

In Korea bor. (Komarov).

DISTR. Asia bor. et Japonia.

*Ranunculus Tachiræi* FRAN. et SAV. Enum. Pl. Jap. II. p. 267.

Huth in Bull du l'Herb. Boiss. (1897). p. 1082.

NOM. JAP. Otokozeri.

HAB. Kyöng-geui : Nam-san (南山) Jul. 16 et 25. 1902 fl. et fr.;

Yöng-deung-pho (永登浦) Jul. 24. 1902. fl. et fr. (T. Uchiyama).

DISTR. Japonia.

*Ranunculus repens* L. Forbes et Hemsl. l.c. p. 15. Palib. l.c.

I. p. 27. Léve'l. l.c. p. 298.

NOM. JAP. Hai-Kinpöge.

HAB. Korea : Sine loco speciali (Webster).

Phyöng-an : loco humidoso Jun. 1901. (Faurie).

DISTR. Reg. bor. et temp.

*Ranunculus hyperboreus* ROTTB. Kom. l.c. p. 293.

NOM. JAP. Haihikinokasa.

HAB. in Korea bor. (Kom.)

DISTR. Reg. bor. et arc. et India.

*Ranunculus ternatus* THUNB. Léve'l. l.c. p. 298.

NOM. JAP. Hikinokasa.

HAB. Phyöng-an : loco herboso. Jun. 1901. (Faurie).

DISTR. China et Japonia.

*Ranunculus acris* L. Sp. Pl. (ed. II). p. 779. DC. Prodr. I. p. 36. Ledeb. Fl. Ross. I. p. 40. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 5. Fran. et Sav. l.c. I. p. 8. Miyabe l.c. p. 215. Forbes et Hemsl. l.c. p. 13. Huth in Bull. du l'H. Boiss. (1897). p. 1079. Itō et Matsum. l.c. p. 274. A. Gray et S. Watson l.c. I. p. 35. Diels l.c. p. 334. R. propinquus in Ledeb. Fl. Ross. I. p. 40.

var. *japonica* MAXIM. Pl. Chin. p. 24. Huth in Bull. du l'H. Boiss. (1897). p. 1082. Palib. l.c. I. p. 16. R. acer L. Léve'l. l.c. p. 298.

NOM. JAP. Kinpōge; Umanoashigata.

HAB. Kang-uön : Jul. 1901. (Faurie). Kum-gang-san (金剛山) Aug. 20. 1902. (T. Uchiyama).

Kyöng-geui : Nani-san-dong (南山洞) Oct. 16. 1900. Nam-han-san (南韓山). Aug. 1. 1902.; Yöng-deung-pho (永登浦) Jul. 24. 1902.; Inchon (仁川) 1900. (T. Uchiyama).

Seoul Mai 1886 fl. (Kalinowsky); ibidem, *versus cacumenum montis Nam-san* (南山). Apr. 20. 1894 fl., Han-Tschu-Wan. Mai. 4. 1894 fl. in ditione Seouleni : Pauck-Han Mai 9. 1894. fl. (Sontag) ex Palib.

Kyöng-san : Pu-san (釜山-Enuma). ibidem. (Kalinowsky).

Phyöng-an : Man-gyöng-dai (萬景岱). Sept. 13. 1902. (T. Uchiyama).

DISTR. Europa, Asia bor. et Japonia.

**CALTHA** L. (sp. 1.)

*Caltha palustris* L. Sp. Pl. (ed. II.) p. 784. DC. Prodr. I. p. 44. Ledeb. Fl. Ross. I. p. 48. Hook. et Arn. Bot. Beech. Voy. p. 112. Miq. l.c. III. p. 6. Regel Pl. Radd. I. p. 52. Huth in Bull. du l'H. Boiss. (1897). p. 1083. Forbes et Hemsl. l.c. p. 17. Palib. l.c. p. 17. A. Gray et S. Watson l.c. p. 39. Palib. Mater. fl. Mong. Sept. p. 18. Diels l.c. p. 324. Léve'l. l.c. p. 298. Kom. l.c. p. 228.

HAB. Korea : Sine loco speciali (Carles). Mont. Nai-piang 1200 m. Jul. 1601. (Faurie).

var. *typica* REGEL Pl. Radd. I. p. 53. Maxim. Pl. Chin. p. 26. NOM. JAP. Ryūkiukwa.

HAB. Kang-uön : Kum-gang-san (金剛山). Aug. 18. 1902. (T. Uchiyama).

DISTR. Reg. bor., temp. et arc.

**ERANTHIS** SALISB. (sp. 1.)

*Eranthis Vaniotiana* LÉVE'L. l.c. p. 299.

HAB. Kang-uön : Umbra silvæ Jul. 1901 (Faurie).

Planta endemica.

**TROLLIUS** L. (sp. 1.)

*Trollius patulis* SALISB. in Trans. Linn. Soc. VIII. (1807). p. 302. Ledeb. Fl. Ross. I. p. 50. Schmidt Sachal. p. 160. n. 19. Huth in Bull. du l'Herb. Boiss. (1897) p. 1084. Kom. Fl. Mansh. II. p. 232.

NOM. JAP. Shinanokinbai.

HAB. Phyöng-an: Monte Schang-pei-schan (長白山). Jul. 7. 1905 fl.  
(T. Imagawa).

In Korea bor (Komarov.) ex Kom.

DISTR. Persia, Caucasus et Asia bor.

### ISOPYRUM L. (sp. l.)

*Isopyrum Raddeanum* MAXIM. Forbes et Hemsl. l.c. p. 18.  
Palib. Consp. Fl. Kor. I. p. 18.

HAB. Phyöng-an: Jugam Schang-pai-Shan (長白山) in trajectu  
Laoling 2800 p. s. m. (Webster).

DISTR. Manshuria.

### AQUILEGIA L.

#### Clavis specierum.

A. Sepala ovato-lanceolata, styli exerti.....*A. viridiflora* PALL.

B. Sepala elliptica, styli inserti.....*A. sibirica* LAM.

*Aquilegia viridiflora* PALL. Palib. l.c. I. p. 18.

HAB. Kyöng-geui: Seoul. Apr. 2. 1894. (Sontag).

DISTR. Sibiria.

*Aquilegia sibirica* LAM. DC. Prodr. I. 50. Ledeb. Fl. Ross.  
I. p. 56. Fl. Alt. II. p. 296.

A. bicolor Ehr. in Pers. Syn. Pl. II. 85.

HAB. Phyöng-an: Monte Schang-pei-schan (長白山). Jul. 5. 1905.  
fl. (T. Imagawa).

DISTR. Sibiria.

### DELPHINIUM L.

#### Clavis specierum.

A. Lacinis foliorum linearibus, petalis pallidis.....*D. grandiflorum* L.

*B. Segmentis foliorum rhomboideis plus minus inciso laciniatis; petalis atroceruleis* ..... *D. elatum* L.

*Delphinium grandiflorum* L. Kom. l.c. II. p. 247.

HAB. in Korea. bor. (Kom).

DISTR. Sibiria et Manshuria.

*Delphinium elatum* L. Sp. Pl. (ed. II.) p. 749. Ledeb. Fl. Ross. I. p. 63. O. Fedtschenko u. B. Fedt. in Engl. Bot. Jahrb. XXVII. p. 427. Huth in Engl. Bot. Jahrb. XX. p. 378. Kom. l.c. II. p. 249.

*D. intermedium ranunculoides* DC. Prodr. I. p. 55.

*D. elatum* var. *palmatum* Léve'l. l.c. p. 300.

(Nostra specimina *longicalcaratum* Huth, et Léve'l. *palmatum* continent.)

HAB. Kang-uön: in Monte Sept. 4. 1901. (Faurie). Ha-syön-ri (下仙里). Aug. 8. 1902 (T. Uchiyama).

Kyöng-geui: Inter Kai-syöng (開城) et Kum-chhyön (金川) Sept. 6. 1902. Nam-han-san (南韓山) Aug. 1. 1902. (T. Uchiyama).

Ham-gyöng: Mu-san-nyöng (茂山嶺) Aug. 11. 1907. fl. (K. Maeda).

DISTR. Sibiria. China bor. et Manshuria.

## ACONITUM TOURN.

### Clavis specierum.

*A. Casside longe cylindracea, apice posticum curvata.*

a) Fl. albis v. pallide ceruleis.....*A. albo-violaceum* Kom.

b) Fl. flavi.

a) Folia palmati 5-lobata, dentes foliorum ovati.

.....*A. longe-cassidatum* NAKAI.

β) Folia 3-5 partita, segmentis foliorum inciso-laciniatis.

.....*A. umbrosum* (KORSCH.) Kom.



*B.* Casside conico-cylindracea, obtuse-conica v. subnaviculare, apice recta v. antrorsum vix curvata.

- a) Fl. flavi.....*A. Anthora* L.
- b) Fl. pallide caerulei v. atro-caerulei.
- a) Caule volubile .....*A. volubile* PALL.
- β) Caule erecto v. apice flexuoso.
- Casside subnaviculare .....*A. Napellus* L.
- Casside obtuse-conica v. conico-cylindracea.
- △ Rostro vix producto.....*A. ochotense* RECHB.
- △△ Rostro horizontali producto v. reflexo.
- || Foliis 5-7 fidis .....*A. Fischeri* RECHB.
- ||| Foliis 3 partitis, lateralibus bifidis.
- Lacinis foliorum anguste-linearibus.  
.....*A. macrorhynchum* TURCZ.
- Lacinis foliorum lanceolatis v. ovatis.
- ‡ Carpellis villosis .....*A. jaluense* KOM.
- ‡‡ Carpellis glabris v. subglabris.
- ( Inflorescentia ad apicem caulis dense racemosa.  
.....*A. Kusnezoffi* RECHB.
- (( Inflorescentia axillari-contracta.
- \* Carpellis 5, bracteis ad apicem pediceli positis.  
.....*A. Uchiyamai* NAKAI.
- \*\* Carpellis 3, bracteis ad basin pediceli positis.  
.....*A. koreanum* NAKAI.

*Aconitum albo-violaceum* KOM. l.c. II. p. 251.

HAB. In Korea bor. (KOM).

Kang-üon: Kum-gang-san (金剛山). Aug. 16. 1902. fl. et carp. jun.

Planta endemica.

*Aconitum (Lycocotnum) longe-cassidatum*, nov. TAB. I. Caulis ½-1 m. altus, ad apicem adpresse pubescens, pilis recurvatis,

foliis radicalibus et caulibus inferioribus longe petiolatis, laminis 5-7 lobatis, lobis mucronato-grosse-serratis, adpresse pilosis, margine ciliolatis, subtus ad venas pubescentibus, caulibus superioribus brevipetiolatis, laminis 3-5 lobatis, lobis rhombico-acuminatis, acute-serratis, adpresse pubescentibus; inflorescentia ad apicem caulis et axillari dense racemosa, pedunculis elongatis, bracteis lanceolatis v. linearibus, pubescentibus; pedicellis brevissimis, pubescentibus; fl. ochroleucis, casside longe-cylindracea apice posticum curvata pubescenti, rostro horizontali-producto apice plus minus incurvato et fuscoso; nectariis longe calcaratis, calcaribus junioribus semi-annularibus; patentibus paulum curvatis; staminibus numerosis reflexis; filamentis ad basin dilatatis; carpellis 3, junioribus parallelis v. patentibus, pilosis; seminibus triangulari-alatis, faciebus rugosis.

HAB. Kyōng-geui: Nam-san (南山). Sept. 1. 1902. fl. et carp. mat.  
(T. Uchiyama).

Planta endemica.

Ad. A orientale affinis, differt eo, tamen, casside posticum curvata, foliis grossius serratis, etc.

*Aconitum umbrosum* (KORSCH.) KOM. Fl. Mansh. II. p. 250.

A. Lycoctonum subsp. umbrosum Korsch. Act. h. Petrop. XII. p. 300.

HAB. Kan-tō, circa Rokudōkō (六道溝) Sept. 1. 1907. fl. (K. Maeda).

DISTR. Amur. et Manshuria.

*Aconitum Anthora* L. Sp. Pl. (ed. II.) p. 751. Willd. Sp. Pl. Tome. II. p. 1234. Rehb. Ueb. Aconit. p. 15. Illus. Gen. Aconit. tab. LIX. DC. Prodr. I. p. 56 Ait. Hort. Kew. III. p. 322. Ledeb. Fl. Ross. I. p. 65. Regel Pl. Radd. I. p. 71.

Koch Syn. Fl. Germ. et Helv. I. p. 20. Forbes et Hemsl. l.c. p. 20. Kom. Fl. Mansh. II. p. 259.

A. Delavayi Franch. var. coreanum Léve'l. l.c. p. 300.

HAB. Kyöng-geui: Nam-san (南山). Oct. 19. 1900. fl. et carp. mat. (T. Uchiyama).

In Korea bor. (Komarov).

Hoang-hai: Inter Nam-Chhyön (南川) et An-syöng (安城) Sept. 7. 1902. fl. Inter An-syöng (安城) et Syö-heung (瑞興) Sept. 8. 1902. fl.; Inter Syö-heung et Phung-syu-nön (風壽院) Sept. 9. 1902 fl. (T. Uchiyama).

Kan-tö: circa Tohdolkoh (頭道溝) Sept. 11. 1907. fl. (K. Maeda).

DISTR. Europa et Asia.

*Aconitum volubile* PALL. Willd. Sp. Pl. Tome II. p. 1237. Ait. Hort. Kew. (ed. II). III. p. 323. Rehb. Illus. Gen. Aconit. tab. XXV. Kom. l.c. II. p. 253.

A. ciliare DC. Prodr. I. p. 61.

A. recognitum Rehb. Ueb. Aconit. p. 42.

β. *pubescens* REGEL. Pl. Radd. I. p. 91.

Nostra specimina 5-ovulata.

NOM. JAP. Tsurubushi.

HAB. Kang-uön: Kan-bal-ko-ryöng (干發告嶺). Aug. 21. 1902. (T. Uchiyama).

DISTR. Sibiria, China bor. et centr., Manshuria et Japonia.

*Aconitum Napellus* L. Sp. Pl. (ed. II.) p. 751. Willd. Sp. Pl. Tome II. p. 1235. Ait. Hort. Kew. (ed. II.) p. 322. Regel Pl. Radd. I. p. 101. Koch Syn. Fl. Germ. et Helv. I. p. 20. Hook. et Thom. Fl. Brit. Ind. I. p. 28. Köhler Med. Pfl. I. tab. 72. Kom. Fl. Mansh. II. p. 258.

A. Napellus, Dodonæi (tab. 1-4). Kœlleanum (tab. 62). tauricum (tab. 63). formosum et strictum (tab. 64). Hoppeanum, acutum

et angustifolium (tab. 65). laxum et Funkianum (tab. 66). autumnale (tab. 67). pyramidale, Bernhardianum, acuminatum (tab. 68). neubergense (tab. 67). multifidum, amœnum (tab. 70). in Rehb. Illus. Gen. Aconit.

A. molle, intermedium et Napellus in DC. Prodr. I. p. 60-64.

A. delphinifolium, Napellus et paniculatum in Ledeb. Fl. Ross. I. p. 67-70.

NOM. JAP. Hosobano-torikabuto.

HAB. In Korea bor. (Komarov).

Hoang-hai: Inter An-syöng (安城) et Syö-heung (瑞興). Sept. 8. 1902 (T. Uchiyama).

DISTR. Per totam temp. reg.

*Aconitum ochotense* Rehb. Illus. Gen. Aconit. tab. XVIII. Fran. Pl. Dav. p. 22. Forbes et Hemsl. l.c. p. 21.

A. Kusnezoffi Rehb.  $\beta$ . ochotense Regel in Pl. Radd. I. p. 94.

HAB. Kyöng-geui: Inchon (仁川). Sept. 17. 1902. fl. (T. Uchiyama).

DISTR. China, Manshuria et Amur.

*Aconitum Fischeri* Rehb. Illus. Gen. Aconit. t. XXII. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 8. Regel Pl. Radd. I. p. 98-99. Fran. et Sav. Enum. Pl. Jap. I. p. 12. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 20. Huth Ranuncul. Jap. in Bull. l'Herb. Boiss. (1897). p. 1091. Fin. et Gagn. Fl. Orient. in Bull. Soc. Bot. Fr. (1904). p. 514.

HAB. Kyöng-geui: Monte Peuk-han-san (北漢山). Nov. 1900. fl. et fr. (T. Uchiyama).

DISTR. Asia bor. et Am. bor.

*Aconitum macrorhynchum* Turcz. Maxim. Prim. Fl. Amur. p. 25. Regel Pl. Radd. I. p. 95. Kom. Fl. Maush. II. p. 258.

HAB. Kyöng-geui: Syong-työng (松亭). Sept. 28. 1902. fl. et carp. mat. (T. Uchiyama).

DISTR. Sibiria, China et Manshuria.

*Aconitum jaluense* KOM. l.c. p. 257.

HAB. in Korea bor. (Komarov).

Hoang-hai: Inter Kai-syöng (開城) et Kum-ehhyön (金川).  
Sept. 6. 1902. fl. (T. Uchiyama).

Planta endemica.

*Aconitum koreanum*, nov. TAB. II.

A. Fischeri in Catalogue of plants Herb. Coll. Sci. Imp. Univ. Tokyo. p. 271 (ex parte).

Caule erecto apice pubescenti, foliis 3-partitis, segmentis petiolulatis, segmentis lateralibus bifidis, omnibus dentatis, dentis ovatis, glaberrimis, inflorescentia ad apicem caulis v. axillari laxe racemosa, pedicelis pedunculisque dense villosis, pilis patentibus, pedicelis elongatis, bracteis binis, lanceolatis; flores cœrulei, casside obtuse-conica, rostro horizontali producto, nectariis suberectis ad apicem gradatim contrahit, nectariis posticum curvatis, filamentis alatis, carpellis 3, junioribus subnutantibus, glaberrimis, patentibus, seminibus transverse-alatis.

HAB. Kyöng-geui: Mok-chyang (木市). Nov. 9. 1900 fl. et carp. mat. (T. Uchiyama).

Planta endemica.

Ad. A. Fischeri affinis sed differt eo foliis tripartitis, segmentis foliorum omnibus petiolulatis etc.

*Aconitum Uchiyamai* sp. nov. TAB. III. Caule erecto glaberrimo; foliis radicalibus longe petiolatis, caulibus brevipetiolatis v. subsessilibus, omnibus tripartitis, segmentis lateralibus bifidis v. partitis, segmentis foliorum sessilibus v. petiolulatis, lanceolatis

dentatis v. subpinnatisectis, dentis foliorum inferiorum lanceolatis, superiorum ovatis, minutissime ciliolatis; inflorescentia ad apicem pubescenti, bracteis binis, flores maximi, pallide cœrulei; casside florum patentum elongata subcylindracea, apice plus minus antroorsum nutante, rostro horizontali producto v. reflexo; nectariis limbis æquilongis ad calcaria posticum curvatis, filamentis alatis pilosis, carpellis 5 glaberrimis, patentibus, maturatis nullis, stylis dilatatis.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 18. 1902. (T. Uchiyama).

*Aconitum Kusnezoffi* REICH. Illus. Gen. Aconit. tab. XXI. Maxim. Prim. Fl. Amur. p. 28. et *A. ochotense* p. 27. Ledeb. Fl. Ross. I. p. 69. Fran. Pl. Dav. p. 22. Forbes et Hemsl. l.e. p. 20.

*A. Kusnezoffi* *α.* *typicum* Regel in Pl. Radd. I. p. 93.

HAB. Hoang-hai: Inter Kai-syöng (開城) et Kum-chhyön (金川) Sept. 6. 1902. (T. Uchiyama).

DISTR. Sibiria, China et Manshuria.

### ACTÆA L. (sp. 1.)

*Actea spicata* L. Sp. Pl. (ed. II.) p. 722. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 468. Franch. Pl. Dav. p. 23. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 8. Franch. et Sav. l.e. I. p. 15. Huth in Engl. Bot. Jahrb. XVI. p. 308. Forbes et Hemsl. l.e. p. 21. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 326. E DE Halácsy Consp. Fl. Græc. Vol. I. p. 34.

var. *nigra* WILLD. Huth in Engl. Bot. Jahrb. XVI. p. 308.

*A. spicata* L. *α.* *melanocarpa* in Ledeb. Fl. Ross. I. p. 71. Huth in Bull. du l'Herb. Bois. (1897). p. 1092.

f. *acuminata* WALLICH Huth in Engl. Bot. Jahrb. XVI. p. 308.

A. *acuminata* Wallich in Kom. Fl. Mansh. II. p. 236.

NOM. JAP. Ruiyō-shōma.

HAB. Kang-uön : Kum-gang-san. (金剛山). Aug. 10. 1902. (T. Uchiyama).

DISTR. Reg. bor. et temp.

### CIMICIFUGA L.

#### Clavis specierum.

A. Racemis simplicibus.....*C. simplex* WORMSK.

B. Racemis paniculatis.

a) Staminodiis ad medium bifidis .....*C. dahurica* TURCZ.

β) Staminodiis integris, mucronatis v. paullum bifidis.

○ Foliis rhomboideis, basi cuneatis...*C. foetida* L. δ *typica* REGEL.

○○ Foliis dilatatis, basi cordatis.

† Staminodiis integris.....*C. heracleifolia* KOM.

†† Staminodiis paullum bifidis.

.....*C. heracleifolia* KOM. var. *bifida* NAKAI.

*Cimicifuga simplex* WORMSK. Maxim. Prim. Fl. Amur. p. 29.

Fr. Schmidt Reis. in Amur. u. Insel. Sachl. p. 32. et p. 109.

Fran. et Sav. Enum. Pl. Jap. I. p. 15. Miyabe Fl. Kuril Isl. p. 216. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p.

326. Kom. Fl. Mansh. II. p. 241.

*C. foetida* L. in Miq. l.c. III. p. 8.

*C. foetida* L. β. Ledeb. Fl. Ross. I. p. 72.

*C. foetida* L. var. *simplex* Regel in Pl. Radd. I. p. 122.

*C. foetida* L. var. *simplex* Wormsk. Huth in Engl. Bot. Jahrb. XVI. p. 318.

*Actæa Cimicifuga* Hook. et Arn. in Bot. Beech. Voy. p. 112.

A. *cimicifuga*  $\beta$ .? simplex in DC. Prodr. I. p. 64.

NOM. JAP. ———

HAB. Kang-uön: Kan-bal-ko-ryöng (干發告嶺). Aug. 10. 1902. (T. Uchiyama).

DISTR. Europa et Asia.

*Cimicifuga dahurica* (TURCZ.) MAXIM. Kom. Fl. Mansh. p. 239.  
*Cimicifuga dahurica* Turcz. in Regel Fl. Uss. n. 39. Pl. Radd. I. p. 119.

*Cimicifuga dahurica* Torr. et Gray. in Maxim. Prim. Fl. Amur. p. 28. suppl. Ind. Fl. Pek. p. 468.

*Cimicifuga dahurica* Huth in Engl. Bot. Jahrb. XVI. p. 316.

Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 326.

Léveillé in Bulletin Acad. Int. Geo. Bot. (1902). p. 301.

*Actinospora dahurica* Turcz. in Linnæa X. beiblatt. p. 81.

Ledeb. Fl. Ross. I. p. 72. Walp. Rep. I. p. 60.

*a. typica* HUTH l.c. p. 317. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 23.

*Cimicifuga dahurica* Turcz. *a. fertilis* Regel. Pl. Radd p. 120.

*Actæa dahurica* Franch. Pl. Dav. p. 23.

HAB. Interior Koreæ. Sept. 4. 1901. Monte Naipiang rivulo silvæ. ad 1200 m. Aug. 22. 1901. (Faurie).

Kang-uön: Meuk-kai (墨浦) Aug. 12. 1902. (T. Uchiyama).

forma *mascula* HUTH in l.c. p. 317.

C. *dahurica*  $\beta$ . *mascula* Regel Pl. Radd. I. p. 121.

HAB. Kang-uön: Meuk-kai-dong (墨浦洞). Aug. 12. 1902. fl. (T. Uchiyama).

DISTR. Dahuria, Sibiria, et China bor.

*Cimicifuga foetida* L. Huth in Engl. Bot. Jahrb. XVI. p.



316. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb XXIX. p. 326.

*Actæa Cimicifuga* L. Sp. Pl. (ed. II). p. 722. DC. Prodr. I. p. 64. Ledeb. Fl. Ross. I. p. 82.

♂. *typica* REGEL Pl. Radd. I. p. 123. Huth l.c. p. 318.

*Cimicifuga foetida* a. Ledeb. Fl. Ross. I. p. 72. Linnæa X. beiblatt. p. 81.

HAB. Kyöng-geui: Inchon (仁川) Sept. 17. 1902. fl. (T. Uchiyama).

Hoang-hai: Inter An-Syöng (安城) et Syö-Heung (瑞興) Sept. 8. 1902; Inter Nam-Chhyön (南川) et An-Syöng (安城) Sept. 7. 1902. (T. Uchiyama).

DISTR. China centr, Sibiria et Monglia.

*Cimicifuga heracleifolia* KOM. l.c. II. p. 243.

HAB. In Korea bor. (Komarov).

var. *bifida* NAKAI. Tab. IV. Petalis apice bifidis, lobis apice antheroidis. Ceter. ut *typica*.

HAB. Kang-uön: Chhyang-Yön-Ri (長淵里). Aug. 13. 1902. fl. (T. Uchiyama).

DISTR. Manshuria.

## PÆONIA L.

### Clavis specierum.

A. Caulis herbaceus.

a) Foliolula margine minutissime et sub lente tantum conspicue dentato-sabra.

α) Carpellis glabris.....*P. albiflora* PALL. α. *typica* HUTH.

β) Carpellis dense hirsutis.....*P. albiflora* PALL. β. *trichocarpa* BUNGE.

b) Foliolula margine integerrima v. subundulata.....*P. obovata* MAXIM.

B. Caulis lignosus .....*P. Moutan* AIT.

*Paeonia albiflora* PALL. DC. Prodr. I. p. 66. Ledeb. Fl. Ross. I. p. 74. Maxim. Prim. Fl. Amur. p. 29. et suppl. Ind. Fl. Pek. p. 468. Ind. Fl. Mong. p. 480. Pl. Chin. p. 34. Baker et Moore in Journ. Linn. Soc. XVII. p. 376. Baker in Gard. Chron. XXI. p. 779. Regel Pl. Radd. I. p. 124. Miq. l.c. III. p. 9. Fran. et Sav. l.c. I. p. 14. Fr. Schmidt l.c. p. 32. Franch. Pl. Dav. p. 23. Forbes et Hemsl. l.c. p. 21. Huth in Bull. du l'Herb. Boiss. (1897). p. 1095. Diels l.c. p. 324. Itō in Tokyo. Bot. Mag. XIV. p. 72. Léve'l. l.c. p. 301. Kom. l.c. p. 224.

*P. officinalis* Thunb. (non L.) in Fl. Jap. p. 230.

*a. typica* HUTH. in Engl. Bot. Jahrb. XIV. p. 265.

NOM. JAP. Shakuyaku.

HAB. Kyōng-sang: Pu-san (釜山). (T. Uchiyama).

Prope sepulchro regio Syou-ouen; rarius. Mai 1901 (Faurie).

DISTR. Sibiria et China bor.

*β. trichocarpa* BUNGE. Huth in Engl. Bot. Jahrb. XIV. p. 265. Maxim. Pl. Chin. p. 34. Walp. Rep. I. p. 61.

NOM. JAP. Shyakuyaku.

HAB. Kyōng-sang: Pu-san (釜山). (T. Uchiyama).

DISTR. Sibiria et China bor.

*Paeonia obovata* MAXIM Prim. Fl. Amur. p. 29. Mél. Biol. XII. p. 416. Regel. Tent. Fl. Uss. n. 41. Pl. Radd. I. p. 124. Fr. Schmidt l.c. n. 31. Huth in Engl. Bot. Jahrb. XIV. p. 265. Bull. du l'H. Boiss. (1897) 1095. (1899) p. 601. Forbes et Hemsl. l.c. p. 22. Baker in Gard. Chron. XXI. p. 779. Kom. l.c. p. 226.

*P. oreogeton* S. Moore in Baker et Moore l.c. p. 376.

*P. albiflora* fl. roseo. Franch. et Sav. Enum. Pl. Jap. I. p. 14.

NOM. JAP. Yamashakuyaku.

HAB. in Korea bor. (Komarov).

Kang-uön : Kum-gang-san (金剛山). Aug. 17. 1902. fr. (T. Uchiyama).

DISTR. Sibiria orient. Manshuria et Japonia.

*Paeonia Moutan* Arr. Hort. Kew. (ed. II.) III. 315. DC. Prodr. I. p. 65. Baker in Gard. Chron. XXI. p. 779. Miq l.c. IV. p. 9. Diedrich Nachtrag. Gart. Lex. V. p. 439. Fran. et Sav. l.c. I. p. 14. Huth in Engl. Bot. Jahrb. XIV. p. 272. in Bull. du l'Herb. Boiss (1897). 9. 1095. Itō et Matsum. Tent. Fl. Lutch. l.c. p. 279. Diels l.c. p. 324. Forbes et Hemsl. l.c. p. 22. Itō in Tokyo Bot. Mag. XIV. p. 72.

P. arborea Reich. Schneider. l.c. p. 271.

NOM. JAP. Botan.

HAB. Kyōng-sang : Pu-san (釜山). (T. Uchiyama).

DISTR. China et Japonia.

## MAGNOLIACEÆ.

### Clavis generum.

- A. Flores hermaphoditi. Carpella ∞-seriatim imbricata, spicata.  
Arbores erecti ..... *Magnolia* L.
- B. Flores unisexuales. Carpella baccata, ∞-seriatim spicata.  
Frutex scandentes ..... *Schizandra* MICH.

## MAGNOLIA L.

### Clavis specierum.

- A. Foliata in tempore florente ..... *M. parviflora* SIEB. et ZUCC.
- B. Folia nulla in tempore florente..... *M. obovata* THUNB.

*Magnolia parviflora* STEB. et ZUCC. DC. Prodr. I. p. 79. Fran. et Sav. l.c. I. p. 16. Schneider Handb. der Laubholz. I. 331. fig. 209. g.

NOM. JAP. Ōyamarengé.

HAB. Kyōng-geui : Seoul. Mai. 1886. fl. (Kalinowsky). Van-tang-san. Jun. 2. 1895 fl. (Sontag).

Kyōng-syang : Chyang-Ryōng-San (頂嶺山). Oct. 2. 1902. fr. (T. Uchiyama).

Kang-uön : Kum-gang-san (金剛山). Aug. 16. 1902. fr. (T. Uchiyama). ibidem. 1895 fol. (K. Hayashi).

Phyōng-an : Ko-syōng-ryōng (高城嶺) Sept. 11. 1905 ster. (T. Imayawa).

DISTR. Japonia.

*Magnolia obovata* THUNB. Palib. Consp. Fl. Kor. I. p. 19.

NOM. JAP. Mokuren.

HAB. Kyōng-geui : Seoul (京城). Van-tang-san Jun. 2. 1895 fl. (Sontag).

DISTR. Japonia.

### SCHIZANDRA RICH.

(=Sphaerostemma Blume et Maximowiczia Rupr.)

(sp. 1.)

*Schizandra chinensis* (RUPR.) BAILL. Fran. et Sav. l.c. I. p. 17. Franch. Pl. Dav. p. 24. Maxim. Pl. Chin. p. 39. Forbes et Hemsl. l.c. p. 25. Diels l.c. p. 322. Kom. l.c. p. 221. Schneider l.c. p. 341. Fig. 219 a-i.

Maximowiczia chinensis Rupr. in Maxim. Prim. Fl. Amur. p. 31. Suppl. Ind. Fl. Pck. p. 468. Fr. Schmidt l.c. p. 32 et p. 109. Regel Pl. Radd. I. p. 125.

NOM. JAP. Matsubusa.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 16. 1902 (T. Uchiyama).

Kan-tō: circa Ten-po-san (天寶山). Sept. 8. 1907. (K. Maeda).

DISTR. China et Japovia.

## MENISPERMACEÆ

### Clavis generum.

A. Stamina 6-9.....*Cocculus* DC.

B. Stamina 12-24.....*Menispermum* L.

## COCCULUS DC. (sp. 1.)

*Cocculus Thunbergii* DC. Prodr. I. p. 98. Sieb. et Zucc. Fl. Jap. fam. nat. p. 189. Benth. Fl. Hongk. p. 13. Maxim. Mél. Biol. XI. p. 651. Miq. l.c. III. p. 10. Fran. et Sav. l.c. I. p. 19. Fran. Pl. Dav. p. 24. Hance in Journ. of Linn. Soc. XIII. p. 99. Henry List of Plant. Form. p. 16. Forbes et Hemsl. l.c. p. 28. Itō in Tokyo. Bot. Mag. XIV. p. 74. Palib. Consp. Fl. Kor. I. p. 19. Diels l.c. p. 345. Yabe in Tokyo Bot. Mag. XVII. p. 196. Diels in Engl. Bot. Jahrb. XXXVI. beiblatt. p. 45.

C. ovalifolius DC. Prodr. I. p. 99.

C. diantherus Hook. et Arn. Bot. Beech. Voy. p. 169.

*Menispermum orbiculatum* Thunb. Fl. Jap. p. 194.

*Cebatha orbiculata* in Schneider l.c. p. 327.

NOM. JAP. Aotsuzurafuji.

HAB. Kyōng-sang: Port Fu-san (釜山). (Wilford).

Kyōng-geui: Prope Seoul. Jun. 1886. fl. (Kalinowsky). Mons

Yisan Mai. 28. 1894. (Sontag). Ō-ryu-kol (梧柳洞) Oct. 2. 1900

♀ fr. mat. Nam-san. (南山). Jul. 18. 1902. ♀ fr. immat. (f.

*subtriloba* Miq.); Yöng-deung-pho (永登浦). Jul. 24. 1902 ♂ fl.  
(f. *subcorolata* Miq.) (T. Uchiyama).

**MENISPERMUM** L. (sp. 1.)

*Menispermum davuricum* DC. Palib. Consp. Fl. Kor. I. p. 20.

NOM. JAP. Ōtsuzurafuji.

HAB. Kyöng-geui : Seoul (京城). Mai. 1886. fl. (Kalinowsky). Pauk-Han. Mai 9. 1886 fl. (Sontag).

DISTR. Sibiria, China bor., Manshuria et Japonia.

**LARDIZABALACEÆ.**

**Clavis generum.**

- A. Sepalis 6, petalo 0. .... *Stauntonia* DC.  
B. Sepalis 3, petalo 0. .... *Akebia* DECNE.

**STAUNTONIA** DC. (sp. 1.)

*Stauntonia hexaphylla* DECSN. Sieb. et Zucc. Fl. Jap. fam. nat. n. 359. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 9. Fran. et Sav. I. p. 21. Forbes et Hemsl. l.c. p. 30. Itō et Matsum. l.c. p. 289. Palib. l.c. I. p. 21. Matsum. et Hayata. l.c. p. 17. Schneider l.c. 295.

*Raiania hexaphylla* Thunb. Fl. Jap. p. 149.

NOM. JAP. Mube.

HAB. In archipelago Koreano : Port Hamilton (Wilford).

Korea : Sine loco indicato (Enuma).

DISTR. Japonia.

**AKEBIA** DECNE (sp. 1.)

*Akebia quinata* DECNE. Hance in Journ. Bot. (1878) p. 8.

Moore in Journ. Bot. (1878). p. 137. Sieb. et Zucc. Fl. Jap. p. 189. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 9. Fran. et Sav. I. p. 21. Forbes et Hemsl. Ind. Fl. Sin. I. p. 30. Palib. l.c. p. 21. Diels. l.c. p. 21. Schneider l.c. p. 296. *Raiania quinata* Thunb. Fl. Jap. p. 148.

NOM. JAP. Akebi.

HAB. Sine loco speciali (Carles.) In archipelago Koreano : Port Hamilton (Oldham).

Kyōng-geui : Phung-to (豊島). (T. Uchiyama).

DISTR. China et Japonia.

## BERBERIDACEÆ.

### Clavis generum.

- A Folia penninervia v. pinnatisecta v. pinnatim 2-3 ternata, ovula e basi erecta.
- a) Frutex. Folia simplicia, bacca indeliscens.....*Berberis* L.
- b) Herba. Folia subpinnatim bis terve trisecta. Capsula vesicaria, indeliscens .....*Leontice* L.
- c) Herba. Folia bis terve pinnatim trisecta. Capsulæ pericarpium evanescente, semina drupæformia nudans.....*Caulophyllum* MICHX.
- B. Ovula 2-∞ serialia, folia palmatinervia .....*Jeffersonia* BARTON.

## BERBERIS L.

### Clavis specierum.

- A. Carpellis globosis.....*B. koreana* PALIB.
- B. Carpellis oblongis.
- a) Foliis 4-12 c.m. longis.....*B. vulgaris* L. var. *japonica* REGEL.
- b) Foliis multo minoribus .....*B. sinensis* DESF.

*Berberis koreana* PALIB. Tab. nostra V. f. B. Palib. l.c. I. p. 22. tab. I. S. K. Schneider in Bull. Herb. Boiss. (1908) p. 261.

- HAB. Kyōng-geui: Seoul (京城) Schin-ku-kaï Apr. 18. 1894. fl.  
(Sontag)—ex Palib. Peuk-han-san (北漢山) Oct. 14. 1900. fr.  
(T. Uchiyama).  
Kang-nōn: Kan-bal-ko-ryōng (干發告嶺) Aug. 21. 1902. fr.;  
Peuk-tun-ji (北屯址) Aug. 22. 1902. fr.; (T. Uchiyama).  
In trajectu secus viam ad Peking ducentem Mai. 25. 1894. fl.;  
(Sontag). *In ditione Seoulensi: Peuk-han Mai 9. 1894 fl.*  
(Sontag)—ex Palib.  
Ham-gyōng: In collibus Ouen-san (元山). Aug. 1901 (U. Fabric)  
—ex Schueider.

Planta endemica.

*Berberis vulgaris* L. Sp. Pl. (ed. II). p. 471. DC. Prodr. I. p. 105. Ledeb. Fl. Ross. I. p. 79. Fran. et Sav. Enum. Pl. Jap. I. p. 22. Benth. et Hook. fil. Brit. Fl. (ed. III). p. 15. Forbes et Hemsl. l.c. p. 32. Dr. Thomè Fl. Deutsch. Öst. u. Schw. II. p. 155. E de Halácsy l.c. I. p. 36.

var. *japonica* REGEL. Fran. et Sav. Enum. Pl. Jap. II. p. 273.

NOM. JAP. Ōbamegi.

HAB. Kang-nōn: Chyang-yōn-ri (長淵里). Aug. 13. 1902. (T. Uchiyama).

DISTR. Asia bor. et Japonia.

*Berberis sinensis* DESF. Palib. l.c. I. p. 20.

HAB. Phyōng-an: Jugam Schang-pai-shan (長白山). in trajectu  
Laoling 2800 p. s. m. (Webster).

DISTR. Europa. Africa bor. Asia et Am. bor.

### LEONTICE L. (sp. L.)

*Leontice microrhynca* S. MOORE. Palib. Consp. Fl. Kor. I. p. 23.



HAB. Phyön-an: Jugam Schang-pai-shan (長白山). in trajectu  
Laoling 2800 p. s. m. (Webster).

DISTR. Manshuria.

**CAULOPHYLLUM** MICHX. (sp. 1.)

*Caulophyllum thalictroides* MICHX. Miq. Prol. Fl. Jap. in l.c.  
II. p. 70. Fran. et Sav. l.c. I. p. 25. A. Gray et S. Watson  
l.c. I. p. 70. Kom. Fl. Mansh. II. p. 326.

*Leontice thalictroides* L. DC. Prodr. I. p. 110. Fr. Schmidt  
l.c. p. 110. Diels l.c. p. 337.

*Caulophyllum robustum* Maxim. in Prim. Fl. Amur. p. 33.  
Regel P. Radd. I. p. 126.

NOM. JAP. Ruiyobotan.

HAB. Kang-nön: Kum-gang-san (金剛山). Aug. 14. 1902 (T. Uchi-  
yama).

DISTR. Manshuria, Amur, Japonia et America bor.

**JEFFERSONIA**, BARTON. (sp. 1.)

*Jeffersonia dubia* BENTH. et Hook. fil. Forbes et Hemsl. l.c. p.  
33. Palib. l.c. I. p. 23. Kom. l.c. II. p. 322.

HAB. Korea: Sine loco speciali (Carles). In Korea bor. (Komarov).

Phyön-an: Jugam Schang-pai-shan (長白山). in trajectu Laoling  
(Webster).

DISTR. Manshuria.

**NYMPHÆACEÆ**

**Clavis generum.**

A. Sepala et petala 3.....*Brasenia* SCHREBER.

B. Sepala 4-6. Petala et stamina ∞

- a) Ovula  $\infty$  ..... *Nymphaea* L.  
 b) Ovula 1. .... *Nelumbo* KARST.

**BRASENIA**, SCHREBER. (sp. 1.)

*Brasenia peltata* PURSH, Fran. et Sav. l.c. I. p. 25.

*Brasenia purpurea* (MICHX.) CASP. in Engl. Prantl. Nat. Pfl. Fam. III. 2. p. 6. Kom. Fl. Mansh. II. p. 216.

*Menianthes nymphoides* THUNB. Fl. Jap. p. 82.

NOM. JAP. Jun-sai.

HAB. Kyōng-syang: Mok-chyang (木市). Nov. 9. 1900 (T. Uchiyama).

DISTR. Manshuria, Japonia et America bor.

**NYMPHÆA** L. (sp. 1.)

*Nymphaea tetragona* GEORGI. Bot. Mag. XXXVII. tab. 1525.  
 Forbes et Hemsl. l.c. p. 33. A. Gray et S. Watson l.c. I. p. 76. Kom. l.c. II. p. 218.

*N. pygmæa* AIT. in DC. Prodr. I. p. 116. Diedrich Nachtrag. zu. Gar. Lex. Vol. V. p. 273. Fr. Schmidt. l.c. p. 110.

var. *angusta* CASP. Fran. et Sav. l.c. I. p. 25.

f. *orientalis* CASP. Miq. l.c. II. p. 251.

NOM. JAP. Hitsujigusa.

HAB. Kyōng-sang: Mok-chyang (木市). Nov. 9. 1900 fr., Kum-san-ri (金山里) Oct. 14. 1900 fl. (T. Uchiyama).

DISTR. China et Japonia.

**NELUMBO** KARST. (sp. 1.)

*Nelumbo nucifera* GÆRTN. Palib. l.c. I. p. 20.

Sæpe Colitur.

DISTR. Asia et Australia.

**PAPAVERACEÆ****Clavis generum.**

A. Flores exalcarata.

a) Carpella cylindræa.

α) Foliis lyratopinnatim sectis ..... *Stylophorum* Nutt.

β) Foliis bipinnatim sectis..... *Chelidonium* L.

b) Carpella obovata ..... *Papaver* L.

B. Flores calcarati..... *Corydalis* Vent.

**STYLOPHORUM** Nutt. (sp. 1.)

*Stylophorum japonicum* Miq. Palib. l.c. I. p. 23.

NOM. JAP. Yamabukisō.

HAB. Korea: sine loco speciali (Webster).

DISTR. China, Manshuria et Japonia.

**CHELIDONIUM** L. (sp. 1.)

*Chelidonium majus* L. Sp. Pl. (ed. II). p. 723. - DC. Prodr. I. p. 123. Ledeb. Fl. Ross. I. p. 91. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Peking. p. 468. Pl. Chin. p. 46. Sieb. et Zucc. p. 171. Regel Pl. Radd. I. p. 133. Fr. Schmidt l.c. p. 33 et p. 110. Miq. l.c. III. p. 11. Fran. et Sav. l.c. I. p. 28. Franch. Pl. Dav. p. 27. Baker et Moore l.c. p. 378. Engl. et Prantl. l.c. III. 2. p. 140. Itō et Matsum. l.c. p. 293. Palib. l.c. p. 24. Yabe in Tokyo bot. Mag. XVII. p. 197. Kom. l.c. II. p. 339.

NOM. JAP. Kusano-ō.

HAB. Korea: sine loco speciali (Perry).

Kyōng-geui: Prope Seoul (京城). Apr. 1886. fl. (Kalinowsky).

Chhyōng-nyang-li (靑涼里). Jul. 27. 1902.; Nam-san (南山) Oct. 11. 1900. fl. et fr. (T. Uchiyama).

Kang-nön : Kum-gang-san (金剛山) Aug. 20. 1902. (T. Uchiyama).

DISTR. Europa, Africa, Asia et America bor.

### PAPAVER L. (sp. 1.)

*Papaver alpinum* L. Sp. Pl. (ed. II). p. 725. DC. Prodr. I. p. 118. Maxim. Prim. Fl. Amur. p. 35. 468. 480. in Act. h. Petrop. XI. p. 44. Regel Tent. Fl. Uss. n. 19. Pl. Radd. p. 127-133. Korsch. Act. h. Petrop. XII. p. 305. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 34. Kom. Fl. Mansh. II. p. 340.

*P. nudicaule* L. Sp. Pl. (ed. II). p. 507. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 354. Gray et S. Watson Syn. Fl. N. Amer. I. i. p. 89. Bunge Enum. Pl. Chin. bor. n. 22.

HAB. Phyöng-an : Monte Schang-pei-schan (長白山) Jul. 9. 1905. alab. (T. Imagawa).

DISTR. Asia bor. et centr. et America bor.

### CORYDALIS VENT.

#### Clavis specierum.

#### A. Radices fibrosæ.

a) Semina nitida levia.

α) Flores flavi ..... *C. Raddeana* REGEL.

β) Flores rosei ..... *C. Bungeana* TURCZ.

b) Semina elevato-punctata.

α) Planta 1-3 pedalis ..... *C. pallida* (THUNB.) PERS.

β) Planta 4 pedalis v. altior ..... *C. gigantea* TRAUT. et MEY.

#### B. Radices tuberosæ.

a) Segmentis foliorum oblongo-cuneatis, integris v. apice 1-3 fidis.

..... *C. bulbosa* DC.

b) Segmentis foliorum rotundatis apice pectinatoincisis.

.....*C. bulbosa* DC. v. *retundiloba* MAXIM.

*Corydalis Raddeana* REGEL. Pl. Radd. I. p. 145. Fr. Schmidt  
l.c. p. 32.

NOM. JAP. Miyama-keman ; Tsurukeman.

HAB. Kyöng-geui : Peuk-han-san (北漢山). Oct. 14. 1900 fl. et fr.  
(T. Uchiyama).

Kang-uön : Prope Chho-mok-dong (草木洞). Aug. 11. 1902. fl.  
et fr. Kum-gang-san (金剛山). Aug. 20. 1902. fl. (T. Uchiyama).

DISTR. Sibiria, China bor, Manshuria et Japonia.

*Corydalis Bungeana* TURCZ. Kom. l.c. II. p. 348.

HAB. In Korea bor. (Komarov).

DISTR. Sibiria et Manshuria.

*Corydalis pallida* (THUNB.) PERS. DC. Prodr. I. p. 129. Sieb.  
et Zucc. Fl. Jap. p. 174. Maxim. Prim. Fl. Amur. suppl. Ind.  
Fl. Pek. p. 469. Miq. l.c. III. p. 13. Franch. et Sav. l.c. I.  
p. 31. Fran. Pl. Day. p. 30. Henry List of plant of Form. p.  
17. Forbes et Hemsl. l.c. p. 38. Engl. et Prantl. l.c. III. 2.  
p. 144. Diels l.c. p. 355. Itō et Matsum. l.c. p. 294. Kom.  
l.c. II. p. 345. Matsum. et Hayata Enum. Pl. Form. in l.c. p.  
20. Palib. l.c. I. p. 24.

*Corydalis aurea* Willd. var. *speciosa* Regel, Fran. et Sav. l.c. II.  
p. 275.

*Corydalis heterocarpa* Sieb. et Zucc. l.c. I. p. 173.

*Corydalis speciosa* Maxim. Prim. Fl. Amur. p. 39.

*Corydalis Wilfordi* Regel Pl. Radd. I. p. 148. Miq. Prol. Fl.  
Jap. p. 201. Fran. et Sav. l.c. I. p. 30. II. p. 275.

*Fumaria lutea* Thunb. Fl. Jap. p. 277.

*Fumaria pallida* Thunb. Willd Sp. Pl. III. p. 865.

NOM. JAP. Kikeman.

HAB. In archipelago Koreano : Port Hamilton (Wilford). In Korea bor. (Komarov).

Kyōng-geui : Scoul (京城). *Tuck-Tschu-ab* Apr. 1894 fl. (Sontag).

Peuk-han-san (北漢山). Oct. 14. 1900 fl. et fr. (T. Uchiyama).

Kyōng-sang : Mul-geum (勿禁) Oct. 11. 1902. fl. et fr. (T. Uchiyama).

DISTR. Sibiria, China, Manshuria et Japonia.

var. *platycarpa* MAXIM. Palib. l.c. I. p. 24.

NOM. JAP. Hama-Kikeman.

HAB. In archipelago Koreano : Port Hamilton (Oldham).

Kyōng-sang : Pu-san (釜山).

DISTR. Sibiria, Manshuria, China et Japonia.

*Corydalis gigantea* TRAUTV. et MEY. Kom. Fl. Mansh. II. p. 343.

HAB. In Korea bor.—ex Kom.

DISTR. Manshuria.

*Corydalis bulbosa* DC. Prodr. I. p. 127. Fran. et Sav. Enum. Pl. Jap. I. p. 29. Fran. Pl. Dav. p. 28. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 36.

*C. ambigua*  $\beta$ . *amurensis* Maxim. Prim. Fl. Amur. p. 37.

*C. digitata* Pers. Syn. Pl. II. p. 269.

*C. gamosepala* Maxim. Prim. Fl. Amur. p. 38.

*C. Halleri* Spr. Syst. Veg. III. p. 160.

*C. incisa* Pers. var. ? in Catalogue Pl. Herb. Coll. Sci. Imp. Univ. Tokyo p. 271.

*C. remota* Fisch. in Maxim. Prim. Fl. Amur. p. 37. Baker. et Moore in Journ. Linn. Soc. XVII. p. 378. Fr. Schmidt. Amur. p. 33. Kom. Fl. Mansh. II. p. 349.

*C. solida* Sm. Ledeb. Fl. Ross. I. p. 100. Miq. Prol. Fl. Jap.

in Ann. Mus. Bot. Lugd. Bat. III. p. 12. Palib. Consp. Fl. Kor. I. p. 24.

*C. solida* L. (non Sm.) in Regel. Pl. Radd. I. p. 138.

HAB. Kyöng-geui: Prope Seoul. Apr. 1886. fl. (Kalinowsky). *Schin-Ku-Kai* Apr. 18. 1894; Hut-Tschai-Meo. Mai 1. 1894.; in ditione Seculensi; Mons Yisan. Mai 28. 1894. fl. (Sontag)—ex Palib. Seoul (京城). Mai. 1908 fl. (K. Jō.)

γ. *rotundiloba* MAXIM. Prim. Fl. Amur. p. 38.

β. *rotundiloba* Regel Pl. Radd. I. p. 139.

α. *rotundiloba* Miq. l.c. III. p. 12. Fran. et Sav. l.c. I. p. 29.

4. *rotundiloba* Kom. Fl. Mansh. II. p. 351.

HAB. Kyöng-geui: Phung-to (豊島). Ko-on-pho (古溫浦). 1900. (T. Uchiyama).

Chyöl-la: Sine loco indicato (Enuma).

DISTR. Sp. Sibiria et Manshuria.

## CRUCIFERÆ

### Clavis generum.

A. Siliqua elongata, per totam longitudinem dehiscens.

a) Cotyledones accumbentes.

α) Siliqua varia, valvis turgidis .....*Nasturtium* R. Br.

β) Siliqua tetragono-anceps .....*Barbarea* R. Br.

γ) Siliqua anguste lineari-elongata.

○ Valvis non elasticis .....*Arabis* L.

○○ Valvis elasticis.

□ Rhizoma ± squamosum .....*Dentaria* L.

□□ Rhizoma non squamosum .....*Cardamine* L.

b) Cotyledones incumbentes.

α) Stamina longiora connata .....*Dontostemon* ANDRZ.

β) Stamina libera.

- Siliqua elongata, teres v. compressa .....*Sisymbrium* L.  
 ○○ Siliqua elongata tetragono .....*Erysium* L.
- B. Siliqua brevis ; per totam longitudinem dehiscens.
- a) Cotyledones incumbentes.....*Capsella* MÆNCH.  
 b) Cotyledones accumbentes.
- a) Siliqua exalata .....*Draba* L.  
 β) Siliqua alata.....*Thlaspi* L.
- C. Siliqua elongata indehiscens .....*Raphanus* L.

**NASTURTIUM** R. BR.**Clavis specierum.**

- A. Pl. glaberrima.
- a) Siliqua elongata linearis .....*N. montanum* WALL.  
 b) Siliqua elliptica v. oblongo-elliptica .....*N. palustre* DC.
- B. Pl. hispida, siliqua globosa .....*N. globosum* TURCZ.

*Nasturtium montanum* WALL. Maxim. Prim. Fl. Amur. p. 42. Suppl. Ind. Fl. Pek. p. 469. Hooker et Thom. Præc. ad. Fl. Ind. in Journ. Linn. Soc. V. p. 139. Hook. Fl. Brit. Ind. I. p. 134. Miq. Prol. Fl. Jap. in l.c. III. p. 71. Fr. Schmidt. l.c. p. 111. Fran. et Sav. l.c. I. p. 32. Fran. Pl. Dav. p. 31. Henry. l.c. p. 17. Forbes et Hemsl. l.c. p. 40. Itō et Matsum. l.c. p. 297. Boiss. in Bull. du l'Herb. Boiss. (1899). p. 781. Palib. l.c. I. p. 25. Yabe l.c. p. 197. Matsum. et Hayata l.c. p. 22.

NOM. JAP. Inugarashi.

HAB. Kyōng-geui: Ō-ryu-kol (梧柳洞). Oct. 12. 1900 fl. et fr. (T. Uchiyama).

Kyōng-sang: Port Fusan (Wilford).

DISTR. Japonia, China, India et Java.

*Nasturtium palustre* DC. Prodr. I. p. 137. Ledeb. Fl. Ross.



I. p. 112. Baker et Moore l.c. p. 378. Miq. l.c. II. p. 71. Fran. et Sav. l.c. I. p. 32. Hook. Handb. New. Zealand Fl. p. 10. Benth. Fl. Austral. I. p. 65. Hook. fil. Fl. Brit. Ind. I. p. 133. Fl. Brit. Isl. p. 28. Hook. et Arn. Bot. Beech. Voy. p. 135. Fran. Pl. Dav. p. 31. Maxim. Pl. Chin. p. 50. Diels l.c. p. 46. Thomè l.c. II. p. 186. Boiss. in Bull. du l'Herb. Boiss. (1899). p. 782. Palib. Materials. Fl. Kwantung. Pen. p. 16. Kom. Fl. Mansh. II. p. 358.

*Nasturtium palustre* DC. var. *genuinum* Regel in Pl. Radd. I. p. 152.

*Nasturtium terete* R. Br. in A. Gray. et S. Watson. Fl. N. Am. p. 147.

NOM. JAP. Sukashitagobō.

HAB. Kyōng-geui: Chyōng-nyang-li (清涼里). Oct. 17. 1900. fl. et fr.; Prope Yōng-deung-pho (永登浦). Jul. 24. 1902. fl. et fr.; Yong-san (龍山). Sept. 3. 1902. fl. et fr. (T. Uchiyama).

DISTR. Europa, Asia, Australia et America bor.

*Nasturtium globosum* Turcz. Hance in Journ. Linn. Soc. XIII. p. 76. Maxim. Prim. Fl. Amur. p. 42. Suppl. Ind. Fl. Pek. p. 469. Henry l.c. p. 17. Forbes et Hemsl. l.c. p. 39. Diels l.c. p. 357. Boiss. l.c. p. 78. Kom. l.c. p. 360. Matsum. et Hayata l.c. p. 22.

*Nasturtium cantoniense* Hance in Journ. Bot. Vol. III. (1865). p. 378.

*Cochlearia globosa* Ledeb. Fl. Ross. I. p. 159.

var. *brachypetalum* nov. Petalis calyce  $\frac{1}{2}$  brevioribus.

HAB. Kang-uön: Chhyang-do (昌道). Aug. 9. 1902. fl. et carp. jun. (T. Uchiyama).

DISTR. sp. Sibiria, China et Yezo.

**BARBAREA** R. BR. (sp. 1.)

*Barbarea vulgaris* R. BR. DC. Prodr. I. p. 140. Ledeb. Fl. Ross. I. p. 114. Hook. et Thom. Præc. ad Fl. Ind. in l.c. V. p. 139. Oliver. Fl. Trop. Afr. I. p. 59. Hook. fil. Fl. Brit. Ind. I. p. 134. Fl. Brit. Isl. p. 26. Miq. l.c. II. p. 72. Benth. Fl. Austral. I. p. 66. Fran. et Sav. l.c. I. p. 32. K. Miyabe Fl. Kurile Isl. p. 217. Thomè l.c. II. p. 172. Pl. 272. E De Halácsy. Consp. Fl. Græc. I. p. 59. Kom. l.c. II. p. 357.

*Barbarea vulgaris* R. BR.  $\gamma$ . *striata* Regel in Pl. Radd. I. p. 155.

NOM. JAP. Yamagarashi.

HAB. Kyōng-geui: Phung-to (豊島), Ko-on-pho (古温浦). fl. 1900.  
(T. Uchiyama).

Chyōlla: So-an-do (所安島). (Eauuna).

In Korea bor. (Komarov).

DISTR. Europa, Asia temp., Africa bor. et med. et Australia.

**ARABIS** L.**Clavis specierum.**

A. Siliquæ plus minus pendulæ.....*A. pendula* L.

B. Siliquæ erectæ.

a) Plantæ subglabræ.

α) Foliis dentatis amplexicaulibus.....*A. perfoliata* LAM.

β) Foliis lyratis, petiolulatis .....*A. lyrata* L.

b) Plantæ hirsutæ.

α) Plantæ crassiusculæ dense contractæ.....*A. Stelleri* DC.

β) Plantæ plus minus elatæ.

○ Foliis amplexicaulibus .....*A. hirsuta* Scop.

○○ Foliis petiolatis v. sessilibus.

△ Foliis sublyratatis .....*A. Halleri* L.

△△ Foliis integris.....*A. axillaris* KOM.

*Arabis pendula* L. Sp. Pl. (ed. II). p. 930. DC. Prodr. I. p. 147. Ledeb. Fl. Ross. I. p. 122. Maxim. Prim. Fl. Amur. p. 44. et Pl. Chin. p. 51. Fr. Schmidt. l.c. p. 112. Regel Pl. Radd. I. p. 169. Miq. l.c. II. p. 72. Fran. et Sav. l.c. I. p. 33. Forbes et Hemsl. l.c. p. 42. Boiss. in Bull. du l'Herb. Boiss. (1899). p. 786. Kom. l.c. II. p. 375.

NOM. JAP. Ezohatazao.

HAB. Hoang-hai: Inter Kai-syöng (開城). et Kum-chhyön (金川) Sept. 5. 1902. fl. et fr.; Inter Syö-heung (瑞興). et Phung-syu-uön (風壽院). Sept. 8. 1902. fl. et fr. (T. Uchiyama).

DISTR. Asia bor. et Japonia.

*Arabis perfoliata* LAM. Fran. et Sav. l.c. I. p. 34. Benth. et Hook. fil. Brit. Fl. (ed V). p. 29. Forbes et Hemsl. l.c. p. 42. Miyabe l.c. p. 217. A. Gray et S. Watson. l.c. I. p. 160. Boiss. l.c. p. 785. Palib. l.c. I. p. 26. Kom. l.c. II. p. 375.

A. glabra Crantz. Hook et Thome. Præc. ad Fl. Ind. in l.c. p. 140. Hook. fil. Fl. Brit. Ind. I. p. 135. Benth. Fl. Austral. I. p. 67. E. De Halácsy. l.c. I. p. 51.

Turritis glabra L. Sp. Pl. (ed. II). p. 930. DC. Prodr. I. p. 142. Ledeb. Fl. Ross. I. p. 166. Koch. Syn. Fl. Germ. et Helv. I. p. 33. Miq. Prol. Fl. Jap. in l.c. II. p. 72. Fr. Schmidt. l.c. p. 111. Thomè l.c. II. p. 183. Pl. 277.

NOM. JAP. Hatazao.

HAB. Ripa occidentalis (Perry). in archipelago Koreano (Wilford, Oldham. No. 48).

In Korea bor. (Komarov).

Kyöng-geui: Seoul (京城) Aug. 1883. fl. (Dr. Gottsche) Nam-san (南山). Jul. 16. 1902. fl. et fr. (T. Uchiyama).

DISTR. Europa, Asia, Australia et Am. bor.

*Arabis tyrata* L. Kom. Fl. Mansh. II. p. 377.

HAB. In Korea bor. (Komarov).

DISTR. Am. bor. Mansh. et Japonia.

*Arabis Stelleri* DC. Palib. Consp. Fl. Kor. I. p. 26. Forbes et Hemsl. l.c. p. 42.

HAB. In archipelago Koreano: Port Hamiltan (Wilford, Oldham.  
Nr. 52. 998.

DISTR. Japonia.

*Arabis Halleri* L. Kom. Fl. Mansh. II. p. 378.

HAB. in Korea bor. (Komarov).

DISTR. Europa, Manshuria et Japonia.

*Arabis hirsuta* Scop. Forbes et Hemsl. l.c. p. 42. Palib. l.c. p. 26.

HAB. Kyōng-sang: Port Fusan (Wilford).

DISTR. Europa, Asia, occid. et orient.

*Arabis axillaris* Kom. Fl. Mansh. II. p. 378.

HAB. In Korea septentrionali (Komarov).

Planta endemica.

### CARDAMINE L. (cum Dentaria).

#### Clavis specierum.

A. Rhizoma squamosum.

a) Segmentum folii lanceolatum, acuminatum ... *C. leucantha* O. SCHUTZ.

b) Segmentum folii rhomboideum v. oblongo-ovatum ... *C. (Dentaria) sp.?*

B. Rhizoma exsquamosum.

a) Folia trifoliolata ..... *C. tenuifolia* (LEDEB.) TURCZ.

b) Folia pinnata.

a) Plantae annuae, flores minuti 1.2-4 mm. longi.

..... *C. hirsuta* L. var. *sylvatica* LINK.

β) Plantæ perennes, flores majores 4–15 m.m. longi.

○ Folia caulina sessilia .....*C. lyrata* BUNGE.

○○ Folia caulina manifesto-petiolata.

△ Folia rhizomata ex superioribus diversa..*C. pratensis* L.

△△ Folia rhizomata ex superioribus vix diversa.

.....*C. prorepens* FISCH.

*Cardamine leucantha* (TAUSCH.) O. E. SCHUTZ. Monogr. der Gattung Cardamine in Engl. Bot. Jahrb. XXXII. p. 403.

*Cardamine dasyloba* Miq. in l.c. II. p. 73. Fran. et Sav. l.c. I. p. 36. II. p. 281. Diels l.c. p. 358.

*Cardamine macrophylla* Willd. DC. Prodr. I. p. 152. Ledeb. Fl. Ross. I. p. 128. Maxim. Prim. Fl. Amur. p. 45. Hook et Thom. Præc. ad Fl. Ind. in Journ. Linn. Soc. V. p. 145. Maxim. Mèl. Biol. IX. p. 10. Regel Pl. Radd. I. p. 176. Fr. Schmidt. l.c. p. 113. Fran. Pl. Dav. p. 34. Hook. fil. Fl. Brit Ind. I. p. 139. Maxim. Pl. Chin. p. 51. Boiss. in Bull. du l'Herb. Boiss. (1899). p. 793. Kom. Fl. Mansh. II. p. 363.

NOM. JAP. Konronso.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 21. 1902.

DISTR. Sibiria, China, India et Japonia.

*Cardamine (Dentaria)* sp.? Rhizoma crassiusculum, squama 3–5 mm. longa et lata, concava; caule erecto v. subdecumbente crassiusculo glaberrimo; foliis rhizomatibus pinnatis longe petiolatis bijugo-pinnatis terminalibus 3–4 c.m. longis. 2–2.5 c.m. latis; grosse denticulatis, dentis obtusis, lateralibus subsessilibus 3–3.5 c.m. longis 2–2.5 c.m. latis, caulibus 2–3 jugo-pinnatis, segmentis terminalibus inferiorum rotundatis hexagonoangulatis, 3–5 c.m. longis latisque, lateralibus terminalibus æquiformibus. 2–3 c.m. longis latisque, superiorum angustioribus grossedentatis, apice obtusis, basi subcuneatis 3–4 c.m. longis 1.5–3 c.m. latis, lateralibus

2.5-4 c.m. longis. 1-2.5 c.m. latis, ramis rhizomatoideis, cum radicibus, racemis terminalibus, pedicellis elongatis, siliquis linearibus vix stipitatis ad apicem attenuatis, stigmatibus crassiusculis, flores et semina nulla.

HAB. Kang-nön : Kum-gang-san (金剛山) Aug. 18. 1902. (T. Uchiyama).

*Cardamine tenuifolia* Turcz. Forbes et Hemsl. l.c. p. 44. Palib. l.c. I. p. 27.

HAB. Phyöng-an : Jugam Schang-pai-shan (長白山). in trajectu Laoling 2800 p. s.m. (Webster).

DISTR. Sibiria et Manshuria.

*Cardamine hirsuta* L. Sp. Pl. (ed. II). p. 915. DC. Prodr. I. p. 152. Ledeb. Fl. Ross. I. p. 127. Hooker et Thom. l.c. V. p. 146. Benth. et Müll. Fl. Austral. I. p. 70. Oliver. Fl. Trop. Africa. I. p. 60. Grisebach. Fl. Brit. West. Indian Isl. p. 13. Hook. Handb. of New Zealand. Fl. p. 12. Fl. Brit Ind. I. p. 138. Benth. et Hook. Brit Fl. p. 32. Fran. Pl. Dav. p. 34. Forbes et Hemsl. l.c. p. 43. E De Halácsy l.c. p. 56. Itō et Matsum. l.c. p. 297. A. Gray et S. Watson. l.c. I. p. 158. Thomè l.c. II. p. 181.

*Cardamine flexuosa* Withering. O. E. Schutz. Monogr. Gatt. *Cardamine* in Engl. Bot. Jahrb. XXXII. p. 473. Diels Fl. Chin. in l.c. XXIX. p. 358.

var. *sylvatica* LINK.

*Cardamine sylvatica* Link. in DC. Prodr. I. p. 152. Ledeb. Fl. Ross. I. p. 127. Hook. fil. Fl. Brit. Ind. I. p. 138. Miq. l.c. II. p. 73. Fran. et Sav. I. p. 35.

*Cardamine hirsuta* var. *sylvatica* Hook. in Bot. Beech. Voy. p. 6. *Cardamine hirsuta* var. *flexuosa* Withering in Forbes et Hemsl. l.c. p. 43. Palib. l.c. I. p. 27.

*Cardamine flexuosa* Withering in Kom. Fl. Mansh. II. p. 369.

*Cardamine flexuosa* var. *petiolulata* O. E. Schutz. Monogr. Gatt. Card. l.c. p. 473.

*Cardamine hirsuta* L. in Matsum. et Hayata l.c. p. 23.

NOM. JAP. Tanetsukebana.

HAB. Kyöng-geui: Seoul (京城): Mabon Mart. 4. 1884. fl.; Tschakol-Nan. Mart. 10. 1894. ster., *Hut-Schu-Mian*, Mart. 19. 1894. ster. in declivitate bor. montis Nam-san (南山). Mart. 28. 1894. fl. in ipsa urbe. Apr. 2. 1894. fl. (Sontag).

Chhyöng-nyang-li (清凉里). Oct. 17. 1900 fl. et fr. (T. Uchiyama).  
In archipelago Koreano: Port Hamilton (Oldham. Nr. 47.)

DISTR. Europa, Asia et America bor.

*Cardamine lyrata* BUNGE. Maxim. in Mém. Biol. IX. p. 6. Fran. et Sav. l.c. I. p. 36. Forbes et Hemsl. l.c. p. 43. Boiss. in Bull. du l'Herb. Boiss. (1899). p. 791. O. E. Schutz. Monogr. Gatt. Card. in l.c. p. 504. Kom. Fl. Mansh. II. p. 368.

NOM. JAP. Mizuta-garashi.

HAB. Kyöng-geui: Syong-työng (松亭). Sept. 28. 1902 str. (T. Uchiyama).

DISTR. Sibiria orient., China bor. et Japonia.

*Cardamine pratensis* L. Kom. Fl. Mansh. II. p. 366.

HAB. in Korea bor. (Komarov).

DISTR. Reg. temp.

*Cardamine prorepens* FISCHER. Kom. Fl. Mansh. II. p. 366.

HAB. in Korea bor. (Komarov).

DISTR. Sibiria et Manshuria.

### DONTOSTEMON ANDRZ. (sp. 1.)

*Dontostemon dentatus* LEDEB. Fl. Ross. I. p. 175. Maxim.

Prim. Fl. Amur. p. 45. Mém. Biol. IX. p. 12. Baker et Moore l.c. p. 378. Fran. Pl. Day. p. 36. Forbes et Hemsl. l.c. p. 45. Palib. Consp. Fl. Kor. I. p. 28. Materials for a Flora of Kwan-tung Penn. p. 16. Diels Beiträge zu Fl. Tsin-lin-shan in Engl. Bot. Jahrb. XXXVI. Beiblatt. p. 47. Kom. Fl. Mansh. II. p. 382.

NOM. JAP. Hanahatazao.

HAБ. Kyöng-san : Port Fusan (Wilford). In archipelago Koreano : Long-reach. (Oldham).

Kyöng-geui : Syong-do (松都). Oct. 23. 1901. fr., Nam-han-san (南韓山) Aug. 1. 1902, fl. et fr. (T. Uchiyama).

DISTR. Sibiria, Manshuria et Japonia.

### SISYMBRIUM L.

#### Clavis specierum.

A. Foliis oblongo-obovatis.....*S. Maximowiczii* PALIB

B. Foliis 2-3 pinnatisectis .....*S. Sophia* L.

*Sisymbrium Maximowiczii* PALIB. (Tab. nostra VI. f. I.) Palib. Consp. Fl. Kor. I. p. 28. t. 3. Matsum. in Tokyo. Bot. Mag. XVI. p. 17. Yabe in Tokyo. Bot. Mag. XVII. p. 197. Makino in Tokyo. Bot. Mag. XIX. p. 68 et p. 108.

Alyssi species dubia fr. deficiente Miq. in Ann. Mus. Bot. Lugd. Bat II. p. 200.

Arabis sp. n.? Forbes et Hemsl. l.c. p. 43.

NOM JAP. Hananazuna.

HAБ. Korea : Sine loco speciali (Carles). In archipelago Koreano : Tracey Isl. (Oldham. Nr. 58).

Kyöng-san : Fusan. (Enuma).

Kyöng-geui : Nam-han-san (南韓山). Aug. 1 et 2. 1902 (T. Uchiyama).



Kang-uön : Chhyun-chyön (春川) Aug. 1906. fl. (S. Shinogōri-yama).

DISTR. Japonia.

Hæc species semper flores pallide-purpureos habent, quamquam in exsiccatae in albos variant.

*Sisymbrium Sophia* L. Sp. Pl. (ed. II). p. 920. DC. Prodr. I. p. 193. Ledeb. Fl. Ross. I. p. 180. Hook. et Thomson l.c. p. 158. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Mong. p. 480. Regel Pl. Radd. I. p. 203. Fran. Pl. Dav. p. 36. Hook. Brit. Fl. p. 34. Maxim. Pl. Chin. p. 53. Forbes et Hemsl. l.c. p. 46. A. Gray et S. Watson. l.c. I. p. 139. E De Halácsy l.c. I. p. 70. Thomè l.c. II. p. 212. Kom. l.c. II. p. 355. Diels Beiträge zu Fl. Tsin-lin-shan in Engl. Bot. Jahrb. XXXVI. beiblatt. p. 46.

*Sophia sophia* L. in Hook. Fl. Brit. Ind. I. p. 150.

NOM. JAP. Kujiragusa.

HAB. Chyōlla : Sine loco speciali (Enuma).

DISTR. Europa, Asia et Am. bor.

### **ERYSIUM** L. (sp. 1.)

*Erysium aurantiacum* MAXIM. Kom. Fl. Mansh. II. p. 380.

HAB. in Korea bor. (Komarov).

DISTR. Tyrolia, Amur et Manshuria.

### **CAPSELLA**, MENCH. (sp. 1.)

*Capsella Bursa-pastoris*, MENCH. DC. Prodr. I. p. 177. Ledeb. Fl. Ross. I. p. 199. Maxim. Prim. Fl. Amur. p. 46. Suppl. Ind. Fl. Pek. p. 469. Hook. et Thomson. l.c. p. 172. Regel Pl. Radd. I. p. 201. Grisebach. Fl. Brit. W. Ind. Isl. p. 14. Benth. et Müll. Fl. Austral. I. p. 82. Benth. et Hook. Brit.

Fl. (ed. 5). p. 45 Harvey et Sonder Fl. Cap. I. p. 31. Oliver. Fl. Trop. Afr. I. p. 68. Miq. l.c. II. p. 75. Fr. Schmidt, l.c. p. 115. Hook. fil. Fl. Brit. Ind. I. p. 159. Fran. et Sav. Enum. Pl. Jap. I. p. 38. Hook. et Arn. Bot. Beech. Voy. p. 7. Maxim. Pl. Chin. p. 58. Forbes et Hemsl. l.c. p. 48. Henry l.c. p. 17. Miyabe l.c. p. 219. Itō et Matsum. l.c. p. 301. Diels, l.c. p. 358. Boiss. in Bull. du l'H. Boiss. (1899). p. 797. A. Gray et S. Watson. l.c. I. p. 131. Thomè l.c. II. p. 216. Pl. 295. E De Halácsy l.c. I. p. 115. Palib. l.c. I. p. 30. Kom. l.c. II. p. 372. Matsum. et Hayata l.c. p. 24. *Thlaspi siliculis obovatis* Gorteri, in S. G. Gmelin Fl. Sib. III. p. 253.

*Thlaspi Bursa-pastoris* L. in Fran. Pl. Dav. p. 39.

NOM JAP. Nazuna.

HAB. Kyōng-geui: Seoul (京城) Apr. 1886 fl. et fr. (Kalinowsky).

Inter Chemulpo (仁川) et Seoul (京城) Mart. 17. 1894, fl. (Sontag).

Chhyōng-nyang-li (清凉里) Oct. 17. 1900, fl. et fr. (T. Uchiyama).

DISTR. Europa, Asia, Amerika bor. Australia et Africa.

### DRABA L. (sp. 1.)

*Draba nemorosa* L. DC. Prodr. I. p. 171. Maxim. Prim. Fl. Amur. p. 45. Suppl. Ind. Fl. Mong. p. 480. Baker et Moore l.c. p. 378. Fran. Pl. Dav. p. 35. Fr. Schmidt, l.c. p. 34. Forbes et Hemsl. l.c. p. 41. Diels l.c. p. 358. Kom. l.c. II. p. 374.

HAB. Sine loco speciali (Carles.)

var. *hebecarpa* LEDEB. Fl. Ross. I. p. 154 et p. 756. Fran. Pl. Dav. p. 35. Regel Pl. Radd. I. p. 199. Miq. in Ann. Mus. Bot. Lugd. Bat. II. p. 74. Fran. et Sav. Enum. Pl. Jap. II.

p. 282. Maxim. Pl. Chin. p. 55. A. Gray et S. Watson. Syn. Fl. N. Am. p. 107.

NOM. JAP. Inu-nazuna.

HAB. Chhyun-Chhyöng: in ripas fluminum Paing-ma-gang (白馬江) et Chin-gang (鎮江). (Enuma).

Kyöng-geui (京畿道). *Seoul in decliv. bor. montis Nam-san* (南山). Mart. 28. 1894. fl. (Sontag).

var. *leiocarpa* LINDL. Ledeb. l.c.

HAB. Kyöng-geui (京畿道) Seoul Apr. 1885. fl. et fr. (Kalinowsky).

DISTR. Asia orient. et bor.

### THLASPI L. (sp. 1.)

*Thlaspi arvense* L. Sp. Pl. (ed. II). p. 901. DC. Prodr. I. p. 175. Ledeb. Fl. Ross. I. p. 162 et p. 756. Hook. et Thom. l.c. p. 176. Regel Pl. Radd. I. p. 201. Miq. in Ann. Mus. Bot. Lugd. Bat. II. p. 75. Oliver Fl. Trop. Afr. I. p. 90. Fran. et Sav. l.c. I. p. 39. Fran. Pl. Dav. p. 38. Hook. Fl. Brit. Isl. (ed. 5) p. 43. Fl. Brit. Ind. I. p. 162. Baker et Moore. l.c. p. 378. Forbes et Hemsl. l.c. p. 49. Maxim. Pl. Chin. p. 57. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 357. et Beiträge zu Fl. Tsin-lin-shan in ibidem XXXVI. Beiblatt p. 46. Boiss. in Bull. du l'H. Boiss. (1899). p. 597. Palib. Consp. Fl. Kor. I. p. 30. Thomè l.c. II. p. 188. Pl. 280. Kom. l.c. II. p. 353.

NOM. JAP. Gunpai-nazuna.

HAB. Korea sine loco speciali (Perry). Idem fr. (Enuma).

Kyöng-geui: Seoul Jul. 1886 fr. (Kalinowsky). Chemulpo Apr. 10. 1889. fl. (Dr. Bunge).

In archipelago Koreano. (Wilford. Nr. 691. Oldham. Nr. 49).

Korea bor. (Komarov).

DISTR. Europa, Asia et America bor.

**RAPHANUS L.****Clavis specierum.**

- A.* Siliqua bilocularis ..... *R. sativus* L.  
*B.* Siliqua unilocularis ..... *R. raphanistrum* L.

*Raphanus sativus* L. Sp. Pl. (ed. II). p. 935. DC. Prodr. I. p. 228. Thunb. Fl. Jap. p. 263. Ledeb. Fl. Ross. I. p. 225. Hook. et Thomson. l.c. 180. Maxim. Prim. Fl. Amur. p. 47. Miq. l.c. II. p. 76. Fr. Schmidt. l.c. p. 115. Fran. et Sav. l.c. I. p. 39. Hooker Fl. Brit. Ind. I. p. 166. Forbes et Hemsl. l.c. p. 50. Diels Fl. Centr. Chin. in l.c. p. 357. A. Gray et S. Watson. l.c. I. p. 133. Thomè l.c. II. p. 229. Pl. 305. E De Halácsy. l.c. I. p. 122. Kom. l.c. II. p. 357.

NOM. JAP. Daikon.

HAB. Kyōng-san : Phu-san (釜山) (Enuma).

DISTR. Europa, Asia et Am. bor.

*Raphanus raphanistrum* L. Forbes et Hemsl. l.c. p. 49. Palib. l.c. I. 30.

NOM. JAP. Hama-daikon.

HAB. Korea : Sine loco speciali (Carpenter).

Kyōng-geui : Seoul Mai 1886 fl. (Kalinowsky).

DISTR. Europa, Asia et America.

**VIOLACEÆ (gn. I.)****VIOLA L.****Clavis specierum.**

*A.* Caulescens.

*a)* Foliis cordato-acuminatis.

*a)* Stipulis parvis squamatis, fl. flavi ..... *V. uniflora* L.

β) Stipulis majoribus incisopinnatisectis; fl. albi.

.....*V. canina* L. var. *acuminata* REGEL.

b) Foliis lanceolatis.

a) Foliis brevipetiolatis.....*V. Websteri* HEMSLEY.

β) Foliis petiolis æquilongis.....*V. Raddeana* REGEL.

c) Foliis reniformibus.

a) Foliis apice acutis .....*V. verecunda*, A. GRAY.

β) Foliis apice obtusis .....*V. biflora* L.

B. Acaules.

a) Foliis 3-5 sectis .....*V. pinnata* L.

b) Foliis simplicibus.

a) Radice infra collum divisa.

○ Planta parva humilis; foliis cordato-rotundatis.

.....*V. variegata* FISCH.

○○ Foliis cordato-oblongis v. cordatodeltoideis v. lanceolatis.

△ Foliis glabris v. parce puberulis.

† Petiolis exalatis .....*V. japonica* LANGSD.

†† Petiolis alatis.

\* Foliis basi subsagittatis.

.....*V. Patrini* DC. var. *subsagittata* MAXIM.

\*\* Foliis basi cuneatis v. rotundatis v. subtruncatis.

( Floribus intense-violaceis.

.....*V. Patrini* DC. var. *chinensis* GING.

(( Floribus albis .....*V. Patrini* DC. a. *typica* MAXIM.

△△ Foliis dense pubescentibus.

† Floribus magnis, pedunculis apice glabris.

.....*V. hirtipes* S. MOORE.

†† Floribus mediocris; pedunculis pubescentibus.

.....*V. phalacrocarpa* MAXIM.

β) Rhizomate articulado.

○ Estolonibus.

△ Rhizomate simplice crasso .....*V. Rossi*, HEMSL.

△△ Rhizomate ramoso filiformi.....*V. epipsila* LEDEB.

## ○○ Stolonifera.

△ Stolones epigeos emittens.

† Foliis glabris, membranaceis .....*V. albida* PALIB.†† Foliis pubescentibus, crassiusculis...*V. serpens*, WALL.

△△ Stolones hypogaei.

† Foliis dense-hirsutis.....*V. hirta* L. var. *collina* REGEL.†† Foliis subglabris .....*V. Selkinki* GOLDII.

*Viola uniflora* L. Sp. Pl. (ed. II). p. 1329. DC. Prodr. I. p. 301. Ledeb. Fl. Ross. I. p. 255. Maxim. in Mém. Biol. IX. p. 751. Forbes et Hemsl. l.c. p. 56. Palib. Consp. Fl. Kor. I. 35. Kom. l.c. III. p. 71.

*Viola uniflora a. typica* Regel in Pl. Radd. I. p. 254.

*Viola biflora* var. Baker et Moore in Journ. Linn. Soc. XXVII. p. 379.

NOM. JAP. Kisumire.

HAB. Korea, sine loco speciali (Carles).

Phyöng-an: Jugam Schan-pai-shan (長白山) in trajectu Laoling (Webster).

Kyöng-geui: Seoul (京城) *Schin-Ku-Ku* Apr. 18. 1894. fl.; Thee-Mun-An-Tai-Kul Apr. 29. 1894. fl.; Hut-Tschai-Meo Mai 25. 1894. fl., (Sontag). Peuk-han-san (北漢山). Jul. 28. 1902. fr., (T. Uchiyama).

DISTR. Sibiria, China et Japonia.

*Viola Websteri*, HEMSL. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 56. Palib. l.c. I. p. 36.

HAB. Phyöng-an: Jugam Schan-pai-shan in trajectu Laoling 2800. p. s.m. (Webster).

Planta endemica.

*Viola Raddeana* REGEL. Forbes et Hemsl. l.c. p. 54. Palib. l.c. I. p. 35.

NOM. JAP. Tachisumire.

HAB. Korea sine loco speciali (Carles).

DISTR. Manshuria et Japonia.

*Viola canina* L. Sp. Pl. (ed. II). p. 1324. DC. Prodr. I. p. 298. Boiss. in Bull. du l'Herb. Boiss. (1900). p. 1080.

*V. acuminata*, *canina*, *sylvestris* et *arenaria* in Ledeb. Fl. Ross. I. p. 233-254.

*V. acuminata*, *canina*, et *sylvestris* in Maxim. Prim. Fl. Amur. p. 50-51.

*γ. acuminata* (LEDEB.) REGEL. in Pl. Radd. I. p. 247. Baker et Moore l.c. p. 379. Maxim. in Mél. Biol. IX. p. 796. Forbes et Hemsl. l.c. p. 52. Palib. l.c. I. p. 31. W. Becker in Bull. du l'Herb. Boiss. (1901). p. 852. Diels Beiträge zu Fl. des Tsin-lin-shan in Engl. Bot. Jahrb. XXXVI. Beiblatt. p. 79.

*V. acuminata* Ledeb. in Fl. Ross. I. p. 252. Maxim. Prim. Fl. Amur. p. 50. Suppl. Ind. Fl. Pek. p. 469. Fr. Schmidt. l.c. p. 115. Fran. Pl. Dav. p. 44. Kom. Fl. Mansh. III. p. 67.

NOM. JAP. Inu-sumire; Yezonotachitsubosumire.

HAB. Korea: sine loco speciali (Carles) in Korea bor. (Komarov).

Phyöng-an: Jugam Schan-pai-schan (長白山). in trajectu Laoling 2800 p. s. m. (Webster).

Kyöng-geti: Prope Seoul (京城附近). Aug. 1883. (Dr Gottsche). Apr. 1886. fr. (Kalinowsky). Thee-mun-an-tai-kul. Apr. 29. 1894. Van-tang-san Jun. 2. 1895 fl. (Sontag). Nam-san (南山) Jul. 18. 1902. fr.; Nam-han-san (南漢山). Oct. 18. 1900 fr. (T. Uchiyama).

DISTR. Asia bor.

*Viola verecunda* A. GRAY. Miq. Ann. Mus. Bot. Lugd. Bat. II. p. 155. Baker et Moore l.c. p. 379. Maxim. in Mél. Biol. IX.

p. 750. Henry List of Plant. Formos. p. 18. K. Miyabe Fl. Kuril. Isl. p. 219. Palib. l.c. I. p. 36. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 477. Boiss. in Bull. du l'Herb. Boiss. (1900). p. 1075. Kom. l.c. III. p. 71. Matsum. et Hayata l.c. p. 31.

V. japonica Fran. et Sav. Enum. Pl. Jap. I. p. 42.

NOM. JAP. Tsubo-sumire.

HAB. Kyōng-geui: Seoul (京城). Mai 1886 fl. (Kalinowsky). Thee-Mun-An-Tai-Kul Apr. 29. 1894. fl.; Hut-Tschai-Meo Mai 1. 1894. fl., Hon-Tschu-Wan Mai 4. 1894. fl.; in ditione Seouleni: *Pauck-Han Mai 9. 1886. fl.*, Yran-san Mai 18. 1894. fl., Tun-Kwan-Tai-Kul Apr. 24. 1895. fl., (Sontag). Nam-san (南山). Jul. 16. 1902. fr. (T. Uchiyama).

Kang-uön: Kum-gang-san (金剛山). Aug. 20. 1902. fr. (T. Uchiyama).

In Korea bor. (Komarov).

DISTR. China, Mansuria et Japonia.

*Viola biflora* L. Sp. Pl. (ed. II). p. 1326. DC. Prodr. I. p. 300. Ledeb. Fl. Alt. I. p. 261. Fl. Ross. I. p. 254. Fran. et Sav. Enum. Pl. Jap. II. p. 290. Hance in Journ. Bot. (1875). p. 131. Fran. Pl. Dav. p. 44. Maxim. in Mém. Biol. IX. p. 749. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 52. Kom. Fl. Mansh. III. p. 71.

NOM. JAP. Kibanano-Komauotsume.

HAB. Phyōng-an: Monte Schang-peï-schan (長白山) Jul. 9. 1905. carp. jun. (T. Imagawa).

In Korea bor.—ex Kom.

DISTR. Reg. temp. et bor.

*Viola Rossi* HEMSL. Forbes et Hemsl. l.c. p. 54. Palib. l.c. I.



p. 35. tab. II. Kom. l.c. III. p. 55. Makino in Tokyo Bot. Mag. XXI. p. 34.

V. Matsumuræ Makino in Tokyo Bot. Mag. XVI. p. 134.

NOM. JAP. Akebonosumire.

HAB. Kyōng-geui: Seoul (京城). in montibus (Carles) Apr. 1886. fl. (Kalinowsky). Schin-Ku-Kai Apr. 18. 1894. fl.; Thee-Mun-An-Tai-Kul Apr. 29. 1894. fl., Hut-Tschai-Meo Mai 1. 1894. fl. Montes prope viam ad Peking ducentem Mai 25. 1894. fl. Tun-Kwan-Tai-Kul Apr. 24. 1895. fl., in ditione Seoulensi: in monte Yi-san, Mai 28. 1894. fl. (Sontag). Nam-san (南山). Jul. 18. 1902. fr.; Jul. 20. 1902. fr. (T. Uchiyama). Seoul Mai. 1908. fl. (K. Jō).

DISTR. China, Manshuria et Japonia.

*Viola epipsila* LEDEB. Kom. Fl. Mansh. III. p. 61.

HAB. in Korea bor. (Komarov).

DISTR. Sibiria et Manshuria.

*Viola hirta* L. Sp. Pl. (ed. II). p. 1324. Thunb. Fl. Jap. p. 326. DC. Prodr. I. p. 295. Maxim. in Mél. Biol. IX. p. 737. Forbes et Hemsl. l.c. p. 52. Boiss. in Bull. du l'Herb. Boiss. (1900). p. 1079. W. Becker in ibidem. (1901). p. 853.

β. *collina* REGEL. Pl. Radd. I. p. 236. Maxim. in Mél. Biol. IX. p. 707. Palib. Consp. Fl. Kor. I. p. 32.

V. *collina* Bess. in Ledeb. Fl. Ross. I. p. 249. Maxim. Prim. Fl. Amur. p. 47. Fran. et Sav. Enum. Pl. Jap. II. p. 648.

NOM. JAP. Yezaoisumire.

HAB. Kyōng-geui: Seoul (京城). Schin-Ku-Kai Apr. 18. 1894. fl. et defl.; Hut-Tschai-Meo Mai 1. fr. (Sontag). Nam-san (南山). Jul. 20. 1902. fr. (T. Uchiyama). Seoul Mai. 1908. fl. (K. Jō).  
Kang-nŏn: Kum-gang-san (金剛山). Aug. 15. 1902. fr. mat. (T. Uchiyama).

In archipelago Koreano (Oldham).

DISTR. Rossia et Asia bor.

*Viola albida* PALIB. Consp. Fl. Kor. I. p. 31. t. II. f. 2.

HAB. Kyōng-geui: Seoul (京城). Schin-Ku-Kai Mai 18. 1894. fl.;  
Thee-Mun-An-Tai-Kul Apr. 29. 1894. fl., *Hut-Tschai-Meo Mai* 1.  
1894. fl. (*Soutay*). Nam-han-san (南韓山). Oct. 18. 1900. fr.  
Peuk-han-san (北漢山). Jul. 28. 1902. fr. (T. Uchiyama). Seoul  
Mai. 1908. fl. (K. Jō).

Planta endemica.

*Viola serpens* WALL. DC. Prodr. I. p. 296. Hooker fil. Fl. Brit. Ind. I. p. 184. Maxim. Mém. Biol. IX. p. 739. Aitchison in Journ. Linn. Soc. XVIII. p. 35. Pl. XI. A. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 55. Diels in Engl. Bot. Jahrb. XXXVI. beiblatt p. 78. Kom. Fl. Mansh. III. p. 62.

*V. aspera* Ging. DC. Prodr. I. p. 295.

*V. confusa* Champ. in Benth. Fl. Hongk. p. 20.

*V. Wrightiana* Wight. Icon. Pl. Ind. Orient. 943.

*V. canescens* Wall. in Journ. Linn. Soc. XVIII. Pl. XI. 13.

HAB. In Korea bor. (Komarov).

Kang-nōn: Kum-gang-san (金剛山). Aug. 14. 1902 (T. Uchiyama).

DISTR. Malaya, India, China et Manshuria.

*Viola pinnata* L. Specimina nostra magni pretii sunt. Unum eorundem tria foliorum exempla, videlicet, *V. pinnatæ* var. *Chærophylloidis*, var. *Sieboldianæ* et *V. dactyloidis* habet. Cetera habent 2 exempla videl. *Sieboldianæ* et *chærophylloidis* vel *chærophylloidis* et *dactyloidis*. 23 specimina habemus et omnia (præter 2 *Sieboldianas* et 1 *dactyloidem*) manifestant quæ supra indicavi; ita *V. dactyloidem* in *V. pinnata* reducere debeo.

Varietates sieboldiana et charophylloides, contra, pretium formæ vix habent.

*L.* Sp. Pl. (ed. II). p. 1323. DC. Prodr. I. p. 293. Ledeb. Fl. Ross. I. p. 243. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 469. et Ind. Fl. Mong. p. 480. Baker et Moore in Journ. Linn. Soc. XVII. p. 379. Maxim. in Mél. Biol. IX. p. 717. Miq. in Ann. Mus. Bot. Lugd. Bat. II. p. 152. Fran. Pl. Dav. p. 41. Fran. et Sav. Enum. Pl. Jap. I. p. 40. Kom. Fl. Mansh. III. p. 48.

*V.* pinnata  $\beta$ . dissecta,  $\gamma$ . Sieboldiana,  $\delta$ . charophylloides, Maxim. in Mél. Biol. p. 717-719.  $\gamma$ . dissecta et  $\delta$ . charophylloides Regel. Pl. Radd. I. p. 219. var. dissecta Ledeb. Fl. Ross. I. p. 243. Maxim. Prim. Fl. Amur. p. 47.

*V.* dactyloides Roem. et Schult. Syst. V. 351. Ledeb. Fl. Ross. I. p. 244. Regel Pl. Radd. I. p. 214. DC. Prodr. I. p. 293. Maxim. Prim. Fl. Amur. p. 40. in Mél. Biol. IX. p. 719. Palib. Consp. Fl. Kor. I. p. 32. Kom. Fl. Maush. III. p. 50.

NOX. JAP. Ezo-Sumire.

DISTR. Kyōng-geui: Seoul Apr. 1886. fl. (Kalinowsky). Seoul Shin-Ku-Kai Apr. 18. 1894. fl.; Thee-Mun-An-Tai-Kul. Apr. 29. 1894. fl. Hut-Tschai-Meo. Mai. 1. 1894. fl. et fr., in Monte Yran-san. Mai 18. 1894. fl.; Tun-Kwan-Tai-Kul. Apr. 24. 1895. fl. (Sontag). Nam-san (南山). Jul. 18. 1892. fr., Peuk-han-san (北漢山). Jul. 28. 1902. fr. (T. Uchiyama). Seoul Mai 25. 1894. (Sontag). Sine loco specialī Oct. 1900. (T. Uchiyama). Seoul Maio 1908. fl. (K. Jō).

In archipelago Koreano (Oldham).

DISTR. Asia bor. et Japonia.

*Viola variegata* Fisch. DC. Prodr. I. p. 297. Ledeb. Fl. Ross. I. p. 244. Maxim. Prim. Fl. Amur. p. 48. Suppl. Ind. Fl. Pek. p. 469. in Mél. Biol. IX. p. 728. Baker et Moore l.c.

p. 379. Fran. et Sav. l.c. II. p. 286. Fr. Schmidt l.c. p. 34. Fran. Pl. Dav. p. 42. Forbes et Hemsl. l.c. p. 56. Palib. l.c. I. p. 36. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 477. Beiträge zu Fl. Tsin-lin-shan in Engl. Bot. Jahrb. XXXVI. beiblatt. p. 77. Palib. Materials Fl. Kwan-tung. Penn. p. 25. Kom. Fl. Mansh. III. p. 57.

*V. variegata* *a.* *typica* Regel Pl. Radd. I. p. 226.

NOM. JAP. Fuirinogenjisumire.

HAB. Korea: Sine loco speciali (Carles).

Kyöng-geui: Seoul (京城) Tuck-Tschu-ab. Apr. 23. 1894. fl. (Sontag). Nam-san (南山). Jul. 25. 1902. fr., Penk-han-san Jul. 28. 1902. fr. (T. Uchiyama).

DISTR. China bor. Japonia et Sachalin.

*Viola hirtipes* S. MOORE. Forbes et Hemsl. l.c. p. 53. Palib. l.c. I. p. 33. Kom. l.c. III. p. 55.

NOM. JAP. Sakurasumire.

HAB. Kyöng-geui: Seoul: montes prope urbem (Carles) Ibidem: Schin-Ku-Kai. Apr. 18. 1894. fl.; Hut-Tschai-Meo. Mai 1. 1894. fl., *Tun-Kwan-Tai-Kul.* Apr. 24. 1895. fl. (Sontag). Seoul Maio 1908. fl. (K. Jō).

In Korea bor. (Komarov).

DISTR. Manshuria et Japonia.

*Viola phalacrocarpa* MAXIM. in Mém. Biol. IX. p. 726. Palib. Consp. Fl. Kor. I. p. 34. Materials for a flora of the Kwang-tung-peninsula p. 25. Boiss. in Bull. du l'Herb. Boiss. (1900). p. 1079. Makino in Tokyo. Bot. Mag. II. p. 252. Kom. Fl. Mansh. III. p. 56.

*V. conilii* Fran. et Sav. Enum. Pl. Jap. II. p. 285.

NOM. JAP. Akanesumire.

HAB. Kyöng-geui: Chemuplo (仁川). Apr. 10. 1889. fl. (Dr. Bunge). ibidem. Nov. 1900. (T. Uchiyama). Seoul (京城): Mabon. Mart.

4. 1894. fl., Tscha-Kol-Nau Mart. 10. 1894. fl., Inter Chemulpo et Seoul (京城仁川間). Mart. 17. 1894. fl. Hut-Schu-Mian. Mart. 19. 1894. fl., Arvia-Tai-Kul. Mart. 23. 1894. fl. in declivitate bor. montis Namsan Mart. 28. 1894. fl. (Sontag). ibidem Jul. 20. 1902. fr. (T. Uchiyama). Thee-Mun-An-Tai-Kul. Apr. 29. 1894. fl., Hut-Tschai-Meo. Mai 18. 1894. fl., Han-Tschai-Wan. Mai 4. 1894. fl., Yran-san. Mai 18. 1894. fl. et defl.; Tun-Kwan-Tai-Kul. Apr. 24. 1895. fl., *prope Tap-Tong. Mai 20. 1895. fl.*, Van-Tan-San. Jun. 2. 1895. fl. (Sontag).

DISTR. Maushuria et Japonia.

*Viola Patrini* DC. Prodr. I. p. 293. Ledeb. Fl. Ross. I. p. 245. Maxim. Prim. Fl. Amur. p. 48. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. II. p. 132. Baker et Moore l.c. p. 379. Hooker fil. Fl. Brit. Ind. I. p. 182. Fran. Pl. Dav. p. 41. Forbes et Hemsl. l.c. p. 53. Itō et Matsum. l.c. p. 306. V. Patrini DC. *α. typica* Maxim. in Mél. Biol. IX. p. 721. *α. typica et angustifolia* Regel. Pl. Radd. I. p. 230.

NOM. JAP. Shirobanasumire.

HAB. In Korea bor. (Komarov):

Korea, locus et datum sunt ignoti (specimina ex dom. Tanaka ad dom. Makino missa sunt).

var. *chinensis* GING. DC. Prodr. I. p. 293. Maxim. in Mél. Biol. IX. p. 722. Pl. Chin. p. 60. Palib. Consp. Fl. Kor. I. p. 33. Materials for the Kwan-tung peninsula p. 25. Makino in Tokyo Bot. Mag. Vol. XIV. p. 174. Boiss. in Bull. du l'Herb. Boiss. (1900). p. 1078. Diels Beiträge zu fl. Tsin-lin-shan in Engl. Bot. Jahrb. XXXVI. beiblatt. 77.

V. Patrini DC. var. *Gmeliniana* Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 74. et Fran. et Sav. Enum. Pl. Jap. I. p. 41.

NOM. JAP. Sumire, Sumotoribana.

HAB. Kyōng-geui: Seoul (京城). Apr. 1886. fl. (Kalinowsky). Ai-o-

Quoi. Feb. 20. 1894. Mabon. Mart. 4. 1894. fl., *Inter Chemulpo et Seoul* (京城仁川間). Mart. 17. 1894. fl.; Hut-Schu-Mian. Mart. 19. 1894. fl., in declivi. bor. montis Namsan. Mart. 28. 1894. (Sontag). in monte Namsan (南山). Jul. 25. 1902. ibidem. Oct. 11. 1900. fl. et fr. (T. Uchiyama). Seoul (京城). Maio 1908. fl. (K. Jō). *in urbe Seoul Apr. 2. 1894. fl.*, Schin-Ku-Kai. Apr. 18. 1894. fl., Hut-Tschai-Meo. Mai. 1. 1894. fl. et fr., Tun-Kwan-Tai-Kul. Apr. 24. 1895. fl.; In ditione Seoulensi: in monte Yran-san. Mai. 18. 1894. defl. (Sontag). Chemulpo Apr. 10. 1889. fl. (Dr. Bunge). ibidem. Nov. 30. 1900. fl. et fr. (T. Uchiyama). Peuk-han-san (北韓山). Jul. 28. 1902. fr., Nam-han-san (南韓山). Aug. 1. 1902. fr. (T. Uchiyama).

In archipelago Koreano: Port Hamilton. (Oldham).

DISTR. India China et Japonia.

var. *subsagittata* MAXIM. Prim. Fl. Amur. p. 49. Regel Pl. Radd. I. p. 231. Palib. l.c. I. p. 34. Boiss. in Bull. du l'Herb. Boiss. (1900). p. 1078. Diels Beiträge zu Fl. des Tsin-lin-shan in Engl. Bot. Jahrb. XXXVI. beiblatt. p. 77.

V. Patrini DC. *a. triangularis* Fran. et Sav. Enum. Pl. Jap. I. p. 41. II. p. 285.

NOM. JAP. Sumire. Sumotoribana.

HAB. Kyōng-geui: Seoul (京城). Arvia-Tai-Kul. Mart. 23. 1894. fl.; *in ipsa urbe Apr. 2. 1894. fl.*; Inter Chemulpo et Seoul (仁川京城間). Mart. 17. 1894.; Schin-Ku-Kai. Apr. 18. 1894. fl., Hut-Tschai-Meo. Mai. 1. 1894. fl., Han-Tschu-Wan. Mai. 4. 1894. fl., Tun-Kwan-Tai-Kul. Apr. 24. 1895. fl., Prope Tap-Tong: Mai. 20. 1895. fl., in ditione Seoulensi: in montibus Yran-san Mai. 18. 1894.; Yisun Mai. 28. 1894. fl. (Sontag). Nam-san (南山). Jul. 18. 1902. Inter Phajyu et Kai-syōng (坡州開城間). Sept. 5. 1902. fr.; Chyang-ho-uōn (長湖院). Sept. 27. 1902. fl. (T. Uchiyama). Seoul. Maio 1908. fl. (K. Jō).

DISTR. China et Japonia.

*Viola japonica* LANGSD. DC. Prodr. I. p. 295. Maxim. in Mél. Biol. IX. p. 724. Fran. et Sav. Enum. Pl. Jap. I. p. 42. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 53. Palib. Consp. Fl. Kor. I. p. 32. Boiss. Bull. du P'Herb. Boiss. (1900). p. 1079. Henry. l.c. p. 18. Diels Fl. Tsin-lin-schan in Eng. Bot. Jahrb. XXXVI. Beiblatt. p. 77. Matsum. et Hayata. l.c. p. 29.

*Viola Kamtschatica* var. *pekinensis* Regel Pl. Radd. I. p. 230.

NOM. JAP. Kosumire.

HAB. in archipelago Koreano: Port Hamilton (Oldham).

Kyöng-geui: Nam-san (南山). Oct. 13. 1900. fl. et fr.; ibidem. Jul. 18 et 20. 1902; P'enk-han-san (北韓山). Jul. 28. 1902; Prope Chhyöng-nyang-li (清涼里近傍). Jul. 27. 1902. fr. Chemulpo (仁川) Nov. 30. 1900. fl. (T. Uchiyama).

Kang-nön: Ha-syön-ri (下仙里). Aug. 8. 1902. (T. Uchiyama).

Chhyöl-la: Mok-pho (木浦). Nov. 7. 1900. fl. (T. Uchiyama).

DISTR. India, China et Japonia.

*Viola Selkirkii* PURSH. DC. Prodr. I. p. 305. Maxim. Mél. Biol. IX. p. 730. Miq. Prol. Fl. Jap. p. 85. Fran. et Sav. Enum. Pl. Jap. I. p. 41. et II. p. 284. Franch. Pl. Dav. p. 42. Forbes et Hemsl. l.c. p. 55. Miyabe Fl. Kuril. Isl. p. 213. A. Gray et S. Watson l.c. I. p. 474. et p. 197. Makino in Tokyo. Bot. Mag. II. p. 352. et XVI. p. 130. Alp. Pl. of Japan. I. Pl. I. fig. 6.

*Viola borealis* Weinn. in Linnæa X. p. 66.

*V. kamtschatica* Gingins in Linnæa I. p. 406. Regel Pl. Radd. I. p. 227.

*V. imberbis* Ledeb. Fl. Alt. I. p. 257. Fl. Ross. I. p. 245.

*V. umbrosa* Fries. Ledeb. Fl. Ross. I. p. 248. Maxim. Prim. Fl. Amur. p. 48.

NOM. JAP. Miyamasumire.

HAB. Kang-uön : Ha-syön-ri (下仙里). Aug. 8. 1902. fr. (T. Uchiyama).

DISTR. America bor. et Asia bor.

## PITTOSPORACEÆ

### PITTOSPORUM BANKS. (sp. 1.)

*Pittosporum Tobira* ART. Hort. Kew. (ed. II). II. p. 27. DC. Prodr. I. p. 346. Sieb. et Succ. Fl. Jap. p. 132. Henry l.c. p. 18. Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 108. Prol. Fl. Jap. p. 272. Fran. et Sav. l.c. I. p. 44. Forbes et Hemsl. l.c. p. 58. Palib. Consp. Fl. Kor. I. p. 37. Matsum. et Hayata l.c. p. 33.

*Euonymus Tobira* Thunb. Fl. Jap. p. 99.

NOM. JAP. Toberanoki.

HAB. In archipelago Koreano : Port Hamilton (Wilford).

Kyöng-sang : Pu-san (釜山). Nov. 17. 1900. fr. mat. Mok-pho (木浦). Nov. 5. 1900. fr. mat. (T. Uchiyama).

DISTR. China et Japonia.

## POLYGALACEÆ (gn. 1.)

### POLYGALA L.

#### Clavis specierum.

- A.* Suffrutex, foliis brevipetiolatis ..... *P. sibirica* L.  
*B.* Herba, foliis longepetiolatis ..... *P. triphylla*, HAM.

*Polygala sibirica* L. Sp. Pl. (ed. II). p. 987. DC. l.c. I. p. 324. Ledeb. Fl. Ross. I. p. 269. Maxim. Prim. Fl. Amur. p.



52. Suppl. Ind. Fl. Pek. p. 469. Miq. Prol. Fl. Jap. p. 148. Fran. et Sav. Enum. Pl. Jap. I. p. 44. Baker et Moore. l.c. p. 379. Regel Pl. Radd. I. p. 212. Hook. fil. Fl. Brit. Ind. I. p. 205. Fran. Pl. Dav. p. 44. Forbes et Hemsl. l.c. p. 61. Bennett. Journ. of Bot XVI. p. 277. Kom. Fl. Mansh. II. p. 676.

*Polygala japonica* Houtt. DC. Prodr. I. p. 324. Sieb. et Zucc. Fl. Jap. p. 152. Baker et Moore. l.c. p. 379. Miq. Prol. Fl. Jap. p. 148. Benth. Fl. Austr. I. p. 139. Fran. et Sav. Enum. Pl. Jap. I. p. 45. Henry l.c. p. 18. Maxim. Pl. Chin. p. 64. Palib. Consp. Fl. Kor. I. p. 37. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 311. Kom. Fl. Mansh. II. p. 275. Matsum. et Hayata l.c. p. 34.

*Polygala vulgaris* L. in Thunb. Fl. Jap. p. 277.

NOM. JAP. Himehagi.

HAB. Kyōng-geui: Seoul (京城). Aug. 1883. (Dr. Gottsche), ibidem. Apr. 1886. fl.; Mai. 1886. fr. immat. (Kalinowsky). *Hon-Tschu-Wan. Mai. 4. 1894. fl.* in ditione Seoulenſi: Pauk-Han. Mai. 9. 1894., Van-Tang-San. Jun. 2. 1895. fl. (Sontag). Chemulpo Apr. 10. 1889. fl. (Dr. Bunge). Prope Chhyōng-nyang-li (清涼里附近). Jnl. 27. 1902. str.; Nam-han-san (南韓山). Oct. 19. 1900. ster.; Phung-to (豐島) fl. 1900. (T. Uchiyama).

Chyōlla: Insl. So-an-do (所安島) fl. (Enuma).

In Korea bor. (Komarov).

DISTR. Europa, Asia et Australia.

*Polygala triphylla* HAM. Forbes et Hemsl. l.c. p. 62. Palibin. l.c. I. p. 38.

HAB. Korea: sine loco speciali (Carles).

DISTR. China, India et Japonia.

**CARYOPHYLLACEÆ.****Clavis generum.**

- A. Calyx 5-dentatus.
- a) Calyx multistriatus, floribus conspicuis .....5 *Dianthus* L.
- b) Calyx 5-nervis, floribus parvis.....4 *Gypsophila* L.
- c) Calyx 10-nervis.
- a) Capsula dehiscens.
- Capsula 3 v. 6 valvis .....1. *Silene* L.
- Capsula 5-valvis .....2. *Lychnis* TOURN.
- β) Capsula indehiscens .....3. *Cucubalus* L.
- B. Sepala libera v. basi coalita.
- a) Stipellata.....12. *Tissa* ADANS.
- b) Exstipellata.
- a) Petala 2-partita.
- Capsula globosa.....6. *Stellaria* L.
- Capsula cylindracea .....7. *Cerastium* DILL.
- β) Petala integra.
- Gynæcium isomerum.....8. *Sagina* L.
- Gynæcium oligomerum.
- \* Valvis capsulae integris.....9. *Alsine* SCOP.
- \*\* Valvis capsulae 2-partitis.
- † Semina strophiolata .....11. *Mehringia* L.
- †† Semina exstrophiolata .....10. *Arenaria* L.

**SILENE L.****Clavis specierum.**

- A. Foliis ovatis v. ovato-lanceolatis v. cordato-ovatis.
- a) Fl. capitatis .....*S. capitata* KOM.
- b) Fl. laxis, longe pedicellatis .....*S. seoulensis* NAKAI.

## B. Foliis lanceolatis v. lineari-lanceolatis.

## a) Capsula carpophorum 2-4 plo superans.

α) Caulis repens.....*S. repens* PATRI.

## β) Caulis erectus.

○ Calyx 10-nervis.

△ Caulis ramosus, fl. axillares.

\* Inflorescentia viscida.....*S. foliosa* MAXIM. *a. typica* ROHRB.

\*\* Inflorescentia glabrescens.

.....*S. foliosa* MAXIM. *β. macrostyla* ROHRB.

△△ Caulis simplex v. subsimplex, fl. racemosi.

.....*S. tenuis* WILLD. var. *Jenissea* ROHRB.

○○ Calyx enervis .....*S. koreana* KOM.

## b) Capsula carpophorum 5-6 plo superans.

α) Planta erecta pubescens.....*S. aprica* TURCZ. var. *typica* ROHRB.

β) Planta erecta, pilosa. ....*S. aprica* TURCZ. var. *firma* S. et Z.

*Silene capitata* KOM. (Tab. nostra VI. f. II.) KOM. Fl. Mansh. II. p. 199. tab. IV. a.

HAB. Kang-uön : Prope Saing-Chhyang (生昌). Aug. 23. 1902. fl. et fr. (T. Uchiyama).

DISTR. Manshuria.

*Silene seoulensis*, nov. Tab. VII. Caule gracile ascendente, pubescente; nodi inferiores radices emittens. Foliis ovatis v. ovato-lanceolatis, acutis brevi-petiolatis v. sessilibus, pilosis; dichatio regulare, pedicellis elongatis gracillimis; calyce campanulato 5-dentato, 10 nervis, glabro; gynophorium ovarium æquilongum; petalis viride-ochroleucis, exsiccatis albis v. pallide-fuscescentibus apice dilatatis, 2-lobatis, lobis oblongis; staminibus 10, exertis, 5 petalis alternis, ceteris eis adherentibus; ovario globoso; stylis 3 exertis, apice pubescentibus, recurvatis, carpellis ovatis, 6 valvis, seminibus minute elevatopunctatis.

HAB. Kyōng-geui: Peuk-han-san (北漢山). Oct. 14. 1900. Carp. mat.; Nam-san (南山). Jul. 18. 1902. alabastr. fl. et carp. jun. (T. Uchiyama). Seoul (京城). Aug. 1906. (S. Shimogōriyama).  
Kyōng-sang: Chyang-ryōng-san (頂嶺山). Oct. 2. 1902. Carp. mat. et fl. (T. Uchiyama).

*Silene foliosa* MAXIM. Prim. Fl. Amur. p. 53. Rohrbach. Monog. Gatt. Silene p. 185. Kom. Fl. Mansh. II. p. 193.

*α. typica* ROHRB. in Linnæa XXXVI. p. 682. Williams Gn. Silene in Journ. Linn. Soc. XXXII. p. 142.

NOM. JAP. Yezomantema.

HAB. Kang-uön: Meuk-kai-dong (墨浦洞). Aug. 10. 1902. Carp. et fl. (T. Uchiyama).

DISTR. Amur, Manshuria et Japonia.

*β. macrostyla* ROHRB. l.c.

*Silene macrostyla* Maxim. in Kom. Fl. Mansh. II. p. 193.

HAB. in Korea bor. (Komarov).

DISTR. Sibiria et Manshuria.

*Silene tenuis* WILLD. DC. Prodr. I. p. 378. Rohrb. Monogr. p. 186. Williams in Journ. Linn. Soc. XXXII. p. 143. Kom. Fl. Mansh. II. p. 192.

var. *Jenissea* ROHRB. Monogr. p. 187. Korsch. Act. h. Petrop. XII. p. 312.

*S. tenuis* b. *Jenissea* Williams l.c.

*S. graminifolia* Otth. *α. grandiflora* b. in Ledeb. Fl. Ross. I. p. 307.

HAB. Kang-tō: Circa Sai-ryn-ka (細林河). Sept. 10. 1907. fl. et fr. (K. Maeda).

DISTR. Sibiria, Amur, et Manshuria.

*Silene koreana* KOM. Fl. Mansh. II. p. 198. tab. III. a.

HAB. In Korea bor. (Komarov).

Planta endemica.

*Silene repens* PATRI. Kom. Fl. Mansh. II. p. 195.

NOM. JAP. Biranji.

HAB. in Korea bor. (Komarov).

DISTR. Caucasus, Sibiria et Manshuria.

*Silene aprica* TURCZ. Ledeb. Fl. Ross. I. p. 317. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 469. Ind. Fl. Mong. p. 480. Baker et Moore in Journ. Linn. Soc. XVII. p. 380. Regel Pl. Radd. I. p. 317. Franch. Pl. Dav. p. 49. Rohrb. in Linnæa XXXVI. p. 684. Forbes et Hemsl. l.c. p. 64.

Melandryum apricum Rohrb. in Linnæa XXXVI. p. 239.

*a. typica* ROHRB. in Linnæa p. 685. Williams. in Journ. Linn. Soc. XXXII. p. 167. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 319. Beiträge zu Fl. des Tsin-lin-shan in ibidem. XXXVI. beiblatt. p. 37. Palib. Consp. Fl. Kor. I. p. 40.

*Silene aprica* Kom. Fl. Mansh. II. p. 196.

*Silene Oldhamiana* MIQ. in Ann. Mus. Bot. Lugd. Bat III. p. 187.

Melandryum Oldhamianum Rohrb. in Linnæa XXXVI. p. 241.

Melandryum apricum Rohrb. in Fran. et Sav. Enum. Pl. Jap. I. p. 48.

HAB. Kyöng-geui: Seoul (京城). Aug. 1883. (Dr. Gottsche). Mai. 1886. fl. (Kalinowsky).

Chyöl-la: So-an-do (所安島). (M. Enuma).

Kyöng-sang: Pu-san (釜山). Nov. 17. 1900. Mok-pho. Nov. 5. 1900. (T. Uchiyama).

In archipelago Koreano: Port Hamilton (Wilford).

In Korea bor. (Komarov).

DISTR. Sibiria, Mongolia, China, Manshuria et Japonia.

β. *firma* SIEB. et Zucc. Rohrb. in Linnæa XXXVI. p. 686.

Williams. l.c. p. 168. Palib. l.c. I. p. 40.

*Silene firma* Sieb. et Zucc. Fl. Jap. p. 166. Miq. Prol. Fl. Jap.

p. 7. Fran. Pl. Dav. p. 50. Kom. Fl. Mansh. II. p. 197.

*Silene aprica* Turcz. in Maxim. Pl. Chin. p. 66.

*Melandryum apricum* var. *firmum* Rohrb. in Linnæa XXXVI.

p. 240.

NOM. JAP. Fushiguro.

HAB. Kyōng-geui: Seoul (京城). Sept. 1886. fr. (Kalinowsky). Peuk-

han-san (北漢山). Oct. 19. 1900. fr.; Nam-han-san (南漢山).

Oct. 1900. fr.; Nam-san (南山). Jul. 1902. fl. et fr. (T. Uchi-

yama).

Kang-uön: Kum-gang-san (金剛山). Aug. 15. 1902. fl. et fr.

(T. Uchiyama).

In Korea bor. (Komarov).

DISTR. Sibiria, Mongolia, Manshuria, China et Japonia.

## LYCHNIS L.

### Clavis specierum.

A. Lobis petalorum interioribus oblongis v. late-ovatis.

.....*L. fulgens* FISCH. *a. typica* REGEL.

B. Lobis petalorum interioribus ovatosubquadratis.

.....*L. fulgens* β. *cognata* MAXIM.

C. Lobis petalorum interioribus oblongo-linearibus .....*L. laciniata* MAXIM.

*Lychnis fulgens* FISCH. Bot. Mag. tab. 2104. DC. Prodr. I. p.

386. Ledeb. Fl. Ross. I. 330. Maxim. Prim. Fl. Amur. p.

55. Regel Pl. Radd. I. p. 330. Forbes et Hemsl. l.c. p. 67.

Kom. Fl. Mansh. II. p. 201.

*a. typica* REGEL. Pl. Radd. I. p. 330. Fran. Pl. Dav. p. 50. Rohrb. in Linnæa XXXVI. p. 184. et 676.

HAB. Kyöng-geui: Nam-han-san (南韓山). Aug. 1. 1902. fl. et carp. mat. (T. Uchiyama).

Kang-uön: Chyang-yön-ri (長淵里). Aug. 13. 1902. fl. et carp. mat. (T. Uchiyama).

Ham-gyöng: Mu-san-nyöng (茂山嶺). Aug. 11. 1907. fl. (K. Maeda).

*β. cognata* MAXIM. Regel l.c. I. p. 331. Rohrb. l.c. p. 185. et p. 676.

*Lychnis cognata* Maxim. Prim. Fl. Amur. p. 55. Suppl. Ind. Fl. Pek. p. 469. Kom. Fl. Mansh. II. p. 203.

HAB. In Korea bor. (Komarov).

DISTR. sp. Sibiria et Manshuria.

*Lychnis laciniata* MAXIM. Kom. Fl. Mansh. II. p. 203.

HAB. in Korea bor. (Komarov).

DISTR. Manshuria.

### CUCUBALUS L. (sp. 1.)

*Cucubalus baccifer* L. (=C. bacciferus L.) Sp. Pl. (ed. II). p. 591. DC. Prodr. I. p. 367. Ledeb. Fl. Ross. I. p. 333. Maxim. Prim. Fl. Amur. p. 56. Koch. Fl. Germ. et Helv. (ed. III). p. 86. Regel Pl. Radd. I. p. 333. Rohrb. in Linnæa XXXVI. p. 267. Hook. fil. Fl. Brit. Ind. I. p. 222. Maxim. Pl. Chin. p. 68. Williams in Journ. Linn. Soc. XXXIV. p. 428. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 319. Beiträge Fl. Tsin-lin-shan. XXXVI. beiblatt p. 37. Thomè Fl. Deutsch. Öst. u. Schw. II. p. 98. tab. 217.

var. *japonicus* Miq. Prol. Fl. Jap. p. 15. in Ann. Mus. Bot. Lugd. Bat. III. p. 142. Fran. et Sav. Enum. Pl. Jap. I. p. 48. C. baccifer L. Rohrb. in Linnæa XXXVI. p. 689. Kom. Fl. Mansh. II. p. 205.

NOM. JAP. Nanbanhakobe, Tsurubakobe.

HAB. In Korea bor. (Komarov).

Kyōng-geui: Nam-han-san (南韓山). Oct. 18. 1900. carp. mat;  
Inter Pha-jyu (坡州) et Kai-syōng (開城). Sept. 5. 1902. fl. et  
carp. (T. Uchiyama).

DISTR. var. Manshuria et Japonia.

## GYPSOPHILA L.

### Clavis specierum.

- A. Folia capillacea ..... *G. acutifolia* FISCH.  
B. Folia lanceolata.  
a) Folia ovato-lanceolata, subamplexicaulia..... *G. perfoliata* L.  
b) Folia oblongo-lanceolata, basi paullum angusta... *G. Oldhamiana* MIQ.

*Gypsophila acutifolia* FISCH. DC. Prodr. I. p. 353. Ledeb. Fl. Ross. I. p. 295. Regel Pl. Radd. I. p. 89. Fran. Pl. Dav. p. 47. Rohrb. in Linnæa XXXVI. p. 674.

a. *angustifolia* LEDEB. l.c.

*G. acutifolia* a. typica Regel Pl. Radd. I. p. 90.

HAB. Kan-tō: Circa Tōdōkō Sept. 11. 1907. fl. et fr. Rokudōkō Aug.  
24. 1907. fl. et fr. (K. Maeda).

DISTR. China et Sibiria.

*Gypsophila perfoliata* L. Sp. Pl. (ed. II). p. 583. Rohrb. in Linnæa XXXVI. p. 674. DC. Prodr. I. p. 352. Regel Pl. Radd. p. 294. Kom. Fl. Mansh. II. p. 206.



*G. perfoliata* γ. *latifolia* Fenzl. in Ledeb. Fl. Ross. I. p. 297.  
Maxim. Prim. Fl. Amur. p. 52. Regel Tent. Fl. Uss. n. 83.

HAB. Kan-tō: Circa Tenpōsan (天寶山). Sept. 8. 1907. fl. (K. Maeda).

In Korea bor.—ex Kom.

DISTR. Europa et Asia bor.

*Gypsophila Oldhamiana* Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 187. Rohrb. in Linnaea XXXVI. p. 675. Forbes et Hemsl. l.c. p. 64. Williams l.c. p. 325. Palib. Consp. Fl. Kor. I. p. 40. Materials for a Flora of the Kwan-tung peninsula p. 15. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 319. Kom. Fl. Mansh. II. p. 206.

HAB. Kyōng-geui: Seoul (京城). Aug. 1883. fl. In-chon (仁川). Aug. 1883. fl. (Dr. Gottsche). Oct. 31. 1900. fr.; Peuk-han-san (北漢山). Oct. 14. 1900. fl.; Nam-han-san (南韓山). Aug. 2. 1902. fl.; Yōng-deung-pho (永登浦). Jul. 24. 1902. fl. (T. Uchiyama).

Kyōng-sang: Pusan (釜山). 1900 fr. (T. Uchiyama).

Kang-uōn: Kum-gang-san (金剛山). Aug. 20. 1902. fl. (T. Uchiyama).

Phyōng-an: Phyōng-yang (平壤). Sept. 12. 1902. fl. (T. Uchiyama).

In archipelago Koreano: Kuper Harbour (Oldham, Nr. 76).

DISTR. China et Manshuria.

## DIANTHUS L.

### *Clavis specierum.*

A. Calyx subcylindricus; torus parum elongatus ..... *D. barbatus* L.

B. Calyx cylindricus; torus elongatus in gynophorium stipitifomis.

a) Petala fimbriata ..... *D. superbus* L.

b) Petala dentata.

a) Bracteis foliaceis .....*D. sinensis* L. var. *sylvatica* Koen.

β) Bracteis squamosis .....*D. sinensis* L. var. *asper* Koch.

*Dianthus barbatus* L. Kom. Fl. Mansh. II. p. 207.

NOM. JAP. Fujinadeshiko.

HAB. In Korea bor. (Komarov).

DISTR. Europa, China, Manshuria et Japonia.

*Dianthus superbus* L. Sp. Pl. (ed. II). p. 589. Bot. Mag. IX. 297. DC. Prodr. I. p. 365. Ledeb. Fl. Ross. I. p. 285. Maxim. Prim. Fl. Amur. p. 52. Suppl. Ind. Fl. Mong. p. 480. Pl. Chin. p. 64. Koch Syn. Fl. Germ. et Helv. (ed. III). p. 85. Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 77. Prol. Fl. Jap. p. 8. Regel Pl. Radd. I. p. 288. Fr. Schmidt. Reiss. in Amur. u. Insl. Sachl. p. 116. Fran. et Sav. Enum. Pl. Jap. I. p. 46. Fran. Pl. Dav. p. 46. Rohrb. in Linnæa XXXVI. p. 678. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 64. Williams in Journ. Linn. Soc. XXIX. p. 411. XXXIV. p. 426. Palib. Consp. Fl. Kor. I. p. 39. Materials for a fl. of the Kwantung Peninsula p. 15. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 312. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 319. Kom. Fl. Mansh. II. p. 207. Matsum. et Hayata Enum. Pl. Formosanarum in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 35.

NOM JAP. Nadeshiko; Kawaranadeshiko.

Specimina nostra ad f. subobtusus Regel sunt similima.

HAB. In archipelago Koreano (Oldham. Nr. 75).

Ham-gyōng: Gensan (元山). Jul. 18. 1889. fl. (Dr. Epow).

Kyōng-geui: Nam-han-san (南韓山). Aug. 1. 1902. fl. (T. Uchiyama).

Chyöl-la : So-an-do (所安島). 1900. str. (M. Enuma).

In Korea bor. (Komarov).

DISTR. Europa, Sibiria, China, Manshuria et Japonia.

*Dianthus sinensis* L. (=D. chinensis L). DC. Prodr. I. p. 359. Bot. Mag. I. p. 25. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Mong. p. 481. Sieb. et Zucc. Fl. Jap. p. 116. Rohrb. in Linnæa XXXVI. p. 670. Forbes et Hemsl. l.c. p. 63. Williams l.c. p. 429. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 319. Kom. Fl. Mansh. II. p. 208.

D. *segueri* Chaix. Ledeb. Fl. Ross. I. p. 277. Regel Pl. Radd. I. p. 278. Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 76. Prol. Fl. Jap. p. 8. Hook. Fl. Brit. Ind. I. p. 215. Fran. et Sav. Enum. Pl. Jap. I. p. 45. Itō et Matsum. l.c. p. 312.

var. *sylvaticus* KOCH. Maxim. Pl. Chin. p. 64. Williams l.c. p. 430. Palib. Consp. Fl. Kor. I. p. 39. Materiaux. pour la fl. Mong. septentr. p. 18. Materials for a fl. of Kwan-tung Peninsula p. 15.

D. *Segueri*  $\beta$ . *sylvaticus* Koch. Fl. Germ. et Helv. (ed. III). p. 83. Regel Pl. Radd. I. p. 279.

NOM. JAP. Konadeshiko.

HAB. Kyōng-geui : Seoul (京城). Jul. 1886. fl. (Kalinowsky). Peukhan-san (北漢山). Jul. 28. 1902. fl.; Ō-ryu-kol (梧柳洞). Oct. 12. 1900. fl. et carp. mat. (T. Uchiyama).

var. *asper* KOCH. Williams l.c. p. 430. Palib. Consp. Fl. Kor. I. p. 39. Materials for the Fl. of the Kwan-tung. Pen. p. 15.

D. *Segueri*  $\alpha$ . *asper* Koch in Fl. Germ. et Helv. I. p. 83. Regel Pl. Radd. I. p. 279.

D. *Segueri* Fran. Pl. Dav. p. 45.

NOM. JAP. Konadeshiko.

HAB. K'yang-geui: Seoul (京城). Aug. 1883. fl. (Dr. Gottsche). Jul. 1886. fl. (Kalinowsky). In-chon. Aug. 1883. (Dr. Gottsche). Penkhan-san (北韓山). Oct. 14. 1900. fl. et fr.; Nam-san (南山). Jul. 16. 1902. fl. (T. Uchiyama). ibidem Aug. 1906. fl. (S. Shimogōriyama).

Ham-gyōng: Mu-san-nyōng (茂山嶺). Aug. 11. 1907. fl. et fr. (K. Maeda).

Kantō: Kyokushigai (局子街). Sept. 16. 1907. fl. (K. Maeda).

DISTR. Sp. Asia et Europa.

## STELLARIA L.

### Clavis specierum.

#### A. Radix tuberosa.

##### a) Fl. brevissime pedicellatis.

α) Foliis ovatis v. rhombéo-ovatis .....*St. heterophylla* HEMSL.

β) Foliis lanceolatis v. oblanceolatis .....*St. raphanorrhiza* HEMSL.

##### b) Pedicelis elongatis.

α) Foliis lineari-lanceolatis.....*St. sylvatica* MAXIM.

β) Foliis brevipetiolatis, ovato-lanceolatis v. late-lanceolatis.

.....*St. Davidi* FRANCH.

#### B. Radix fibrosa.

##### a) Caule simplice.

##### α) Foliis superioribus sessilibus.

○ Caule villosó v. pubescente, foliis late-lanceolatis.

.....*St. radicans* L.

○○ Caule subglabro, foliis ovato-lanceolatis.....*St. ebracteata* KOM.

β) Foliis omnibus longe-petiolatis .....*St. Bungeana* FENZL.

##### b) Caule ramoso v. diffuso.

##### α) Foliis anguste-linearibus v. lanceolatis.

○ Foliis anguste-linearibus.....*St. longifolia* MÜHL.

○○ Foliis lanceolatis .....*St. uliginosa* MURR.

β) Foliis ovato-lanceolatis v. ovatis.

- a) *Stylis* 3 ..... *St. media* L.  
 β) *Stylis* 5 ..... *St. aquatica* Scop.

*Stellaria (Krascheninnikowia) heterophylla* (Miq.) Hemsl.  
 Forbes et Hemsl. l.c. p. 68.

*Krascheninnikowia heterophylla* Miq. in Ann. Mus. Bot. Lugd.  
 Bat. III. p. 187. Maxim. in Mém. Biol. IX. p. 40. Fran.  
 et Sav. Enum. Pl. Jap. II. p. 298. Palib. Consp. Fl. Kor. I.  
 p. 41.

HAB. In archipelago Koreano: Port Hamilton (Wilford Nr. 712).  
 Sontsik-group. (Oldham. Nr. 80).

Kyöng-geui: Seoul (京城). Prope Tap-Tong. Apr. 25. 1895. fr.  
 inmat. (Wilford). Nam-san (南山). Jul. 18. 1902. fr.; Nam-han-  
 san (南韓山). Aug. 1. 1902. fr. (T. Uchiyama).

DISTR. Japonia.

*Stellaria (Krascheninnikowia) raphanorhiza* Hemsl. Forbes  
 et Hemsl. l.c. p. 69.

*Krascheninnikowia raphanorhiza* Palib. Consp. Fl. Kor. I. p.  
 42. Kom. l.c. II. p. 180.

HAB. Kyöng-geui: Montes prope Seoul (Carles). Shin-Ku-Kai. Apr.  
 18. 1894. fl; Juck-Tchu-Ab. Apr. 23. 1894. fl. (Sontag). Nam-  
 san (南山). Jul. 18. 1902. fr; Nam-han-san (南韓山). Aug. 1.  
 1902. fr. (T. Uchiyama).

DISTR. Manshuria et China.

*Stellaria (Krascheninnikowia) sylvatica* Maxim. Kom. Fl.  
 Mansh. II. p. 176.

HAB. in Korea. bor. (Komarov).

DISTR. Amur. et Manshuria.

*Stellaria (Krascheninnikowia) Davidi* Franch. Kom. Fl.  
 Mansh. II. p. 177.

HAB. in Korea bor. (Komarov).  
DISTR. China et Manshuria.

*Stellaria radicans* L. Kom. Fl. Mansh. II. p. 168.

NOM. JAP. Yezo-Ōyamahakobe.  
HAB. In Korea bor. (Komarov).  
DISTR. Sibiria, Amur, et Manshuria.

*Stellaria ebracteata* Kom. Fl. Mansh. II. p. 172.

HAB. In Korea bor. (Komarov).  
DISTR. Amur.

*Stellaria Bungeana* (L.) Scop. Kom. Fl. Mansh. II. p. 167.

HAB. In Korea bor. (Komarov).  
DISTR. Europa, Caucasus, Sibiria, Manshuria et Japonia.

*Stellaria longifolia* MÜHL. Kom. Fl. Mansh. II. p. 170.

NOM. JAP. Nagabanotsumekusa ; Yezonominofusuma.  
HAB. In Korea bor. (Komarov).  
DISTR. Sibiria ; Manshuria, Japonia et America bor.

*Stellaria uliginosa* MURREY. Ledeb. Fl. Ross. I. p. 393. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 79. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 469. Benth. Fl. Hongk. p. 22. Hook. Fl. Brit. Ind. I. p. 233. Regel Pl. Radd. I. p. 383. Benth. et Hook. Fl. Brit. Isl. (ed. V). p. 73. Koch. Syn. Fl. Germ. et Helv. (ed. III). p. 103. Maxim. in Mém. Biol. IX. p. 49. Henry. l.c. p. 19. Forbes et Hemsl. l.c. p. 69. Diels Fl. Centr. Chin. l.c. p. 320. A. Gray et S. Watson Syn. Fl. N. America I. i. p. 234. Itō et Matsum. l.c. p. 314. Kom. l.c. p. 173. Matsum. et Hayata l.c. p. 36.

NOM. JAP. Nominofusuma.  
HAB. In Korea bor. (Komarov).

Kyöng-geui: Prope Chhyöng-nyang-li (清凉里近傍). Oct. 17. 1900. fl. (T. Uchiyama).

Kaug-uön: Chyang-chhyön (長川). Oct. 5. 1902. fl. et fr. (T. Uchiyama).

DISTR. Europa et Asia.

*Stellaria media* (L). CYRILL. CHAR. COMM. KOM. FL. MANSU. II. p. 169.

NOM. JAP. Hakobe.

HAB. In Korea bor. (Komarov).

DISTR. Regio temp.

*Stellaria aquatica* SCOPOLI. DC. Prodr. I. p. 398. Baker et Moore in Journ. Linn. Soc. XVII. p. 400. Miq. Prol. Fl. Jap. p. 11. Hook. fil. Fl. Brit. Ind. I. p. 229. Benth. Fl. Hongk. p. 21. Forbes et Hemsl. l.c. p. 67. Diels Fl. Centr. Chin. in l.c. p. 319. Matsum. et Hayata l.c. p. 36.

*Melachium aquaticum* Fries in Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 469. Mél. Biol. IX. p. 54.

*Myosoton aquaticum* Moench. in Fran. Pl. Dav. p. 53.

*Cerastium aquaticum* L. Sp. Pl. (ed. II). p. 629.

NOM. JAP. Ushihakobe.

HAB. In Korea bor. (Komarov). in archipelago Koreano: Port Hamilton (Wilford). Sontsik group. (Oldham).

Kyöng-geui: Seonl (京城): prope Tap-Tong. Apr. 25. 1895. fr. imm. (Wilford). Ō-ryu-kol (梧柳洞). Oct. 15. 1900. carp. mat. et fl.; Nam-san (南山). Jul. 16. 1902. carp. mat. et fl. (T. Uchiyama).

Kang-uön: Kum-gang-san (金剛山). Aug. 20. 1902. fl. et carp. mat. (T. Uchiyama).

DISTR. China, Manshuria et Japonia.

**CERASTIUM L.****Clavis specierum.**

- A. Petalis calyce 2-3 plo longioribus ..... *C. pilosum* LEDEB.  
 B. Petalis calyce æquantibus v. vix longioribus.  
 ..... *C. vulgatum* L. var. *brachypetalum* FZL.

*Cerastium pilosum* LEDEB. Forbes et Hemsl. l.c. p. 67. Palib.  
 l.c. I. p. 40. Kom. l.c. II. p. 181.

HAB. Korea boreali-occidentalis finitima : Toonghwasiën (Webster).

In Korea bor. (Komarov).

DISTR. Sibiria et Mansuria.

*Cerastium vulgatum* L.

var. *brachypetalum* FZL. Palib. Consp. Fl. Kor. I. p. 41. Kom.  
 Fl. Mansh. II. p. 183.

HAB. Korea, Sine loco speciali (Carles). In Korea bor. (Komarov).

Kyöng-geui : Seoul (京城). Mai : 1886. defl. (Kalinowsky). Hut-

Tschai-Meo, Mai. I. 1894. fl. Yisan Mai. 28. 1894. fl. (Sontag).

DISTR. Europa et Asia bor.

**SAGINA L. (sp. 1.)**

*Sagina Linnæi*, PRESL. Forbes et Hemsl. l.c. p. 70. Palib. l.c.  
 I. p. 43. Kom. l.c. II. p. 185.

NOM. JAP. Tsumekusa.

HAB. In archipelago Koreano : Port Hamilton (Wilford, Oldham).

In Korea bor. (Komarov).

DISTR. Asia, Europa et America bor.

**ALSINE L.****Clavis specierum.**

- A. Foliis lineari-subulatis ..... *Alsine luricina* CRANTZ.  
 B. Foliis carnosis ellipticis ..... *Alsine peploides* WAHL.



*Alsine taricina* CRANTZ. Kom. Fl. Mansh. II. p. 186.

HAB. In Korea bor. (Komarov).

DISTR. Sibiria, Amur, et Manshuria.

*Alsine (Honkenya) peploides* (L.) WAHLENB.

*Ammodenia peploides* (L.) Rupr. in Kom. Fl. Mansh. II. p. 187.

NOM. JAP. Hamahakobe.

HAB. In Korea bor. (Komarov).

DISTR. Reg. bor, temp, et arc.

### ARENARIA L.

#### Clavis specierum.

A. Foliis ovatis ..... *A. serpyllifolia* L.

B. Foliis subulato-filiformibus ..... *A. juncea* M. BIEB.

*Arenaria serpyllifolia* L. Palib. Consp. Fl. Kor. I. p. 43.

NOM. JAP. Nominotsuzuri.

HAB. Kyöng-geui: Seoul (京城) Mai. 1886. defl. (Kalinowsky). Ai-O-  
 Quoi Feb. 26. 1894. ster., Tschä-Kol-Nau. Mart. 10. 1894. ster.,  
 Hut-Schu-Mian. Mart. 9. 1894; Arvia-Tai-Kul. Mart. 23. 1894;  
 Schin-Ku-Kai. Apr. 18. fl.; Hut-Tschai-Meo. Mai. 1. 1894. fl;  
 Montes prope viam ad Peking ducentem Mai. 25. 1894. fl.  
 (Sontag).

DISTR. Asia, Europa et America bor.

*Arenaria juncea* M. a. BIEB. Kom. Fl. Mansh. II. p. 187.

HAB. In Korea bor. (Komarov).

DISTR. Tauria et Manshuria.

### MÖHRINGIA L. (sp. 1.)

*Möhringia lateriflora* FENZL.

*Arenaria lateriflora* L. in Forbes et Hemsl. l.c. p. 70. Palib.

l.c. I. p. 42.

NOM. JAP. Ōyamafusuma.

HAB. Phyōng-an: Jugam Schang-pai-shan (長白山) in trajectu  
Laoling 2800. p. s. m. (Webster).

Kyōng-geui: Seoul (京城). Mai. 1886. fl. (Kalinowsky).

DISTR. China bor., Manshuria, Sibiria et Japonia.

### TISSA ADANS. (sp. 1.)

*Tissa media* (L.) DUMORT.

Spergularia media G. Don. in Kom. Fl. Mansh. II. p. 190.

HAB. Probabiliter in Korea bor. (Komarov).

DISTR. Europa.

## PORTULACACEÆ

### PORTULACA L.

#### Clavis specierum.

- A. Flores conspicui, foliis linearibus.....*P. grandiflora* Hook.  
B. Flores parvi, foliis obovatis.....*P. oleracea* L.

*Portulaca grandiflora*, Hook. Palib. Consp. Fl. Kor. I. p. 44.

HAB. Kyōn-geui: Seoul (京城). Sept. 1886. fl. (Kalinowsky).

DISTR. Per totam regionem colitur.

*Portulaca oleracea* L. Sp. Pl. (ed. II). p. 638. Thunb. Fl. Jap. p. 192. DC. Prodr. III. p. 353. Ledeb. Fl. Ross. II. p. 145. Maxim. Prim. Fl. Amur. p. 113. Suppl. Ind. Fl. Pek. p. 472. Koch. Syn. Fl. Germ. et Helv. (ed. III). p. 217. Sieb. et Zucc. Fl. Jap. Nat. Fam. p. 117. Benth. Fl. Austr. I. p. 169. Oliver. Fl. Trop. Afr. I. p. 148. Grisebach Fl. Brit. West. Ind. Isl. p. 57. J. D. Hooker Fl. Brit. Ind. I. p. 246. Miq. Fl. Ind. Batav. I. p. 1061. Fran. et Sav. Enum. Pl. Jap. I. p. 53.

Harvey et Sonder Fl. Cap. II. p. 381. Hillebrand Fl. of the Hawaiian Isl. p. 39. Henry List of Plant. Form. p. 19. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 71. Itō et Matsum. l.c. p. 317. A. Gray S. Watson Syn. Fl. N. America I. i. p. 263. Thomè Fl. Deutsch. Öst. u. Schw. II. p. 78. tab. 207. E De Hálacsy Consp. Fl. Græc. I. p. 566. Palib. Consp. Fl. Kor. I. p. 44. Kom. l.c. II. p. 166. Matsum. et Hayata l.c. p. 38.

NOM. JAP. Suberihyu.

HAB. Kyōng-geui: Nam-san (南山). Oct. 11. 1900. fr. et alabastr. (T. Uchiyama).

In archipelago Koreano: Port Hamilton (Oldham).

DISTR. Per totam regionem trop. et temp.

## ELATINEÆ

### ELATINE L.

#### Clavis specierum.

- A. Flores sessiles; calyce bipartito.....*E. triandra* SCHKUHR.  
 B. Flores pedunculati; calyce tripartito.....*E. orientalis* MAKINO.

*Elatine triandra* SCHKUHR. DC. Prodr. I. p. 390. Walp. Rep. I. p. 283. V. p. 38. Kom. Fl. Mansh. III. p. 46.

In Korea septentrionali a Cl. Komarov coll.

DISTR. Europa, Manshuria, Amur. Ussuri, Japonia et Formosa.

*Elatine orientalis* (Tab. nostra XII. f. II.) in Tokyo Bot. Mag. XII. p. 117. XIV. p. 30.

HAB. Kyōng-san (慶尙道): Kum-san-ri (金山里). Oct. 14. 1902. fl. et fr. (T. Uchiyama).

DISTR. Japonia.

## HYPERICINEÆ (gn. 1.)

## HYPERICUM L.

## Clavis specierum.

A. Foliis petalisque nigropunctatis.

a) Styli 2 .....*H. Dominii* LÉVE'L. et VNT.

β) Styli 3.

a) Caule elineato .....*H. erectum* THUNB.

b) Caule lineato, nigro-punctato .....*H. attenuatum* CHOIS.

B. Foliis pellucido-punctatis.

a) Glandulæ inter stamina nullæ.

a) Suffruticosa .....*H. Ascyron* L.

β) Herbacea.

○ Bracteis foliis æquiformibus.

△ Caule simplice erecto, apice plus minus ramoso.

*H. japonicum* THUNB. var. *Thunbergii* (Fr. et Sav.) KELLER.

△△ Caule e basi ramosissimo, procumbente.

.....*H. Yabei* LÉVE'L. et VNE.

○○ Bracteis lanceolatis v. lineari-lanceolatis. *H. japonicum* THUNB.

b) Glandulæ hypogynæ cum staminum phalangibus alterna.

.....*H. asiaticum* (MAXIM.) NAKAI.

*Hypericum erectum* THUNB. Fl. Jap. p. 296. DC. Prodr. I. p. 548. Sieb. et Zucc. Fl. Jap. Fam. Nat. I. p. 162. Blume in Mus. Bot. II. p. 25. Miq. in Ann. Mus. Bot. Lugd. Bat. II. p. 259. Fran. et Sav. Enum. Pl. Jap. I. p. 55. Maxim. in Mém. Biol. IX. p. 168. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 73. Miyabe l.c. p. 222. Keller in Bull. du l'Herb. Boiss. (1897). p. 640. Itō et Matsum. l.c. p. 320. Léve'l. in Bull. Soc. Bot. Fr. (1902). p. 595. (1906). p. 500. *H. attenuatum* Choisy. in Fr. Schmidt l.c. p. 119.

HAB. Kyöng-geui: Nam-san (南山). Oct. 10. 1900. fr.; ibidem Jul. 20. 1902. fl.; Chemulpo (仁川). Sept. 17. 1902. fr. (T. Uchiyama).  
 Ham-gyöng: Gen-san (元山). Aug. 1901. (U. Faurie) ex LÉVE'L.  
 Kyöng-san: Fusan (釜山). Oct. 1903. (U. Faurie) ex LÉVE'L.  
 DISTR. Maushuria, China et Japonia.

*Hypericum attenuatum* CHOIS. DC. Prodr. I. p. 548. Ledeb. Fl. Ross. I. p. 448. Maxim. Prim. Fl. Amur. p. 65. in Mém. Biol. XI. p. 166. Enum. Pl. Mong. I. p. 115. Regel Tent. Fl. Uss. n. 103. Hance in Journ. Bot. (1874). p. 259. (1878). p. 104. (1885). p. 321. Fran. Pl. Dav. p. 56. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 72. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 476. Korsch. Act. h. Petrop. XII. p. 317. Kom. Fl. Mansh. III. p. 43. Lève'l. in Bull. Soc. Bot. Fr. (1907). p. 594.

HAB. Corea: Sine loco speciali Jul. 1901. (U. Faurie)—ex Lève'l.  
 Kang-uön: M'te Kum-gang-san (金剛山). Aug. 20. 1902. fl. (T. Uchiyama).

DISTR. Sibiria, Amur, Manshuria et China.

*Hypericum Dominii* LÉVE'L. in Bull. Soc. Bot. Fran. (1907). p. 593.

HAB. Kyöng-san: Fusan (釜山). Oct. 4. 1901. (U. Faurie).—ex Lève'l.

*Hypericum Ascyron* L. Sp. Pl. (ed. II). p. 1102. DC. Prodr. I. p. 545. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. II. p. 259. Fran. et Sav. Enum. Pl. Jap. I. p. 55. Fr. Schmidt l.c. p. 36. Maxim. in Mém. Biol. XI. p. 162. Pl. Chin. p. 76. Fran. Pl. Dav. p. 55. Forbes et Hemsl. l.c. p. 72. Diels Fl. Centr. Chin. in l.c. p. 476. Palib. Materials for a

Fl. of the Kwan-tung-penin. p. 25. Matsum. et Hayata l.c. p. 40. Léve'l l.c. p. 592.

HAB. Kyöng-san: Fusan (Wilford)...ex Léve'l.

var. *longistylum* MAXIM. Prim. Fl. Amur. p. 64. Mém. Biol. XI. p. 163. Enum. Pl. Mongol. I. p. 115. Palib. Consp. Fl. Kor. I. p. 44. Léve'l. in Bull. Soc. Bot. Fr. (1906). p. 499.

H. asecyron in Catalogue of plants in the Herb. of the Coll. Sci. Imp. Univ. Tokyo. p. 272.

NOM. JAP. Tomoesō.

HAB. Kyöng-geui: Seoul (京城). Jul. 1883. fl. (Kalinowsky). Peukhan-san (北漢山). Oct. 14. 1900. fr.; sine loco speciali fl.; Yöngdeung-pho (永登浦). Jul. 24. 1902. fl. (T. Uchiyama).

DISTR. Amur et Manshuria.

*Hypericum japonicum* THUNB. Fl. Jap. p. 295. DC. Prodr. I. p. 549. Sieb. et Zucc. Fl. Jap. Fam. Nat. I. p. 163. Miq. Prol. Jap. in Ann. Mus. Bot. Lugd. Bat. II. p. 259. Fran. et Sav. Enum. Pl. Jap. I. p. 55. II. p. 300. Hooker Handb. of the New. Zealand. Fl. p. 29. Fl. Brit. Ind. I. p. 256. Benth. Fl. Austr. I. p. 182. Fran. Pl. Dav. p. 55. Forbes et Hemsl. l.c. p. 73. Keller in Bull. du l'Herb. Boiss. (1897). p. 641. in Engl. Bot. Jahrb. XXXIII. p. 554. Bull. du l'Herb. Boiss. (1908). p. 185. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 320. Henry List Pl. Form. p. 19. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 476. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo XXII. p. 41. Léve'l. in Bull. Soc. Bot. Fran. (1906). p. 501.

H. involutum Chois. et H. pusilum Chois. in DC. Prodr. I. p. 549.

*H. mutilum* (non L.) Maxim. Mél. Biol. XI. p. 171. Fran. et Sav. Enum. Pl. Jap. l.c.

*Brathys japonica* et *laxa* Bl. Mus. Bot. Lugd. Bat. II. p. 19.

*B. nepalensis* in *ibidem* p. 11.

HAB. Chyöl-la: Mok-pho (木浦). Nov. 6. 1900. fl. et fr. (T. Uchiyama).

var. *Thunbergii* (FRAN. et SAV.) KELLER. in Bull. du l'Herb. Boiss. (1908). p. 185.

*H. Thunbergii* Fran. et Sav. Enum. Pl. Jap. II. p. 300. Lévê'l. in Bull. Soc. Bot. Fran. (1906). p. 501.

*H. japonicum* Thunb. Fl. Jap. t. 31.

HAB. Kyöng-geui: Seoul: monte Nam-san (南山). Aug. 30. 1902. fl. et fr. (T. Uchiyama).

Korea: Sine loco speciali (De Brand) ex Fran. et Sav. l.c.

DISTR. sp. Japonia, China et Australia.

*Hypericum asiaticum* (MAXIM.) NAKAI.

*Elodes virginica* var. *asiatica* Maxim. Mél. Biol. XI. p. 157.

*Triadenum asiaticum* (Maxim.) Kom. in Fl. Mansh. III. p. 45.

*Hypericum virginicum* (non L.) Miq. Prol. Fl. Jap. p. 146.

Fran. et Sav. Enum. Pl. Jap. I. p. 56. Lévê'l. in Bull. Soc. Bot. Fran. (1906). p. 503.

*Elodea virginica* Regel (non Nutt.) Tent. Fl. Uss. n. 104.

*E. crassifolia* et *E. japonica* Bl. Mus. Bot. Lugd. Bat. II. p. 15.

HAB. Kan-tō: circa Tō-dō-kō. Sept. 11. 1907. fr.

DISTR. Ussuria, Amur, Manshuria et Japonia.

*Hypericum Yabei* LÉVÊ'L. et VNT. in Bull. Soc. Bot. Fr. (1906). p. 501.

*H. japonicum* var. *cæspitosum* Nakai in Schéd. Herb. Tokyo. (Nomen nudum).

HAB. Kyōng-geui: Kwa-oi (蟹岩). Oct. 24. 1900. fl. et fr. (T. Uchiyama).

DISTR. Japonia.

## DILLENACEÆ.

### ACTINIDIA, LINDE.

#### Clavis specierum.

A. Pedunculus paucifloriferus.

a) Stamina numerosissima ..... *A. polygama* PLANCH.

b) Stamina numerosa sed  $\frac{1}{2}$  pauciora quam præced. *A. Kolomikta*, RUPR.

B. Pedunculus plurifloriferus.

a) Serraturæ foliorum lineari-subfiliformes..... *A. arguta*, PLANCH.

b) Serraturæ foliorum incurvo-mucronate ..... var. *rufa*, MAX.

*Actinidia polygama*, PLANCH. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 15. F. Schmidt Reis. in Amur. Isl. Sachl. p. 118. Fran. et Sav. Enum. Pl. Jap. I. p. 59. Ch. Sp. Sargent Forest. fl. of Jap. p. 19. Kom. Fl. Mansh. III. p. 39.

*Trochostigma polygama*, Sieb. et Zucc. Fl. Jap. Fam. Nat. p. 164.

HAB. In Korea Septentr. (Komarov).

Kyōng-geui: Nam-han-san (南韓山). Aug. 1. 1902. fr. (T. Uchiyama).

Phyōng-an: Ad superiorem fluminis Julu. Aug. 1907. ster. (M. Shiki).

DISTR. Manshuria et Japonia.

*Actinidia Kolomikta*, RUPR. Maxim. Prim. Fl. Amur. p. 63. F. Schmidt. Reis. in Amur. Insl. Sachl. p. 118. Ch. Sp. Sargent Forest. Fl. of Jap. p. 19. Forbes et Hemsley Ind. Fl.



Sin. in Journ. Linn. Soc. XXIII. p. 78. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 470. Fl. Tsin-lin-shan in Engl. Bot. Jahrb. XXXVI. beiblatt p. 76. Kom. Fl. Mansh. III. p. 36.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 16. 1902. fr. (T. Uchiyama). ibidem. 1895. fol. (K. Hayashi).

DISTR. China, Manshuria et Japonia.

*Actinidia arguta*, PLANCH. Kom. Fl. Mansh. III. p. 35.

HAB. In Korea Septentr. (Komarov).

DISTR. China, Japonia et Manshuria.

var. *rufa* (PLANCH.) MAXIM. Palib. Consp. Fl. Kor. I. p. 45.

HAB. In archipelago Koreano: Port Hamilton (Oldham. Nr. 94).

DISTR. Japonia.

## TERNSTRÆMIACEÆ.

### Clavis generum.

A. Fructus dehiscentis.

a) Radicula infra ..... *Stewartia*, L.

b) Radicula supra ..... *Thea*, L.

B. Fructus indehiscens ..... *Eurya*, THUNB.

### STEWARTIA, L. (=Stuartia, L). (sp. 1.)

*Stewartia monadelphæ* SIEB. et ZUCC. Forbes et Hemsley Ind. Fl. Sin. in Journ. Soc. XXIII. p. 80. Palib. Consp. Fl. Kor. I. p. 45.

NOM. JAP. Himesharanori.

HAB. In archipelago Koreano (Oldham. Nr. 91. A.)

DISTR. Japonia.

**THEA**, L. (sp. 1.)

*Thea japonica*, NOIS. Forbes et Hemsley Ind. Fl. Sin. in Journ. Soc. XXIII. p. 81. Palib. Consp. Fl. Kor. I. p. 45.

NOM. JAP. Chanoki.

HAB. In archipelago Koreano : Port Hamilton (Wilford, Oreflew).

DISTR. China et Japonia.

**EURYA**, THUNB.**Clavis specierum.**

- A. Foliis obovato-oblongis apice obtusis .....*E. chinensis*, R. BR.  
 B. Foliis lanceolatis v. oblongo-obovatis apice acutis v. acuminatis.  
 .....*E. japonica* THUNB.

*Eurya chinensis*, R. BR. DC. Prod. I. p. 525. Miq. Prol. Fl. Jap. p. 203. Fran. et Sav. Enum. Pl. Jap. I. p. 58. Hooker Fl. Brit. Ind. I. p. 284. Forbes et Hemsley Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 76. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 474. Palib. Consp. Fl. Kor. I. p. 46. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Coll. Imp. Univ. Tokyo XII. p. 326.

*Eurya littoralis*, Sieb. et Zucc. Fl. Jap. Fam. Nat. p. 163.

NOM. JAP. Hamahisakaki.

HAB. In archipelago Koreano : Port Hamilton (Oldham. Nr. 93).

Kyōng-sang : Chyōl-yōng-do 絶影島 (=牧ノ島). fr. Nov. 16. 1900.  
 (T. Uchiyama). Ibidem. Oct. 13. 1902. fr. ( , ).

DISTR. Japonia, China et India.

*Eurya japonica*, THUNB. in Fl. Jap. p. 191. DC. Prod. I. p. 525. Sieb. et Zucc. Fl. Jap. Fam. Nat. p. 163. Miq. Prol. Fl. Jap. p. 302. et 266. Fran. et Sav. Enum. Pl. Jap. I. p. 57. Forbes et Hemsley Ind. Fl. Sin. in Journ. Linn. Soc. XXIII.

p. 77. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX.  
 p. 474. Palib. Consp. Fl. Kor. I. p. 46. Matsum. et Hayata  
 Enum. Pl. Form. in Journ. Sci. Coll. Imp. Univ. Tokyo. XXII.  
 p. 46.

*Eurya japonica* Thunb. *α. Thunbergii* Thwait. in Hook. Fl. Brit.  
 Ind. I. p. 284. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci.  
 Coll. Imp. Univ. Tokyo. XII. p. 326.

NOM. JAP. Hisakaki.

HAB. In archipelago Koreano: Port Hamilton (Wilford).

Kyōng-sang: Chyōl-yōng-do 絶影島 (= 牧ノ島). Oct. 13. 1902.  
 alabast. (T. Uchiyama).

Chyōl-la: Mok-pho (木浦). Nov. 5. 1900. fr. et alabastr. (T.  
 Uchiyama).

DISTR. China et Japonia.

## MALVACEÆ.

### Clavis specierum.

A. Carpella matura ab axi v. receptaculo secedentia.

a) Ovula 1 ..... *Malva* L.

b) Ovula 3-9 ..... *Abutilon* L.

B. Capsula loculicide dehiscens, carpellis non secedentibus.

a) Bracteolæ 5..... *Hibiscus* GÆRTN.

b) Bracteolæ 3..... *Gossypium* L.

### MALVA, L. (sp. 1.)

*Malva verticillata*, L. Sp. Pl. (2. ed). p. 97. DC. Prod. I. p.  
 433. Hooker Fl. Brit. Ind. p. 320. Oliver Fl. trop. Afr.  
 I. p. 177. Forbes et Hemsley Ind. Fl. Sin. in Journ. Linn.  
 Soc. XXIII. p. 84. Diels Fl. Centr. Chin. in Engl. Bot.  
 Jahrb. XXIX. p. 469. Palib. Consp. Fl. Kor. I. p. 47. A.

Gray et S. Watson. Syn. Fl. N. America I. i. p. 298. Kom. Fl. Mansh. III. p. 32.

*Malva pulchella* Beruh. Ledeb. Fl. Ross. I. p. 436. Maxim. Prim. Fl. Amur. p. 61. Suppl. Ind. Fl. Pek. p. 469. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 20. Fran. Pl. Dav. p. 58. Fran. et Sav. Enum. Pl. Jap. I. p. 62.

*Malva chinensis*, Mill. DC. Prod. I. p. 436.

NOM. JAP. Fuyuaoi.

NOM. KOR. Aona.

HAB. Kyöng-geui: Seoul Jul. 1886. fruct. (Kalinowsky).

Ibidem. Oct. 19. 1900. fl. et fruc. (T. Uchiyama).

Sine loco indicato fl. (T. Uchiyama).

Ham-gyöng: Pu-ryöng (富寧). Aug. 11. 1907. fr. (K. Maeda).

DISTR. Europa, Asia, Africa et America bor.

### ABUTILON GÆRTN. (sp. 1.)

*Abutilon avicennæ*, GÆRTN. Palib. Consp. Fl. Kor. I. p. 47.

NOM. JAP. Ichibi; Kiriasa.

HAB. Kyöng-geui: Seoul Aug. 1886. fr. immat. (Kalinowsky).

DISTR. Europa et Asia.

### HIBISCUS L. (sp. 1.)

*Hibiscus trionus* L. Sp. Pl. (2. ed). p. 980. DC. Prod. I. p. 453. Bot. Mag. (VI). t. 206. Hooker Fl. Brit. Ind. I. p. 334. Benth. Fl. Austral I. 210. Oliver Fl. Trop. Afr. I. p. 196. Fran. Pl. Dav. p. 59. Koch. Syn. Fl. Germ. et Helv. (ed. III.) p. 113. Forbes et Hemsley Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 88. Thomè Fl. Deutch. Öst. u. Schw. III. p. 268. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 469. Palib. Consp. Fl. Kor. I. p. 47. E De Halácsy Consp. Fl.

Græc. I. p. 262. A. Gray et S. Watson. Syn. Fl. N. America I. i. p. 336. Kom. Fl. Mansh. III. p. 33.

*Hibiscus trionus* L. *a. hispidus*, Harvey et Sonder. Fl. Cap. I. p. 262.

*Hibiscus ternatus*, Cav. Ledeb. Fl. Ross. I. p. 438. Maxim. Prim. Fl. Amur. p. 61. Suppl. Ind. Fl. Pek. p. 469. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 19. Fran. et Sav. Enum. Pl. Jap. I. p. 64.

NOM. JAP. Ginsenkwa.

HAB. Kyōng-geui: In-chon. Aug. 1883. fl. (Dr. Gottsche).

Hoang-hai: Inter Ka-chyang-ko-ri (加將去里) et Nam-chhyōn (南川). Sept. 7. 1902. fl. et fr. mat. (T. Uchiyama).

DISTR. Asia, Australia, Europa, Africa et America bor.

### GOSSYPIUM, L. (sp. 1.)

*Gossypium herbaceum*, L. Sp. Pl. (2. ed). p. 975. Thunb. Fl. Jap. p. 271. DC. Prod. I. p. 456. Ledeb. Fl. Ross. I. p. 438. Sieb. et Zucc. Fl. Jap. Fam. Nat. I. p. 166. Hooker Fl. Brit. Ind. I. p. 346. Oliver Fl. Trop. Afr. I. p. 211. Grisebach Fl. Brit. W. Ind. Isl. p. 86. Forbes et Hemsley Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 88. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Coll. Imp. Univ. Tokyo XII. p. 342. A. Gray et S. Watson. Syn. Fl. N. America I. i. p. 338. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Coll. Imp. Univ. Tokyo. XXII. p. 57. Kom. Fl. Mansh. III. p. 34.

*Gossypium indicum* Lam. Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd. Bat. III. p. 19. Fl. Ind. Bat. I. p. 163. Fran. et Sav. Enum. Pl. Jap. I. p. 64.

NOM. JAP. Wata.

HAB. Kyōng-geui: Seoul: Nam-san (南山). Sept. 1. 1902. fl. et fr. (T. Uchiyama).

**STERCULIACEÆ.****MELOCHIA** L. (sp. 1.)

*Melochia corchorifolia*, L. Sp. Pl. p. 944. Willd. Sp. Pl. III. p. 604. Benth. Fl. Austr. I. p. 235. Oliver Fl. Trop. Afr. I. p. 236. Hooker Fl. Brit. Ind. I. p. 374. Forbes et Hemsley Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 91. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 470. A. Gray et S. Watson. Syn. Fl. N. America I. i. p. 341.

*Melochia concatenata* L. Sp. Pl. (2. ed). p. 944. Willd. Sp. Pl. III. p. 602.

*Melochia supina* L. Sp. Pl. (2. ed). p. 944.

*Melochia truncata* Willd. Sp. Pl. III. p. 601.

*Riedleia concatenata* (L). DC. Prod. I. p. 492.

*Riedleia corchorifolia* (L). DC. Prod. I. p. 491.

*Riedleia supina* (L). DC. Prod. I. p. 491.

*Riedleia truncata* (Willd.) DC. Prod. p. 491.

NOM. JAP. Nojiaoi.

HAB. Kyōng-geui: Prope Tsu-hyōn (奄峴). Sept. 27. 1902. fl. et fr. (T. Uchiyama).

DISTR. America bor, Afr. trop. Australia, India, China et Japonia.

**TILIACEÆ.****Clavis specierum.**

A. Petala basi foveolata, circa basin tori plus minus elevati apice stamini-feri inserta ..... *Grewia* L.

B. Petala haud foveolata, circa stamina immediate inserta.

a) Herba; capsulis loculicide dehiscentibus ..... *Corchoropsis* S. et Z.

b) Arbor; fructis globosis, indehiscentibus ... . *Tilia* L.

**GREWIA** L. (sp. 1.)

*Grewia parviflora* BUNGE. Enum. Pl. Chin. bor. n. 57. Fran. Pl. Dav. p. 59. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 93. Maxim. Pl. Chin. n. 201. Palib. Consp. Fl. Kor. I. p. 47. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 468. Kom. Fl. Mansh. III. p. 31.

HAB. In archipelago Koreano, (Oldham.)—ex Hemsl. et Palib.

Kyöng-geui : Chemulpo (仁川). Sept. 17. 1902., Oct. 31. 1900.  
fr. (T. Uchiyama).

Chöl-la : Mok-pho (木浦). Nov. 5. 1900. fr. (T. Uchiyama).

DISTR. China et Manshuria.

**CORCHOROPSIS**, SIEB. et. ZUCC. (sp. 1.)

*Corchoropsis psilocarpa*, HARMS et LOES. (Tab. nostra IX.) Gilg et Loesner Beiträge. Fl. Kiantshou. in Engl. Bot. Jahrb. XXXIV. Beiblatt. p. 51. Kom. Fl. Mansh. III. p. 24.

HAB. Kyöng-geui : Prope Tsn-hyön (奄峴). Sept. 27. 1902. fl. et  
fr. mat. (T. Uchiyama).

DISTR. China et Manshuria.

**TILIA**, L.**Clavis specierum.**

A. Folia glabra, subtus glauca ..... *T. amurensis*, KOM.

B. Folia subtus tomentosa, multo latiora.

..... *T. manshurica*, RUPR. et MAXIM.

*Tilia amurensis*, KOM. Fl. Mansh. III. p. 24.

HAB. Kang-uön : Kum-gang-san (金剛山). Aug. 16. et 18. 1902. fr.  
(T. Uchiyama). ibidem. 1895. fr. (K. Hayashi).

Ad superiorem fluminis Jalu. Aug. 1907. ster. (M. Shiki).

DISTR. Manshuria.

*Tilia mandshurica*, Rupr. et Maxim. Prim. Fl. Amur. p. 62. Mél. Biol. X. p. 586. Franchet Pl. Dav. p. 60. Baker et Moore in Journ. Linn. Soc. XVII. p. 380. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 468. Forbes et Hemsley. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 94. Kom. Fl. Mandch. III. p. 28.

*Tilia pekinensis* Rupr. in Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 469.

HAB. in Korea septentr. et med. (Komarov).

Kang-nön : Kum-gang-san (金剛山). Aug. 16. 1902. fr. (T. Uchiyama). ibidem. 1895. fr. (K. Hayashi).

Phyöng-an : Sia-ryöng (新嶺). Sept. 11. 1905. ster. (T. Imagawa).

DISTR. China et Manshuria.

## LINACEÆ. (gn. 1.)

### LINUM L. (sp. 1.)

*Linum stellarioides* PLANCH. Walp. Ann. Bot. Syst. II. p. 117. Fran. et Sav. Enum. Pl. Jap. I. p. 68. Franch Pl. Dav. p. 61. Forbes et Hemsley. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 95. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 420. Kom. Fl. Mansh. II. p. 663.

*Linum davuricum* Miq. (non Schult.) Prol. Fl. Jap. p. 148.

NOM. JAP. Matsuba-ninjin.

HAB. In Korea septentr. (Komarov).

Kyöng-geui : Chemulpo (仁川). Oct. 30. 1900. fructifera : Ko-yang 高陽. Sept. 4. 1902. florif. et fr. (T. Uchiyama).



Kang-nön : Peuk-tun-ji (北屯址). Aug. 22. 1902. fl. Meuk-kai (墨浦). Aug. 12. 1902. fl. (T. Uchiyama).

Ham-gyöng : Mu-san-nyöng (茂山嶺). Aug. 11. 1907. fl. (K. Maeda).

DISTR. China, Manshuria et Japonia.

## OXALIDACEÆ (gn. 1.)

### OXALIS L.

#### Clavis specierum.

#### A. Acaules.

- a) Foliolis obcordatis ..... *O. acetosella*, L.  
 b) Foliolis obtriangularibus ..... *O. obtriangularis*, MAXIM.

#### B. Caulescens.

- a) Caulis decumbens ..... *O. corniculata*, L.  
 b) Caulis erectus ..... *O. stricta*, L.

*Oxalis acetosella* L. Sp. Pl. (ed. 2). p. 620. Thunb. Fl. Jap. p. 187. DC. Prodr. I. p. 700. Ledeb. Fl. Ross. I. p. 482. Maxim. Prim. Fl. Amur. p. 71. Pl. Chin. p. 86. Koch. Syn. Fl. Germ. et Helv. I. p. 123. Miq. Prol. Fl. Jap. p. 231. Fran. et Sav. Enum. Pl. Jap. I. p. 69. Fr. Schmidt. Reis. in Amur. Insl. Sachl. p. 37. et p. 120. Benth. et Hook. Fl. Brit. Isl. (ed. V.) p. 95. Hook. Fl. Brit. Ind. I. p. 436. Baker et Moore in Journ. Linn. Soc. XVII. p. 380. Miyabe Fl. Kurile Isl. p. 47. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 99. E. De Halácsy Consp. Fl. Græc. I. p. 308. Thomè Fl. Deutsch. Öst. u. Schw. III. p. 209. tab. 386. A. Gray et S. Watson. Syn. Fl. N. Am. I. p. 367. Kom. Fl. Mansh. II. p. 659.

*O.* scapo unifloro, foliis ternatis, radice ramosa articulata, Gmel. Fl. Sib. IV. p. 174.

NOM. JAP. Miyama-Katabami.

HAB. Kang-nön : Kum-gang-sad (金剛山). Aug. 18. 1900. fr. (T. Uchiyama).

DISTR. Europa. Asia et Am. bor.

*Oxalis obtriangularis*, MAXIM. in Mém. Biol. VI. p. 260. Fran. et Sav. Enum. Pl. Jap. I. p. 70. Baker et Moore in Journ. Linn. Soc. XVII. p. 380. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 99. Kom. Fl. Mansh. II. p. 660.

NOM. JAP. Ōyama-katabami.

HAB. In Korea Septr. (Komarov).

Kang-nön : Kum-gang-san (金剛山). Aug. 24. 1900. ster. (T. Uchiyama).

DISTR. Japonia et Manshuria.

*Oxalis corniculata*, L. Sp. Pl. (ed. 2). p. 623. Thunb. Fl. Jap. p. 187. Ledeb. Fl. Ross. I. p. 483. Wight. Ic. Pl. Ind. Orient. 18. Sieb. et Zucc. Fl. Jap. fam. nat. p. 136. Koch. Syn. Fl. Germ. et Helv. I. p. 124. Miq. Prol. Fl. Jap. p. 271. Benth. Fl. Austral. I. p. 301. Grisebach. Fl. Brit. W. Ind. Isl. p. 133. Hooker. Handb. New. Zeal. Fl. p. 38. Fl. Brit. Ind. I. p. 436. Benth. et Hook. Fl. Brit. Isl. (ed. V.) p. 95. Fran. et Sav. Enum. Pl. Jap. I. p. 69. Franch. Pl. Dav. p. 65. Baker et Moore in Journ. Linn. Soc. XVII. p. 380. Maxim. Pl. Chin. p. 86. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 99. E. De Halácsy Consp. Fl. Græc. I. p. 308. Palib. Consp. Fl. Kor. I. p. 48. Thomè Fl. Deutsch. Öst. u. Schw. III. p. 209. A. Gray et S. Watson. Syn. Fl. N. Am. I. p. 365. Kom. Fl. Mansh. II. p. 662. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 68. O. pusila, Salisb. in Trans. Linn. Soc. II. p. 243. tab. 23. fig. 5.

NOM. JAP. Katabami.

HAB. Kyöng-geui: Seoul Aug. 1886. fruct. (Kalinowsky). ibidem.

Nam-san (南山). Oct. 11. 1900. fr.: Yöng-deung-pho (永登浦).

Jul. 24. 1902. fl. et fr. (T. Uchiyama).

In Korea septentr. (Komarov).

DISTR. fere per totam orbem.

*Oxalis stricta*, L. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 99. Palib. Consp. Fl. Kor. I. p. 49. Kom. Fl. Mansh. II. p. 661.

HAB. Kyöng-geui: Seoul Mai. 1886. fl. (Kalinowsky). In Korea septentr. (Komarov).

DISTR. Sponte in Am. bor. in cultis fere totius orbis terrarum afferata.

## BALSAMINACEÆ (gn. 1.)

### IMPATIENS L.

#### Clavis specierum.

A. Pedunculus 2-4 floriferus.

a) Calcaribus furcillatis, floribus roseis v. pallide roseis.

.....*I. furcillata*, HEMSL.

b) Calcaribus simplicibus, floribus flavis .....*I. Noli-tangere*, L.

B. Pedunculus 4-12 floriferus.

a) Floribus ochroleucis .....*I. koreana*, n.

b) Floribus purpureis .....*I. Textori*, Miq.

*Impatiens furcillata*, HEMSL. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 101. Palib. Consp. Fl. Kor. I. p. 49. Kom. Fl. Mansh. II. p. 741.

HAB. Ham-gyöng: Gensau (Perry). in archipelago Koreano: Port Hamilton (Oldham. Nr. 123). in Korea septentr. (Komarov).

DISTR. Manshuria.

*Impatiens Noli-tangere* L. Sp. Pl. (ed. 2). p. 1329. DC. Prodr. I. p. 687. Ledeb. Fl. Ross. I. p. 481. Maxim. Prim. Fl. Amur. p. 71. Fran. et Sav. Enum. Pl. Jap. I. p. 70. Fran. Pl. Dav. p. 65. Fr. Schmidt. Reis. in Amur. u. Insl. Sachl. p. 36. et. p. 120. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 101. Palib. Consp. Fl. Kor. I. p. 49. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 454. Thomè Fl. Deutsch. Öst. u. Schw. III. p. 25. tab. 402. A. Gray et S. Watson. Syn. Fl. N. Am. I. p. 369. Kom. Fl. Mansh. II. p. 740.

NOM. JAP. Ki-tsurifune.

HAB. Ripa boreali-orientalis (Perry).

Kang-uön: Prope Chyang-yön-ri (長淵里). Aug. 13. 1902.

florifera: Kum-gang-san (金剛山). Aug. 19. 1902. florifera.

DISTR. Europa, Asia et Am. bor.

*Impatiens (racemose) koreana*, sp. nov. (tab. VIII.) Pl.  $1\frac{1}{2}$ – $2\frac{1}{2}$  pedalis, caule erecto, ramoso, glaberrimo, rarius glanduloso-hispidulo, nodis tumescentibus; foliis brevipetiolatis, subtus glaucescentibus, oblongo-ovatis; ad basin subito contracto-acuminatis, apice acuminatis, mucronato-serratis; pedunculis floriferis foliis æquilongis, fructiferis superantibus a basi ad medium glanduloso-hispidulis, racemis 5–12 floriferis, bracteis lanceolatis v. ovato-lanceolatis, acuminatis, sæpissime reflexis, pedicellis gracilibus, floriferis fructiferis brevioribus, glaberrimis, floribus 1– $1\frac{1}{2}$  poll. longis, sepalis 2 viridescens, obliquicornatis, mucronatis, petalis ochroleucis, intus purpureomacuratis, calcaribus elongatis ad apicem annulari-revolutis, stigmatibus punctatis, carpellis subnutantibus, seminibus rugosis, complanatis.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 20. 1902.

*Impatiens Textori*, MIQ. Prol. Fl. Jap. p. 8. Fran. et Sav. Enum. Pl. Jap. I. p. 70. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 102. Palib. Cousp. Fl. Kor. I. p. 49.

NOM. JAP. Tsurifune-sō.

HAB. Kyōng-geui: Montes Prope Seoul (Carles). ibidem. Aug. 1883. (Dr. Gottsche). Sept. 1886. fl. et defl. (Kalinowsky). ibidem. Namsan (南山). Oct. 11. 1900. fl. et fr. ibidem: Aug. 30. 1902. florif. (T. Uchiyama).

Kyōng-san: Pusan (釜山). fl. (T. Uchiyama).

DISTR. Japonia.

## GERANIACEÆ.

### Clavis generum.

- A. Stamina 10, omnia antherifera ..... *Geranium* L.  
 B. Stamina antherifera 5, squamæformia 5. .... *Erodium* LHER.

## GERANIUM L.

### Clavis specierum.

- A. Pedunculus unifloriferus..... *G. sibiricum* L.  
 B. Pedunculus bifloriferus.  
 a) Pedicellis fructiferis erectis..... *G. soboliferum* KOM.  
 b) Pedicellis fructiferis arcuato-deflexis.  
 a) Foliis profunde 3-5 partitis ..... *G. dahuricum* DC.  
 β) Foliis profunde 3-5 fidis.  
 ○ Lobis foliorum rhombeo-ovatis, grosse-dentatis.  
 △ Caule pilis minutis vestito. .... *G. koreanum*, KOM.  
 △△ Caule hirsuto. .... *G. koreanum* KOM. var. *hirsutum* M.  
 ○○ Lobis foliorum rhombeo-oblongis, subtrifidis.  
 ..... *G. Maximowiczii* REGEL.

○○○ Lobis foliorum cuneato-obovatis v. oblanceolatis, inciso-laciniatis .....*G. Sieboldii*, MAXIM.

*Geranium sibiricum*, L. Sp. Pl. (ed. 2.) p. 957. DC. Prodr. I. p. 639. Ledeb. Fl. Ross. I. p. 459. Maxim. Prim. Fl. Amur. p. 70. Mél. Biol. X. p. 617. Pl. Chin. p. 85. Miq. Prol. Fl. Jap. p. 201. Fran. et Sav. Enum. Pl. Jap. I. p. 69. Regel. Tent. Fl. Uss. p. 39. Franch. Pl. Dav. p. 62. Hook. fil. Fl. Brit. Ind. I. p. 431. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 419. Fl. Tsin-lin-schan. in Engl. Bot. Jahrb. XXXVI. Beiblatt. 70. A. Gray et S. Watson. Syn. Fl. N. Am. I. i. p. 360. Thomè Fl. Deutsch. Öst. u. Schw. III. p. 203. Kom. Fl. Mansh. II. p. 645.

HAB. Kyöng-geui: Seoul: Nam-san (南山). Oct. 10. 1900. fruct.; prope Yöng-deung-pho (永登浦). Jul. 24. 1902. fl. et fr. (T. Uchiyama).

Kang-üon: Kum-gang-san (金剛山). Aug. 15. 1902. fl. et fr. (T. Uchiyama).

Ham-gyöng: Mu-san-nyöng (茂山嶺). Aug. 11. 1907. fl. (K. Maeda).

DISTR. Asia, Europa et Am. bor.

*Geranium soboliferum* KOM. Fl. Mansh. II. p. 651. tab. XIV.

HAB. In Korea septentr. (Komarov).

Kan-tö: Rödökö (老道溝). Sept. 9. 1907. fl. et fr. jun. (K. Maeda).

DISTR. Manshuria.

*Geranium dahuricum*, DC. Palib. Consp. Fl. Kor. I. p. 48.

HAB. Kyöng-geui: Seoul: Ai-O-Quoi, Feb. 26. 1894. Mabou Mart. 4. 1894., *Arvia-Tai-Kol. Mart. 1894.* in ipsa urbe Apr. 2. 1894. (Sontag).

DISTR. China, Manshuria et Sibiria.

*Geranium koreanum* KOM. Fl. Mansh. II. p. 652. tab. XIII.

HAB. In Korea septentr. (Komarov).

Kyöng-geui: Nam-han-san (南韓山). Aug. 1. 1902. fl. et fr. (T. Uchiyama).

DISTR. Manshuria.

var. *hirsutum* nov. var.

Caule foliisque hirsutis.

HAB. Kyöng-geui: Nam-san (南山). Jul. 30. 1902. fl. (T. Uchiyama).

*Geranium Maximowiczii* REGEL Tent. Fl. Uss. p. 39. tab. III. fig. 4-6. Maxim. Mém. Biol. X. p. 627. Kom. Fl. Mansh. II. p. 650.

HAB. In Kor. septentr. (Komarov).

Kyöng-geui: Chemulpo (仁川). Nov. 1. 1900. fr. (T. Uchiyama).

DISTR. Manshuria.

*Geranium Sieboldii* MAXIM. Mém. Biol. X. p. 622. Kom. Fl. Mansh. II. p. 648.

HAB. In Korea septentr. (Komarov).

Kang-nön: Chyang-yön-ri (長淵里). Aug. 13. 1902. fl. et fr. jun. (T. Uchiyama).

Hoang-hai: Inter Syö-heung (瑞興) et Phung-syu-nön (風壽院). Sept. 8. 1902. fl. et fr. mat. (T. Uchiyama).

Ham-gyöng: Hoi-ryöng (會寧). Aug. 15. 1907. fl. (K. Maeda).

DISTR. Manshuria et Japonia.

### ERODIUM LHER.

*Erodium Stephanianum*, WILLD. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 48. Palib. Consp. Fl. Kor. I. p. 48. Kom. Fl. Mansh. II. p. 658.

HAB. Korea sine loco speciali (Perry). In Korea septentr. (Komarov).  
 DISTR. Sibiria, Manshuria et China.

## TROPÆOLACEÆ (gn. 1.)

### TROPÆOLUM L. (sp. 1.)

*Tropæolum majus* L. Sp. Pl. (ed. 2). p. 490. DC. Prodr. I. p. 683.

β. *atro-sanguineum*, Sw. Bot. Mag. tab. 3375.

*Tropæolum majus* in Palib. Consp. Fl. Kor. III. p. 45.

HAB. Kyöng-san : Pusan (釜山). fl. cult. (T. Uchiyama).

DISTR. Sponte in Am. austr.

## RUTACEÆ.

### Clavis generum.

A. Arbor v. frutex.

a) Fructus in drupa ..... *Phellodendron* RUPR.

b) Carpella dehiscencia ..... *Zanthoxylum* ROXB.

B. Herba, inflorescentia racemosa, fructus in folliculus..... *Dictamnus* L.

### DICTAMNUS L. (sp. 1.)

*Dictamnus albus* L. Sp. Pl. (ed. 2). p. 548. Hook. fil. Fl. Brit. Ind. I. p. 487. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 103. Maxim. Pl. Chin. p. 92. L. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 423. Thomè Fl. Deutsch. Öst. u. Schw. III. p. 218. tab. 389.

D. fraxinella Pers. in DC. Prodr. I. p. 712. Ledeb. Fl. Ross. I. p. 495. Maxim. Prim. Fl. Amur. p. 72. Miq. Prol. Fl. Jap. p. 210. Fr. Schmidt. Reis. in Amur. u. Insl. Sachl. p. 37. Fran. et Sav. Enum. Pl. Jap. I. p. 71.



*D. fraxinella* Pers.  $\beta$ . *dasycarpus* Regel Tent. Fl. Uss. n. 117.  
*Aquilegia Fauriei* Léveillé in Bull. du l'Acad. Int. Geog. Bot.  
 (1902). p. 300.

HAB. sine loco speciali (Schlippenbach). in archipelago Koreano  
 (Oldham. Nr. 126).

Kyöng-sang: Fusan (釜山). Wilford.

Kyöng-geui: Chemulpo (仁川) (Carles). in ditione Seoulensi in  
 monte Yran-san. Mai. 18. 1894. folia tantum (Sontag). Kounpho  
 (古溫浦) in insula Phung-to (豐島). ster. (Y. Hanabusa). Seoul  
 (京城). Aug. 1906. fr. mat. (S. Shimogōriyama).

Kang-uön: Prope Peuk-tun-ji (北屯址). Aug. 21. 1902. fr. mat.  
 (T. Uchiyama).

Chhyung-chhyöng: Insula Ansen circa Asan (牙山). ster. et fl.  
 (M. Enuma).

DISRR. Europa et Asia.

## ZANTHOXYLUM ROXB.

### Clavis specierum.

A. Arbor.....*Z. Danielli* BENN.

B. Frutex.

a) Spina plana, costa folii alata.....*Z. planispinum* S. et Z.

b) Spina conica.

a) Corolla ochroleuca.....*Z. schiniifolium* S. et Z.

$\beta$ ) Corolla sepalo concolor .....*Z. piperitum* DC.

*Zanthoxylum Danielli* BENN. Maxim. Mém. Biol. IX. p. 656.  
 (adnot. sub. *Z. Bretschneideri*). in Pl. Chin. p. 93. Palib. Consp.  
 Fl. Kor. I. p. 50.

*Evodia Danielli* Hemsl. Forbes et Hemsl. Ind. Fl. Sin. in  
 Journ. Linn. Soc. XXIII. p. 104. Engl. et Prantl. Nat. Pf.

Fam. III. iv. p. 121. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 423. Kom. Fl. Mansh. II. p. 666.

HAB. Kyöng-geui: Chemulpo (仁川) (Carles). ibidem. Sept. 17. 1902. fr. mat: Nam-san (南山). Oct. 11. 1900. fr. mat; ibidem. Jul. 30. 1902. fl. (T. Uchiyama).

DISTR. China et Manshuria.

*Zanthoxylum schiifolium* SIEB. et ZUCC. Fl. Jap. Fam. Nat. n. 113. Miq. Prol. Fl. Jap. p. 210. Fr. et Sav. Enum. Pl. Jap. I. p. 73. Hance in Journ. Bot. (1883). p. 296. Maxim. Mél. Biol. VIII. p. 3. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 107. Palib. Consp. Fl. Kor. I. p. 51. Fagara schiniifolia (Sieb. et Zucc). Engl. et Prantl. Nat. Pfl. Fam. III. 4. p. 118. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 356.

HAB. Sine loco speciali (Perry).

Kyöng-geui: Peuk-han-san (北漢山). Oct. 14. 1900. fr. mat.; Nam-san (南山). Oct. 11. 1900. fr. mat. Ibidem. Jul. 17. 1902. fl. (T. Uchiyama).

DISTR. China et Japonia.

*Zanthoxylum planispinum* SIEB. et ZUCC. Fl. Jap. Fam. Nat. n. 115. Miq. Prol. Fl. Jap. p. 73. Fr. et Sav. Enum. Pl. Jap. I. p. 73. Maxim. in Mél. Biol. XII. p. 428. Pl. Chin. p. 95. Engl. et Prantl. Nat. Pfl. Fam. III. 4. p. 115. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 71.

*Zanthoxylum alatum* Roxb. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 105. (pro parte).

HAB. in archipelago Koreano: Port Hamilton (Wilford).

Chöl-la: Mok-pho (木浦). Nov. 5. 1900. fr. mat. (T. Uchiyama).

DISTR. China bor. et Japonia.

*Zanthoxylum piperitum* DC. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 107. Palib. Consp. Fl. Kor. I. p. 50.

HAB. in archipelago Koreano: Port Hamilton (Wilford).

DISTR. China et Japonia.

### PHELLODENDRON Rupr. (sp. l.)

*Phellodendron amurense* Rupr. Maxim. Prim. Fl. Amur. p. 72. tab. 4. Regel Tent. Fl. Uss. n. 118. Fr. et Sav. Enum. Pl. Jap. I. p. 73. Rupr. in Mél. Biol. II. p. 526. Maxim. in Mél. Biol. VIII. p. 1. Franch. Pl. Dav. p. 67. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 108. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 424. Kom. Fl. Mansh. II. p. 668.

HAB. Kyöng-geui: Syong-do (松都). Oct. 23. 1900. fr. mat. (T. Uchiyama).

Phyöng-an: ad superiorem fluminis Julu. Aug. 1907. (M. Shiki).

DISTR. Japonia, Manshuria et China.

var. *sachalinensis* Fr. Schmidt. Palib. Consp. Fl. Kor. I. p. 51.

HAB. Kyöng-geui: Seoul Jun. 1886. ster. (Kalinowsky).—ex Palib.

DISTR. var. Sachalin.

### SIMARUBACEÆ.

#### Clavis generum.

- A. Cum capsulis alatis.....*Ailanthus* DESF.  
 B. Cum drupis .....*Picrasma* BLUME.

### AILANTHUS DESF. (sp. l.)

*Ailanthus glandulosa* DESF. DC. Prodr. II. p. 89. Baker et

Moore in Journ. Linn. Soc. XVII. p. 380. Fran. Pl. Dav. p. 68. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 112. Maxim. Pl. Chin. p. 95. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 425. Palib. Consp. Fl. Kor. I. p. 51. A. Gray et S. Watson. Syn. Fl. N. Am. I. p. 378. Kom. Fl. Mansh. II. p. 673.

HAB. Kyöng-geui: Seoul: Jun. 1886. flor. (Kalinowsky).

Kyöng-san: prope Taiku (台封). Oct. 4. 1902. fr. mat. (T. Uchiyama).

DISTR. China, Manshuria et Am. bor.

### PICRASMA BLUME. (sp. 1.)

*Picrasma quassioides* BENN. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 112. Palib. Consp. Fl. Kor. I. p. 52.

HAB. Korea: ripa occidentalis peninsulae. (Perry).

DISTR. Japonia, China et India.

### MELIACEÆ (gn. 1.)

#### CEDRELA L. (sp. 1.)

*Cedrela chinensis* A. JUSS. Walp. Rep. I. p. 436. Fran. et Sav. Enum. Pl. Jap. I. p. 76. Fran. Pl. Dav. p. 68. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 114. Matsum. et Hayata. Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 80.

HAB. Kyöng-san: Kai-kyöng (開慶). Oct. 2. 1902. fr. mat (T. Uchiyama).

DISTR. China et Japonia.

## AQUIFOLIACEÆ. (gn. 1.)

## ILEX L.

## Clavis specierum.

- A. Folia integra.....*I. integra*, THUNB.  
 B. Folia inciso-sinuata, dentibus subulatis.....*I. cornuta*, LINDL. et PAXT.

*Ilex integra* THUNB. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 116. Palib. Consp. Fl. Kor. I. p. 52.

HAB. In archipelago Koreano: Port. Hamilton (Wilford. Oldham. Nr. 144).

DISTR. Japonia.

*Ilex cornuta* LINDL. et PAXT. Walp. Ann. Bot. II. p. 265. Bot. Mag. t. 5057. Hance. in Journ. Bot. (1878). p. 137. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 115. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 436.

HAB. Chyöl-la: Mok-pho. (木浦) Nov. 6. 1900. fr. (T. Uchiyama).

DISTR. China.

## CELASTRACEÆ.

## Clavis generum.

- A. Capsula exalata.  
 a) Folia alterna .....*Celastrus* L.  
 b) Folia opposita .....*Euonymus* L.  
 B. Capsula alata.....*Tripteridium* HOOK. FIL.

## CELASTRUS L. (sp. 1.)

*Celastrus articulatus* THUNB. Fl. Jap. p. 97. DC. Prodr. II. p. 7. Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 153. Miq. Prol. Fl. Jap. p. 17. Fran. et. Sav. Enum Pl. Jap. I. p. 80. Fr. Sch-

midt. Reis. in Amur. u. Insl. Sachl. p. 122. Fran. Pl. Dav. p. 70. Forbes. et Hemsl. Ind. Fl. Sin. in. Journ. Linn. Soc. XXIII. p. 122. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 373. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 446. Matsum. et Hayata Enum. Pl. Form in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 84. *C. orbiculatus* Thunb. in Kom. Fl. Mansh. II. p. 714.

HAB. Sine loco speciali (Perry). in archipelago Koreano (Wilford).

Kyōng-san : Fusan (釜山). (Wilford).

Kyōng-geui : Seoul. Mai. 1886. fl. (Kalinowsky). ibidem, *prope Tap-Tong*. Aug. 25. 1895. cum. fr. mat. (Sontag). Nam-san (南山). Jul. 18. 1902. fr. Nam-han-san (南韓山) Aug. 2. 1902. fr. Peuk-han-san (北韓山). Oct. 14. 1900. fr. (T. Uchiyama).

DISTR. Japonia, Manshuria et China.

## EUONYMUS L.

### Clavis specierum.

#### A. Sempervirens.

a) Caulis erectus.....*E. japonica* THUNB.

b). Caulis scandens.....*E. japonica* THUNB. var. *radicans* MIQ.

#### B. Folia decidua.

##### a) Gemmæ elongatæ imbricatæ.

a) Capsula alata .....*E. sachalinensis* MAXIM.

β) Capsula globosa .....*E. oxyphylla* MIQ.

##### b) Gemmæ breves ovoideæ.

a) Capsula 4-lobata .....*E. europea* L. var. *Hamiltonianæ* MAXIM.

β) Capsula 4-partita.

○ Caulis alatus .....*E. alata* (THUNB.) Sieb.

○○ Caulis exalatus

.....*E. alata* THUNB. var. *striata* (THUNB.) MAKINO.

*Euonymus alata* (THUNB.) SIEB. et ZUCC. Fl. Jap. Fam. Nat.

n. 158. Maxim. Prim. Fl. Amur. p. 73. Miq. Prol. Fl Jap. p. 18. et p. 363. Fr. Schmidt Reis. in Amur. u. Insel Sachl. p. 121. Franch. et Sav. Enum. Pl. Jap. I. p. 78. Maxim. in Mél. Biol. XI. p. 196. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 444. Kom. Fl. Mansh. II. p. 703.

*Euonymus Thunbergiana* Bl. Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 158. Baker. et Moore in Journ. of Linn. Soc. XVII. p. 380. Franch. Pl. Dav. p. 70. Maxim. Pl. Chin. p. 97. Palib. Consp. Fl. Kor. I. p. 54.

*Celastrus alatus* Thunb. Fl. Jap. p. 98. DC. Prodr. II. p. 7.

NOM. JAP. Nishikigi.

HAB. Kyöng-geui : Seoul Mai. 1886. (Kalinowsky). Koumpho (古溫浦). in Insl. Phung-tō (豐島). cum alabastris ; Penk-han-san (北漢山). Oct. 14. 1900. fr. mat. (T. Uchiyama).

Kang-uön : Kum-gang-san (金剛山). Aug. 14. 1902. cum fruct. (T. Uchiyama).

Kyöng-sang : Chyang-ryöng-san (頂嶺山). Oct. 4. 1902. fr. mat. (T. Uchiyama).

Phyöng-an : Kō-syöng-ryöng (高城嶺). Sept. 11. 1905. fr. (T. Imagawa).

DISTR. China, Manshuria et Japonia.

var. *striata* (THUNB). MAKINO. Tokyo Bot. Mag. XXI. p. 138.

*Celastrus striatus* Thunb. Fl Jap. p. 98. DC. Prodr. II. p. 6.

Fran. et Sav. Enum. Pl. Jap. I. p. 80. et II. p. 314.

*Euonymus alata*  $\beta$ . *subtriflora* Fran. et Sav. Enum. Pl. Jap. II. p. 311. Maxim. Mél. Biol. XI. p. 196.

*Euonymus subtriflora* Bl. Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 159.

*Euonymus alata*  $\beta$ . *aptera* Regel Tent. Fl. Uss. p. 41. tab. 7. fig. 2-3.

NOM. JAP. Komayumi.

HAB. Kyöng-geui: Peuk-han-san (北漢山). Oct. 20. 1900. fr. mat.;  
Nam-han-san (南韓山). Aug. 1. 1902. cum fructis (T. Uchiyama).

Kyöng-sang: Chyang-ryöng-san (頂嶺山). Oct. 3. 1902. cum fr. mat. (T. Uchiyama).

Phyöng-an: ad superiorem fl. Jalu, Aug. 1907. fr. (M. Shiki).

DISTR. varietatis; China, Manshuria et Japonia.

*Euonymus europæa* L. Sp. Pl. (ed. 2). p. 286. DC. Prodr. II. p. 4. Ledeb. Fl. Ross. 1. p. 497. Benth. et Hook. fil. Brit. Fl. (ed. V.) p. 97. A. Gray et S. Watson. Syn. Fl. N. Am. I. i. p. 397. Thomè Fl. Deutsch. Öst. u. Schw. III. p. 245. tab. 398.

var. *Hamiltoniana* MAXIM. Mém. Biol. XI. p. 191. Palib. Consp. Fl. Kor. p. 53. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 443.

*E. europæa* L. in Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 119. Thunb. Fl. Jap. p. 101.

*Euonymus Sieboldiana* Bl. Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 157. Miq. Prol. Fl. Jap. p. 18. Fr. Schmidt Reis. in Amur. u. Insl. Sachl. p. 102. Fran. et Sav. Enum. Pl. Jap. I. p. 78. et II. p. 312.

*Euonymus Hamiltoniana* Wall. Miq. Prol. Fl. Jap. p. 363. Fran. et Sav. Enum. Pl. Jap. I. p. 78. Hook. fil. Fl. Brit. Ind. I. p. 612. Kom. Fl. Mansh. II. p. 703.

*Euonymus Maaekii* Rupr. Maxim. Prim. Fl. Amur. p. 75.

*Euonymus Vidali* Fran. et Sav. Enum. Pl. Jap. II. p. 312.

NOM. JAP. Mayumi.

HAB. Kyöng-geui: Seoul. Jun. 1886. cum fruct. immat (Kalinowsky). ibidem. Schin-Ku-Kai; April. 18. 1894. fl.; *prope Tap-Tong*. Aug. 25. 1895. fr. immat. (Sontag). *Prope Chhyöng-nyang-li* (靑涼里). Oct. 17. 1900. Unum cum floribus, cetera cum



fructibus maturatis; Nam-han-san (南韓山). Oct. 18. 1900. fr. mat. (T. Uchiyama),

DISTR. China, Manshuria, India, Japonia. et Am. bor.

*Euonymus oxyphylla* MIQ. Ann. Mus. Bot. Lugd. Bat. II. p. 86. Maxim. Mém. Biol. XI. p. 187. Fran. et Sav. Enum. Pl. Jap. I. p. 79. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 121. Palib. Consp. Fl. Kor. I. p. 53.

NOM. JAP. Tsuribana.

HAB. Kyōng-san: Fusan (釜山) (Wilford). Chyang-ryōng-san (頂嶺山). Oct. 2. 1902. cum fr. mat. (T. Uchiyama)

Kang-uōn: Kum-gang-san (金剛山). Aug. 14. 1902. fr. (T. Uchiyama). Ibidem. 1895. fr. (K. Hayashi).

Sine loco et dato speciali; cum alabastris (T. Uchiyama).

DISTR. Japonia.

*Euonymus japonica* THUNB. Fl. Jap. p. 100. DC. Prodr. II. p. 4. Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 156. Miq. Prol. Fl. Jap. p. 17. Fran. et Sav. Enum. Pl. Jap. I. p. 79. Hook. et Arn. Bot. Beech. Voy. p. 261. Maxim. Mém. Biol. XI. p. 178. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 120. Palib. Consp. Fl. Kor. I. p. 53. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 441. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. p. 370.

NOM. JAP. Masaki.

HAB. Kyōng-geui: Prope Seoul secus viam ad Peking ducentem (frutex usque bipedalis, sterilis). Nov. 1. 1893. (Sontag). Nam-san (南山). Oct. 16. 1900. cum fr. mat. (T. Uchiyama).

Chōl-la: Meuk-Chyang (木市). Nov. 9. 1900. cum. fr. mat. (T. Uchiyama).

DISTR. China, Manshuria et Japonia.

var. *radicans* MIQ. Prol. Fl. Jap. p. 18. et p. 378. Maxim. Mém. Biol. XI. p. 178.

*Euonymus radicans* Sieb. Miq. Prol. Fl. Jap. p. 366. Fran. et Sav. Enum. Pl. Jap. I. p. 79.

NOM. JAP. Tsurumasaki.

HAB. Sine loco et dato speciali, ster. (T. Uchiyama).

DISTR. varietatis. Japonia.

*Euonymus sachalinensis* MAXIM. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 121. Palib. Consp. Fl. Kor. I. p. 54.

NOM. JAP. Murasaki-tsuribana.

HAB. Korea : sine loco speciali (Perry ? Carles ?).

DISTR. China, Manshuria et Japonia.

### TRIPTERIDIUM HOOK. FIL. (sp. 1).

*Tripteridium Wilfordi* HOOK. FIL. Benth. et Hook. Gen. Pl. I. p. 368. Regel Gartenfl. (1869). p. 105. t. 612. Maxim. Mém. Biol. XI. p. 206. Fran. et Sav. Enum. Pl. Jap. I. p. 80. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 125. Palib. Consp. Fl. Kor. I. p. 55. Kom. Fl. Mansh. II. p. 717. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 85.

*Tripteridium Bullocki* Hance in Journ. Bot. (1880). p. 259.

NOM. JAP. Kurozuru.

HAB. Kyōng-geui : Montes prope Seoul (Carles). Peuk-han-san (北漢山). Oct. 14. 1900. cum carp. mat. (T. Uchiyama).

DISTR. China, Manshuria et Japonia.

## RHAMNACEÆ.

### Clavis generum.

A. Ovarium disco immersum.

a) Foliis suboppositis pinnatinerviis ..... *Sageretia* BRONGN.

- b) Foliis alternis trinerviis.....*Ziggyphus* JUSS.  
 B. Ovarium liberum .....*Rhamnus* L.

**RHAMNUS** L.**Clavis specierum.**

- A). Foliis oppositis.  
 a) Foliis ellipticis v. elliptico-lanceolatis .....*R. davurica* PALL.  
 b) Foliis oblongo-lanceolatis v. lanceolatis  
 ..... *R. davurica* PALL. var *nipponica* MAKINO.  
 B). Foliis alternis.  
 a) Foliis glabris v. ad nervos petiolumque leviter pubescentibus  
 b) Inflorescentia axillari-glomerata .....*R. parvifolia* BUNGE.  
 β) Inflorescentia umbellata .....*R. crenata* S. et Z.  
 b) Foliis caulibus juvenilibusque pubescentibus v. villosis  
 .....*R. globosa* BUNGE.

*Rhamnus davurica* PALL. Fl. Ross. II. p. 24. tab. 61. Willd. Sp. Pl. I. p. 1097. DC. Prodr. II. p. 25. Ledeb. Fl. Ross. I. p. 502. Max. Prim. Fl. Amur. p. 76. Regel Tent. Fl. Uss. n. 122. (pro parte) Hook. fil. Fl. Brit. Ind. I. p. 639. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 128. L. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 459. Kom. Fl. Mansh. III. p. 9.

*Rhamnus cathartica* L. β. *intermedia* et γ. *davurica* Maxim. in Mém. Acad. Soc. Pétersb 7e serie X. (reprint. p. 8). Franch. Pl. Dav. p. 72.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 15. 1902. fr. mat. (T. Uchiyama).

Phyöng-an: Ad superiorem fl. Jalu. Aug. 1907. ster. (M. Shiki).

Kyöng-san: Monte Chiri-san (智異山). Aug. 1907. (M. Shiki).

DISTR. China, India et Sibiria.

var. *nipponica* MAKINO. Tokyo Bot. Mag. XVIII. p. 98.

HAB. Kyöng-geui: Nam-han-san (南韓山). Oct. 18. 1900. fr. mat.  
(T. Uchiyama).

Ham-gyöng: Sin-ryöng (新嶺). Sept. 11. 1905. fr. (T. Imagawa).

Phyöng-an: Ad superiorem fl. Jalu. Aug. 1907. ster. (M. Shiki).

DISTR. Japonia.

*Rhamnus globosa*, BGE. Enum. Pl. Chin. bor. n. 83. Kom. Fl. Mansh. III. p. 2.

R. tinctoria Waldst. et Kit. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 129. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 459.

R. virgata Roxb. *α*. *sylvestris* Maxim. in Mém. Acad. Soc. Pétersb. 7e Serie. X. (reprint. p. 13).

R. chlorophora Dene. (ex. Hemsl. l.c.).

HAB. Kyöng-geui: Chemulpo (仁川). Sept. 17. 1902. fructifera;  
Peuk-han-san (北漢山). Oct. 14. 1900. fr. mat.; Nam-han-san  
(南韓山). Aug. 2. 1902. fr. (T. Uchiyama).

DISTR. China et Manshuria.

*Rhamnus parvifolia*, BUNGE. Enum. Pl. Chin. bor. n. 83. Maxim. in Mém. Acad. Soc. Pétersb. 7e serie. X. (reprint p. 16) Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 129. Franch. Pl. Dav. p. 129. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 459. Kom. Fl. Mansh. III. p. 12.

R. crenata, Baker et Moore in Journ. Linn. Soc. XVII. p. 380.

R. virgata *β*. *aprica* Maxim. in Mém. Acad. Soc. Pétersb. 7e Serie X. (reprint p. 14).

HAB. In Korea bor. (Komarov).

Kang-uön: prope Chyang-yön-ri (長淵里). Aug. 13. 1902. fructifera. (T. Uchiyama).

Kyöng-san : Chyang-ryöng-san (頂嶺山). Oct. 2. 1902. cum fr. mat. (T. Uchiyama).

Phyöng-an : Monte Schang-pei-schan (長白山) Jul. 5. 1905. fr. (T. Imagawa).

DISTR. China et Manshuria.

*Rhamnus crenata* SIEB. et ZUCC. Fl. Jap. Fam. Nat n. 142. Fran. et Sav. Enum Pl. Jap. I. p. 82.

*Frangula crenata* MIQ. Prol. Fl. Jap. p. 220.

NOW JAP. ISONOKI.

HAB. Chöl-la : Mok-pho (木浦) Nov. 9. 1900. fl. et. Fr. (T. Uchiyama).

DISTR. Japonia.

### SAGERETIA, BRONGN. (sp. 1.)

*Sageretia theezans* BRONGN. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 131. Palib. Consp. Fl. Kor. I. p. 55.

HAB. in archipelago Koreano : Port Hamilton (Okhham Nr. 166/1).

DISTR. India, China et Formosa.

### ZIZYPHUS, JUSS. (sp. 1.)

*Zizyphus vulgaris* LAM. DC. Prodr. II. p. 19. Ledeb. Fl. Ross. I. p. 501. Hook. fil. Fl. Brit. Ind. I. p. 633. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 126. Palib. Consp. Fl. Kor. I. p. 55. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 458. Kom. Fl. Mansh. III. p. 1.

*R. zizyphus* L. Sp. Pl. (ed. II.). p. 282.

*Z. soporifera* DC. Prodr. II. p. 22.

*R. soporifer* Lour. Fl. Cochinch. p. 138.

*a. spinosus* BUNGE. Enum. Pl. Chin. bor. n. 81. Maxim. in Mém. Acad. Soc. Pétersb. Te serie X. (reprint p. 3.).

NOM. JAP. Natsume.

HAB. Sine loco speciali (Perry).

Kyōng-geui: Seoul (京城). Sept. 1883. ster. (Y. Hanabusa). Namsan (南山). Oct. 13. 1900. ster. (T. Uchiyama).

DISTR. Europa et Asia.

## AMPELIDACEÆ.

### Clavis generum.

- A. Perigonium 4.....*Cissus* L.  
 B. Perigonium 5.  
 a) Non cirrifera .....*Quinaria* RAF.  
 b) Cirrifera.  
 a) Inflorescentia cymosa .....*Ampelopsis* PLANCH.  
 β) Inflorescentia racemosa v. paniculata .....*Vitis* L.

## VITIS L.

### Clavis specierum.

- A. Pedunculus cirriferus.  
 a) Folia subtus cinereo-tomentosa.....*V. Thunbergii* Sieb. et Zucc.  
 b) Folia subglabra  
 a) Folia non lobata.....*V. flexuosa* THUNB.  
 β) Folia 3-5 lobata.....*V. amurensis* RUPR.  
 B. Pedunculus non cirriferus .....*V. vinifera* L.

*Vitis vinifera* L. Sp. Pl. (ed. II). p. 293. DC. Prodr. I. p. 633. Miq. Ann. Mus. Bot. Lugd. Bat. I. p. 92. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 136. (excl. *V. amurensis*). Kom. Fl. Mansh. III. p. 19.

NOM. JAP. Budō.



## ERRATA.

- P. 3. line 15. Put *aliis* for *allis*.; line 24. omit 'a'.
- .. 14. ,, 3. ,, *caulinis* for *caulinalibus*.
- .. 19. ,, 15. ,, *multo* for *multe*.
- .. 28. ,, 1 and 3; P. 31 line 27, P. 55. line 26. Put *caulinis* for *caulinibus*.
- .. 32. ,, 1. Put *dentibus* for *dentis*.
- .. 37. ,, 22. ,, *scandens* for *scandentes*.
- .. 45. ,, 3. ,, *excalcarati* for *excalcarati*.
- .. 52. ,, 28. ,, *lyratis* for *lyratatis*.
- .. 55. ,, 3. ,, *manifeste* for *manifesto*.
- .. 55. ,, 28; P. 94 line 13. Put *conformibus* for *aequiformibus*.
- .. 56. ,, 1. Put *rhizomatoideis* for *rhizomatoideis*.
- .. 63. ,, 28. ,, *mediocribus* for *mediocris*.
- .. 94. ,, 17. ,, *Vnt.* for *Vne*.
- .. 99. ,, 14. ,, *Termstroemiaceae* instead of *Ternstroemiaceae*.
- .. 99. ,, 18. ,, *Radicula* for *Raideula*.
- .. 116. ,, 7. ,, *schiniifolium* for *schiiifolium*.
- .. 119. ,, 22; Put 124 lines 12 et 13 Put *Tripterygium* for *Tripteridium*.
- .. 137. ,, 18. Put *viridia* for *viridea*.
- .. 140. ,, 15. ,, *Leguminose* for *Leguminosae*.
- .. 142. lines 10, 14 and 19. Put *Gleditschia* for *Gleditzia*.
- .. 151. ,, 1 and 2. Put *Aeschynomene* for *Aeschenomene*.
- .. 205. line 9. Put *ramorum* for *ranorum*.
- .. 215. ,, 16. ,, *mucronati* for *mucronatis*, line 17. Put *acuminati* for *acuminatis*.
- .. 217. ,, 27. ,, 'e' for 'ex'.
- .. 229. ,, 1. ,, 金川 for 金山.
- .. 232. ,, 5. ,, *Cotyledon* for *Cotylodon*.
- .. 234. ,, 18. ,, *Callitrichaceae* for *Callitrichiaceae*.
- .. 241. ,, 28. ,, *parvi* for *parvis*.
- .. 243. ,, 1. ,, *koreæ* for *koreanæ*.
- .. 251. ,, 24. ,, *compressa* for *compressae*, line 26, *transversalis* for *transversalis*.
- .. 259. ,, 19 must be omitted.
- .. 261. ,, 11., P. 262. line 17. P. 265 lines 27 and 28. Put *lacinis* for *lacinis*.
- .. 264. ,, 20. Put *collibus* for *collibus*.
- .. 265. ,, 28. ,, *lanceolatis* for *lanceolatis*.
- .. 270. ,, 18. ,, *Uchiyamana* for *Uchiyama*; line 28. *Planta* for *Plante*.
- .. 283. ,, 2. ,, *Caprifoliaceae* for *Caprifoliaceae*.
- .. 285. ,, 1. ,, *dilatata* for *dilatata*.
- .. 297. ,, 26. ,, *America* for *American*.
- .. 299. ,, 20. ,, *Valerianaceae* for *Valerianaceae*.

For Index.

- P. 1. Put *Ailanthus* for *Ailanthus*, p. 41. for p. 45, *Gleditschia* for *Gleditzia*, *Ligusticum* for *Ligustrum*, p. 106 for p. 108.
- P. 2. Put *Pæleria* for *Pæleria*, *Pæonia* for *Pæonia*, p. 100 for p. 109, *Adans* for *Adams*, p. 92 for p. 254, *Trypterygium* for *Tripteridium*.
- In Explicatio tabulæ VIII. lines 5 and 6. Put *videntur* for *videtur*.
- .. .. XII. line 4. Put *b. Flos* for *d. Flos*.



HAB. Kyōng-geui: Nam-san. (南山). Juli. 18. 1902. fructifera (T. Uchiyama).

DISTR. India, China et Manshuria.

*Vitis amurensis* RUPR. Maxim. Prim. Fl. Amur. p. 69. Franch. Pl. Dav. p. 74. Palib. Consp. Fl. Kor. I. p. 56. Kom. Fl. Mansh. III. p. 14.

*Vitis vinifera*  $\beta$ . *amurensis* Regel Tent. Fl. Uss. n. 109.

*Vitis Thunbergii* Regel Gartenfl. t. 424. (fide Palib)

*Vitis vulpina* L. var. *amurensis* Rupr. in Regel Gartenfl. tab. 339.

*Vitis vinifera* Forbes et Hemsl. l.c. (pro parte).

HAB. Kyōng-geui: Seoul Jun. 1886. fl. (Kalinowsky); Nam-san (南山). Oct. 10. 1900. ster; ibidem. Oct. 13. 1900. ster. (T. Uchiyama).

Kang-uön: Meuk-kai (墨浦). Aug. 12. 1902. fr. mat. (T. Uchiyama).

DISTR. Manshuria, China et Amur.

*Vitis Thunbergii* SIEB et ZUCC. Palib. Consp. Fl. Kor. I. p. 56. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 134. (pro parte).

NOM. JAP. Ebizuru.

HAB. Kyōng-san: Fusan (釜山). (Wilford)

Kyōng-geui: Chemulpo (仁川). (Carles).

DISTR. China et Japonia.

*Vitis flexuosa* THUNB. Trans. Linn. Soc. II. p. 332. DC. Prodr. I. p. 634. Palib. Consp. Fl. Kor. I. p. 56. Matsum. et Hayata. Enum. Pl. Formos. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 89.

*Vitis flexuosa*  $\alpha$ . *typica* Pl. in Palib. Consp. Fl. Kor. I. p. 56.

*Vitis flexuosa* Sieb. et Zucc. Miq. in Ann. Mus. Bot. Lugd. Bat. I. p. 92. Fran. et Sav. Enum. Pl. Jap. I. p. 82.

*Vitis indica* Thunb. Fl. Jap. p. 103. (non L.).

NOM. JAP. Sankakuzuru, Gyōjanomizu.

HAB. In archipelago Koreano : Herschel Island. (Oldham. Nr. 174.).

Kyōng-geui : Nam-han-san (南韓山). Aug. 1. 1902. fructifera.  
(T. Uchiyama).

DISTR. Japonia. Manshuria et China.

**AMPELOPSIS** PLANCH. (sp. 1.)

*Ampelopsis heterophylla* SIEB. et ZUCC. Fl. Jap. Fam. Nat. n. 408. Gilg in Engl. et Prantl. Nat. Pfl. Fam. III. 5. abt. p. 449. Kom. Fl. Mansh. III. p. 20.

var. *Bungei* PLANCH. Maxim. Pl. Chin. n. 256. (sub nom. Vitis).  
*Ampelopsis humulifolia* Bge. Enum. Pl. Chin. bor. n. 69.

*Cissus bryoniaefolia* Regel Tent. Fl. Uss. tab. 41. f. 3.

*Vitis heterophylla* Thunb. Fl. Jap. p. 103. Miq. Ann. Mus. Bot. Lugd. Bat. I. p. 92. Fran. et. Sav. Enum. Pl. Jap. I. p. 84. Forbes. et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 133.

*Vitis heterophylla* β. Maximowiczii Regel in Gartenfl. t. 185. f. 2.

*Vitis heterophylla* var. *humulifolia* Hook. fil. in Bot. Mag. t. 5682.

NOM. JAP. Nobudō.

HAB. In Korea septentr. (Komarov).

Kang-uön : Kum-gang-san (金剛山). Aug. 20. 1902. florifera  
(T. Uchiyama).

Kyōng-san : Fusan (Wilford).

Kyōng-geui : Seoul (京城). Jun. 1886. defl. (Kalinowsky); *Fan-Tan-San*. Jun. 2. 1895. fr. imm. (Sontag).

DISTR. China, Manshuria et Japonia.

**CISSUS** L. (sp. 1.)

*Cissus japonica* WILLD. Palib. Consp. Fl. Kor. I. p. 57.

*Vitis japonica* Thunb. in Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 134.

NOM. JAP. Binbōkazura, Yabukarashi.

HAB. In archipelago Koreano (Oldham. Nr. 167).

DISTR. Japonia, China, India, Malaya et Australia.

### QUINARIA RAF. (sp. 1.)

*Quinaria tricuspadata* KEHNE. Gilg in Engl. et Prantl. Nat. Pfl. Fam. III. 5. p. 449. Palib. Consp. Fl. Kor. I. p. 58.

*Vitis inconstans* Miq. Ann. Mus. Bot. Lugd. Bat. I. p. 91. Fran. et Sav. Enum. Pl. Jap. I. p. 84. II. p. 316. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 133. Maxim. Pl. Chin. n. 255. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 91.

*Cissus Thunbergii* Sieb. et Zucc. l.c. n. 405.

*Ampelopsis tricuspadata* Sieb. et Zucc. l.c. n. 407.

NOM. JAP. Tsuta.

HAB. Sine loco speciali (Schlippenbach).

Kyōng-geui: Seoul Jun. 1886. fl. incip. (Kalinowsky). Nam-san. Oct. 11. 1900. fr. mat. ibidem. Jul. 25. 1902. fr. jun. (T. Uchiyama).

Chōl-la: Insul. Soanto (所安島). ster (Y. Hanabusa).

### ACERACEÆ (gn. 1.)

#### ACER L.

##### Clavis specierum.

A. Folia trifoliolata.

a) Folia glabra.....*A. manshuricum* MAXIM.

b) Folia pubescentia v. pilosa.....*A. triflorum* KOM.

B. Folia 3-7 fida v. lobata.

- a) Lobis foliorum integris.  
 α) Folia glabra..... *Acer pictum* THUNB. var. *Mono* PAX.  
 β) Folia subtus pubescentia... *Acer pictum* THUNB. var. *Savatieri* PAX.
- b) Lobis foliorum duplicato-serratis.  
 α) Alæ samaræ subparallele, folia ambitu ovato-lanceolata.  
 ..... *A. Ginnula* MAXIM.  
 samaræ intense coccineæ ... *A. Ginnula* MAX. f. *coccineum* m.  
 β) Alæ samaræ rectæ v. divergentes.  
 ○ Racemus multifloriferus.  
 † Folia 5-7 lobata.  
 △ Racemus fructiferus quam 6 cm. brevior, pedunculus gracilis,  
 folia mediocria, petiolus ramulusque glabri.  
 ..... *A. Tschonoskii* MAXIM.  
 △△ Racemus fructiferus longissimus 10 cm. superantus, pedun-  
 culus robustus, folia magna, petiolus ramulusque pilis  
 albidis dense vestiti. *A. ukurunduense* TRAUT. et MEX.  
 †† Folia trilobata ..... *A. tegmentosum* MAXIM.  
 ○○ Racemus paucifloriferus.  
 Folia 3-lobata v. indivisa ... *A. barbinerve* MAXIM.
- c) Folia 9-11 lobata.  
 a) Alæ samaræ rectæ v. arcuato-acuminatæ.  
 ..... *A. japonicum* THUNB. var. *nudicarpum*, m.  
 b) Alæ samaræ subhorizontales.  
 α) Alæ samaræ oblique obovatæ *A. Pseudo-Sieboldianum* (PAX.) KOM.  
 β) Alæ samaræ oblongæ.  
 ..... *A. Pseudo-Sieboldianum* KOM. var. *koreanum* m.
- Acer manshuricum* MAXIM. in Mém. Biol. VI. p. 371. X. p.  
 610. XII. p. 434. Pax. in Engl. Bot. Jahrb. VII. p. 253. XI.  
 p. 80. in Pfl. Reich. VIII. p. 29. Kom. Fl. Mansh. II. p. 727.  
 HAB. In Korea bor. (Komarov).  
 Kang-uön : monte Kum-gang-san (金剛山). 1895. ster. (K.  
 Hayashi).

Kyöng-san : monte Chirisan (智異山). Aug. 1907. (M. Shiki).  
 Distr. Manshuria et Amur.

*Acer triflorum* KOM. Fl. Mansh. II. p. 729. tab. XV.

HAB. in Korea bor. (Komarov).

Kang-uön : Kum-gang-san (金剛山). Aug. 15. 1902. fructifera  
 (T. Uchiyama).

Phyöng-an : Ö-ka-san (五佳山). Aug. 23. 1905. fr. (T. Imagawa).

DISTR. Manshuria.

*Acer pictum* THUNB. Fl. Jap. p. 161.

var. *Mono* PAX. in Engl. Bot. Jahrb. VII. p. 236.

A. mono Max. Prim. Fl. Amur. p. 68. Regel Tent. Fl. Uss.  
 n. 107. Fran. et Sav. Enum. Pl. Jap. II. p. 520. Rupr. Mém.  
 Biol. II. p. 523. Fr. Schmidt Reis. in Amur. u. Insl. Sachl.  
 p. 36. et p. 119. Kom. Fl. Mansh. II. p. 730.

A. pictum Baker et Moore in Journ. Linn. Soc. XVII. p. 380.  
 Fran. Pl. Day. p. 77. Forbes et Hemsl. Ind. Fl. Sin. in Journ.  
 Linn. Soc. XXIII. p. 141.

A. pictum Thunb.  $\gamma$ . Maxim. in Mém. Biol. X. p. 600.

NOM. JAP. Itayakaede.

HAB. Kyöng-geui : Phung-tö (豐島). Ster. (Enuma). Peuk-han-san  
 (北漢山). Oct. 14. 1900. fructifera (T. Uchiyama).

Kang-uön : Kum-gang-san (金剛山). Aug. 14. 1902. fructifera  
 (T. Uchiyama).

DISTR. Japonia, Manshuria, Amur. et China.

var. *Savatieri* PAX. in Engl. Bot. Jahrb. VII. p. 236.

A. pictum  $\delta$ . Maxim. in Mém. Biol. X. p. 600.

A. truncatum Fran. et Sav. Enum. Pl. Jap. I. p. 87.

HAB. Kyöng-san : Chyang-ryöng-san (頂嶺山). Oct. 2. 1902. fructifera  
 (T. Uchiyama).

DISTR. var. Japonia.

*Acer Ginnata* MAXIM. in Mém. Biol. II. p. 415. Rupr. ibidem. p. 522. Pax. in Engl. Bot. Jahrb. VII. p. 185. Kom. Fl. Mansh. II. p. 716.

*A. tataricum* var. *Ginnata* Maxim. in Prim. Fl. Amur. p. 67. in Mém. Biol. X. p. 604. Regel Tent. Fl. Uss. n. 106. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 142. Palib. Consp. Fl. Kor. I. p. 59.

*A. tataricum* v. *acuminatum* Franch. Pl. Dav. I. p. 76.

NOM. JAP. Karakogi-kaede.

HAB. Kyōng-geui: Seoul (京城). Mai. flor. Jun. 1806. fr. immat. (Kalinowsky). Ō-ryu-kol (梧柳洞). Oct. 11. 1900. fr.; Pha-jyu (坡州). Oct. 22. 1900. fr.; Syong-tyōng (松亭). Sept. 28. 1902. fruct. (T. Uchiyama).

Kang-uōn: Monte Kum-gang-san (金剛山). 1895. fr. (K. Hayashi).

Phyōng-an: Ad superiorum fl. Jalu. Aug. 1907. ster. (M. Shiki).

DISTR. China, Manshuria et Japonia.

f. *coccineum*, m. fructus omnis intense coccineus, cetera ut typica.

HAB. Kang-uōn: Chhyang-dō (昌道). Aug. 9. 1902. fr. (T. Uchiyama).

*Acer Tschonoskii* MAXIM. in Mém. Biol. XII. p. 432. Pax in Pfl. Reich. VIII. p. 71. Kom. Fl. Mansh. II. p. 735.

NOM. JAP. Mine-kaede.

HAB. Ham-gyōng: In-Nam-Sya (仁南社). Aug. 18. 1905. ster. (T. Imagawa).

Kang-uōn: monte Kum-gang-san (金剛山). 1895. ster. (K. Hayashi).  
In Korea bor (Kom.)

DISTR. Manshuria, et Japonia.

*Acer ukurunduense* TRAUT. et MEY. Rupr. in Mém. Biol. II. p. 520. Kom. Fl. Mansh. II. p. 722.

*A. spicatum* var. *ukurunduense* Maxim. in Prim. Fl. Amur. p. 65. in Mél. Biol. X. p. 594. Fran. et Sav. Enum. Pl. Jap. I. p. 88. Pax. in Engl. Bot. Jahrb. VII. p. 188.

Fr. Schmidt Reis. in Amur. u. Insl. Sachl. p. 36. et. p. 119.

NOM. JAP. Ogarabana.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 18. 1902. fr. (T. Uchiyama), ibidem. 1895. ster. (K. Hayashi).

Phyöng-an: Ad superiorem fl. Jalu. Aug. 1907. ster. (M. Shiki).

DISTR. China, Manshuria, Amur, Sachalin, et Japonia.

*Acer tegmentosum* MAXIM. in Mél. Biol. X. p. 597. Pax in Engl. Bot. Jahrb. VII. p. 246. Pfl. Reich. VIII. p. 67. Rupr. in Mél. Biol. II. p. 521. Regel Tent. Fl. Uss. n. 105. Korsch. Act. h. Petrop. XII. p. 317. Kom. Fl. Mansh. II. p. 733.

HAB. Phyöng-an: Ad superiorem fl. Jalu. Aug. 1907. ster. (M. Shiki).

DISTR. Manshuria et Amur.

*Acer barbinerve* MAXIM. in Mél Biol. VI. p. 369. X. p. 592. Pax in Engl. Bot. Jahrb. VII. 252. Pfl. Reich. VIII. p. 72. Kom. Fl. Mansh. II. p. 736.

HAB. Kang-uön: Monte Kum-gang-san (金剛山). 1895. fr. (K. Hayashi).

In Korea bor. (Komarov).

DISTR. Manshuria et Japonia.

*Acer japonicum* THUNB. Fl. Jap. p. 161. DC. Prodr. I. p. 595. Sieb. et Zucc. Fl. Jap. II. p. 82. t. 144. Miq. Prol. Fl. Jap. p. 18. Fran. et Sav. Enum. Pl. Jap. I. p. 87. Maxim. in Mél. Biol. X. p. 605. Pax in Engl. Bot. Jahrb. VII. p. 199.

var. *nudicarpum* m. fructus nudus; folia vulgo 11-lobata, minima 9-lobata; aë samaræ arcuato-conniventes.

HAB. Kyöng-geui: Nam-san (南山). Jul. 20. 1902. fr.; Nam-han-san (南韓山). Aug. 2. 1902. fr. (T. Uchiyama).

*Acer Pseudo-Sieboldianum* (PAX) KOM. Fl. Mansh. II. p. 725.

*A. circumlobatum* Maxim. var. *Pseudo-Sieboldianum* Pax in Engl. Bot. Jahrb. VII. p. 199.

*A. Sieboldianum* Miq. var. *manshuricum* Maxim. in Mém. Biol. XII. p. 433. Palib. Consp. Fl. Kor. I. p. 58.

*A. japonicum* Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 140. (ex Kom.).

*A. Sieboldianum* var. Baker et Moore in Journ. Linn. Soc. XVII. p. 380.

HAB. Kyōng-geui : Seoul. Aug. 1883. ster. (Dr. Gottsche.) Jun. 1886.

fr. immat. (Kalinowsky). Nam-han-san (南韓山). Aug. 2. 1902.

fr. ; Peuk-han-san (北韓山). Jul. 28. 1902. fr. (T. Uchiyama).

Kang-nōn : Monte Kum-gang-san (金剛山). 1895. ster. (K. Hayashi).

Ham-gyōng : In-nam-sya (仁南社). Aug. 18. 1905. ster. (T. Imagawa).

In Korea septentr. (Komarov).

DISTR. Manshuria.

var. *koreanum* n. (TAB. X. f. I.) Folia 9–11 lobata. Samara tota glabra, alæ samaræ oblongæ subhorizontaliter patentés.

HAB. Kyōng-geui : Peuk-han-san (北漢山). Oct. 14. 1900. fr. (T. Uchiyama).

Kyōng-san : Chyang-ryōng-san (頂嶺山). Oct. 2. 1902. fr. (T. Uchiyama).

## STAPHYLEACEÆ.

### Clavis generum.

*A.* Folliculis coriaceis ..... *Euscaphis* SIEB. et ZUCC.

*B.* Capsulis vesiculosiis ..... *Staphylea* L.



**EUSCAPHIS** SIEB. et Zucc. (sp. 1.)

*Euscaphis japonica* PAX. in Engl. Prantl. Natur.-pfl.-fam. III. 5. p. 262. Matsum. in Tokyo Bot. Mag. XII. p. 63. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 389. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 448. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 97.

*E. staphyleoides* Sieb. et Zucc. Fl. Jap. I. p. 124. t. 67. Miq. Prol. Fl. Jap. p. 256. Fran. et Sav. Enum. Pl. Jap. I. p. 91. Franch. Pl. Dav. p. 78. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 143.

NOM. JAP. Gonzui.

HAB. Chōl-la: Mok-pho (木浦). Nov. 5. 1900. fr. (T. Uchiyama).

DISTR. China et Japonia.

**STAPHYLEA** L.**Clavis speciei et Varietatis.**

A. Folia exsiccata nigrescentia ..... *S. Bumalda* SIEB. et Zucc.

B. Folia exsiccata fuscoso-viridea, dilatata. ... *S. Bumalda* var. *latifolia* m.

*Staphylea Bumalda* SIEB. et Zucc. Fl. Jap. I. p. 108. tab. 95. Fl. Jap. Fam. Nat. n. 162. Miq. Prol. Fl. Jap. p. 257. Fran. et Sav. Enum. Pl. Jap. I. p. 90. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 447.

HAB. Kang-uön: Prope Chyang-yön-ri (長淵里附近). Aug. 13. 1902. fr. (T. Uchiyama).

DISTR. Japonia et China.

var. *latifolia* m. Folia ex 4 cm. lata-7 cm. longa ad. 5.5 cm. lata-10. cm. longa, utrinque subito attenuata, exsiccata fuscoco-viridia. (nunquam nigrescentia); flores ignoti; carpella ut genuina.

HAB. Kyōng-san : Chyang-ryōng-san (頂嶺山). Oct. 2. 1902. fr. (T. Uchiyama).

## SABIACEÆ. (gn. 1.)

### MELIOSMA. BLUME.

#### Clavis specierum.

- A. Folia simplicia.....*M. myriantha* SIEB. et ZUCC.  
 B. Folia pinnata.  
     a) Pinnæ 2-4 jugæ, ovato-lanceolatæ, remote-serrulatæ.  
         ..... *M. Oldhami* MAXIM.  
     b) Pinnæ 3-6 jugæ, oblongo-ovatæ, spinuloso-serratæ.  
         ..... *M. Wallichii* PLANCH.

*Meliosma myriantha* SIEB. et ZUCC. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 145. Palib. Consp. Fl. Kor. I. p. 59.

NOM. JAP. Awabuki.

HAB. In archipelago Koreano : Herschel Island. (Oldham. Nr. 183/1).

DISTR. Japonia.

*Meliosma Oldhami* MAXIM. Mém. Biol. VI. p. 263. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 145. Palib. Consp. Fl. Kor. I. p. 59.

HAB. In archipelago Koreano (Oldham. Nr. 183).

Planta endemica.

*Meliosma Wallichii* PLANCH. Hook f. Fl. Brit. Ind. II. p. 6. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 146. Palib. Consp. Fl. Kor. I. p. 59.

HAB. Kyōng-san : monte Chiri-san (智異山). Aug. 1907. alab. (M. Shiki).

Port Fusan (Wilford); in archipelago Koreano: Herschel Isl.  
(Oldham Nr. 183), ex Hemsl. et Palib.

DISTR. Himalaya.

## ANACARDIACEÆ. (gn. 1.)

### RHUS L.

#### Clavis specierum.

- A. Costa folii alata.....*R. semialata*, MURR.  
B. Costa folii exalata.  
    a) Carpellis glabris.....*R. silvestris* SIEB. et ZUCC.  
    β) Carpellis hispidulis .....*R. trichocarpa* MIQ.

*Rhus semialata* MURR. DC. Prodr. II. p. 67. (varietates *a.*  
*Osbeckii* DC. β. *Roxburghii* DC). Sieb. et Zucc. Fl. Jap. Fam.  
Nat. n. 117. Fran. et Sav. Enum. Pl. Jap. I. p. 92. (β. *Osbeckii*).  
Hook. fil. Fl. Brit. Ind. II. p. 10. Forbes et Hemsl. Ind. Fl.  
Sin. in Journ. Linn. Soc. XXIII. p. 146. Palib. Consp. Fl.  
Kor. I. p. 60. (var. *Osbeckii* DC). Diels Fl. Centr. Chin. in  
Engl. Bot. Jahrb. XXIX. p. 433. Kom. Fl. Maush. II. p. 702.  
Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp.  
Univ. Tokyo XXII. p. 100.

*R. javanicum* L. Sp. Pl. (ed. II). p. 380. Thunb. Fl. Jap. p. 121.

NOM. JAP. Nurude; Fushinoki.

HAB. Kyōng-geui: Seoul Sept.—Oct. 1894. folia (Kaliuowsky);

Ibidem: Nam-san (南山), Sept. 1. 1902. fl.; Ibidem. Oct. 2. 1900.  
fr. (T. Uchiyama).

In Korea sept. (Komarov).

DISTR. India, China, Manshuria et Japonia.

*Rhus silvestris* SIEB. et Zucc. Forbes et Hemsl. Ind. Fl. Sin. in  
Journ. Linn. Soc. XXIII. p. 147. Palib. Consp. Fl. Kor. I.  
p. 60.

NOM. JAP. Yamahaze, Yabu-urushi.

HAB. Kyōng-geui: Chemulpo (仁川) (Carles?), in archipelago  
Koreano (Oldham. Nr. 187).

DISTR. Japonia et China.

*Rhus trichocarpa* MIQ. Ann. Mus. Bot. Lugd. Bat. II. p. 84.  
Franch. et Sav. Enum. Pl. Jap. I. p. 93. Forbes et Hemsl.  
Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 148. Palib.  
Consp. Fl. Kor. I. p. 60.

NOM. JAP. Yama-urushi.

HAB. Kyōng-geui: Chemulpo (仁川) (Carles), Seoul (京城). Jun.  
1886. fr. immat. (Kalinowsky). Ibidem: Nam-san (南山). Jul.  
30. 1902. fr. mat; Ibidem; Nam-han-san (南韓山). Oct. 13.  
1900. fr. mat. (T. Uchiyama).

DISTR. Japonia.

## LEGUMINOCÆ.

### I. MIMOSOIDEÆ. (gn. 1.)

#### **ALBIZZIA** RICH. (sp. 1.)

*Albizzia Julibrissin* BOER. MIQ. Prol. Fl. Jap. p. 243. Fran.  
et Sav. Enum. Pl. Jap. I. p. 166. Baker in Hook. fil. Fl. Brit.  
Ind. II. p. 300. Forbes et Hemsl. Index. Fl. Sin. in Journ.  
Linn. Soc. XXIII. p. 216. Franch. Pl. David. p. 102. Boiss.  
in Bull. du l'Herb. Boiss. (1898). p. 680. Palib. Consp. Fl.  
Kor. I. p. 72. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb.  
XXIX. p. 409. Kom. Fl. Mansh. II. p. 564. Matsum. in  
Tokyo Bot. Mag. XVI. p. 105.

NOM. JAP. Nemunoki.

HAB. Kyōng-geui: Seoul (京城). 1886. foli. (Kalinowsky). Chemulpo  
(仁川). Oct. 29. 1900. fructifera. Ibidem. Sept. 17. 1902. fructi-  
fera (T. Uchiyama).

DISTR. India, China et Japonia.

## CÆSALPINEÆ.

**Clavis generum.**

- A. Folia pinnata.....*Cassia* L.  
 B. Folia abrupte 1-2 pinnata .....*Gleditzia* L.

**CASSIA** L.**Clavis specierum.**

- A. Petiolo glandulam subpedicellatam gerente.....*C. nictitans* L.  
 B. Petiolo eglanduloso.....*C. mimosoides* L.

*Cassia nictitans* L. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 211. Palib. Consp. Fl. Kor. I. p. 72.

HAB. Kyöng-geui : Chemulpo (仁川) (Carles).

DISTR. China, India et Am. bor.

*Cassia mimosoides* L. Sp. Pl. (ed. II). p. 543. Willd. Sp. Pl. II. p. 528. DC. Prodr. II. p. 503. Benth. Fl. Hongk. p. 98. in Trans. Linn. Soc. XXVII. p. 578. Fl. Austr. II. p. 291. Fran. et Sav. Enum. Pl. Jap. I. p. 115. Fran. Pl. Dav. p. 101. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 210. Baker in Hook. fil. Fl. Brit. Ind. II. p. 266. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 680. Palib. Consp. Fl. Kor. I. p. 72. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 409.

*C. angustissima* Lam. in DC. Prodr. II. p. 505.

*C. procumbens* Thunb. Fl. Jap. p. 179. Miq. Prol. Fl. Jap. p. 242. Lour. Fl. Cochinch. p. 264.

*Senna sensitiva et tenella* Rox. Fl. Ind. p. 353-354.

NOM. JAP. Kawaraketsumei.

HAB. Kyöng-geui : Seoul (京城). Aug. 1883. fl. (Dr. Gottsche).

ibidem. monte prope viam ad Peking ducentem. Mai. 25. 1894. fl., (var. *dimidiata* Roxb.!) prope Tap-Tong Aug. 25. 1895. fr. mat; in ditione Seoulensi: Pauck-Han. Mai. 9. 1894. fl. in monte Yran-san. Mai. 10. 1894. fl. (Sontag).

var. *dimidiata* ROXB. Baker in Hook. fil. Fl. Brit. Ind. II. p. 266. Matsum. in Tokyo Bot. Mag. XVI. p. 100.

HAB. Ō-ryu-kol (梧柳洞). Oct. 12. 1900. Prope Yöng-deung-pho (永登浦近傍). Jul. 24. 1902. (T. Uchiyama).

DISTR. Reg. trop. et subtrop.

## GLEDITZIA L.

### Clavis specierum.

- A. Cum spinis compressis.....*G. caspica* DESF.  
 B. Sine spinis .....*G. japonica* MIQ. var. *inermis* NAKAI.

*Gleditzia caspica* DESF. DC. Prodr. II. p. 479. Ledeb. Fl. Ross. I. p. 718. Maxim. in Mém. Biol. XII. p. 451.

HAB. Kyöng-geui: Sompá village. Oct. 18. 1900. fructifera (T. Uchiyama).

DISTR. Sibiria.

*Gleditzia japonica* MIQ. Prol. Fl. Jap. p. 242. Fran. et Sav. Enum. Pl. Jap. I. p. 114. Matsum. in Tokyo Bot. Mag. XVI. p. 99. Kom. Fl. Mansh. II. p. 566.

var. *inermis* NAKAI. nov.

G. ramis espinosis, pinnis foliorum 1.5-6 cm. longis 7-25 mm. latis. Cetera ut typica.

HAB. Kyöng-geui: Inter Pha-jyu (坡州) et Kai-syöng (開城). Sept. 5. 1902. (T. Uchiyama).

DISTR. Japonia.

## PAPILIONATÆ.

## Clavis tribuum.

## A. Stamina libera.

a) Folia digitatim trifoliolata ..... I. *Podalyrieæ*.

b) Folia imparipinnata ..... IX. *Sophoreæ*.

## B. Stamina monadelphæ v. diadelphæ.

a) Legumina articulata v. uniovulata ..... VI. *Hedysareæ*.

b) Legumina non articulata.

a) Petiolis apice cirriferis v. apiculatis, foliis paripinnatis.

..... VII. *Vicieæ*.

β) Foliis imparinnatis, v. digitato-pinnatis.

○ Foliis simplicibus ..... II. *Genisteæ*.

○○ Foliis 3-∞ foliolatis.

△ Foliolis 3, denticulatis ..... III. *Trifolieæ*.

△△ Foliolis integris.

\* Herbæ non volubiles; foliis imparipinnatis.

† Inflorescentia capitata..... IV. *Lotææ*.

†† Inflorescentia racemosa v. paniculata. ... V. *Galegeæ*.

\*\* Herbæ volubiles, foliis 3-foliolatis..... VIII. *Phaseoleæ*.

## I. PODALYRIEÆ (gn. 1.)

**THERMOPSIS** R. Br. (sp. 1.)

*Thermopsis fabacea* DC. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 150. Palib. Consp. Fl. Kor. I. p. 60.

NOM. JAP. Sendai-hagi.

HAB. Korea: Jensen (?). (Perry).

DISTR. China, Manshuria, Japonia et Am. bor.

## II. GENISTEÆ. (gn. 1.)

**CROTALARIA** L. (sp. 1.)

*Crotalaria sessilifolia* L. Sp. Pl. (ed. II.) p. 1004. DC. Prodr. II. p. 128. Miq. Prol. Fl. Jap. p. 230. Fran. et Sav. Enum. Pl. Jap. I. p. 94. Baker in Hook. fil. Fl. Brit. Ind. II. p. 73. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 152. Palib. Consp. Fl. Kor. I. p. 61. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 396. Matsum. in Tokyo Bot. Mag. XVI. p. 38. Kom. Fl. Mansh. II. p. 639. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo Vol. XXII. p. 103.

*C. brevipes* Champ. in Hook. Kew Journ. Bot. IV. p. 44.

*C. eriantha* Sieb. et Zucc. Fl. Jap. Fam. Nat. p. 13.

*C. Oldhami* Miq. Prol. Fl. Jap. p. 230.

HAB. Kyōng-geui: Chemulpo (仁川) (Carles); prope Seoul: Han-Tschu-Wan. Oct. 19. 1893. fr. mat.; in monte Nam-san (南山). Oct. 23. 1893. fr. mat. (Sontag). Chhyōng-nyang-li (清涼里). Oct. 17. 1900. fr. mat. (T. Uchiyama).

Kang-uōn: Peuk-tun-ji (北屯址). Aug. 21. 1902. fl. (T. Uchiyama).

In archipelago Koreano: Green Island (Oldham. Nr. 32).

DISTR. Japonia, Manshuria, China et Japonia.

## III. TRIFOLIEÆ. (gn. 1.)

**Clavis generum.**

A. Folia digitatim 3-7 foliolata.....*Trifolium* L.

B. Folia pinnatim 3-foliolata.

a) Legumina deliscentia; racemus brevis .....*Medicago* L.

b) Legumina indehiscentia, racemus elongatus .....*Melilotus* Juss.



**MEDICAGO** L.**Clavis specierum.**

- A. Caulis erectus, legumen contortum.....*M. sativa* L.  
 B. Caulis procumbens, legumen reniforme, monospermum ...*M. lupulina* L.

*Medicago sativa* L. Kom. Fl. Mansh. II. p. 573.

NOM. JAP. Murasaki-umagoyashi.

HAB. In Korea bor. (Komarov).

*Medicago lupulina* L. Kom. Fl. Mansh. II. p. 573.

NOM. JAP. Kometsubu-umagoyashi.

HAB. In Korea bor. (Komarov).

**MELILOTUS** Juss.**Clavis specierum.**

- A. Racemis densis, leguminibus subglobosis. ....*M. indicus* (L.) ALL.  
 B. Racemis laxis, leguminibus obovato-ellipticis. ....*M. suaveolens* LEDEB.

*Melilotus indicus* (L.) ALL. O. E. Schultz. in Engl. Bot. Jahrb. Vol. XXIX. p. 713. Kom. Fl. Mansh. II. p. 575.

*M. indica* L. in E De Halácsy Consp. Fl. Graec. I. p. 372.

*M. minima* Roth. in DC. Prodr. II. p. 186.

*M. parviflora* Desf. DC. Prodr. II. p. 187. Ledeb. Fl. Ross. I. p. 538. Koch Syn. Fl. Germ. et Helv. (ed. III.) p. 144. Baker et Moore in Journ. Linn. Soc. XVII. p. 381. Benth. Fl. Austr. II. p. 186. Baker in Hook. fil. Fl. Brit. Ind. II. p. 89. Franch. Pl. Dav. p. 81. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 155. Itō et Matsum. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 398. Thomè Fl. Deutsch. Öst. u. Schw.

III. p. 144. Matsum. et Hayata Enum. Pl. Formos. in Journ. Sci. Col. Imp. Univ. Tokyo. XXII. p. 104.

*M. polonicus* Ser. in DC. Prodr. II. p. 187.

*Trifolium indicum* Willd. Sp. Pl. III. p. 1353. Roxb. Fl. Ind. III. p. 388.

*Trifolium M. indicus* *α* L. Sp. Pl. (ed. II.). p. 1077.

HAB. Kyōng-geui: Chemulpo (仁川). Oct. 31. 1900. fr. Seoul. Nam-san (南山). Aug. 2. 1902. fl. (T. Uchiyama).

DISTR. Europa et Asia bor.

*Melilotus suaveolens* LEDEB. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 155. Palib. Consp. Fl. Kor. I. p. 61.

NOM. JAP. Ebira-hagi.

HAB. In archipelago Koreano (Oldham. Nr. 344).

DISTR. Sibiria, Manshuria et China bor.

### TRIFOLIUM L. (sp. 1.)

*Trifolium Lupinaster* L. Sp. Pl. (ed II). p. 1079. Willd. Sp. Pl. III. p. 1857. DC. Prodr. II. p. 204. Ledeb. Fl. Ross. I. p. 551. Maxim. Prim. Fl. Amur. p. 79. Regel Tent. Fl. Uss. n. 122. Miq. Prol. Fl. Jap. p. 223. Fran. et Sav. Enum. Pl. Jap. I. p. 96. II. p. 324. Fr. Schmidt Reis. in Amur. u. Insl. Sachl. p. 37. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 155. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 661. Matsum. Tokyo Bot. Mag. XVI. p. 41.

NOM. JAP. Shajikusō.

HAB. Hoang-hai Phyōng-an (黃海平安兩道間). Inter Hoang-jyu (黃州). et Phyōng-yang (平壤). Sept. 10. 1902. fl. (T. Uchiyama).

Kan-tō: circa Rokudōkō (六道溝). Aug. 24. 1907. fl. (K. Maeda).

DISTR. Sibiria, Manshuria, China et Japonia.

## IV. LOTEÆ (gn. 1.)

**LOTUS** L. (sp. 1.)

*Lotus corniculatus* L. Sp. Pl. (ed. II). p. 1092. DC. Prodr. II. p. 214. Ledeb. Fl. Ross. I. p. 560. Baker in Hook. fl. Fl. Brit. Ind. II. p. 91. Franch. Pl. Dav. p. 81. Forbes et Hemsl. l.c. p. 155. Brand in Engl. Bot. Jahrb. XXV. p. 210. var. *japonicus* REGEL Miq. Prol. Fl. Jap. p. 231. Fran. et Sav. l.c. I. p. 97. Brand l.c. p. 212. Boiss. in Bull. du l'Herb. Bois. (1898). p. 662. Palib. l.c. I. p. 61.

*L. corniculatus* Matsum. in Tokyo Bot. Mag. XVI. p. 61.

*L. corniculatus* var. *japonicus* f. *concolor* Makino in Tokyo Bot. Mag. XVIII. p. 100.

NOM. JAP. Miyakogusa.

HAB. Korea sine loco speciali (Perry et Carles).

Kyöng-sang: Fusan (釜山). (Wilford). Insula Chyöl-yöng-do (絶影島). Nov. 16. 1900. (T. Uchiyama).

Kyöng-geui: Seoul (京城). Jun. 1886. fl. (Kalinowsky). Ibidem montem prope viam ad Peking ducentem Mai. 25. 1894. fl. (Sontag). Nam-san (南山). Jul. 18. 1902. fl. et fr. mat. Prope Yong-deung-pho (永登浦近傍). Jul. 24. 1902. fl. et fr. mat. Chemulpo (仁川). Nov. 1. 1900. fr. mat. ibidem Sept. 17. 1902. fl. (T. Uchiyama).

DISTR. Japonia.

## V. GALEGEÆ.

**Clavis generum.**

A. Antheræ connectivum glandula v. mucrone appendiculatum

.....*Indigofera* L.

B. Antheræ muticæ.

- a) Legumina lignosa ..... *Milletia* W. et ARN.  
 b) Legumina non lignosa.  
 a) Pedunculi 1-paucifloris ..... *Gueldenstaedtia* FISCH.  
 β) Pedunculi multifloriferi.  
 ○ Carina obtusa..... *Astragalus* L.  
 ○○ Carina mucrone v. acumine erecto v. recurvo appendiculata.  
 ..... *Oxytropis* DC.

## INDIGOFERA L.

### Clavis specierum.

- A. Foliolis 3-5 jugis; supra pilosis ..... *I. kirilowi* MAXIM.  
 B. Foliolis 5-13 jugis, supra glabris ..... *I. venulosa* CHAMP.

*Indigofera kirilowi* MAXIM. Palib. Consp. Fl. Kor. I. p. 62.  
 Kom. Fl. Mansh. II. p. 579.

*I. macrostachya* Bunge Enum. Pl. Chin. bor. n. 96. Baker et  
 Moore l.c. p. 381. Fran. Pl. Dav. p. 82. Forbes et Hemsl. l.c.  
 p. 157. Diels l.c. p. 411.

HAB. Korea: Loco non indicato (Carles et Perry).

Kyōng-geui: Seoul (京城). Mai. 1886. fl. (Kalinowsky) Ibidem:  
 Thee-Mun-An-Tai-kul, Apr. 29. 1894. fl., Hon-Tschu-Wan. Mai.  
 4. 1894. fl., *Pauk-Han Mai. 9. 1894. fl.*, secus viam ad Peking  
 ducentem Mai. 28. 1894. fl. (Sontag). Nam-san (南山). Oct. 11.  
 1900. fr. mat. Nam-han-san (南韓山). Jul. 17. 1902. fl.; Peuk-  
 han-san (北韓山). Jul. 28. 1902. fl. (T. Uchiyama).

Ham-Gyōng: Gen-sang (元山). (Dr. Epow).

DISTR. China, bor. et Manshuria.

*Indigofera venulosa* CHAMP. Palib. Consp. Fl. Kor. I. p. 63.  
 Forbes et Hemsl. l.c. p. 158.

HAB. In archipelago Koreano: Hooper Island (Oldham Nr. 324).

DISTR. China.

**MILLETTIA** W. et ARN. (sp. 1.)

*Milletia japonica* A. GRAY. Pl. Jap. p. 386. Miq. Prol. Fl. Jap. p. 202. Fran. et Sav. l.c. I. p. 98.

*Wistaria japonica* Sieb. et Zucc. Fl. Jap. I. p. 188. tab. 43.

NOM. JAP. Doyōfuji.

HAB. Kyōng-sang: Mok-Chyang (木市). Nov. 9. 1900. fr. mat.

Fusan (釜山). Nov. 15. 1900. fr. mat. (T. Uchiyama).

DISTR. Japonia.

**GUULDENSTÆDTIA** FISCH. (sp. 1.)

*Gueldenstedtia pauciflora* FISCH. Kom. Fl. Mansh. II. p. 583.

HAB. in Korea bor. (Komarov).

DISTR. Sibiria, Altaica et Manshuria.

**ASTRAGALUS** L.**Clavis specierum.**

A. Prostrata; fl. roseis ..... *A. sinicus* L.

B. Erecto-diffusa.

a) Floribus purpureis ..... *A. dahuricus* DC.

b) Floribus ochroleucis.

a) Leguminibus compressis ..... *A. membranaceus* FISCH.

β) Leguminibus teretibus ..... *A. uliginosus* L.

*Astragalus sinicus* L. Forbes et Hemsl. l.c. p. 166. Palib. l.c. I. p. 63.

NOM. JAP. Genge.

HAB. in archipelago Koreano (Oldham. Nr. 326).

DISTR. China et Japonia.

*Astragalus dahuricus* DC. Prodr. II. p. 285. Maxim. Prim. Fl. Amur. suppl. Ind. Fl. Pek. p. 470. Ind. Fl. Mong. p. 481.

Franch. Pl. Dav. p. 86. Forbes et Hemsl. l.c. p. 165. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 413. Kom. Fl. Mansh. II. p. 587.

HAB. Kang-nön : Kan-bal-ke-ryöng (干葵告嶺). Aug. 10. 1902. fl. ;  
Peuk-tun-ji (北屯址). Aug. 21. 1902. fl. et fr. jun. (T. Uchiyama).  
Kan-tō : circa Rokudōkō (六道溝). Aug. 24. 1907. fl. (K. Maeda).  
In Korea bor. (Komarov).

DISTR. Dahuria, China, Mongolia et Manchuria.

*Astragalus membranaceus* FISCH. Kom. Fl. Mansh. II. p. 586.

HAB. In Korea bor. (Komarov)

DISTR. Asia temp.

*Astragalus uliginosus* L. Kom. Fl. Mansh. II. p. 588.

HAB. In Korea bor. (Komarov).

DISTR. Sibiria et Manchuria.

### OXYTROPIS DC. (sp. 1.)

*Oxytropis uralensis* DC. Prodr. II. p. 276. Ledeb. Fl. Alt. III. p. 289. Fl. Ross. I. p. 593.

*Astragalus uralensis* L. Sp. Pl. (ed. II.) p. 1071.

*Astragalus ambiguus* Willd. Sp. Pl. III. p. 1312.

HAB. Phyöng-an : monte Schang-peï-schan (長白山). Jul. 9. 1905.  
fl. et carp. mat. (T. Imagawa).

DISTR. Regio Altaica et Uralensis.

## VI. HEDYSAREÆ.

### Clavis generum.

- A. Folia stipellata ..... *Desmodium* DESV.  
B. Folia exstipellata.  
a) Stamina diadelpha ..... *Lespedeza* MICH.  
b) Stamina monadelpha ..... *Aeschynomene* L.

**AESCHENOMENE** L. (sp. 1.)

*Aeschenomene indica* L. Sp. Pl. (ed. II). p. 1061. DC. Prodr. II. p. 320. Benth. Fl. Hongk. p. 79. Miq. Prol. Fl. Jap. p. 233. Fran. et Sav. l.c. I. p. 100. Baker in Hook. fil. Fl. Brit. Ind. II. p. 750. Fran. Pl. Dav. p. 97. Boiss. in Bull. du Herb. Boiss. (1898). p. 668. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 413. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo. XII. p. 408. Matsum. in Tokyo Bot. Mag. XVI. p. 73. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Coll. Imp. Univ. Tokyo. XXII. p. 106. NOM. JAP. Kusanemu. HAB. Kyōng-geui: Ō-ryu-kol. (梧柳洞). Oct. 12. 1900. fr. mat. DISTR. India, China et Japonia.

**DESMODIUM** DESV.**Clavis specierum.**

A. Foliis trifoliolatis.

a) Foliolis ovatis v. ovato-lanceolatis, pilosis.

.....*D. podocarpum* DC. var. *japonicum* MAXIM.

b) Foliolis obovatis v. obovato-rotundatis, pubescentibus.

.....*D. oxyphylla* DC. var. *villosum* MATSUM.

B. Foliis imparipinnatis.....*D. Oldhami* OLIV.

*Desmodium podocarpum* DC. Prodr. II. p. 336. Maxim. in Mél. Biol. XII. p. 443. Baker in Hook. fil. Fl. Brit. Ind. II. p. 165. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 174. Diels l.c. p. 414. Kom. Fl. Mansh. II. p. 598. HAB. in Korea bor. (Komarov).

var. *japonicum* MAXIM. in Mél. Biol. XII. p. 441. Boiss. in

Bull. du l'Herb. Boiss. (1898). p. 668. Palib. Consp. Fl. Kor. I. p. 64.

*D. japonicum* Miq. Prol. Fl. Jap. p. 234. Fran. et Sav. l.c. I. p. 100.

*Hedysarum caudatum* Thunb. Fl. Jap. p. 236.

NOM. JAP. Yabu-hagi.

HAB. Ham-gyöng : Quensan (元山), (Perry). Ibidem Jul. 18. 1889 fl. (Dr. Epow).

Kyöng-geui : Nam-san (南山). Oct. 13. 1900. fr. mat. ; Nam-han san (南韓山). Aug. 2. 1902. fl. (T. Uchiyama).

DISTR. Japonia.

*Desmodium oxyphylla* DC. Prodr. II. p. 336. Baker in Hook. fil. Fl. Brit. Ind. II. p. 167.

var. *villosum* MATSUMURA. in Tokyo. Bot. Mag. XVI. p. 77.

HAB. Phyöng-an : Phyöng-yang (平壤). Mt. Mo-ran-bon (牡丹臺) Sept. 12. 1902. fr. mat. (T. Uchiyama).

DISTR. var. Japonia.

*Desmodium Oldhami* OLIV. in Journ. Linn. Soc. IX. p. 165. Miq. Prol. Fl. Jap. p. 234. Fran. et Sav. Enum. Pl. Jap. I. p. 101. Maxim. in Mém. Biol. XII. p. 442. Forbes et Hemsl. l.c. p. 174. Diels l.c. p. 414. Matsum. in Tokyo Bot. Mag. XVI. p. 75. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 669. Kom. Fl. Mansh. II. p. 599.

*Hedysarum incanum* Thunb. Fl. Jap. p. 289.

NOM. JAP. Fuji-kanzō.

HAB. In Korea bor. (Komarov).

Kang-uön : Kum-gang-san (金剛山). Aug. 14. 1902. fl. (T. Uchiyama).

DISTR. China, Manshuria et Japonia.



**LESPEDEZA** MICH.**Clavis specierum et Varietatum.**

- A. Flores axillari-fasciculati; caulis ascendens v. procumbens.
- a) Caule gracile, longissimo, hirsuto, stipulis lineari-lanceolatis.  
 .....*L. pilosa* S. et Z.
- b) Caule diffuso, ascendente, piloso, stipulis ovatis.  
 .....*L. striata*  $\beta$  *stipulacea* (MAX.) MAKINO.
- B. Flores axillari v. terminali racemosi, caule erecto v. decumbente.
- a) Frutices erecti ramosissimi.
- a) Racemi compositi, vexillo carina brevior.
- Folia utrinque acuta v. apice acuminata ...*L. Buergeri* MIQ.
- Folia obtusa .....*L. Buergeri* var. *Oldhami* MAXIM.
- $\beta$ ) Racemi simplices, vexillo carina superante v. æquante.
- Racemi pauciflori, foliis breviores .....*L. cyrtobotrya* MIQ.
- Racemi multiflori, fructiferi folio longiores.
- △ Foliolis rotundatis v. ovalibus emarginato-obtusis  
 .....*L. bicolor* TURCZ. a. *typica* MAXIM.
- △△ Foliolis ovato-ellipticis v. oblongis, obtusis v. acutiusculis.  
 .....*L. bicolor*  $\beta$ . *intermedia* MAXIM.
- △△△ Foliolis ellipticis v. oblongis, sæpe acutis.  
 .....*L. bicolor*.  $\gamma$ . *Sieboldi* MAXIM.
- b) Suffrutices erecti v. decumbentes.
- a) Caule foliisque fuscato-tomentoso. ....*L. tomentosa* SIEB.
- $\beta$ ) Caule foliisque nunquam fuscato-tomentoso.
- Caule diffuso, pedunculi capillares .....*L. virgata* DC.
- Pedunculi firmi.
- △ Calyce legumine subæquilonga.  
 † Folia viridia.....*L. juncea* PERS.  
 †† Folia sericea ...*L. juncea* L. var. *sericea* (MIQ.) MAXIM.
- △△ Calyce legumine duplo longiore, folia adpresse-pilosa.  
 .....*L. trichocarpa* PERS.

*Lespedeza pilosa* SIEB. et ZUCC. Fl. Jap. Fam. Nat. n. 20. Fran. et Sav. l.c. I. p. 102. Maxim. Act. H. Petr. II. p. 381. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 671. Matsum. in Tokyo Bot. Mag. XVI. p. 72.

Hedysarum pilosum Thunb. Fl. Jap. p. 288. Miq. Prol. Fl. Jap. p. 237.

NOM. JAP. Nekohagi.

HAB. Kyōng-sang: Fusan (釜山). Chyōl-yōng-do (絶影島). Oct. 13. 1902. fr. (T. Uchiyama).

DISTR. Japonia.

*Lespedeza striata* HOOK. et ARN. Bot. Beech. Voy. p. 262. Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 18. Benth. Fl. Hongk. p. 85. Maxim. Act. H. Petr. II. p. 332. (p. p.) Franch. Pl. Dav. p. 97. Miq. Prol. Fl. Jap. p. 237. Fran. et Sav. Enum. Pl. Jap. I. p. 102. Forbes et Hemsl. l.c. p. 182.

Hedysarum striatum Thunb. Fl. Jap. p. 289.

*β. stipulacea* (MAXIM.) MAKINO. in Tokyo Bot. Mag. VII. p. 156. *L. stipulacea* Maxim. Prim. Fl. Amur. p. 85. Ind. Fl. Pek. p. 470. Fr. Schmidt l.c. p. 124. Palib. l.c. I. p. 66. Matsum. in Tokyo Bot. Mag. XVI. p. 72. (p. p).

NOM. JAP. Maruba-yahazusō.

HAB. Kyōng-geui: Prope Seoul (京城附近). Sept. 1886. fr. (Kalinowsky). Ibidem. Mai. 25. 1894. ster; *In ditione Scoulesii Pauck-Han. Mai. 9. 1894*, in monte Yi-san. Mai. 28. 1894. (Sontag). Nam-san (南山). Aug. 30. 1902. fl., Ibidem. Oct. 10. 1900. fr. (T. Uchiyama).

DISTR. China, Manshuria et Japonia.

*Lespedeza Buergeri* Miq. Prol. Fl. Jap. p. 235. Fran. et Sav.

l.c. I. p. 101. Maxim. in Act. H. Petr. II. p. 353. Forbes et Hemsl. p. 179. Palib. l.c. I. p. 65.

NOM. JAP. Kihagi.

HAB. in archipelago Koreano (Oldham. Nr. 333).

Kyöng-geui: Nam-san (南山). Jul. 16. 1902. fl. Ibidem Oct. 11. 1900. fr. (T. Uchiyama).

DISTR. Japonia.

var. *Oldhami* MAXIM. Act. H. Petr. II. p. 354. Palib. l.c. p. 65. Matsum. in Tokyo Bot. Mag. XVI. p. 70. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Coll. Imp. Univ. Tokyo Vol. XII. p. 405. Matsum. et Hayata in ibidem XXII. p. 105.

L. Oldhami Miq. Prol. Fl. Jap. p. 236.

NOM. JAP. Maruba-kihagi.

HAB. in archipelago Koreano (Oldham. Nr. 335).

DISTR. var. Japonia.

*Lespedeza cyrtobotrya* Miq. Prol. Fl. Jap. p. 236. Fran. et Sav. l.c. I. p. 102. Maxim. Act. H. Petr. II. p. 357. Forbes et Hemsl. l.c. p. 180. Matsum. in Tokyo Bot. Mag. XVI. p. 70.

L. cyclobotrya Palib. l.c. I. p. 65.

L. virgata S. et Z. Fl. Jap. Fam. Nat. n. 19.

NOM. JAP. Miyama-hagi.

HAB. Kyöng-geui: Peuk-ham-san (北漢山). Oct. 14. 1900. fr. (T. Uchiyama).

In archipelago Koreano (Oldham Nr. 337).

DISTR. Japonia.

*Lespedeza bicolor* Turcz. Ledeb. Fl. Ross. I. p. 705. Maxim. Prim. Fl. Amur. p. 86. Regel Tent. Fl. Uss. n. 140. Miq. Prol. Fl. Jap. p. 235. Fr. Schmidt l.c. p. 38. Fran. et Sav. l.c. I. p. 101. Fran. Pl. Dav. p. 95. Maxim. Act. H. Petr.

II. p. 356. Forbes et Hemsl. l.c. p. 179. Diels l.c. p. 415.  
Kom. Fl. Mansh. II. p. 659.

*a. typica* MAXIM. Act. H. Petr. II. p. 356.

NOM. JAP. Natsuhagi.

HAB. Kyōng-geui: Nam-san (南山). Jul. 18. 1902. fl. (T. Uchiyama).  
*β. intermedia* MAXIM. Act. H. Petr. II. p. 356. Matsum. in  
Tokyo Bot. Mag. XVI. p. 69. Palib. l.c. I. p. 64.

*Lespedeza bicolori affinis* Maxim. in Prim. Fl. Amur. Suppl. Ind.  
Fl. Pek. p. 470.

NOM. JAP. Yamahagi.

HAB. Kyōng-geui: Chemulpo (仁川) (Carles); Ibidem. Sept. 17.  
1902. fl. (T. Uchiyama).

In-chhon Aug. 1880. (Dr. Gottsche), prope Seoul (京城附近).  
Jun. 1886. fl. (Kalinowsky). Ibidem: *prope Tap-Tong. Mai. 20.*  
*1895. ster.* (Sontag).

Kyōng-san: Fusan (釜山) (Wilford).

In archipelago Koreano (Oldham. Nr. 335).

*γ. Sieboldi* MAXIM. Act. H. Petrop. II. p. 356. Palib. l.c. p. 64.

NOM. JAP. Miyaginohagi.

HAB. In archipelago Koreano (Oldham. Nr. 332).

DISTR. sp. China, Manshuria et Japonia.

*Lespedeza tomentosa* SIEB. in SCHÉD. Maxim. Act. h. Petr. II. p.  
376. Baker in Hook. fil. Fl. Brit. Ind. II. p. 143. Fran. Pl.  
Dav. p. 97. Matsum. in Tokyo Bot. Mag. XVI. p. 71. Kom.  
Fl. Mansh. II. p. 606.

*L. villosa* Pers. Syn. Pl. II. p. 318. DC. Prodr. II. p. 349.  
Fran. et Sav. l.c. I. p. 102. Forbes et Hemsl. l.c. p. 183.  
Palib. l.c. I. p. 66.

*Desmodium tomentosum* DC. Prodr. II. p. 337.

*L. macrophylla* Bunge in Maxim. Prim. Fl. Amur. Suppl. Ind.  
Fl. Pek. p. 470.

*Hedysarum tomentosum* Thunb. Fl. Jap. p. 286.

*Hedysarum villosum* Willd. Sp. Pl. III. p. 1195.

NOM. JAP. Inuhagi.

HAB. Kyöng-geui: Chemulpo (仁川) (Carles), Hut-Tschai-Meo. prope Seoul Mai. 1. 1894. fl. (Sontag). Nam-san (南山). Sept. 1. 1902. fl. et leg. jun: Ibidem. Oct. 11. 1900. fr.; Nam-han-san (南韓山). Aug. 2. 1902. fl.; prope Yöng-deung-pho (永登浦附近). Jul. 24. 1902. fl. (T. Uchiyama).

In archipelago Koreano (Oldham. Nr. 347). In Korea bor. (Komarov).

DISTR. China, Manshuria, Japonia et India.

*Lespedeza virgata* DC. Prodr. II. p. 350. Miq. Prol. Fl. Jap. p. 237. Fran. et Sav. l.c. I. p. 102. Maxim. Act. h. Petr. II. p. 362. Forbes et Hemsl. l.c. p. 183. Palib. l.c. I. p. 66. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Coll. Imp. Univ. Tokyo XII. p. 405. Matsum. in Tokyo Bot. Mag. XVI. p. 71. Boiss. in Bull. du l'Herb. Boiss. (1898). 670. Matsum. et Hayata l.c. p. 105.

*Hedysarum virgatum* Thunb. Fl. Jap. p. 290.

NOM. JAP. Makiehagi.

HAB. in archipelago Koreano (Oldham. Nr. 340).

Kyöng-geui: Chemulpo (仁川) (Carles). Inchhon. Aug. 1883. (Dr. Gottsche), Nam-san (南山). Jul. 30. 1902. fl.; Nam-han-san (南韓山). Aug. 2. 1902. fl. et leg. jun. (T. Uchiyama).

DISTR. Japonia.

*Lespedeza juncea* PERS. Syn. Pl. II. p. 318. DC. Prodr. II. p. 348. Ledeb. Fl. Ross. I. p. 714. Maxim. Prim. Fl. Amur. p. 86. Regel Fl. Uss. n. 141. Fran. et Sav. l.c. I. p. 102. Fran. Pl. Dav. p. 96. Forbes et Hemsl. l.c. p. 181. Palib. l.c. I. p. 65. Kom. Fl. Maush. II. p. 603.

HAB. Kyōng-geui : Chemulpo (仁川). Nov. 1. 1900. fl. et fr. (T. Uchiyama).

Phyōng-an : Phyōng-yang (平壤), monte Mo-ran-bor (牡丹峯).  
Sept. 12. 1902. fl. (T. Uchiyama).

DISTR. Australia, India, China et Manshuria.

var. *sericea* (Miq.) HEMSL. Forbes et Hemsl. l.c. p. 181. Matsum. in Tokyo Bot. Mag. XVI. p. 71. Itō et Matsum. l.c. p. 406. Matsum. et Hayata l.c. p. 105.

*L. argyræa* S. et Z. Fl. Jap. Fam. Nat. p. 120.

*L. sericea* Miq. Prol. Fl. Jap. p. 239. Maxim. in Act. h. Petr. II. p. 368. Boiss. in Bull. du l'Herb. Boiss. (1898), p. 671.

*L. juncea* var. *sericea* Palib. (non Hemsl.) l. p. 65.

Hedysarum *sericeum* Thunb. Fl. Jap. p. 289.

NOM. JAP. Medohagi.

HAB. Korea sine loco speciali (Carles); in archipelago Koreano (Oldham). In Korea bor. (Komarov).

Kyōng-geui : Nam-san (南山). Sept. 1. 1902. fl.; Ibidem. Oct. 10. 1900. fr. (T. Uchiyama).

Kan-tō : circa Sai-rin-ka (細林河). Sept. 10. 1907. fl. (K. Maeda).

DISTR. var. China, Manshuria et Japonia.

*Lespedeza trichocarpa* PERS. Syn. Pl. II. p. 318. DC. Prodr. II. p. 349. Ledeb. Fl. Ross. I. p. 714. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 471. Ind. Fl. Mong. p. 481. in Act. h. Petr. II. p. 375. Fran. Pl. Dav. p. 97. Forbes et Hemsl. l.c. p. 183. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 415. Kom. Fl. Mansh. II. p. 605.

HAB. Phyōng-an : Phyōng-yang (平壤). Sept. 13. 1902. fl. et fr. (T. Uchiyama).

Kan-tō : circa Rokudōkō Aug. 24. 1907. fl. (K. Maeda).

DISTR. Sibiria, Manshuria et China.

## VII. VICIÆ.

## Clavis generum.

- A. Staminum vagina ore oblique.....*Vicia* L.  
 B. Staminum vagina ore æqualis .....*Lathyrus* L.

## VICIA L.

## Clavis specierum.

- A. Folia terminali non cirrifera.  
 a) Folia unijuga.....*V. unijuga* AL. BR.  
 b) Foliola multijuga.  
 a) Caulis tetragonus, foliola 3-5 juga.....*V. venosa*, MAXIM.  
 β) Caulis teres, foliola 6-7 juga .....*V. Cracca* L. var. *japonica* MIQ.  
 B) Folia terminali cirrifera.  
 a) Racemus 1-2 floriferus.  
 a) Foliola apice truncata v. retusa, styli sub stigmata pubescentes.  
 .....*V. angustifolia* L.  
 β) Foliola apice obtusa v. acuta, styli pubescentes.  
 .....*V. tetrasperma* MENCH.  
 b) Racemus 2-7 floriferus.  
 β) Foliola oblonga apice tridentata.....*V. tridentata* BUNGE.  
 β) Foliola linearia apice obtusa v. retusa .....*V. hirsuta* KOCH.  
 c) Racemus 10-∞ floriferus.  
 a) Racemus simplex.  
 ○ Stipulum edentatum.....*V. japonica* A. GRAY.  
 ○○ Stipulum dilatatum, dentatum .....*V. amæna* FISCH.  
 β) Racemus compositus, foliolis magnis. *V. Pseudo-Orobus* FISCH. et MEY.

*Vicia unijuga* AL. BR. Hance in Journ. Bot. (1874). p. 209.  
 Maxim. Mém. Biol. IX. p. 65. Franch. Pl. Dav. p. 99. Forbes  
 et Hemsl. l.c. p. 186. Miyabe Fl. Kurile Isl. p. 275. Matsum.  
 in Tokyo Bot. Mag. XVI. p. 81. Boiss. in Bull. du l'Herb

Boiss. (1898). p. 675. Diels l.c. p. 416. Palib. l.c. I. p. 68.  
Kom. l.c. II. p. 618.

*Lathyrus Messerschmidtii* Fran. et Sav. I. p. 106.

*Orobus lathyroides* L. Sp. Pl. (ed. II). p. 1027. DC. Prodr. II.  
p. 373. Baker et Moore in Journ. Linn. Soc. XVII. p. 381.  
Maxim. Prim. Fl. Amur. p. 44. Suppl. Ind. Fl. Pek. p. 420. Ind.  
Fl. Mong. p. 481. Regel Tent. Fl. Uss. n. 139. Miq. Prol. Fl.  
Jap. p. 35.

NOM. JAP. Nantenhagi, Taniwatari.

HAB. Kyōng-geui: Seoul (京城). 1883. (Dr. Gottsche), Nam-han-san  
(南韓山). Aug. 2. 1902. fr., Ibidem. Oct. 18. 1900. fr. mat. (T.  
Uchiyama).

Kyōng-san: Fusan (釜山). (Wilford); Chyōl-yōng-do (絕影島).  
Oct. 13. 1902. fl.; Chyang-ryōng-san (頂嶺山). Oct. 2. 1902. fr.  
mat. (T. Uchiyama).

Kang-nōn: Kum-gang-san (金剛山). Aug. 20. 1902. fr. jun. (T.  
Uchiyama).

Phyōng-an: Phyōng-yang (平壤). m'te Moranbon (牡丹峯). Sept.  
12. 1902. fl. (T. Uchiyama).

In Korea bor. (James).

DISTR. Sibiria, Manshuria, China et Japonia.

*Vicia venosa* MAXIM. Mém. Biol. IX. p. 66. Kom. Fl. Mansh.  
II. p. 620.

*Lathyrus venosus* Fran. et Sav. I. p. 106.

*Orobus venosus* Willd. Ledeb. Fl. Ross. I. p. 689.

HAB. Kyōng-geui: Nam-san (南山). Jul. 30. 1902. fl. Peuk-han-san  
(北韓山). Jul. 28. 1902. fl.; Nam-han-san (南韓山). Oct. 18.  
1900. fr. mat. (T. Uchiyama).

Kang-nōn: Mt. Kum-gang-san (金剛山). Aug. 16. 1902. fl. (T.  
Uchiyama).

DISTR. Sibiria et Manshuria.



*Vicia Cracca* L. Sp. Pl. (ed. II). p. 1035.

var. *japonica* Miq. Prol. Fl. Jap. p. 238. Forbes et Hemsl. l.c. p. 184. Palib. l.c. I. p. 67.

NOM. JAP. Kusafuji.

HAB. in archipelago Koreano (Oldham. Nr. 368).

DISTR. var. japonia.

*Vicia angustifolia* L. Palib. Consp. Fl. Kor. I. p. 67.

NOM. JAP. Hosobano-yahazuendō.

HAB. Kyōng-geui: Seoul (京城). (Dr. Gottsche).

DISTR. Europa, Asia et America bor.

*Vicia tetrasperma* MÆNCH. Forbes et Hemsl. l.c. p. 185. Palib. l.c. I. p. 68.

NOM. JAP. Kasumagusa.

HAB. in archipelago Koreano: Port. Hamilton (Oldham Nr. 364).

DISTR. Europa et Asia bor.

*Vicia tridentata* BUNGE. Palib. Consp. Fl. Kor. I. p. 68.

HAB. Kyōng-geui: Seoul (京城). Mai. 1886. fl. (Kalinowsky).

DISTR. China et Manshuria.

*Vicia hirsuta* KOCH Forbes et Hemsl. l.c. p. 184. Palib. l.c. I. p. 68.

NOM. JAP. Suzume-noendō.

HAB. in archipelago Koreano: Port Hamilton (Wilford Nr. 632).

DISTR. Europa, Africa et Asia bor.

*Vicia japonica* A. GRAY. Pl. Jap. p. 385. Fran. et Sav. l.c. I. p. 103. Kom. l.c. II. p. 612.

*Vicia pallida* Turcz. in Maxim. Prim. Fl. Amur. p. 82. Ledeb. Fl. Ross. I. p. 673. Regel Tent. Fl. Uss. n. 133. Fr. Schmidt l.c. p. 38.

NOM. JAP. Hirohano-kusafuji.

HAB. Kyōng-geui : Peuk-han-san (北漢山). Oct. 14. 1900. fr. (T. Uchiyama).

In Korea bor. (Komarov).

DISTR. Sibiria, Manshuria et Japonia.

*Vicia amena* FISCH. DC. Prodr. II. p. 355. Ledeb. Fl. Ross. I. p. 672. Maxim. Prim. Fl. Amur. p. 81. Ind. Fl. Pek. p. 470. Ind. Fl. Mong. p. 481. Regel Tent. Fl. Uss. n. 132. Fr. Schmidt l.c. p. 124. Fran. et Sav. l.c. I. p. 104. Fran. Pl. Dav. p. 98. Miyabe Fl. Kurile Isl. p. 225. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 184. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 673. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 416. Palib. Consp. Fl. Kor. I. p. 66.

NOM. JAP. Tsuru-Fujibakama.

HAB. Kyōng-geui : Inchhon Aug. 1883. (Dr. Gottsche). Prope Yōng-deung-pho (永登浦近傍). Jul. 24. 1902. fl. (T. Uchiyama).

Kang-uön : Kan-bal-ko-ryōng (干發告嶺). Aug. 10. 1902. fl. et fr. (T. Uchiyama).

Kyōng-san : Fusan (釜山). (Wilford)

DISTR. Sibiria, Mongolia, China, Manshuria et Japonia.

*Vicia Pseudo-Orobus* FISCH. et MEY. Ledeb. Fl. Ross. I. p. 671. Maxim. Prim. Fl. Amur. p. 81. Mél. Biol. IX. p. 67. Baker et Moore l.c. p. 381. Forbes et Hemsl. l.c. p. 185. Fran. et Sav. l.c. I. p. 103. Fran. Pl. Dav. p. 98. Diels l.c. p. 416. Boiss. in Bull. du l'Herb. Boiss. (1895). p. 675. Kom. Fl. Mansh. II. p. 613.

NOM. JAP. Ōba-kusafuji.

HAB. Kyōng-geui : Chemulpo (仁川). Sept. 17. 1902. fl. (T. Uchiyama).

DISTR. Dahuria, China, Manshuria et Japonia.

**LATHYRUS** L.**Clavis specierum.**

- A.* Flores flavi.....*L. Davidii* HANCE.  
*B.* Flores purpurei.  
 a) Caulis erectus, alatus.....*L. palustris* L.  
 b) Caulis decumbens, exalatus .....*L. maritimus* BIGEL.

*Lathyrus Davidii* HANCE in Journ. Bot. (1871). p. 130. Maxim. Mél. Biol. IX. p. 63. Fran. et Sav. Enum. Pl. Jap. II. p. 326. Fran. Pl. Dav. p. 99. Forbes et Hemsl. l.c. p. 186. Matsum. in Tokyo Bot. Mag. XVI. p. 82. Palib. l.c. I. p. 69. Kom. l.c. II. p. 623.

*L. sp. aff. pisiformi* Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 470.

NOM. JAP. Itachi-sasage.

HAB. Kyöng-geui: Nam-han-san (南韓山). Aug. 1. 1902. fl. (T. Uchiyama).

Ad limites boreales Koreae, (James).

DISTR. China, Manshuria et Japonia.

*Lathyrus palustris* L. Forbes et Hemsl. l.c. p. 186. Palib. l.c. I. p. 69.

NOM. JAP. Renrisō.

HAB. Kyöng-geui: Chemulpo (Carles).

DISTR. Europa, Asia et Am. bor.

*Lathyrus maritimus* BIGEL. Maxim. Prim. Fl. Amur. p. 82. Mél. Biol. IX. p. 60. Miq. Prol. Fl. Jap. p. 233. Fr. Schmidt l.c. p. 124. Fran. et Sav. Enum. Pl. Jap. I. p. 105. Miyabe Fl. Kurile Isl. p. 225. Forbes et Hemsl. l.c. p. 186. Palib. l.c. I. p. 69. Boiss. Bull. du l'Herb. Boiss. (1898). p. 676. Kom. Fl. Mansh. II. p. 626.

*Pisum maritimum* L. Sp. Pl. (ed. II). p. 1027. DC. Prodr. II. p. 368. Ledeb. Fl. Ross. I. p. 661.

NOM. JAP. Hama-endō.

HAB. Kyōng-geui : Chemulpo (仁川) (Carles); Ibidem. Oct. 31. 1900. ster. (T. Uchiyama).

Kyōng-san : Fusan (釜山) (Wilford). Port Hamilton (巨文島). (Oldham. Nr. 365, Wilford. Nr. 685).

DISTR. Europa, Asia et Am. bor.

### VIII. PHASEOLEÆ.

#### Clavis generum.

A. Stylus superne barbatus.....*Phaseolus* L.

B. Stylus glaber.

a) Folia subtus resinoso-punctata.

α) Ovula 2 rarissime 3 .....*Rhynchosia* LOUR.

β) Ovula 4-∞ .....*Dunbaria* W. et ARN.

b) Folia non resinoso-punctata.

a) Inflorescentia nunquam nodoso-racemosa.

○ Ovarium stipitatum .....*Amphicarpæa* ELL.

○○ Ovarium sessile .....*Glycine* L.

β) Inflorescentia nodoso-racemosa .....*Pueraria* DC.

#### AMPHICARPÆA ELL. (sp. 1.)

*Amphicarpæa Edgeworthi* BENTL. Baker in Hook. fil. Fl. Brit. Ind. II. p. 181.

var. *japonica* OLIV. in Journ. Linn. Soc. IX. p. 164. Fran. et Sav. Enum. Pl. Jap. I. p. 107. Forbes et Hemsl. l.c. p. 188. Diels l.c. p. 417. Matsum. in Tokyo Bot. Mag. XVI. p. 84. Boiss. in Bull. l'Herb. Boiss. (1898). p. 677.

*Shunteria trisperma* Miq. Prol. Fl. Jap. p. 239.

NOM. JAP. Yabu-mame.

HAB. Kyöng-geui: Nam-san (南山). Aug. 30. 1902. fl. (T. Uchiyama).

DISTR. Japonia.

**GLYCINE** L. (sp. 1.)

*Glycine Soja* SIEB. et ZUCC. Fl. Jap. Fam. Nat. n. 15. Miq. Prol. Fl. Jap. p. 240. Fran. et Sav. l.c. I. p. 108. Fran. Pl. Dav. l.c. p. 100. Maxim. in Mél. Biol. IX. p. 70. Forbes et Hemsl. l.c. p. 70. Palib. l.c. I. p. 69. Boiss. in Bull. l'Herb. Boiss. (1898). p. 678. Kom. l.c. II. p. 633.

*G. ussuriensis* Regel Tent. Fl. Uss. n. 146. tab. VII. fig. 5-8. Matsum. in Tokyo Bot. Mag. XVI. p. 85.

NOM. JAP. Tsuru-mame.

HAB. Kyöng-geui: Seoul (京城). Aug. 1886. fl. (Kalinowsky). Ō-ryu-kol (梧柳洞). Oct. 10. 1900. fr. mat. (T. Uchiyama).

Korea sine loco speciali (Carles).

DISTR. China et Manshuria.

**PUERARIA** DC. (sp. 1.)

*Pueraria Thunbergiana* BENTH. in Journ. Linn. Soc. IX. p. 122. Hance in Journ. Bot. (1874). p. 259. Fran. et Sav. l.c. I. p. 109. Forbes et Hemsl. l.c. p. 191. Itō et Matsum. l.c. p. 426. Palib. l.c. I. p. 71. Boiss. in Bull. l'Herb. Boiss. (1898). p. 678. Kom. l.c. II. p. 635. Matsum. et Hayata l.c. p. 111. *Dolichos hirsutus* Thunb. in Trans. Linn. Soc. II. p. 339.

*Pachyrrhizus Thunbergianus* Sieb. et Zucc. Fl. Jap. Fam. Nat. add. p. 113.

*Pueraria hirsuta* (Thunb). Matsum. in Tokyo Bot. Mag. XVI. p. 91.

NOM. JAP. Kuzu.

HAB. Kyöng-geui: Chemulpo (仁川) (Carles); In-chhon Aug. 1883.

fl. (Dr. Gottsche). Nam-han-san (南韓山). Oct. 18. 1900. fl. (T. Uchiyama).

Kang-uön: Meuk-kai (墨浦). Aug. 13. 1902. fl. (T. Uchiyama).  
In Korea bor. (Komarov). In locis variis (Perry).

DISTR. China, Manshuria et Japonia.

### PHASEOLUS L.

#### Clavis specierum.

A. Semina oblongo-cylindrica ..... *P. minimus* ROXB.

B. Semina cylindrico-compressa ..... *P. Riccardianus* TEN.

*Phaseolus minimus* ROXB. Fl. Ind. III. p. 290. Benth. Fl. Hongk. p. 88. Forbes et Hemsl. l.c. p. 198. Palib. l.c. I. p. 70. Kom. l.c. p. 636.

HAB. Kyöng-geui: Seoul (京城) secus viam ad Peking ducentem 1894. fl.; in ditione Seoulensi: in monte Yran-san Mai. 18. 1894. fl. (Sontag). Nam-san (南山). Aug. 30. 1902. fr.; Ō-ryu-kol (梧柳洞). Oct. 12. 1900. fl. (T. Uchiyama).

DISTR. China et Manshuria.

*Phaseolus Riccardianus* TEN. Palib. Consp. Fl. Kor. I. p. 70.

HAB. Kyöng-geui: Seoul (京城). Aug. 1886. fl. et fr. imm. (Kalinowsky).

DISTR. China.

### DUNBARIA W. et ARN. (sp. l.)

*Dunbaria subrhombica* HEMSL. Forbes et Hemsl. l.c. p. 195. Palib. l.c. I. p. 71.

HAB. Kyöng-san: Fusan. 1889. (Dr. Epow).

DISTR. China.

### RHYNCHOSIA LOUR. (sp. l.)

*Rhynchosia rotundifolia* LOUR. Fl. Cochin. p. 460. DC. Prodr.

II. p. 385. Fran. et Sav. l.c. I. p. 112. Maxim. in Mél. Biol. IX. p. 70. Forbes et Hemsl. l.c. p. 196. Diels l.c. p. 418. Palib. l.c. I. p. 71. Matsum. in Tokyo Bot. Mag. XVI. p. 95. Itō et Matsum. l.c. p. 432. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 678. Matsum. et Hayata l.c. p. 113.

NOV. JAP. Tankirimame.

HAB. Kyōng-san: Mok-chyang (木市). Nov. 9. 1900. fr. mat.; Mok-pho (木浦). Nov. 8. 1900. fr. (T. Uchiyama).

DISTR. China et Japonia.

## IX. SOPHOREÆ.

### Clavis generum.

- A. Legumen compressum.....*Cladrastis* RAFIN.  
 B. Legumen teres, moniliforme.....*Sophora* L.

### CLADRASTIS RAFIN. (sp. 1.)

*Cladrastis amurensis* (RUPR. et MAXIM.) BENTH. Gen. Pl. I. p. 554. Maxim. in Mél. Biol. IX. p. 73. Fran. et Sav. l.c. I. p. 113. Matsum. in Tokyo Bot. Mag. XVI. p. 97. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 679. Kom. Fl. Mansh. II. p. 569. *Maackia amurensis* Rupr. et Maxim. Mél. Biol. II. p. 534. Maxim. Prim. Fl. Amur. p. 87. tab. V. Regel Tent. Fl. Uss. n. 198. Fr. Schmidt Reis. in Amur. Insl. Sachl. p. 38.

HAB. Kyōng-geui: Nam-san (南山). Aug. 30. 1902. fr. jun.; Ibidem. Oct. 16. 1900. ster.; Nam-han-san (南韓山). Aug. 2. 1902. fl. et alabastr. (T. Uchiyama).

Pyōng-an: Ti-nyong-ryōng (地龍嶺). Aug. 21. 1905. ster. (T. Imagawa). Ad superiorem fl. Jalu. Aug. 1907. ster. (M. Shiki).

Kang-üon: monte Kum-Gang-San. 1895. ster. (K. Hayashi).

DISTR. Manshuria, Amur. et Japonia.

**SOPHORA** L.**Clavis specierum.**

- A.* Arbor, inflorescentia paniculata.....*S. japonica* L.  
*B.* Suffrutex, inflorescentia racemosa.....*S. flavescens* ART.

*Sophora flavescens* ART. Hort. Kew. (ed. II.) III. p. 92. L. Sp. Pl. (ed. II.) p. 499. DC. Prodr. II. p. 96. Ledeb. Fl. Ross. I. p. 716. Maxim. Prim. Fl. Amur. p. 87. Bunge Enum. Pl. Chin. bor. n. 89. Regel Tent. Fl. Uss. n. 147. Fr. Schmidt l.c. p. 38. Fran. et Sav. l.c. I. p. 113. Fran. Pl. Dav. p. 100. Forbes et Hemsl. l.c. p. 202. Itō et Matsum. l.c. p. 114. Matsum. in Tokyo Bot. Mag. XVI. p. 98. Palib. Consp. Fl. Kor. I. p. 71. Matsum. et Hayata Enum. Pl. Form. XXII. l.c. p. 114. *Sophora angustifolia* Sieb. et Zucc. Fl. Jap. Fam. Nat. I. p. 10. Miq. Prol. p. 241. Palib. l.c. p. 71. Boiss. in Bull. du l'Herb. Boiss. (1898). p. 679.

NOM. JAP. Kurara.

HAB. in archipelago Koreano : Herschel Isl. (Oldham Nr. 383-384) ex Hemsl.

Kyōng-san : Fusan (Wilford) ex Hemsl. et Palib. ibidem Nov. 15. 1900. alab. (T. Uchiyama).

Kyōng-geui : prope Seoul Jun. 1886 fl. (Kalinowsky) ex Palib. Nam-san (南山). Jul. 18. 1902. fl. ibidem. Oct. 16. 1900. fr. mat. (T. Uchiyama).

Phyōng-an : Phyōng-yang (平壤). Sept. 13. 1902. (T. Uchiyama).

Ham-gyōng : Gensan (元山). Jul. 18. 1889. (Dr. Epon) ex Palib.

DISTR. China, Manshuria, Sibiria et Japonia.

*Sophora japonica* L. Sp. Pl. (ed. II.) p. 500. Thunb. Fl. Jap. 178. DC. Prodr. II. p. 95. Benth. Fl. Hongk. p. 95. Miq.



Prol. p. 241. Bunge Enum. Pl. Chin. bor. n. 88. Fran. et Sav. Enum. Pl. Jap. I. p. 113. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 202. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 410.

Mimosa corniculata Lour. Fl. Cochinch. p. 651.

Styphonolobium japonicum Schott in Walp. Rep. I. p. 807.

NOM. JAP. Enju.

HAB. Phyöng-an : Phyöng-yang (平壤). Sept. 13. 1902. fl. (T. Uchiyama).

Kyöng-san : Chhyöng-do (清道). Oct. 9. 1902. fr. (T. Uchiyama).

DISTR. China et Japonia.

## ROSACEÆ.

### Clavis tribuum.

A. Fructus drupacea v. pomacea.

a) Fructus drupacea, ovarium superum.....X. *Prunoideæ*

b) Fructus pomacea, ovarium inferum .....II. *Pomoideæ*.

B. Fructus neque drupacea neque pomacea.

a) Ovarium inferum.

a) Achenia sicca .....VIII. *Sanguisorbieæ*.

β) Achenia sicca, tubo calycis carnoso inclusa...IX. *Roseæ*.

b) Ovarium superum.

a) Follicula dehiscentia .....I. *Spiræceæ*.

β) Carpella indehiscentia.

○ Filamenta basi contracta .....VII. *Ulmariææ*.

○○ Filamenta basi dilatata.

△ Pistilis 5-8 .....III. *Kerrieæ*.

△△ Pistilis ∞.

\* Ovula 2.....IV. *Rubineæ*.

\*\* Ovula 1.

- ‡ Semina pendula ..... *V. Potentillinae*.  
 †† Semina erecta ..... *VI. Dryadinae*.

## I. SPIRÆEÆ.

## Clavis specierum.

- A. Herbæ.....*Aruncus* (TOURN.) KOSTEL.  
 B. Frutices.  
 a) Semina albuminata.  
 a) Testa seminum coriacea.  
   ○ Follicula 2-valvata .....*Physocarpus* (CAMBESS.) MAXIM.  
   ○○ Follicula 1-2 ovulata .....*Stephanandra* SIEB. et ZUCC.  
   β) Testa seminum membranacea .....*Sorbaria* (SER.) A. BR.  
 b) Semina exalbuminata.....*Spiræa* L.

**STEPHANANDRA** SIEB. et ZUCC. (sp. 1.)

*Stephanandra incisa* ZABEL. Palib. Consp. Fl. Kor. I. p. 73.

*Stephanandra flexuosa* Sieb. et Zucc. Miq. Prol. p. 221. Fran. et Sav. Enum. Pl. Jap. I. p. 121. Maxim. in Act. II. Petrop. VI. p. 217. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 228.

*Spiræa incisa* Thunb. Fl. Jap. p. 213.

NOM. JAP. Kogome-utsugi.

HAB. Kyōng-geui: Chemulpo (仁川). (Carles), Seoul (京城). (Dr. Gottsche), ibidem Mai. 1885. fl., (Kalinowsky) ibidem. montes prope viam ad Peking ducentem Mai. 25. 1894. alab.; *Fan-Tang-san*. Jun. 2. 1895. fl. (Sontag). ex Palib. M'te Nam-san (南山). Jul. 17. 1902. fr.; ibidem. Oct. 10. 1902. fr. (T. Uchiyama).

Kyōng-san: Fusan (釜山). (Wilford). ex Palib.

In archipelago Koreano: Herschel Isl. (Oldham. Nr. 205).

DISTR. Japonia.

**SPIRÆA** L.**Clavis specierum.**

- A. Inflorescentia cymosa v. umbellata, pedicellis indivisis.  
 .....I. *Chamaedryon* SER.
- a) Inflorescentia umbellata, foliis integris argute serrulatis.  
 .....*S. prunifolia* S. et Z.
- b) Inflorescentia umbellato-cymosa.
- a) Sepalis reflexis; foliis ellipticis v. lanceolatis irregulariter serratis.  
 .....*S. flexuosa* MAXIM.
- β) Sepalis erectis.
- Foliis pubescentibus acute-ellipticis v. ovatis, inciso-serratis v. subtrilobatis .....*S. pubescens* TURCZ.
- Foliis glabris, trilobatis v. incisis .....*S. trilobata* L.
- B. Inflorescentia cymosa v. cymoso-paniculata, pedicellis plus minus ramosis.
- a) Inflorescentia cymosa, cymis apice inflatis ...II. *Catospira* K. KOCH.
- a) Foliis integris, sepalis erectis.....*S. trichocarpa* NAKAI.
- β) Foliis serratis, sepalis reflexis.
- Foliis ovato-lanceolatis duplicato-serratis.  
 .....*S. Frischiana* C. K. SCHN.
- Foliis ellipticis v. oblongis irregulariter argute serratis.  
 .....*S. koreana* NAKAI.
- b) Inflorescentia cymoso-paniculata, panicula cylindracea.  
 .....III. *Spiraria* SER.  
 Foliis lanceolatis..... *S. salicifolia* L.

*Spiraea prunifolia* SIEB. et ZUCC. Fl Jap. I. 131. t. 70. Fl. Jap. Fam. Nat. n. 38. Fran. et Sav. l.c. I. 120. Maxim. Act. h. Petrop. VI. 184. Forbes et Hemsl. Index Fl. Sin. in Journ. Linn. Soc. XXIII. 226. Palib. l.c. I. 73. C. K. Schneider in Bull. du l'Herb. Boiss. (1905). 336.

forma *simpliciflora* NAKAI.

*Spiraea prunifolia* fl. simplici Matsum. et Hayata in Journ. Sci. Coll. Imp. Univ. Tokyo XXII. 119. t. XII.

HAB. Kyōng-geui : Chemulpo (仁川). (Carles); Seoul (京城). Mai. 1886. fl. (Kalinowsky). Schin-ku-kai Apr. 18. 1894. fl., *Hon-Tschu-Wan. Mai 4. 1894. fl.*, Tun-kwan-Tai-kul. Apr. 24. 1895. (Sontag) ex Palib.

DISTR. formæ. Formosa.

*Spiraea flexuosa* FISCHER. DC. Prodr. II. 542. Kom. Fl. Mansh. II. 458. C. K. Schn. l.c. 340.

*S. chamaedrifolia*  $\beta$ . *flexuosa* Maxim. Act. h. Petrop. VI. 186. Korsch. ibidem. XII. 333.

HAB. in Korea bor. (Kom.) ex Kom.

DISTR. Asia bor.

*Spiraea pubescens* TURCZ. Bull. Soc. Nat. Mosc. (1832). 160. Maxim. Act. h. Petrop. VI. 193. Franch. Pl. Dav. 106. Forbes et Hemsl. l.c. 227. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 383. Komarov. l.c. II. 458. C. K. Schn. l.c. (1905). 342.

HAB. in Korea bor. (Kom.) ex Kom.

DISTR. China et Manshuria.

*Spiraea trilobata* L. Sp. Pl. (ed. II). 702. DC. Prodr. II. 543. Ledeb. Fl. Ross. II. 11. Bunge Enum. Pl. Chin. bor. n. 135. Maxim. in. Act. h. Petrop. VI. 197. Franch. Pl. Dav. 107. Forbes et Hemsl. l.c. 228. C. K. Schn. l.c. (1905). 343.

HAB. Kyōng-geui : inter Kai-Syōng. et Kum-chhyōn (開城金川間). Sept. 6. 1902. fr. (T. Uchiyama).

Korea australis : monte Chiri Aug. 1907. fr. (M. Shiki).

DISTR. Sibiria et China.

*Spiraea trichocarpa* NAKAI, sp. nov. Caulis erectus apice flexuosus; rami densiusculi angulati, glabri; juventutes purpurascens; folia brevi-petiolata, oblanceolata v. oblonga, utrinque acuta, integerrima, glaberrima, subtus subglauca; inflorescentia ad apicem rami terminalis, corymboso-paniculata, pubescens v. pilosa, pedicelli graciles, sepala erecta, triangularia, acuta, pilosa, annuli nectarii adsunt, carpella 3-5 (vulgo 4-5) parallelia, apice patentia, tomentosa, pili fusci; styli terminales persistentes patentis, carpellis æquilongis, stigma capitatum. Flores.....

Ad *S. mongolica* Maxim. affinis, differt tamen, foliis penninervis, oblanceolatis etc.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 20. 1902. fr. mat. (T. Uchiyama).

Planta endemica.

*Spiraea Frischiana* C. K. SCHNEIDER, in Bull. du l'Herb. Boiss. (1905). 347.

HAB. Kyöng-geui: Peuk-han-san (北漢山). Oct. 14. 1900. fr. (T. Uchiyama).

Kang-uön: Chho-Mok-dong (草木洞). Aug. 10. 1902. fl. et fr. immat. (T. Uchiyama).

DISTR. China.

*Spiraea koreana* NAKAI, sp. nov. S. caulibus reflexis, ramosis, ramulis subangulatis, glaberrimis; foliis brevipetiolatis v. subsessilibus, ellipticis basi rotundatis v. rotundato-subcuneatis, apice acutis, irregulariter acute serratis, subtus ad nervos fuscoso-pubescentibus, inflorescentia ad apicem ramuli terminali, corymboso-paniculata, ambitu inflatoconica, adpresse ciliolata, calyce reflexo, glabro, nectariis annulatis, capsulis 3-5 patentibus, pilosis, stylis persistentibus, terminalibus, capsulis (cc. 2 m.m. longi. 1 m.m. lati) æquilongis, stigmate capitato.

Ad. Sp. japonicam et Sp. Frischianam affinis, differt a primo caule ramulisque glabris, a secundo, inflorescentia carpellisque minoribus et angulis ramulis inconspicuis etc.

HAB. Kyōng-geui: Nam-san (南山). Jul. 25. 1902. fr. mat. (T. Uchiyama).

Korea australis: monte Chiri (智異山). Aug. 1907. ster. (M. Shiki).

Planta endemica.

*Spiraea satcifolia* L. Sp. Pl. (ed. II). 700. Ledeb. Fl. Ross. II. 15. Maxim. Prim. Fl. Amur. 92. in Act. h. Petrop. VI 209. Regel Tent. Fl. Uss. n. 153. Fr. Schmidt Amur. p. 39. n. 111. Sachl. p. 126. n. 121. Fran. et Sav. Enum. Pl. Jap. II. 332. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 227. Palib. Consp. Fl. Kor. I. 73. Kom. Fl. Mansh. II. 454.

NOM. JAP. Hozaki-shimotsuke.

HAB. Kyōng-geui: Seoul (京城). Jun. 1886. fl. (Kalinowsky). Nam-san (南山). Jul. 16. 1902. fl.; prope Yōng-deung-pho (永登浦近傍). Jul. 24. 1902. fl.; Syong-tyōng (松亭). Oct. 23. 1900. fr. mat. (T. Uchiyama). Nam-san (南山). Aug. 1906. fl. (S. Shimogōriyama).

DISTR. Asia, Europa et America bor.

### ARUNCUS (TOURN.) KOSTEL. (sp. 1.)

*Aruncus silvester* KOSTEL. Maxim. Act. h. Petrop. VI. 167. Korsch. ibidem. XII. 372. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 384. Kom. Fl. Mansh. II. 461.

*Spiraea Aruncus* L. Sp. Pl. (ed. II). 702. DC. Prodr. II. 545. Pall. Fl. Ross. I. 39. t. 26. Ledeb. Fl. Ross. II. 16. Hook. et Arn. Bot. Beech. Voy. 113. Maxim. Prim. Fl. Amur. 92. Fr. Schmidt Amur. p. 39. n. 114. Sachl. p. 126. n. 123. Regel

Tent. Fl. Uss. n. 155. Miq. Prol. Fl. Jap. 221. Fran. et Sav. Enum. Pl. Jap. I. 121. Hook. fil. Fl. Brit. Ind. II. 323. Forbes et Hemsl. l.c. 223.

NOM. JAP. Yamabuki-shōma.

HAB. Kang-uön: Kum-gang-san (金剛山). Aug. 18. 1902. fr. mat. (T. Uchiyama).

DISTR. Reg. bor. et temp.

### PHYSOCARPUS (CAMBESS) MAXIM. (sp. 1.)

*Physocarpus amurensis* MAXIM. Act. h. Petrop. VI. 221. Kom. Fl. Mansh. II. 453.

*Spiræa amurensis* Maxim. Prim. Fl. Amur. 90.

HAB. in Korea bor. (Komarov) ex. Kom. l.c.

DISTR. Manshuria.

### SORBARIA (SER). A. BR. (sp. 1.)

*Sorbaria sorbifolia* A. BR. Maxim. Act. h. Petrop. VI. 223. Korsch. Act. h. Petrop. XII. 334. Diels Centr. l.c. 384. Kom. l.c. II. 463.

*Spiræa sorbifolia* L. Sp. Pl. (ed. II). 702. DC. Prodr. II. 545. Pall. Fl. Ross. I. t. 24. Ledeb. Fl. Ross. II. 15. Maxim. Prim. Fl. Amur. 92. Regel Tent. Fl. Uss. n. 154. Bunge Enum. Pl. Chin. bor. n. 137. Fr. Schmidt Amur. p. 39. n. 112. Sachl. p. 126. n. 122. Hook. fil. Fl. Brit. Ind. II. 334. Forbes et Hemsl. l.c. 227.

*Basilima sorbifolia* Rafin. Ascherson u. Gräbner Syn. Mitteleurop. Fl. VI. i. 29.

HAB. Kang-nön: Kan-Bal-Ko-Ryöng (干發告嶺). Aug. 20. 1902. fl. (T. Uchiyama).

Kanto: prope Tenpōzan. Aug. 1907. (K. Maeda).  
 Distr. Himalaya, China, Sibiria, Manshuria et Japonia.

## II. POMOIDEÆ.

### Clavis generum.

- A. Folia pinnata ..... *Sorbus* L.  
 B. Folia simplicia.  
 a) Folia integerrima.  
 a) Calyx decidua..... *Rhaphiolepis* LINDL.  
 β) Calyx persistentia ..... *Cotoneaster* MEDIK.  
 a) Folia serrata.  
 a) Putamine osseo 1-5 loculari ..... *Crataegus* LINDL.  
 β) Putamine cum septis cartilagineis v. sine putamine.  
 ○ Fructus cum sclerenchyma.  
 \* Inflorescentia corymbosa; ovula in loculis 2..... *Pyrus* TOURN.  
 \*\* Inflorescentia uniflora; ovula in loculis ∞ ... *Cydonia* TOURN.  
 ○○ Fructus sine sclerenchyma.  
 \* Calyx persistentia ..... *Pourthiæa* DECSN.  
 \*\* Calyx decidua..... *Micromeles* DECSN.

## SORBUS L.

### Clavis specierum.

- A. Stipula minuta, pedunculis robustis..... *S. aucuparia* L.  
 B. Stipula ampla..... *S. pohuashanensis* HEDL.

*Sorbus aucuparia* L. Sp. Pl. (ed. II). p. 683. Maxim. in Mèl. Biol. IX. 170. Koch. Dendr. I. 188. Kom. Fl. Mansh. II. 472. Hedl. Monogr. Sorb. 46. Schneider Handb. Laubholzkunde I. 672.

*Pirus aucuparia* L. Ledeb. Fl. Ross. II. 100. Maxim. Prim. Fl. Amur. 103. Regel Tent. Fl. Uss. n. 177. Hook. fil. Fl. Brit.



Ind. II. 375. Fran. Pl. Dav. 120. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 255. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 387.

HAB. pede austro-occidentali montis Schan-pei-schan (白頭山西南麓).  
Jul. 7. 1905. ster. (T. Imagawa).

Kang-uön (江原道): Kum-gang-san (金剛山). Aug. 1895. ster.  
(K. Hayashi).

DISTR. Europa, Asia. et Amer. bor.

*Sorbus pohuashanensis* HEDL. Monogr. Sorb. 33. Schneider Handb. Laubholzkunde I. 672.

Pirus (Sorbus) pohuashanensis Hance in Journ. Bot. (1875) 132.

HAB. Ad superiorem fluminis Jaluensis: Aug. 1907. ster. (Shiki).

Korea australis: Monte Chiri (智異山). Aug. 1907. fructifera  
(Shiki).

Specimen ex monte Chiri, tamen, fructus oblongos, 6 m.m. longos portat.

DISTR. China bor.

### **RHAPHIOLEPIS** LINDL. (sp. 1.)

*Rhaphiolepis japonica* SIEB. et ZUCC. Fl. Jap. I. 162. t. 82. Miq. Prol. Fl. Jap. 229. Fran. et Sav. Enum. Pl. Jap. I. 141. Maxim. Mél. Biol. IX. 181. Engl. Bot. Jahrb. VI. 63. Bot. Mag. t. 5510. (v. integerrima). Forbes et Hemsl. l.c. 264. Palib. Consp. Fl. Kor. I. 76.

R. integerrima Hook et Arn. Bot. Beech. Voy. 263. Walp. Rep. II. 67.

R. Mertensii Sieb. et Zucc. Fl. Jap. I. 164.

NOM. JAP. Sharinbai.

HAB. Kyöng-saug: Insl. Chyöl-yöng-do (絶影島). Oct. 13. 1902. fr. mat.; ibidem Nov. 16. 1900. (T. Uchiyama).

In archipelago Koreano : Port Hamilton (巨文島). (Oldham Nr. 245).

DISTR. Japonia.

Nostra specimina *R. integerrima* concordant.

### COTONEASTER MEDIK.

#### Clavis specierum.

A. Folia rotunda v. rotundato-elliptica, viridia.....*C. integerrima* MEDIK.

B. Folia ovata, purpurea.....*C. Zabeli* C. K. SCHN.

*Cotoneaster integerrima* MEDIK. Wenzig. in Linnæa Vol. XXXVIII. 180. Koch. Dendr. I. 165. Maxim. Mém. Biol. IX. 174. Forbes et Hemsl. l.c. 260. Kom. Fl. Mansh. II. 465.

*Cotoneaster vulgaris* Lindl. in Trans. Linn. Soc. XIII. 1822. DC. Prodr. II. 632. Ledeb. Fl. Alt. II. 219. (excl. var.  $\beta$ .) Fl. Ross. II. 92. Hook. fil. Fl. Brit. Ind. II. 385. Korsch. Act. h. Petrop. XII. 334. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 385.

*Mespilus Cotoneaster* L. Sp. Pl. (ed. II.) 686. Pall. Fl. Ross. I. 30. t. 14.

HAB. in Korea bor. (Komarov) ex Kom. l.c.

DISTR. Europa, Asia. bor. et temp.

*Cotoneaster Zabeli* C. K. SCHN. Fed. Rep. (1907) p. 220.

HAB. in Korea bor. (Komarov).

DISTR. China.

### CRATÆGUS LINDL.

#### Clavis specierum.

A. Foliis inciso-pinnatifidis .....*C. pinnatifida* BUNGE.

B. Foliis trifidis, segmentis lateralibus bifidis .....*C. tenuifolia* KOM.

C. Foliis irregulariter duplicato-serratis .....*C. sanguinea* PALL.

*Crataegus sanguinea* PALL. (*a. GENUINA* MAXIM.) Pall. Fl. Ross. I. 25. t. II. Maxim. Prim. Fl. Amur. 101. in Mél. Biol. IX. 175. Fr. Schmidt Amur. 41. n. 137. Regel Tent. Fl. Uss. n. 173. Fran. et Sav. Enum. Pl. Jap. I. 141. Korsch. Act. h. Petrop. XII. 134. Forbes et Hemsl. l.c. I. 266. Kom. Fl. Mansh. II. 468. C. K. Schneid. Handb. Laubholz. I. 771.

NOM. JAP. Ōsanzashi.

HAB. Ad superiorem fl. Jaluensis Aug. 1907. fr. (Shiki).

DISTR. Sibiria, Amur et Manshuria.

*Crataegus pinnatifida* BUNGE Enum. Pl. Chin. bor. n. 157. Maxim. Prim. Fl. Amur. 101. in Mél. Biol. IX. 175. Regel Gartenfl. (1862) 204. t. 306. Tent. Fl. Uss. n. 174. Baker et Moore in Journ. Linn. Soc. XVII. 382. Korsch. Act. h. Petrop. XII. 334. Fran. Pl. Dav. 118. Forbes et Hemsl. l.c. 259. Palib. Consp. Fl. Kor. I. 77. Kom. Fl. Mansh. II. 466. C. K. Schneid. Handb. Laubholz. I. 769.

*Crataegus Oxyacantha* var. *pinnatifida* Regel Rev. Crat. in Act. h. Petrop. I. 119.

*Mespilus pinnatifida* C. Koch Dendr. I. 152. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 390.

HAB. Kyōng-geui: Seoul (京城). (Carles), ibidem Mai. 1886. fl. (Kalinowsky) Hut-Tschai-Meo. Mai. I. 1894. fl., Hon-Tschu-Wan Mai. 4. fl. *Pauck-Han Mai* 9. 1894. in monte Yran-san Mai 18. 1894. fl. Montes prope viam ed Peking ducentem Mai 25. 1894. fl., Tun-Kwan-Tai-Kul Apr. 24. 1895. fl. (Sontag). ex Palib. l.c. Peuk-han-san (北漢山). Oct. 14. 1900. fr. (T. Uchiyama).

Kang-uön: Kum-gang-san (金剛山). Aug. 20. 1902. fr. (T. Uchiyama).

Phyōng-an: Sin-ryōng in Heui-Chhyōn (熙川郡新嶺). Sept. 21. 1905. ster. (T. Imagawa).

DISTR. China et Manshuria.

*Crataegus tenuifolia* KOM. Fl. Mansh. II. 470. t. C. K. Schneider Handb. Laubholz. I. 771. (sub. *C. tenuifolia* Bat.).

HAB. In Korea bor. (Komarov) ex Kom. l.c.

Planta endemica.

## PYRUS TOURN.

### Clavis specierum.

A. Poma basi articulata.

a) Calyx persistens ; fl. carneus.....*P. spectabilis* AIT.

b) Calyx deciduus, fl. albus.

a) Folia omnia integra ; glaberrima...*P. baccata* L. *a sibirica* MAXIM.

β) Folia omnia integra, juventute tomentosa.

.....*P. baccata* L. β. *manshurica* MAXIM.

B. Poma basi non articulata.

a) Calyx decidua, folia integra crenulato-serrulata...*P. Calleryana* DCsNE.

b) Calyx persistens.

a) Fructus globosus ; folia argute setaceoso-serrata...*P. sinensis* LINDL.

β) Fructus pyciformis ; folia margine crenulata .....*P. communis* L.

Ex clavi excluditur .....*P. Fauriei* C. K. SCHN.

*Pyrus spectabilis* AIT. Hort. Kew. (ed. II.) III. 208. DC. Prodr. II. 635. Miq. Prol. Fl. Jap. 228. Koch. Dendr. I. 209. Bot. Mag. t. 268. Fran. et Sav. Enum. Pl. Jap. I. 138. Maxim. Mél. Biol. IX. 166. Fran. Pl. Dav. 119. Forbes et Hemsl. l.c. 258. Palib. l.c. 75.

NOM. JAP. Kaidō.

HAB. Kyōng-geui : Seoul (京城). Hut-Tschai-Meo. Mai 1. 1894. fl. ;

Pauk-Han Mai 9. 1894. fl. (Soutag) ex Palib. l.c.

DISTR. China et Japonia.

*Pyrus baccata* L. Ait. Hort. Kew. (ed. II.) III. 209. DC. Prodr.

II. 633. Pall. Fl. Ross. I. 23. t. 10. Ledeb. Fl. Ross. II. 97. Maxim. Prim. Fl. Amur. 102. Koch Dendr. I. 210. Maxim. in Mél. Biol. IX. 166. Fr. Schmidt Amur. 41. n. 138. Sachl. 129. n. 142. Regel Tent. Fl. Uss. n. 175. Hook. fil. Fl. Brit. Ind. II. 374. Baker et Moore in Journ. Linn. Soc. XVII. 382. Forbes et Hemsl. l.c. 257. Palib. l.c. 74. Diels l.c. 387. Kom. Fl. Mansh. II. 474.

*α sibirica* MAXIM. in Mél. Biol. IX. 166.

HAB. Kyōng-geui: Seoul (京城—Carles) ex Hemsl. l.c. Peuk-han-san (北漢山). Oct. 14. 1900. fr. (T. Uchiyama).

Hoang-hai (黃海道). Inter Nam-Chhyōn et An-Syōng (南川安城間). Sept. 7. 1902. fr. (T. Uchiyama).

Kang-uōn: Chyun-Chhyōn (春川). Aug. 1906. fr. (S. Shimogōri yama).

*β manshurica* MAXIM. l.c. 166. Palib. l.c. I. 74.

NOM. JAP. Koringo.

HAB. Kyōng-geui (京畿道). Seoul (京城). Apr. 1886. fl. (Kalinowsky) ex Palib. l.c.

Kang-uōn (江原道): Meuk-kai (墨浦). Aug. 12. 1902. fr. (T. Uchiyama).

DISTR. sp. Sibiria, Manshuria, China et India.

*Pyrus Calleryana* DCsNE. Maxim. Bull. Soc. Nat. Mosc. (1879) 18. P. Jacquemontiana Maxim. in Mél. Biol. IX. 169.

NOM. JAP. Inunashi.

HAB. Kyōng-geui (京畿道): Nam-han-san (南韓山). Oct. 18. 1900. fr. mat., prope Tsu-hyōn (奄峴近傍). Sept. 27. 1902. fr. mat. (T. Uchiyama).

DISTR. Japonia.

*Pyrus sinensis* LINDL. Maxim. in Mél. Biol. IX. 168. Baker et Moore in Journ. Linn. Soc. XVII. 382. Korsch. Act. h.

Petrop. XII. 335. Fran. Pl. Dav. 120. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 257. Palib. l.c. I. 75. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 387. Kom. Fl. Mansh. II. 476.

*P. ussuriensis* Maxim. Prim. Fl. Amur. 102. Koch Dendr. I. 206. Regel. Tent. Fl. Uss. n. 176.

*P. communis* Thunb. Fl. Jap. 207.

*P. communis*  $\beta$ . *chinensis* C. Koch Fran et Sav. l.c. I. 138.

*Chaenomeles chinensis* Koehne Gatt. d. Pom. (1890). 29.

NOM. JAP. Nashi.

HAB. Kyōng-geui (京畿道). Seoul (京城). Apr. 1886. fl. (Kalinowsky).

DISTR. China, Maushuria et Japonia.

*Pyrus communis* L. Sp. Pl. (ed. II.) 686. Ait. Hort. Kew. (ed. II.) III. 208. Pall. Fl. Ross. I. 20. DC. Prodr. II. 633. Ledeb. Fl. Koss. II. 94. Miq. Prol. Fl. Jap. 228. Hook. fil. Fl. Brit. Ind. II. 374. Forbes et Hemsl. l.c. 257. Palib. l.c. 74.

NOM. JAP. Seiyōnashi.

HAB. Kyōng-geui (京畿道): Seoul (京城). Jun. 1886. (Kalinowsky),  
*Tun-Kwan-Tai-Kul. Apr. 24. 1895. (Sontag)* ex Palib. l.c.

In ripa occidentalis peninsule (Perry) ex Hemsl. l.c.

DISTR. Europa et Asia.

*Pyrus Fauriei* C. K. SCHN. Fedd. Rep. (1907). p. 121. Schneider. Illus. Handb. Laubholz. I. 666.

HAB. circa Seoul (Faurie).

Planta endemica.

### CYDONIA Tourn. (sp. 1.)

*Cydonia japonica* PERS. Syn. Pl. II. 40. DC. Prodr. II. 638. Focke in Engl. Prantl. Nat. Pf'fam. III. iii P. 22.

*Chænomeles japonica* Lindl. Trans. Linn. Soc. XIII. 97. Maxim.  
Mél. Biol. IX. 162. Fran. Pl. Dav. 119.

*Pyrus japonica* Thunb. Fl. Jap. 207. Kurz. Journ. Bot. (1883).  
298. Koch. Dendr. I. 222. Bot. Mag. t. 692.

NOM. JAP. Boke.

HAB. Kyöng-geui (京畿道): Seoul (京城). Mai. 1886. fl. (Kalinowsky).  
Tun-Kwan-Tai-Kul, Apr. 24. 1895. fl. (Sontag) ex Palib. l.c.

DISTR. China et Japonia.

### POURTHIÆA DECSN. (sp. 1.)

*Pourthiæa variabilis* PALIB. Consp. Fl. Kor. I. 76.

*Pourthiæa villosa*, *P. Calleryana*, *F. lucida*, *P. coreana*. *P.*  
*Oldhami* et *P. Thunbergii* Desne. in Nouv. Arch. du. Mus. X.  
147-149!

*hotinia variabilis* Hemsl. in Journ. Linn. Soc. XXIII. 263.

*Photinia serrulata* Sieb. et Zucc. (non Lindl.). Fl. Jap. Fam. Nat.

*Photinia villosa* et *P. lævis* DC. Prodr. II. 631. Maxim. Mél.  
Biol. IX. 176. Fran. et Sav. Enum. Pl. Jap. I. 142.

*Cratægus villosa* et *C. lævis* Thunb. Fl. Jap. 204.

*Stranvaisia digyna* Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 60.

NOM. JAP. Kamatsuka.

HAB. Kyöng-san (慶尙道): Pusan (釜山—Wilford Nr. 967). ex Palib.  
l.c.

DISTR. China et Japonia.

### MICROMELES DECSN. (sp. 1.)

*Micromeles alnifolia* KÖHNE. Gatt. Pom. (1890) 20. Kom. Fl.  
Mansh. II. 479. Palib. Consp. Fl. Kor. I. 75.

*Cratægus alnifolia* Wenzig. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 387.

*Sorbus alnifolia* C. Koch. Maxim. Mém. Biol. IX. 173.

NOM. JAP. Azukinashi.

HAB. Kyōng-geui (京畿道): Seoul (京城). *Tun-Kwan-Tai-Kul Apr.* 24. 1895. fl. (Sontag) ex Palib. l.c.; Nam-san (南山). Jul. 25. 1902. fr.; ibidem Oct. 16. 1900. fr. mat.; Nam-han-san (南韓山). Oct. 18. 1900. fr. mat.; ibidem. Aug. 2. 1902. fr. (T. Uchiyama).

Kang-nōn (江原道): Kum-gang-san (金剛山). Aug. 1895. ster. (K. Hayashi).

Pyōng-an: Sinryōng (熙川郡新嶺). Sept. 11. 1905. ster. (T. Imagawa).

In Korea borealis (Kom.) ex Kom. l.c.

DISTR. Manshuria et Japonia.

### III. KERRIÆ. (gn. 1.)

#### **KERRIA** DC. (sp. 1.)

*Kerria japonica* DC. in Trans. Linn. Soc. XII. 157. Prodr. II. 571. Sieb. et Zucc. Fl. Jap. I. 183. tt. 98–99. Fran. et Sav. Enum. Pl. Jap. I. 122. Koch Dendr. I. 301. Maxim. Act. h. Petrop. VI. 242. Forbes et Hemsl. Index Fl. Sin. in Journ. Linn. Soc. XXIII. 228.

*Corchorus japonicus* Thunb. Fl. Jap. 227. Bot. Mag. t. 1296.

NOM. JAP. Yamabuki.

HAB. Kyōng-geui (京畿道): Seoul (京城). Mai. 1886 fl. (Kalinowsky); ibidem prope Tap-Tong. Mai 20. 1895 fl. (Sontag) ex Palib. l.c.

DISTR. China et Japonia.



## VI. RUBINÆ. (gn. 1.)

**RUBUS** L.**Clavis specierum.***A.* Herbacei.

a) Foliis integris.....*R. humulifolius* C. A. MEYER.

b) Foliis ternatis .....*R. arcticus* L.

*B.* Furtices.

a) Foliis simplicibus.

α) Ramuli floriferi abbreviati basi fasciculato-foliati. Folia 3-5 fida  
argute inciso-serrata.....*R. palmatus* THUNB.

β) Ramuli floriferi elongati foliati, internodiis foliorum distinctissimi.

○ Folia 3-5 fida, stipulæ ampulæ .....*R. trifidus* THUNB.

○○ Folia 3-5 fida, stipulæ setaceæ.....*R. crataegifolius* BUNGE.

b) Foliis pinnatis.

a) Ramuli novelli floriferi sæpius abbreviati simplices, flores axillari  
1-3.

○ Achenia 2 m.m. longa, petala spatulata, calyx aculeatus.

.....*R. pungens* CAMB.

○○ Achenia 1 m.m. longa, petala orbiculata, calyx inermis.

.....*R. Thunbergii* S. et Z.

β) Ramuli novelli elongati; inflorescentia racemosa v. paniculata.

○ Folia omnia pinnata .....*R. coreanus* MIQ.

○○ Folia omnia v. ramul. florif. ternata, subtus nivea.

△ Petala purpurea, folia sæpius omnia ternata

.....*R. parvifolius* L.

△△ Petala alba, folia infer. et ramor. steril. pinnata.

† Totus dense longeque rubiginoso-glandulosus.

.....*R. phænicolusius* MAXIM.

†† Glandulæ O. v. paucae, breves pallidae.

.....*R. Ideus* L. var. *nipponicus* FOCKE.

*Rubus humulifolius* C. A. MEYER. Maxim. Prim. Fl. Amur. 99. in Mél. Biol. VIII. 375. Fr. Schmidt Reiss. in Amur. u. Insel Sachl. p. 40. n. 131. Kom. Fl. Mansh. II. 480.

HAB. in Korea bor. ex Komarov. l.c.

DISTR. Russia, Amur et Manshuria.

*Rubus arcticus* L. Sp. Pl. (ed. II.) 708. DC. Prodr. II. 565. Pall. Fl. Ross. I. 67. Ledeb. Fl. Ross. II. 70. Maxim. Prim. Fl. Amur. 99. in Mél. Biol. VIII. 376. Fr. Schmidt l.c. p. 41. n. 132. p. 128. n. 136.

NOM. JAP. Chishimaichigo.

HAB. in Korea bor. ex Komarov. l.c.

DISTR. Regio bor. et arct.

*Rubus palmatus* THUNB. Fl. Jap. 217. A. Gray Pl. Jap. 311. Miq. Prol. Fl. Jap. 223. Maxim. in Mél. Biol. VIII. 384. Fran. et Sav. Enum. Pl. Jap. I. 126. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 234. Palib. l.c. I. 78.

NOM. JAP. Ki-ichigo.

Forma foliis plerisque latis 5-lobis probabiliter ex Archipelago Koreano.

(Oldham) ex Miq. l.c.

DISTR. China et Japonia.

*Rubus trifidus* THUNB. Fl. Jap. 217. Maxim. Mél. Biol. VIII. 383. Fran. et Sav. l.c. I. 125. Forbes et Hemsl. l.c. 238. Palib. Consp. Fl. Kor. I. 80.

*R. aceroides* Miq. in Ann. Mus. Bot. Lugd. Bat. III. 36. Prol. Fl. Jap. 224.

*R. hydrastifolius* A. Gray Pl. Jap. 311.

*R. incisus* Miq. (non Thunb.) in Ann. Mus. Bot. Lugd. Bat. III. 35. Prol. Fl. Jap. 223.

*R. rubifolius* Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 9.

NOM. JAP. Kaji-ichigo.

HAB. in archipelago Koreano: Port Hamilton (巨文島). Oldham.  
Nr. 219. ex Hemsl. l.c.

DISTR. Japonia.

*Rubus crataegifolius* BUNGE Enum. Pl. Chin. bor. n. 140.  
Regel Tent. Fl. Uss. n. 169. t. 5. Maxim. in Mél. Biol. VIII.  
383. Fran. et Sav. Enum. Pl. Jap. I. 124. Baker et Moore  
in Journ. Linn. Soc. XVII. 381. Fran. Pl. Dav. 109. Forbes  
et Hemsl. l.c. 230. Palib. l.c. I. 78.

NOM. JAP. Tachi-ichigo.

HAB. Korea, sine loco indicato (Schlippenbach) ex Maxim. l.c.

Kyöng-geui (京畿道): Seoul (京城). et Chemulpo (仁川) (Carles).  
ex Hemsl. l.c. Prope Seoul. Mai 1886. fl. (Kalinowsky). Hut-  
Tschai-Meo. Mai 1. 1894. fl., prope Tap-Tongj. Mai 20. 1895. fl.  
(Sontag). ex Palib. l.c.

Seoul. colle Nam-san (南山). Jul. 18. 1902. fr., ibidem Oct. 11.  
1900. fol. (T. Uchiyama).

Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 14.  
1902. fr. (T. Uchiyama).

DISTR. China et Japonia.

*Rubus Ouensanensis* LÉVL. et VNT. in Bull. Soc. Agric., Sci. et  
Arts de la Sarthe, LX. (1905). p. 62. Fedd. Rep. (1906). p.  
175.

HAB. Ham-gyöng: collibus Ouen-san (元山). Jul. 1901. (Faurie).  
ex Lévl. et Vnt.

*Rubus pungens* CAMB. Maxim. in Mél. Biol. VIII. 386. ( $\beta$   
Oldhami). Forbes et Hemsl. l.c. 236. Palib. l.c. I. 79.

R. Oldhami Miq. in Ann. Mus. Bot. Lugd. Bat. III. 34. Prol.  
Fl. Jap. 222.

NOM. JAP. Sanagi-ichigo.

HAB. Archipelagus Koreanus : (Oldham n. 213. rf.) ex MIQ. l.c.

in Korea (Schlippenbach fl.) ex Maxim l.c.

Kyöng-san (慶尙道) : Pusan (釜山). (Wilford. Nr. 956). ex Hemsl. l.c.

Kyöng-geui (京畿道) : Chemulpo (仁川). et Seoul (京城). In montibus (Carles) ex Hemsl. l.c., ibidem Mai 1886. fl. (Kalinowsky), Seoul ; *Tun-Kwan-Tai-Kul. Apr. 24. 1896.* (Sontag) ex Palib. l.c.

Chyöl-la (金羅道). sine loco indicato fl. (Y. Hanabusa).

DISTR. var. Japonia.

*Rubus Thunbergii* SIEB. et ZUCC. Fl. Jap. Fam. Nat. n. 46. Miq. Prol. Fl. Jap. 222. Maxim. in Mél. Biol. VIII. 389. Fran. et Sav. Enum. Pl. Jap. I. 129. Forbes et Hemsl. l.c. 238. Palib. l.c. I. 79.

NOM. JAP. Kusa-ichigo.

HAB. Korea sine loco indicato (Wilford) ex Maxim. l.c.

in archipelago Koreano : Port Hamilton (Oldham Nr. 47) ex Hemsl. l.c.

DISTR. China et Japonia.

*Rubus coreanus* MIQ. in Ann. Mus. Bot. Lugd. Bat. III. 34. Prol. Fl. Jap. 222. S. Moore in Journ. Bot. (1875). 230. Maxim. Mél. Biol. VIII. 391. Forbes et Hemsl. l.c. 230. Palib. Consp. Fl. Kor. I. 77.

NOM. JAP. Tokkuri-ichigo.

HAB. Archipelagus Coreanus (Oldham n. 215.) ex Miq. l.c.

ad superiorem fl. Jaluensis Aug. 1907. fl. (Shiki).

DISTR. China et Japonia.

*Rubus parvifolius* L. Sp. Pl. (ed. II). 707. Lour. Fl. Coch. 324. DC. Prodr. II. 565. Benth. Fl. Hongk. 105. Fl. Austr. II. 430. Miq. Prol. Fl. Jap. 222. Maxim. in Mél. Biol. VIII.

392. (excl. syn. *R. foliosus* et *R. microphyllus* D. Don). Fran. et Sav. Enum. Pl. Jap. I. 127. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 235. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Coll. Imp. Univ. Tokyo. XII. 451. Palib. Consp. Fl. Kor. I. 79. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Coll. Imp. Univ. Tokyo. XXII. 122.

*R. chinensis* Thunb. Diss. de Rubo. 8. cum. fig.!

*R. purpureus* Bunge l.c. n. 139. Miq. Journ. de. Bot.; Neerl. I. 121.!

*R. triphyllus* Thunb. Fl. Jap. 215.

NOM. JAP. Nawashiro-ichigo.

HAB. insulis Koreanis (Oldham Nr. 212) ex Maxim. l.c.

Kyōng-geui (京畿道). Nam-san (南山). Jul. 18. 1902. fr. et fl., ibidem Oct. 1900. fr. (T. Uchiyama). insula Putung (豐島). Kon-pho (古溫浦). fl. (Y. Hanabusa).

Hoang-Hai. (黃海道). inter An-syōng (安城). et Syō-heung (瑞興). Sept. 8. 1902. (T. Uchiyama).

DISTR. Australia et Asia.

*Rubus phœnicolasius* MAXIM. in Mél. Biol. VIII. 393. Bot. Mag. t. 6479. Gard. Chron. XXVI. 315. f. 74. Forbes et Hemsl. l.c. 235.

NOM. JAP. Urajiro-ichigo.

HAB. Kang-uōn (江原道): Kum-gang-san (金剛山). Aug. 14. 1902. fr. (T. Uchiyama).

DISTR. China et Japonia.

*Rubus Idæus* L. Sp. Pl. (ed. II). 706. Pall. Fl. Ross. II. 64. DC. Prodr. II. 558. Ledeb. Fl. Alt. II. 230. Fl. Ross. II. 65. Miq. Fl. Ind. Bat. I. 377. Regel Tent. Fl. Uss. n. 170. Maxim. in Mél. Biol. VIII. 394.

var. *nipponicus* FOCKE. in Abhandl. Naturwissensch. Ver. zu Bremen XIII. 491–492.! Palib. l.c. I. 78.

*Rubus Idæus*.  $\beta$  *strigosus* Maxim. l.c. (ex parte).

NOM. JAP. Miyama-urajiro-ichigo.

HAB. Kyōng-geui. (京畿道): Seoul (京城). Jun. 1886. fl. (Kalinowsky).

ibidem in *Van-Tang-San Jun.* 2. 1895. fl. (Sontag). ex Palib. l.c.

DISTR. var. Japonia.

## V. POTENTILLINÆ.

### Clavis generum.

A. Sepalis duplicatis.

a) Receptaculis carnosis.

a) Receptaculis maturatis succulentis.....*Eragaria* L.

$\beta$ ) Receptaculis maturatis spongiosus.....*Duchesnea* Sm.

b) Receptaculis maturatis paullo crassatis sed exsiccatis.. ...*Potentilla* L.

B. Sepalis simplicibus .....*Chamærhodos* BUNGE.

## FRAGARIA L. (sp. 1.)

*Fragaria elatior* EHR. DC. Prodr. II. 570. Lessing in Linnæa IX. 177. Ledeb. Fl. Ross. II. 64. Maxim. in Bull. Soc. Nat. Mosc. (1879). 17. Kom. Fl. Mansh. II. 487.

*F. collina* Maxim. Prim. Fl. Amur. 99. Fran. et Sav. Enum. Pl. Jap. II. 356. Fran. Pl. Dav. 110.

*F. moschata* Duchesne Regel Tent. Fl. Uss. n. 167. Korsch. Act. h. Petrop. XII. 331.

*F. neglecta* Ereyne (non Lindl.). Oest. Bot. Z. (1902). 24.!

NOM. JAP. Shirobanano-hebiichigo.

HAB. Kyōng-geui. (京畿道). Nam-san (南山). Jul. 30. 1902. (T. Uchiyama).

DISTR. Europa, Asia bor. et Japonia.

**DUCHESNEA** Sm. (sp. 1.)

*Duchesnea indica* (ANDR.) FOCKE. in Engl. Prantl. Nat. Pfl. Fam. III. iii. 33. Palib. Consp. Fl. Kor. I. 80. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 401. Kom. Fl. Mansh. II. 489.

*Duchesnea fragarioides* Sm. in Trans. Linn. Soc. X. 383. DC. Prodr. II. 571. A. Gray Pl. Jap. 387. Miq. Prol. Fl. Jap. 225. *Fragaria indica* Andr. DC. Prodr. II. 571. Wight Ic. t. 989. Fran. et Sav. Enum. Pl. Jap. I. 129. Hook. fil. Fl. Brit. Ind. II. 343. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 240. Fran. Pl. Dav. 110.

NOM. JAP. Hebi-ichigo.

HAB. Kyōng-geui (京畿道). Seoul (京城). Mai. 1886. fl. Jun. fr. imm. (Kalinowsky) ibidem. Bacton (ab urbe versus meridiem) Oct. 30. 1893. fr.; prope viam per montes ad Peking ducentem. Oct. 30. 1893. fr.; Tschauton Nov. 10. 1893. fr.; Naeton. Nov. 15. 1893. fr.; *in cacumine montis Nam-san Apr. 20. 1894. fr.* Hut-Tschai-Meo. Mai 1. 1894 fr. (Sontag) ex Palib. Peuk-han-san (北漢山). Oct. 14. 1900. fr. mat. (T. Uchiyama).

Kang-uōn (江原道). monte Kum-gang-san (金剛山). Aug. 18. 1902. fr. mat. (T. Uchiyama).

in archipelago Koreano: Port Hamilton (Oldham Nr. 211.) ex Palib. l.c.

in Korea bor., ex Komarov. l.c.

DISTR. China, India, Manshuria et Japonia.

**POTENTILLA** L.**Clavis specierum.**

A. Fruticosæ.....*P. fruticosa* L.

B. Herbacæe v. suffruticosæ.

## a) Foliis pinnatis. v. bipinnatis.

## a) Foliis bipinnatis.

○ Foliis bipinnatis.....*P. chinensis* SER.○○ Foliis subdigitato-bipinnatis .....*P. multifida* L.

## β) Foliis pinnatis.

○ Foliis pinnatis, foliolis 2-9 jugis.

△ Foliolis dentatis.

† Calyx floccoso-tomentosus, foliolis oblongo-ellipticis

.....*P. discolor* BUNGE.

†† Calyx pilosus.

\* Foliolis rhomboideis v. rhombeo-ellipticis, rhizomate abbreviato-subsimplice.

□ Stolonifera.

( Foliolis ovato-lanceolatis.

.....*P. fragarioides a typica* MAXIM.

(( Foliolis rotundatis.

.....*P. fragarioides* ξ *stolonifera* MAXIM.

□□ Stolones nulli.

.....*P. fragarioides* δ *Sprengeliana* MAXIM.

\*\* Foliolis oblongo-ellipticis; rhizomate lignoso ramoso

.....*P. ancistriifolia* BUNGE.△△ Foliolis 2-3 fidis .....*P. bifurca* L.○○ Foliis pinnati-sectis, lobis obovatis v. oblongis...*P. supina* L.

## b) Foliis digitatis.

## a) Foliis semper ternatis.

○ Foliis concoloribus, caulis elatus.....*P. cryptotaenia* MAXIM.

○○ Foliis subtus glaucis, caulis gracilis.

△ Serratulis foliorum utrinque 7-11, sepalis exterioribus minoribus...*P. centigrana* MAXIM. var. *japonica* MAXIM.△△ Serratulis foliorum utrinque 4-8, sepalis exterioribus majoribus.....*P. centigrana* var. *manshurica* MAXIM.

## β) Foliis 3-5 foliolatis.

○ Radix annua.....*P. Kleiniana* WIGHT. et ARN.



○○ Radix perennia, lignosa.

△ Petalis obcordatis, foliolis oblongis grosse-inciso-crenatis, segmentis 2-3 dentatis....*P. reptans* L. var. *incisa* FRANCH.

△△ Petalis obovatis, foliolis lanceolatis v. elliptico-cuneatis, argute-serratis. ....*P. flagellaris* WILLD.

*Potentilla fruticosa* L. Sp. Pl. (ed. II.) 709. Pers. Syn. Pl. II. 53. DC. Prodr. II. 579. (excl. var. β.) Ledeb. Fl. Alt. II. 234. Fl. Ross. II. 67. Lehm. Monogr. 31. Rev. 16. Koch Dendr. I. 299. Fr. Schmidt Reis. in Amur. u. Insl. Sachl. 40. n. 128. p. 127. n. 128. Fran. et Sav. Enum. Pl. Jap. I. 133. Maxim. in Mél. Biol. IX. 157. Benth. et Hook. Brit. Fl. (ed. V.) 138. Fran. Pl. Dav. 110. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 243. Korsch. Act. h. Petrop. XII. 329. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 402. Kom. Fl. Mansh. II. 470.

*P. davurica* Lehm. Rev. 15. Hance in Journ. Linn. Soc. XIII. 79.

*P. glabra* in Bot. Mag. t. 3676.

NOM. JAP. Kinrōbai.

HAB. in Korea bor. ex Komarov. l.c.

DISTR. Reg. bor. et temp.

*Potentilla chinensis* SER. DC. Prodr. II. 583. Maxim. Prim. Fl. Amur. 98. Lehm. Rev. 64. t. 23. Regel Tent. Fl. Uss. n. 164. Baker et Moore in Journ. Linn. Soc. XVII. 381. Fran. et Sav. Enum. Pl. Jap. I. 131. II. 338. Fran. Pl. Dav. 112. Korsch. Act. h. Petrop. XII. 330. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 241. Matsum. in Tokyo Bot. Mag. (1895). 72. Palib. Consp. Fl. Kor. I. 80. Diels l.c. 403. Kom. l.c. 501.

*P. exaltata* Bunge Enum. Pl. Chin. bor. n. 142.

*P. multifida* Baker et Moore l.c. 381. Miq. Prol. Fl. Jap. 224.

NOM. JAP. Kawara-saiko.

HAB. Kyöng-geui (京畿道). Chemulpo (仁川—Carles). Seoul (京城).  
Aug. 1883. (Dr. Gottsche). Jun. 1886. fl. (Kalinowsky). ex Palib.  
l.c.

Nam-san (南山). Jul. 16. 1902. fl. ( $\xi$ . ramosus Fr. et Sav.) ibidem  
Oct. 11. 1900 fl. et fr. ( $\xi$ . ramosus).—(T. Uchiyama) ibidem. Aug.  
1906 fl. et fr. jun. ( $\alpha$ . micrantha—S. Shimogōriyama).

Kang-uön (江原道): Chyang-yön-ri (長淵里). Aug. 13. 1902. fl.  
et fr. ( $\xi$ . ramosus—T. Uchiyama).

Kyöng-san (慶尙道): Fusan (釜山). Fl. ( $\alpha$ . micrantha—Y. Hanabusa).

in archipelago Koreano: Long Reach (Oldham Nr. 209). ex  
Hemsl. l.c.

Korea sine loco speciali ( $\beta$ . hirtella—T. Uchiyama).

Kan-tō (間島). prope Tōdōkō (頭道溝附近). Sept. 11. 1907. fl.  
( $\alpha$ . micrantha—K. Maeda).

DISTR. China, Manshuria et Japonia.

*Potentilla multifida* L. Sp. Pl. (ed. II.) 710. DC. Prodr. II.  
42. Lehm. Monogr. 64. Rev. 34. Redeb. Fl. Alt. II. 43. Fl.  
Ross II. 245. Koch Syn. Fl. Germ. et Helv. (ed. III). I. 186.  
Miq. Prol. Fl. Jap. 224. (pro parte). Hook. fil. Fl. Brit. Ind.  
II. 353. Korsch. Act. h. Petrop. XII. 330. Kom. Fl. Mansh.  
II. 498.

HAB. in Korea bor. ex Komarov. l.c.

DISTR. Europa, Asia bor. et temp.

*Potentilla discolor* BUNGE Enum. Pl. Chin. bor. n. 149. Lehm.  
Rev. 39. t. 12. Fran. et Sav. l.c. I. 131. Franch. Pl. Dav.  
112. Korsch. Act. h. Petrop. XII. 329. Forbes et Hemsl. l.c.  
241. Palib. l.c. 81.

*P. formosana* Hance in Journ. Linn. Soc. XIII. 79.

NOM. JAP. Tsuchiguri.

HAB. Kyōng-geui (京畿道): Seoul (京城). (Dr. Gottsche). ex Palib. l.c.

Kyōng-san (慶尙道). Fusan (釜山—Wilford n. 959). ex Hemsl. l.c. in archipelago Koreano: Long-reach. (Oldham. n. 209). ex Hemsl. l.c.

Chyöl-la (金羅道). Sōandō (所安島). Fl. (Y. Hanabusa).

DISTR. China et Japonia.

*Potentilla fragarioides* L. Sp. Pl. (ed. II). 710. DC. Prodr. II. 38. Ledeb. Fl. Alt. II. 238. Fl. Ross. II. 38. Lehm. Rev. 42. Monogr. 50. t. 4. Maxim. Prim. Fl. Amur. 75. in Mél. Biol. IX. 158. Miq. Prol. Fl. Jap. 225. Regel Tent. Fl. Uss. n. 162. Fran. et Sav. I. 130. II. 337. Hook. fil. Fl. Brit. Ind. II. 350. Forbes et Hemsl. l.c. 242. Korsch. Act. h. Petrop. XII. 329. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 403. Palib. l.c. 81.

*P. grandiflora* Thunb. Fl. Jap. 219. Miq. Prol. Fl. Jap. 225.

NOM. JAP. Kijimushiro.

*α. typica* MAXIM. in Mél. Biol. IX. 159. Palib. l.c. 81.

HAB. Kyōng-geui (京畿道): Chemulpo (仁川). Carles, Dr. Bunge-Apr. 22. 1889 fl.; ex Hemsl. l.c.

prope Chyang-ho-nōn (長湖院近傍). Sept. 29. 1902. fl. et fr. mat. (T. Uchiyama).

*δ. Sprengeliana* MAXIM. l.c. 160. Palib. l.c. 81. Kom. l.c. II. 494.

*P. Sprengeliana* Lehm. Rev. 43. Monogr. 48. t. 3. DC. Prodr. II. 580. Ledeb. Fl. Ross. II. 37. Maxim. Prim. Fl. Amur. 95. Fr. Schmidt l.c. 40. n. 123.

HAB. Kyōng-geui (京畿道). Seoul (京城). Jun. 1886. fl. (Kalinowsky). ibidem Mabon. Mart. 4. 1894. fl., inter Chemulpo (仁川) et Seoul

(京城). Mart. 17. 1894. fl., in *declivitatibus montis Nam-san*  
(南山). Mart. 28. 1894. fl. (Sontag) ex Palib. l.c.  
Phung-tō (豊島). Fl. (Y. Hanabusa).

ξ. *stolonifera* MAXIM. in Mél. Biol. IX. 160. Palib. l.c. I. 81.  
*P. fragiformis* var. *japonica* A. Gray ex Maxim. Mél. Biol. IX.  
160.

*P. Gerardiana* Lindl. ex Rehm. Rev. 42.

*P. japonica* Bl. Miq. Prol. Fl. Jap. 225.

*P. stolonifera* Lehm. Rev. 45. t. 15. Ledeb. Fl. Ross. II. 38.  
DC. Prodr. II. 580.

*P. stolonifera* Ledeb. (non Lehm). in Fr. Schmidt l.c. 127. n. 130.

HAB. Kyōng-geui (京畿道): Seoul (京城). Mai 1886. fl. (Kalinowsky).

DISTR. sp. India, China, Manshuria, Sibiria et Japonia.

*Potentilla ancistrifolia* BUNGE Enum. Pl. Chin. bor. n. 145.  
Lehm. Rev. 43. t. 18. Maxim. Bull. Soc. Nat. Mosc. (1879). 17.  
Forbes et Hemsl. l.c. 240. Diels Fl. Centr. Chin. in Engl. Bot.  
Jahrb. XXIX. 403. Kom. Fl. Mansh. II. 497.

*P. Dickinsii* Fran. et Sav. Enum. Pl. Jap. II. 337.

NOM. JAP. Iwakinbai.

HAB. Kyōng-geui (京畿道): Peuk-han-san (北漢山). Jul. 28. 1902.

fl. et fr. immat.; ibidem. Oct. 14. 1900. fr. (T. Uchiyama).

DISTR. China, Manshuria et Japonia.

Nostra specimina omnia folia 3-4 juga portant.

*Potentilla bifurca* L. Sp. Pl. (ed. II). 711. DC. Prodr. II.  
580. Ledeb. Fl. Alt. II. 245. Fl. Ross. II. 43. Lehm. Monogr.  
38. Rev. 24. Maxim. Prim. Fl. Amur. 95. Ind. Fl. Pek. 471.  
Fr. Schmidt l.c. 40. n. 122. Hook. fil. Fl. Brit. Ind. II.  
353. Forbes et Hemsl. l.c. 241. Korsch. Act. h. Petrop. XII.  
329. Diels l.c. 402.

HAB. in Korea bor.—ex Komarov. l.c.

DISTR. Asia bor. et temp.

*Potentilla supina* L. Sp. Pl. (ed. II.), 711. Lehm. Monogr. 42. Rev. 193. DC. Prodr. II. 580. Ledeb. Fl. Alt. II. 247. Fl. Ross. II. 35. Maxim. Prim. Fl. Amur. 97. Koch Syn. Fl. Germ. et Helv. (ed. III.) p. 185. Regel Tent. Fl. Uss. n. 165. Baker et Moore l.c. 381. Hook. fil. l.c. II. 359. Korsch. l.c. XII. p. 331. Forbes et Hemsl. l.c. 245. Fran. Pl. Dav. 113. Diels l.c. 403. Kom. l.c. 508.

*P. amurensis* Maxim. Prim. Fl. Amur. 98. Regel Tent. Fl. Uss. n. 166. t. IV. fig. 1. Forbes et Hemsl. l.c. 240. Hance in Journ. Linn. Soc. XIII. 79.

HAB. Kyōng-geui (京畿道): prope Yōng-deung-pho (永登浦近傍).  
Jul. 24. 1902. fr. (T. Uchiyama).

in Korea bor.—ex Komarov. l.c.

DISTR. Reg. bor. et temp.

*Potentilla cryptotenia* MAXIM. in Mém. Biol. IX. 155. Fran. et Sav. Enum. Pl. Jap. I. 132. II. 341. Forbes et Hemsl. l.c. 241. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 404. Kom. Fl. Mansh. II. 509.

NOM. JAP. Mitsunoto.

HAB. Kyōng-geui (京畿道): Nam-han-san (南韓山). Aug. 1. 1902.  
fl. et fr. immat. (T. Uchiyama).

Kang-uōn (江原道): monte Kum-gang-san (金剛山). Aug. 20.  
1902. fl. et fr. immat. (T. Uchiyama).

in Korea bor.—ex Komarov l.c.

DISTR. China et Manshuria.

*Potentilla centigrana* MAXIM. in Mém. Biol. IX. 156. Forbes et Hemsl. l.c. 241. Fran. et Sav. l.c. II. 341. Diels l.c. 403. Kom. l.c. II. 510.

*P. repens*  $\beta$ . *trifoliolata* Fran. et Sav. l.c. I. 132.

*a. japonica* MAXIM. l.c. IX. 157. Kom. l.c. 511.

NOM. JAP. Mehebiichigo.

HAB. in Korea bor.—ex Komarov. l.c.

$\beta$ . *manshurica* MAXIM. l.c. 157. Kom. l.c. 511.

HAB. in Korea bor....ex Komarov. l.c.

DISTR. sp. Manshuria et Japonia.

*Potentilla Kleiniana* WIGHT. et ARN. Wight. Ic. t. 85. Lehm. Rev. 79. Miq. Prol. Fl. Jap. 225. Maxim. in Mél. Biol. IX. 162. Fran. et Sav. Enum. Pl. Jap. I. 132. Hook. fil. Fl. Brit. Ind. II. 359. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 243. Palib. Consp. Fl. Kor. I. 82.

*P. Wallichiana* DC. in Lehm. Rev. 80. t. 34.

*Duchesnea sundaica* Miq. Fl. Ind. Bat. I. i. 372. t. 6.

*Potentilla verna* Thunb. Fl. Jap. 219.

NOM. JAP. O-hebiichigo.

HAB. Kyōng-geui (京畿道): Seoul (京城). Mai. 1886. fl. (Kalinowsky).  
ex Palib. l.c.

DISTR. China, India, Manshuria et Japonia.

*Potentilla reptans* L. Sp. Pl. (ed. II.) 714. DC. Prodr. II. 574. (excl. var. r.) Lehm. Monogr. 144. Rev. 183. Ledeb. Fl. Ross. II. 52. Koch Syn. Fl. Germ. et Helv. (ed. III.) 188. Miq. Prol. Fl. Jap. 225. Benth. et Hook. Brit. Fl. (ed. V.) 137. Hook. fil. Fl. Brit. Ind. II. 356. Fran. et Sav. Enum. Pl. Jap. I. 132. Fran. Pl. Dav. 113. (var. *sericophylla*). Forbes et Hemsl. l.c. 244. Kom. Fl. Mansh. II. 505.

var. *incisa* FRANCH. Kom. Fl. Mansh. II. 505.

HAB. in Korea bor.—ex Komarov. l.c.

DISTR. Europa, Asia bor. et temp.

*Potentilla flagellatis* WILLD. DC. Prodr. II. 575. Lehm. Monogr. 141. Rev. 185. Maxim. Prim. Fl. Amur. 97. Ledeb. Fl. Ross. II. 52. Baker et Moore in Journ. Linn. Soc. XVII. 381. Forbes et Hemsl. l.c. 242. Korsch. Act. h. Petrop. XII. 331. Kom. Fl. Mansh. II. 506.

*P. nemoralis* Ledeb. Fl. Alt. II. 256. (excl. syn.)

*P. reptans*  $\gamma$ . *acutiloba* Ser. in DC. Prodr. II. 574.

HAB. in Korea bor.—ex Komarov. l.c.

DISTR. Sibiria, Amur. et Manshuria.

### CHAMÆRODOS BUNGE. (sp. 1.)

*Chamerodos erecta* BUNGE in Ledeb. Fl. Alt. I. 430. Korsch. Act. h. Petrop. XII. 329. Fran. Pl. Dav. 114. Forbes et Hemsl. l.c. 246. Kom. Fl. Mansh. II. 515.

*Sibbaldia erecta* L. Sp. Pl. (ed. II.) 407. DC. Prodr. II. 587.

HAB. in Korea bor.—ex Komarov. l.c.

DISTR. Sibiria, Manshuria, China, et America bor.

## VI. DRYADINÆ.

### Clavis generum.

- A. Styli decidui ..... *Waldsteinia* WILLD.  
 B. Styli persistentes,  
   a) Petala 5 ..... *Geum* L.  
   b) Petala 8-9 ..... *Dryas* L.

### WALDSTEINIA WILLD. (sp. 1.)

*Waldsteinia sibirica* TRATT. Ledeb. Fl. Ross. II. 26. Maxim. Prim. Fl. Amur. 93. Fran. et Sav. Enum. Pl. Jap. I. 129. Fr. Schmidt l.c. 127. n. 133. Kom. Fl. Mansh. II. 516.

*Waldsteinia trifolia* Rochel. in Linnæa XIII. 337. t. 6.

NOM. JAP. Ezo-kinbai.

HAB. in Korea boreale—ex Komarov. l.c.

DISTR. Sibiria, Manshuria, Sachal. et Japonia.

### GEUM L. (sp. 1.)

*Geum strictum* AIT. Hort. Kew. (ed. II.) III. 280. Ledeb. Fl. Ross. II. 22. Maxim. Prim. Fl. Amur. 93. Miq. Prol. Fl. Jap. 226. Regel Tent. Fl. Uss. n. 157. Baker et Moore in Journ. Linn. Soc. XVII. 381. Fran. et Sav. Enum. Pl. Jap. I. 128. Fran. Pl. Dav. 109. Forbes et Hemsl. l.c. 239. Diels l.c. 404. Kom. l.c. 517. Palib. Consp. Fl. Kor. I. 82.

*G. intermedium* Besser ex DC. Prodr. II. 550.

*G. ranunculoides* Ser. in DC. Prodr. II. 551.

NOM. JAP. Ō-daikonsō.

HAB. Kyōng-geui (京畿道): Seoul (京城). Jun. 1886. fl. (Kalinowsky). ex Palib. l.c.

Nam-san (南山). Jul. 16. 1902. fr. immat.; Peuk-ham-san (北漢山). Jul. 28. 1902. fr. immat. (T. Uchiyama).

Kang-nōn (江原道): Menk-kai (墨浦). Aug. 12. 1902. fl. et fr. immat. (T. Uchiyama).

DISTR. Europa, Asia et America bor.

### DRYAS L.

*Dryas octopetala* L. Sp. Pl. (ed. II.) 717. DC. Prodr. II. 549. Ledeb. Fl. Ross. II. 267. Fl. Alt. II. 267. Kom. Fl. Mansh. II. 518.

NOM. JAP. Chōnosukesō.

HAB. monte Schan-pai-schan (白頭山). Jul. 9. 1905. fl. (T. Imagawa).

DISTR. Reg. bor. temp. et arct.



## VII ULMARIEÆ. (gen. 1.)

**ULMARIA** (TOURN.) FOCKE.**Clavis specierum.**

A. Segmenta foliorum lateralia subnulla v. indivisa; petala rubra.

.....*U. purpurea* (MAXIM.)

B. Segmenta foliorum lateralia plura, trifida; petala alba.

.....*U. palmata* (MAXIM.) FOCKE.

*Ulmaria purpurea* (MAXIM.)

Filipendula purpurea Maxim. in Act. h. Petrop. VI. 248. Kom. Fl. Mansh. II. 523.

Spiræa palmata Thunb. (non Pall.) Fl. Jap. 212. Bot. Mag. t. 5726.

NOM. JAP. Kyōganoko.

HAB. in Korea boreali (Kom.) ex Komarov. l.c.

DISTR. Japonia et Manshuria.

*Ulmaria palmata* (MAXIM.) FOCKE. Engl. et Prantl. Nat. Pfl. Fam. III. iii. 41. Palib. Consp. Fl. Kor. I. 82.

Filipendula palmata Maxim. in Act. h. Petrop. VI. 250. Kom. Fl. Mansh. II. 521.

Spiræa digitata Willd. Sp. Pl. II. 1061. Maxim. Prim. Fl. Amur. 92. Regel Tent. Fl. Uss. n. 156. Fr. Schmidt Reis. in Amur. u. Insel. Sachl. 39. n. 115.

Spiræa palmata Pall. Fl. Ross. I. 40. t. 27. Fran. Pl. Dav. I. 108. Forbes et Hemsl. l.c. 226.

NOM. JAP. Chishima-shimotsukesō.

HAB. Kyōng-geui (京畿道): Nam-han-san (南韓山). Aug. 2. 1902. fl. et fr. (T. Uchiyama).

Korea sine loco indicato (James) ex Palib. l.c.

DISTR. Sibiria, Mōngolia, Manshuria et Sachalin.

## VIII. SANGUISORBIÆ.

**Clavis generum.**

- A.* Cum petalis et calyculis.....*Agrimonia* L.  
*B.* Apetala, sepala simplicia .....*Sanguisorba* L.

**AGRIMONIA** L.**Clavis specierum.**

- A.* Foliolis basi rotundatis. .... *A. Eupatoria* L.  
*B.* Foliolis basi cuneatis ..... *A. pilosa* LEDEB.

*Agrimonia Eupatoria* L. Sp. Pl. (ed. II.) 643. DC. Prodr. II. 587. Ledeb. Fl. Ross. II. 31. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 246. p. p. Palib. Consp. Fl. Kor. I. 83.

HAB. Ham-gyöng (咸鏡道). Gen-san (元山). 1889. (Dr. Epow). ex Palib. l.c.

DISTR. Europa, Africa bor. Asia et Am. bor.

*Agrimonia pilosa* LEDEB. Fl. Ross. II. 32. Fran. Pl. Dav. 114. Palib. Consp. Fl. Kor. I. 83.

*Agrimonia Eupatoria* Hemsl. l.c. 246. p. p.

*Agrimonia viscidula* Bunge Enum. Pl. Chin. bor. n. 152. Miq. Prol. Fl. Jap. 226. Fran. et Sav. Enum. Pl. Jap. I. 133.

NOM. JAP. Kin-midzuluki.

HAB. Kyöng-geui (京畿道). Seoul (京城). Jun. 1816. fl. (Kalinowsky). ex Palib. l.c.

Nam-san (南山). Jul. 16. 1902. fl., ibidem. Oct. 11. 1900. fr. mat. (T. Uchiyama).

DISTR. Europa, et Asia bor.

**SANGUISORBA L.****Clavis specierum.**

A. Filamenta teretia, calyce subaequalia.....*S. officinalis* L.

B. Filamenta dilatata calycem valde superantia.

a) Filamenta a medio dilatata sub anthera ochracea attenuata.

.....*S. obtusa* MAXIM.

b) Filamenta excepta basi tota dilatata apice truncata.

.....*S. tenuifolia* FISCH.

*Sanguisorba officinalis* L. Sp. Pl. (ed. II.) 169. DC. Prodr. II. 593. Maxim. Prim. Fl. Amur. 93. in Mém. Biol. IX. 153. Regel Tent. Fl. Uss. n. 160. Franch. Pl. Dav. I. 114. Korseb. Act. h. Petrop. XII. 328. Palib. Consp. Fl. Kor. I. 83. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 404. Kom. Fl. Mansh. II. 525.

Poterium officinale Benth. et Hook. fil. Gen. Pl. I. 624. Fran. et Sav. Enum. Pl. Jap. I. 133. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 247.

NOM. JAP. Warenokō.

HAB. in archipelago Koreano: Green Island (Oldham. Nr. 222). ex Hemsl. l.c.

Phyōng-an (平安道): Phyōng-yang (平壤): colle Mo-ran-bon (牡丹峯). Sept. 12. 1902. fr. (T. Uchiyama).

Kyōng-geui (京畿道). Nam-san (南山). Aug. 30. 1902. fl. et alab.; Chemulpo (仁川). Oct. 30. 1900. fr., Peuk-ham-san (北漢山). Oct. 14. 1900. fr. (T. Uchiyama).

Kang-uōn (江原道). Kum-gang-san (金剛山). Aug. 20. 1902. fl. et alab. (T. Uchiyama).

Kantō (間島). Kōrairei (高麗嶺). Oct. 16. 1907. fl. (K. Maeda).

DISTR. Europa, Asia et America bor.

*Sanguisorba tenuifolia* FISCH. Ledeb. Fl. Ross. II. 28. Maxim.

Prim. Fl. Amur. 94. in Mém. Biol. IX. 152. Miq. Prol. Fl. Jap. 226. Regel Tent. Fl. Uss. n. 158. Fr. Schmidt l.c. 39. n. 119. p. 126. n. 126. Korsch. Act. h. Petrop. XII. 328. Kom. l.c. 527.

*Poterium tenuifolium* Fran. et Sav. I. 133. Forbes et Hemsl. l.c. 247.

HAB. in archipelago Koreano: Bat group. (Oldham.) ex Hemsl. l.c.  
*γ. parviflora* MAXIM. Prim. Fl. Amur. 94. Mém. Biol. IX. 153.

HAB. Kyōng-geui (京畿道): Inter Pha-jyu (坡州) et Kai-Syōng (開城). Sept. 5. 1902. fl. et alab. prope Chyang-ho-uōn (長湖院). Sept. 29. 1902. fr. (T. Uchiyama).

DISTR. Sibiria et Manshuria.

*Sanguisorba obtusa* MAXIM. in Mém. Biol. IX. 152. Makino in Tokyo Bot. Mag. XXI. 155.

*Poterium obtusum* Fran. et Sav. Enum. Pl. Jap. II. 343.

*a. typica* MAKINO l.c.

HAB. Kang-uōn (江原道): m'te Kum-gang-san (金剛山). Aug. 17. 1902. fl. et alab. (T. Uchiyama).

DISTR. Japonia.

## IX. ROSEÆ. (gn. 1.)

### ROSA L.

#### Clavis specierum.

A. Flores in apice caulis terminali solitarii.

a) Aculei stricti.

a) Aculei solitarii, omnes æquales, subulati.

○ Aculei satis rigidi, basi compressi...*R. platyacantha* SCHRENK.

○○ Aculei teretes, densi.

△ Foliolis minutis subtus arachnoideis...*R. koreana* KOM.

△△ Foliolis subtus pallidioribus non arachnoideis  
 .....*R. acicularis* LINDL.

β) Aculei dimorphi, majores subulati, minores aciculares.

○ Folia lævia .....*R. pimpinellifolia* L.

○○ Folia rugosa.

△ Aculei minores densi .....*R. rugosa* THUNB.

△△ Aculei minores subnulli .....*R. kamtschatica* VENT.

b) Aculei recurvati .....*R. davurica* PALL.

B. Flores in ramorum corymbosi.

a) Frutices scandentes v. repentes.

a) Styli in column conuati.

○ Caulis scandens, folia oblongo-elliptica, styli glabri,  
 .....*R. multiflora* THUNB.

○○ Caulis repens, folia rotundata, styli pubescentes.  
 .....*R. Lucia* FRAN. et SAV.

β) Styli liberi .....*R. Beggeriana* SCHRENK.

b) Frutices erecti.

a) Aculei recurvati .....*R. indica* L.

β) Aculei recti v. vix curvati .....*R. jaluana* KOM.

*Rosa platyacantha* SCHRENK. Ledeb. Fl. Ross. II. 75. Regel  
 in Act. h. Petrop. V. 311. Baker in Journ. Bot. XXIII. 284.  
*Rosa xanthina* Lindl. Fran. Pl. Dav. 117. Forbes et Hemsl.  
 l.c. 254. Palib. l.c. I. 85.

HAB. Phyöng-an (平安道): Phyöng-yang (平壤). Sept. 13. 1902. ster.  
 (T. Uchiyama).

Kyöng-geui (京畿道). Seoul (京城). Mai 1886. fl. (Kalinowsky).  
*ibidem* Schin-ku-kai Apr. 18. 1895. fl. (Soutay) ex Palib. l.c.

DISTR. China et Sibiria.

*Rosa koreana* KOM. Fl. Mansh. II 535.

HAB. in Korea bor—ex Komarov. l.c.

Planta endemica.

*Rosa acicularis* LINDL. Maxim. Prim. Fl. Amur. 100. Fr. Schmidt l.c. 41. n. 134. p. 128. n. 138. Regel Act. h. Petrop. V. 302. Tent. Fl. Uss. n. 172. Rupr. in Mém. Biol. II. 509. Korsch. Act. h. Petrop. XII. 332. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 248. Kom. Fl. Mansh. II. 530.

R. Gmelini Bunge Ledeb. Fl. Alt. II. 228.

HAB. Korea australis : monte Chiri (智異山). Aug. 1907. ster. (Shiki).

DISTR. Asia bor. et America bor.

*Rosa pimpinellifolia* L. Sp. Pl. (ed. II.) 703. Ledeb. Fl. Ross. II. 73. Bunge Enum. Pl. Chin. bor. n. 155. Fr. Schmidt l.c. 41. n. 136. Regel in Act. h. Petrop. V. 314. Forbes et Hemsl. l.c. 253. Kom. Fl. Mansh. 534.

HAB. in Korea boreali—ex Komarov. l.c.

DISTR. Europa, Sibiria, China et Manshuria.

*Rosa rugosa* THUNB. Fl. Jap. 213. DC. Prodr. II. 603. Sieb. et Zucc. Fl. Jap. I. 66. t. 28. Fl. Jap. Fam. Nat. n. 55. Maxim. Prim. Fl. Amur. 101. Fran. et Sav. Enum. Pl. Jap. I. 137. Fr. Schmidt Reis. in Amurlande u. auf der Insel Sachlin. p. 128. n. 140. Miyabe Fl. Kurile Isl. 232. Fran. Pl. Dav. 116. Forbes et Hemsl. Index. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 254. Baker in Journ. Bot. XXIII. 284. Palib. Consp. Fl. Kor. I. 83. Kom. Fl. Mansh. II. 529.

R. echinata Duport DC. Prodr. II. 607.

NOM. JAP. Hamanasu.

HAB. Kang-uön (江原道) : Menk-kai (墨浦). Aug. 12. 1902. fl.; prope Chyang-yön-ri (長淵里). Aug. 13. 1902. fl. (T. Uchiyama).

Kyöng-geui (京畿道). Chemulpo (仁川). (Carles). Seoul (京城).

Thee-Mun-Tai-Kul. Apr. 29. 1894. fl., *Pauk-Han. Mai 9. 1894.*

fl. (Sontag) ex Palib. l.c.

var. *ferox* C. A. Mey. Palib. l.c.

HAB. in archipelago Koreano. (Oldham. Nr. 229). ex Palib. l.c.

DISTR. China, Manshuria et Japonia.

*Rosa kantschatica* VENT. DC. Prodr. II. 607. Bot. Mag. t. 3149. Palib. Consp. Fl. Kor. I. 84.

*R. rugosa*  $\beta$ . *kantschatica* Regel in Act. h. Petrop. V. 310.

NOM. JAP. Chishima-hamasu.

HAB. Kyōng-geui (京畿道). Chemulpo (仁川). Oct. 30. 1900. alab. (T. Uchiyama).

Seoul (京城). Mai 1886. fl. (Kalinowsky) ex Palib. l.c.

DISTR. Kantschatica.

*Rosa davurica* PALL. Fl. Ross. II. 61. DC. Prodr. II. 606.

Fran. Pl. Dav. 116. Forbes et Hemsl. l.c. 249. Baker et Moore in Journ. Linn. Soc. XVII. 382. Palib. Consp. Fl. Kor. I. 84.

*R. cinnamonea* (L.) Maxim. Prim. Fl. Amur. 100. Regel Tent. Fl. Uss. n. 171. Fr. Schmidt l.c. 41. n. 135. Korsch. l.c. 332.

*R. cinnamonea*  $\beta$ . *davurica* Regel Act. h. Petrop. V. 325.

*R. cinnamonea* var. *davurica* Pall. Rupr. in Mém. Biol. II. 539.

*R. Wildenowii* Sprengl. Syst. Veg. II. 547. Ledeb. Fl. Ross. II. 77.

HAB. Kyōng-geui (京畿道). Seoul (京城). Mai. 1886. fl. pl. cult. (Kalinowsky), ibidem Van-Tang-San. Jun. 2. 1895. fl. (Sontag) ex Palib. l.c.

DISTR. Sibiria orient. Davuria, Manshuria et Sachalin.

*Rosa multiflora* THUNB. Fl. Jap. 214. DC. Prodr. II. 598.

Fran. et Sav. Enum. Pl. Jap. I. 134. II. 343. Hook. fil. Fl.

Brit. Ind. II. 364. Baker et Moore in Journ. Linn. Soc. XVII. 382. Bot. Mag. t. 1059. Regel in Act. h. Petrop. V. 367. p.

p. Forbes et Hemsl. Ind. Fl. Sin. in l.c. 253. Palib. Consp.

Fl. Kor. I. 85. Kom. Fl. Mansh. II. 536. Aschers. Syn.

Mitteleurop. VI. i. 34. Matsum. et Hayata Enum. Pl. Form in Journ. Sci. Coll. Imp. Univ. Tokyo XXII. 128.

R. Maximowiczii Regel in Act. h. Petrop. V. 378.

NOM. JAP. Noibara.

HAB. Kyōng-geui (京畿道). Ō-ryu-kol (梧柳洞). Oct. 12. 1900. fr. mat., Peuk-han-san (北漢山). Oct. 14. 1900. fr. mat. (T. Uchiyama). Seoul (京城). Aug. 1883. fl. (Dr. Gottsche). Jun. 1886. fl. (forma typica stipulis non pectinatis—Kalinowsky). ibidem ad viam ad Peking ducentem. Oct. 30. 1893. prope montis Nam-san Nov. 20 1893 ster., in ipsa urbe Apr. 2. 1894. fl., Thee-Mun-An-Tai-Kul Apr. 2. 1894 fl., Hut-Tschai-Meo. Mai. 1. 1894 fl., Hong-Tschu-Wan. Mai. 4. 1894 fl., Pauk-Han. Mai. 9 1894 fl., in ditione Seoulsis; in monte Yran-san Mai. 18. 1894 fl., *in monte Yisan. Mai. 28. 1894. fl.*, via ad Peking ducens prope Seoul; Mai. 25. 1894. fl. prope Tap-Tong. Mai. 20. 1895 fl. incip. (Sontag) ex Palib. l.c.

in archipelago Koreano: Port Hamilton (巨文島). Wilford. Nr. 699.) ex Hemsl. l.c.

DISTR. China et Japonia.

*Rosa Lucida* FRAN. et ROCHE. Fran. et Sav. Enum. Pl. Jap. I. 135. II. 344. Henry List. Pl. Form. 40. Forbes et Hemsl. l.c. 251. Bot. Mag. t. 7421. Palib. l.c. 84. Itō et Matsum. Tent. Fl. Lutch. 454. Matsum. et Hayata Enum. Pl. Form. 124.

R. moschata Benth. Fl. Hongk. 106.

R. multiflora Regel Act. h. Petrop. V. 367. p. p.

R. pimpinellifolia Miq. Prol. Fl. Jap. 227.

R. sempervirens Zucc. Miq. l.c.

NOM. JAP. Haiibara; Teriha-noibara.

HAB. Kyōng-sang (慶尙道). Mok-pho (木浦). Nov. 5. 1900 fr. mat; Chyōl-yōng-dō (絶影島). Oct. 13. 1902. fr. mat. (T. Uchiyama). Korea: sine loco speciali (Schlippenbach) ex Hemsl. l.c.



in archipelago Koreano (Oldham. Nr. 234). ex Hemsl. l.c.

DISTR. Japonia, China orient.

*Rosa Beggeriana* SCHRENK. Ledeb. Fl. Ross. II. 82. Regel Act. h. Petrop. V. 369.

♂. *tianschanica* REGEL l.c. 370.

HAB. Hoang-hai (黃海道).—Phyöng-an (平安道); inter Hoang-ju (黃州) et Phyöng-yang (平壤). Sept. 10. 1902. fr. mat. (T. Uchiyama).

DISTR. Asia temp.

*Rosa indica* L. Sp. Pl. (ed. II). p. 705. DC. Prodr. II. 600. Lour. Fl. Coch. 323. Miq. Prol. 227. Fran. et Sav. Enum. Pl. Jap. I. 136. Baker in Journ. Bot. XXIII. 285. Hook. fil. Fl. Brit. Ind. II. 364. Henry List. Plant. Form. 40. Forbes et Hemsl. l.c. 249. Diels Fl. Centr. China in Engl. Bot. Jahrb. XXIX. 405. Matsum. et Hayata Enum. Pl. Form. 127.

*R. bengalensis* Pers. Syn. Pl. II. 50.

*R. chinensis* Jacq. Willd. Sp. Pl. II. 1078. Roxb. Fl. Ind. 513.

*R. indica* Lindl. Regel Act. h. Petrop. V. 357.

*R. longifolia* Willd. Sp. Pl. II. 1079.

*R. sempervirens* Curt. Bot. Mag. t. 284. Roxb. Fl. Ind. II. 514.

NOM. JAP. Kōshinbara.

HAB. Kyöng-geui (京畿道). prope Chhyöng-nyang-li (清涼里). Jul. 27. 1902. fr. mat. (T. Uchiyama).

DISTR. India, China et Japonia.

*Rosa jaluana* KOM. Fl. Mansh. II. 537.

HAB. in Korea bor. ex Komorov. l.c.

Planta endemica.

## X. PRUNOIDEÆ. (gn. 1.)

### Clavis sectionum.

A. Flores corymboso-fasciculati.

- a) Drupa velutina.  
 a) Folia vernatione conduplicata...*I Amygdalus* BENTH. et HOOK.  
 β) Folia vernatione convoluta .....*II. Armeniaca* MERT. et KOCH.
- b) Drupa glaberrima.  
 a) Folia vernatione convoluta .....*III. Prunus* MERT. et KOCH.  
 β) Folia vernatione conduplicata...*IV. Cerasus* MERT. et KOCH.
- B. Flores racemosi* .....*V. Palus* MAXIM.

Sect. I. *AMYGDALUS* BENTH. et HOOK. fil. (gn. 1.)

*Prunus triloba* LINDE. Gard. Chron. (1857). 268. Koch Dendr. I. 90. Maxim. in Mém. Biol. XI. 665. in Bull. Soc. Nat. Mosc. (1879). 15. Fran. Pl. Day. 104. Forbes et Hemsl. l.c. 222.  
*Amygdalus pedunculata* Bunge (non Pall.) l.c. n. 126.  
*Prunus virgata* Hort. ex Hemsl. l.c. 222.

var. *truncata* Kom. l.c. 539.

HAB. in Korea bor.—ex Komarov. l.c.)

Planta endemica.

Sect. II. *ARMENIACA* MERT. et KOCH. (gn. 1.)

*Prunus Armeniaca* L. Sp. Pl. (ed. II) 679. Ledeb. Fl. Ross. II. 3. Koch Dendr. I. 87. Maxim. in Mém. Biol. XI. 673. Fran. Pl. Day. 104. Forbes et Hemsl. l.c. 217. Palib. l.c. I. 86.  
*Armenia vulgaris* DC. Prodr. II. 532.

a. *typica* Maxim. l.c. 674.

NOM. JAP. Anzu.

HAB. Kyōng-geui (京畿道). Seoul (京城—Carles). ibidem Apr. 1886.  
 fl. (Kalinowsky). ex Hemsl. et Palib. l.c.

Nam-han-san (南韓山). Oct. 10. 1900. ster. (T. Uchiyama).

DISTR. India et China.

## Sect. III. PRUNUS MERT. et KOCH. (gn. 1.)

*Prunus communis* HUDS. Maxim. in Mém. Biol. XI. 677. Forbes et Hemsl. l.c. 218. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 407. Palib. Consp. Fl. Kor. I. 86. Kom. Fl. Mansh. II. 542.

*Prunus domestica* L. Sp. Pl. (ed. II) 680. Lour. Fl. Coch. 317. Bunge Enum. Pl. Chin. bor. n. 130. Thunb. Fl. Jap. 203.

*Prunus instricta* L. Sp. Pl. (ed. II) 680.

*Prunus communis* var. *instricta* Hook. fil. Fl. Brit. Ind. II. 315.

NOM. JAP. Sumomo.

HAB. Kyōng-geui (京畿道): Seoul (京城). Apr. 1886. fl. (Kalinowsky). ibidem: Thee-Mun-An-Tai-Kul. Apr. 29 1884. fl. (Sontag).—Pl. cult. (ex. Palib.)

Kang-nōn (江原道). Meuk-Kai (墨浦). Aug. 12. 1902 fr. (T. Uchiyama).

DISTR. Europa et Asia occid.

## Sect. IV. CERASUS MERT. et KOCH.

**Clavis specierum.**

A. Folia subtus glanduloso-punctata.....*P. glandulifolia* RUPR. et MAXIM.

B. Folia subtus non glanduloso-punctata.

a) Flores fasciculati.

α) Calycis tubus campanulatus .....*P. japonica* THUNB.

β) Calycis tubus cylindricus, styli basi pilosi...*P. tomentosa* THUNB.

b) Flores corymbosi cum bracteis foliaceis v. membranaceis.

α) Calycis tubus campanulatus, flores albi.....*P. Maximowiczii* RUPR.

β) Calycis tubus cylindricus, flores carnei ...*P. Pseudo-Cerasus* LINDL.

*Prunus glandulifolia* RUPR. et MAXIM. Prim. Fl. Amur. 87. in Mém. Biol. XI. 700. Kom. Fl. Mansh. II. 546.

HAB. Kang-nön (江原道). monte Kum-gang-san (金剛山). Aug. 1895. ster. (K. Hayashi). Phyöng-an : Innansha (仁南社). Aug. 18. 1905. ster. (T. Imagawa).

DISTR. Manshuria.

*Prunus japonica* THUNB. Fl. Jap. 201. Sieb. et Zucc. Fl. Jap. I. 172. t. 90. Miq. Prol. Fl. Jap. 22. Koch Dendr. I. 115. Maxim. Mém. Biol. XI. 684. Bull. Soc. Nat. Mosc. (1879). 12. Fran. et Sav. Enum. Pl. Jap. I. 117. Baker et Moore in Journ. Linn. Soc. XVII. 381. Forbes et Hemsl. l.c. 219. Diels l.c. 407. Palib. Consp. Fl. Kor. I. 87. Kom. Fl. Mansh. II. 543. *Prunus glandulosa* Thunb. l.c. 203.

*Prunus sinensis* Pers. Syn. Pl. II. 36.

*Cerasus glandulosa* Loisel DC. Prodr. II. 538.

*Cerasus japonica* Loisel DC. Prodr. II. 539.

*Amygdalus pumila* Sims. Bot. Mag. t. 2176.

HAB. in Korea bor.—ex Komarov. l.c.

β. *glandulosa* MAXIM. Bull. Soc. Nat. Mosc. (1879). 13. in Mém. Biol. XI. 685. Palib. Consp. Fl. Kor. I. 87.

*P. glandulosa* Thunb. l.c. 203.

NOM. JAP. Koume.

HAB. Korea orientali (Schlippenbach) ex Hemsl. l.c.

γ. — MAXIM. Mém. Biol. XI. 686. Palib. l.c.

HAB. Kyöng-geui (京畿道). in ditione Seoulensi, in monte Yi-san Mai. 28. 1894. fl. sponte. (Sontag). ex Palib. l.c.

DISTR. China et Japonia colitur.

*Prunus tomentosa* THUNB. Fl. Jap. 203. Sieb. et Zucc. Fl. Jap. I. 51. t. 22. Miq. Prol. Fl. Jap. 23. Koch Dendr. I. 91. Regel Gartenfl. t. 853. Maxim. in Bull. Soc. Nat. Mosc. (1879). 10. in Mém. Biol. XI. 687. Fran. et Sav. Enum. Pl. Jap. I. 117. Fran. Pl. Dav. 105. Baker et Moore in Journ. Linn.

Soc. XVII. 381. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. 222. Hook. fil. Fl. Brit. Ind. II. 314. Palib. Consp. Fl. Kor. I. 88. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. 407. Kom. Fl. Mansh. II. 544.

*Prunus eimerascens* Fran. Pl. Day. II. 34.

*Prunus trichocarpa* Bunge Enum. Pl. Chin. bor. n. 131.

NOM. JAP. Yusuraume.

HAB. Kyöng-geui (京畿道): Seoul (京城). Jun. 1886. fr. (Kalinowsky); ibidem; *Thee-Mun-An-Tai-Kul*. Apr. 29. 1894. fl. incip.; Hut-Tschai-Meo. Mai. 1. 1894. fl. (Sontag).—sponte.—ex Palib. l.c.

DISTR. India, China et Japonia.

*Prunus Maximowiczii* Rupr. Maxim. Prim. Fl. Amur. p. 89. in Mém. Biol. XI. 100. Fr. Schmidt Reis. in Amurl. Insl. Sachl. 125. n. 117. Fran. et Sav. Enum. Pl. Jap. I. 118. Forbes et Hemsl. l.c. 219. Palib. l.c. 87. Kom. l.c. 547.

NOM. JAP. Miyama-zakura.

HAB. Kyöng-geui (京畿道): Chemulpo (仁川) (Carles). ex Hemsl. l.c. in Korea bor.—ex Komarov l.c.

DISTR. Manshuria, Japonia et Sachline.

*Prunus Pseudo-Cerasus* Lindl. Koch Dendr. I. 107. Fran. et Sav. l.c. I. 117. Maxim. in Mém. Biol. XI. 695. Baker et Moore l.c. 381. Forbes et Hemsl. l.c. 221. Palib. l.c. I. 88. Kom. l.c. II. 545.

var. *spontanea* Maxim. l.c. 697. Palib. l.c. I. 88.

NOM. JAP. Yama-zakura.

HAB. Kyöng-geui (京畿道): Seoul (京城). Apr. fl. Jun. 1886. fr. immat. (Kalinowsky), ibidem. Tun-Kwan-Tai-Kul. Apr. 24. 1895. fl. incip., prope Tap-Tong. Mai. 20. 1895. fl., Van-Tang-San. Jun. 2. 1895. fr. immat. (Sontag). ex Palib. l.c. Nam-san (南山). Jul. 20. 1902. fr. (T. Uchiyama).

Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 1895.  
ster. (K. Hayashi).

Phyöng-san : Ōkasan (五佳山洞). Aug. 23. 1905. (T. Imagawa).  
DISTR. Manshuria et Japonia.

Sect. V. PADUS MAXIM. (sp. 1.)

*Prunus Padus* L. Sp. Pl. (ed. II.) 677. Maxim. Prim. Fl. Amur. 89. Ledeb. Fl. Ross. II. 8. Rupr. in Mél. Biol. II. 576. Maxim. in Mél. Biol. XI. 705. Regel Tent. Fl. Uss. n. 149. Baker et Moore l.c. 381. Fr. Schmidt l.c. 38. n. 107. Korsch. Act. h. Petrop. XII. 327. Fran. Pl. Dav. 106. Forbes et Hemsl. l.c. 220. Palib. Consp. Fl. Kor. I. 87. Hook. fil. Fl. Brit. Ind. II. 315.

*Cerasus Padus* DC. Prodr. II. 539.

NOM. JAP. Ezo-uwamizu-zakura.

HAB. Kyöng-geui (京畿道): Seoul (京城). Mai. 1886. fl. (Kalinowsky); ibidem: *Thee-Mun-An-Tai-Kul*. Apr. 29. 1894. fl., *Tun-Kwan-Tai-Kul*. Apr. 24. 1895. fl. (Sontag).—ex Palib. l.c. Seoul: Van-Tang-San. Jun. 2. 1895. (Sontag)! Nam-san (南山). Jul. 20. 1902. fr. (T. Uchiyama).

Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 15. 1902. fr. (T. Uchiyama).

Phyöng-an: Tokuri (海遠郡德里). Sept. 9. 1905. ster. (T. Imagawa).

ad superiorem fl. Jaluensis Aug. 1907. ster. (Shiki).

DISTR. Europa, Sibiria, Manshuria, India, China, et Japonia.

## SAXIFRAGACEÆ.

### Clavis tribuum.

A. Herbae v. suffrutices, folia alterna v. interdum opposita.

a) Suffrutices, capsulis 2-3 loculatis .....I. *Astilbineæ*.

b) Herbæ perenniæ v. annuæ.

a) Flores ad apicem caulis solitarii .....III. *Parnassiceæ*.

β) Inflorescentia paniculata v. cymoso-paniculata. ...II. *Saxifragineæ*.

B. Frutex.

a) Folia opposita, carpella dehiscens.

α) Flores omnes æquiformes .....IV. *Philadelphicæ*.

β) Flores peripherii sæpe steriles, cum sepalis dilatatis.

.....V. *Hydrangeæ*.

b) Folia alterna, fructus in bacca .....VI. *Ribesioideæ*.

## I. ASTILBINÆ.

### Clavis generum.

A. Folia triternata v. bipinnata .....*Astilbe* HAMILT.

B. Folia digitata v. peltata .....*Rodgersia* GRAY.

### ASTILBE HAMILT.

### Clavis specierum.

A. Dentes folii ovato-mucronatis.

.....*A. chinensis* FR. et SAV. var. *seoulensis* NAKAI.

B. Dentes folii lanceolato-acuminatis .....*A. Thunbergii* MIQ.

*Astilbe chinensis* FRAN. et SAV. Enum. Pl. Jap. I. 144. (var. japonica) Fran. Pl. Dav. 121 (var. Davidii) Forbes et Hemsl. Index Fl. Sin. in Journ. Linn. Soc. XXIII. p. 265. Palib. Consp. Fl. Kor. I. 89. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 363. Kom. Fl. Mansh. II. p. 407.

A. odontophylla Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 96. Prol. Fl. Jap. p. 260.

Hoteja chinensis Maxim. Prim. Fl. Amur. p. 120.

Hoteja Thunbergii Regel (non. S. et. Z.) Tent. Fl. Uss. n. 207.

HAB. Kyōng-geui (京畿道). Chemulpo (仁川—Carles) ex Hemsl. l.c. Seoul (京城). Jun. 1886. fl. (Kalinowsky); ibidem. prope Tap-Tong Mai 20. 1894. (Sontag). ex Palib. l.c.

var. *seoulensis* Nov. Caulis elatus, fuscoso-tomentosus, petala calyce 5–6 plo longiora, anguste-linearia, apice acuta, antheræque purpurea.

HAB. Kyōng-geui (京畿道). monte Nam-san (南山). Jul. 20. 1902. fl.; monte Nam-han-san. (南韓山). Oct. 18. 1900. fr. (T. Uchiyama).

DISTR. sp. China, Manshuria et Japonia.

*Astilbe Thunbergii* MIQ. Prol. Fl. Jap. p. 260. Forbes et Hemsl. Index Fl. Sin. in Journ. Linn. Soc. XXIII. p. 266. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 363.

Hoteja Thunbergii S. et Z. Fl. Jap. Fam. Nat. n. 367.

NOM. JAP. Toriashi-shōma.

HAB. Kyōng-geui (京畿道). monte Peuk-han-san. (北韓山). Jul. 28. 1902. fl. (T. Uchiyama).

DISTR. China et Japonia.

## RODGERSIA GRAY.

### Clavis specierum.

A. Folia digitata.....*R. podophylla* A. GRAY.

B. Folia peltata .....*R. tubularis* (Hemsl.) KOM.

*Rodgersia podophylla* A. GRAY. Fran. et Sav. Enum. Pl. Jap. I. p. 144. Forbes et Hemsl. Index Fl. Sin. in Journ. Linn. Soc. XXIII. p. 266. Kom. Fl. Mansh. II. p. 409.

HAB. Kang-nōn (江原道). monte Kum-gang-san (金剛山). Aug. 14. 1902. fr. (T. Uchiyama).

in Korea bor.—ex Kom. l.c.

DISTR. China, Manshuria et Japonia.



*Rodgersia tubularis* (HEMSL.) KOM. Fl. Mansh. II. p. 410. t. IX.  
*Saxifraga tubularis* Hemsl. l.c. p. 269. Engl. in Nat. Pfl. Fam.  
 III. ii. a. p. 61.

HAB. in Korea bor.—ex Kom. l.c.

DISTR. Manshuria.

## II. SAXIFRAGINÆ.

### Clavis generum.

A. Placenta centralis.

a) Stamina 5-6.....*Aceriphyllum* ENGL.

b) Stamina 10 .....*Saxifraga* L.

B. Placenta parietalis .....*Chryso-splenium* L.

### **ACERIPHYLLUM** ENGL. (sp. 1.)

*Aceriphyllum Rossi* ENGL. PRANTL. Nat. Pfl. Fam. III. ii p. 52.  
 Palib. Consp. Fl. Kor. I. 89. Kom. Fl. Mansh. II. 411.  
*Saxifraga Rossi* Oliv. in Hook. Ic. Pl. XIII. p. 46. t. 1258. Baker  
 et Moore in Journ. Linn. Soc. XVII. p. 382. Forbes et Hemsl.  
 Index Pl. Sin. in Journ. Linn. Soc. XXIII. p. 268.

HAB. Kyöng-geui (京畿道). Seoul (京城). in montibus (Carles) ex  
 Hemsl.

Ibidem: Hut-Tschai-Meo. Mai 1. 1894. in ditone Seoulensi: in  
 monte Yi-san Mai 28. 1894. fl. (Sontag). ex Palib.

Nam-san (南山). Jul. 25. 1902. fr. (T. Uchiyama). ibidem Aug.  
 1906 ster. (S. Shimogōriyama).

Kang-uön (江原道). monte Kum-gang-san. (金剛山). Aug. 15.  
 1902. fr. (T. Uchiyama).

In Korea bor.—ex Kom.

Rhizomata ex monte Nam-san reporta sunt, et in nostro horto  
 botanico cult., fl. in Apr.

forma *multilobum* NAKAI. Foliis 10–11 lobatis, lobis trilobulatis, laciniis anguste-lanceolatis.

HAB. Kang-nōn (江原道). monte Kum-gang-san (金剛山). Aug. 15.  
1902. fr. (T. Uchiyama).

DISTR. sp. Manshuria.

## SAXIFRAGA L.

### Clavis sp.

A. Petala calycem parum superantia, immaculata...*S. manshuriensis* KOM.

B. Petala calycem duplo v. multo superantia.

a) Foliis oblongis .....*S. oblongifolia* NAKAI.

b) Foliis reniformibus.

a) Foliis pilosis v. subglabris.

○ Petala elliptica obtusa, unguiculata.....*P. punctata* L.

○○ Petala linearia, utrinque acuta, unguiculata

.....*S. cortuseifolia* S. et Z.

β) Foliis villosis v. hirsutis.

○ Petala oblongo-obtusa .....*S. rotundifolia* L.

○○ Petala linearia, utrinque acuta ...*S. sarmentosa* L.

*Saxifraga manshuriensis* KOM. Fl. Mansh. II. p. 415.

HAB. in Korea bor.—ex Kom.

DISTR. Manshuria.

*Saxifraga oblongifolia* NAKAI. Tab. XI. Herba annua, folia radicalia longe-petiolata, petiolis hirsutis, laminis subæquilongis, laminis oblongis v. late-oblongis v. subrotundatis, glabris margine argute remoteque dentata, serrulatulis apice glandulis terminantibus; folia caulina 1–2, rotundata, argute remoteque serrata; infl. laxe-paniculata, pedunculis glanduloso-hirsutis, pilis patentibus, pedicellis gracilibus, glabris v. ad basin glanduloso-pilosis. Sepala 5. viridia, omnia æquilongia; petala alba vix 2 m.m. longa,

sepalis duplo longiora, oblonga brevi-unguiculata; stamina 10, petala æquilonga; styli 2; ovaria viridia, 2-loculata; semina oblonga 10-costata; costæ papillosæ.

HAB. Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 18. 1902. fl. et fr. (T. Uchiyama).

*Saxifraga punctata* L. Sp. Pl. (ed. II) p. 574. Ledeb. Fl. Ross. II. p. 215.

S. æstivalis Fisch. in Maxim. Prim. Fl. Amur. p. 120. Fr. Schmidt Reis. in Amur. u. Insel. Sachl. p. 43. n. 158.

S. hirsuta  $\beta$ . punctata Ser. in DC. Prodr. IV. p. 42.

HAB. in Korea bor.—ex Kom.

DISTR. Sibiria, Manshuria et America bor.

*Saxifraga cortusafolia* SIEB. et. Zucc. Fl. Jap. Fam. Nat. n. 364. Maxim. in Mél. Biol. VIII. p. 599. Fran. et Sav. Enum. Pl. Jap. I. p. 145. Forbes et Hemsl. Index Fl. Sin. in Journ. Linn. Soc. XXIII. p. 267. Kom. Fl. Mansh. II. p. 412.

NOM. JAP. Daimoji-sō.

HAB. Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 18. 1902. fl. (T. Uchiyama).

In Korea bor.—ex Kom.

DISTR. Manshuria et Japonia.

*Saxifraga sarmentosa* L. Maxim. Mél. Biol. VIII. p. 597. Miq. Prol. Fl. Jap. p. 260. Fran. et Sav. Enum. Pl. Jap. I. p. 145. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 364.

NOM. JAP. Yukinoshita.

HAB. Kyōng-geui (京畿道). monte Peuk-ham-san (北漢山). Oct. 14. 1900. fl. et fr. ibidem, Jul. 28. 1902. ster. (T. Uchiyama).

DISTR. China et Japonia.

*Saxifraga rotundifolia* L. Sp. Pl. (ed. II) p. 576. DC. Prodr. IV. p. 43. Ledeb. Fl. Ross. II. p. 217. Forbes et Hemsl.

Index Fl. Sin. in Journ. Linn. Soc. XXIII. p. 268. Palib.  
Consp. Fl. Kor. I. p. 89.

HAB. Phyöng-an (平安道), monte Schan-pei-schan (長白山—James) ex  
Hemsl.

DISTR. Europa et Asia minor.

### CHRYSOSPLENium L. (sp. 1.)

*Chrysosplenium sphaerocarpum* MAXIM. in Mém. Biol. IX. p.  
770 et XI. p. 227. Forbes et Hemsl. Index Fl. Sin. in Journ.  
Linn. Soc. XXIII. p. 271. Palib. Consp. Fl. Kor. I. p. 90.  
Ch. multicaule Fr. et Sav. Enum. Pl. Jap. II. p. 361. Maxim.  
l.c. XI. p. 228.

Ch. sp. nov. Baker et Moore in Journ. Linn. Soc. XVII. p.  
382.

NOM. JAP. Kogane-nekonomesō.

HAB. Kyöng-geui (京畿道): Seoul (京城) in montibus (Carles) ex  
Hemsl. et Palib.

DISTR. China bor., Manshuria et Japonia.

### III. PARNASSIÆ. (gn. 1.)

#### PARNASSIA L. (sp. 1.)

*Parnassia palustris* L. Sp. Pl. (ed. II) p. 391. DC. Prodr.  
I. p. 320. Maxim. Prim. Fl. Amur. p. 469. Drude in Linnæa  
XXXIX. p. 307. Schmidt Reis. in Amur. u. Insel Sachl. p.  
35. n. 66. p. 116. n. 69. Fran. et Sav. Enum. Pl. Jap. I. p.  
146. Hook. fil. Fl. Brit. Ind. II. p. 401. Forbes et Hemsl.  
Index Fl. Sin. in Journ. Linn. Soc. XXIII. p. 292. Palib.  
Consp. Fl. Kor. I. p. 90. Makino Illus. Fl. Jap. I. i. t. V.  
Kom. Fl. Mansh. II. p. 426.

NOM. JAP. Umebachisō.

HAB. Kyöng-geui (京畿道). Chemulpo (仁川—Carles) ex Hemsl et Palib.

Ibidem. Oct. 31. 1900 fl. (T. Uchiyama). monte Nam-han-san (南韓山). Oct. 18. 1900.; Syong-työng (松亭). Sept. 28. 1902. fl. (T. Uchiyama).

Kyöng-san (慶尙道). Chhyöng-dö (清道). Oct. 1. 1902. fl. (T. Uchiyama).

DISTR. Europa, Asia et America bor.

#### IV. PHILADELPHEÆ.

##### Clavis generum.

A. Petala imbricata, stamina 20-40.....*Philadelphus* L.

B. Petala valvata, stamina 10-15.....*Deutzia* THUNB.

#### PHILADELPHUS L. (sp. 1.)

##### Clavis varietatum.

A. Racemis interruptis 5-11 floris, petala elongata...var.  $\gamma$ . *Satsumi* MAXIM.

B. Racemis densis, petala subrotundata.....var.  $\zeta$ . *pekinensis* MAXIM.

*Philadelphus coronarius* L. Sp. Pl. (ed. II). p. 671. Schrader in DC. Prodr. III. p. 205.

$\gamma$ . *Satsumi* MAXIM. Rev. Hydr. As. Orient. p. 40. Fran. et Sav. Enum. Pl. Jap. I. p. 156.

Ph. Satsumi Sieb. ex Maxim.

Ph. Schrenckii Rupr. in Mém. Biol. II. p. 452. Maxim. Prim.

Fl. Amur. p. 109. Regel Tent. Fl. Uss. n. 187. Kom. Fl.

Mansh. II. p. 429. (p. p.).

NOM. JAP. Baikwa-utsugi.

HAB. Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 14. 1902. fr.; Meuk-kai (墨浦). Aug. 12. 1902 fr. (T. Uchiyama).

Kyöng-geui (京畿道). Seoul (京城). prope Tap-Tong Mai. 20. 1895 fl. (Sontag).

Specimina Sontagina ex herbario horti Petropolitani nobis mitti sunt, et vero sunt var.  $\gamma$ , quamquam Palibin jam ea sub var. *manshuricus* collocavit.

$\zeta$ . *pekinensis* MAXIM. l.c. p. 42. Fran. Pl. Dav. p. 125. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 277. Palib. Consp. Fl. Kor. I. p. 91.

Ph. *pekinensis* Rupr. in Mém. Biol. II. p. 542. Kom. Fl. Mansh. II. p. 430.

Ph. *coronarius* Turcz. En. Chin. in Bull. Soc. Nat. Mosc. (1837). n. 81.

HAB. Kyöng-geui (京畿道). monte Nam-han-san (南韓山). Oct. 18. 1900.; ibidem Aug. 2. 1902. fr. (T. Uchiyama). Chemulpo (仁川—Carles) ex Hemsl. et Palib.

DISTR. Europa, Sibiria, China, Manshuria et Japonia.

## DEUTZIA THUNB.

### Clavis specierum.

A. Calyce glabrato.....*D. glabrata* KOM.

B. Calyce scabrido.

a) Inflores. ad apicem ramulis paucifl., fl. magnis, petalis oblongis  
.....*D. grandiflora* BUNGE

b) Inflores. ad apicem ramulis corymboso multifl.; fl. parvis, petalis  
rotundatis .....*D. parviflora* BUNGE.

*Deutzia glabrata* KOM. (Tab. nostra XII. f. I.) Fl. Mansh. II. p. 433.

HAB. Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 14. 1902. fr. (T. Uchiyama).

Kyöng-san (慶尙道). monte Chii (智異山). Aug. 1907. fl. (Shiki).

DISTR. Manshuria.

*Deutzia parviflora* BUNGE Enum. Pl. Chin. bor. n. 184. Maxim.

Prim. Fl. Amur. p. 110. Rev. Hydr. Asia. Or. p. 33. Regel Tent. Fl. Uss. n. 189. t. 5. f. 7-14. Gartenfl. (1862) t. 370. Fran. Pl. Dav. p. 124. Korsch. Act. h. Petrop. XII. p. 338. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 276. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 381. Kom. Fl. Mansh. II. p. 431.

HAB. Kang-uön (江原道). Meuk-kai (墨浦). Aug. 12. 1902. fr. (T. Uchiyama).

DISTR. China et Manshuria.

*Deutzia grandiflora* Bunge Enum. Pl. Chin. bor. n. 185. Walp. Rep. II. p. 152. Maxim. Rev. Hydr. Asia. Or. p. 30. t. 3 f. 1-13. Baker et Moore in Journ. Linn. Soc. XVII. p. 382. Fr. Pl. Dav. p. 125. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 276. Kom. Fl. Mansh. II. p. 432. Palib. Consp. Fl. Kor. I. p. 91.

HAB. Kyöng-geui (京畿道). in montibus prope Seoul (Carles) ex Hemsl. et Palib.

DISTR. China bor. et Manshuria.

#### V. HYDRANGEÆ. (gn. 1.)

#### **HYDRANGEA** L. (sp. 1.)

*Hydrangea Hortensis* SMITH. Fran. et Sav. Enum. Pl. Jap. I. p. 150.

Hyd. Hortensia Sieb. et Zucc. Fl. Jap. p. 688. Maxim. Rev. Hydr. p. 11. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 273.

*a. acuminata* A. GRAY. Maxim. l.c. p. 13.

Hyd. acuminata Sieb. et Zucc. Fl. Jap. I. p. 110. t. 56. et 57. f. 1.

Hyd. Buergeri S. et Z. l.c. p. 111. t. 57. f. 2.

NOM. JAP. Sawa-ajisai.

HAB. Kyōng-san (慶尙道). Chyang-Ryōng (鳥嶺). Oct. 2. 1902. fr.  
(T. Uchiyama).

DISTR. China et Japonia.

VI. RIBESIOIDEÆ. (gn. 1.)

**RIBES** L.

**Clavis specierum.**

A. Bacca aculeata, pedunculi 1-3 floris .....*R. burejense* Fr. SCHMIDT.

B. Bacca glabra.

a) Pedicelli ob pedunculi brevissimum haud exerti quasi fasciculati fl.  
polygamo-dioici .....*R. fasciculatum* S. et Z.

b) Flores distincte racemosi.

a) Fl. polygamo-dioici, bacca rubra.

○ Inerme .....*R. Maximowizii* KOM.

○○ Aculeati .....*R. diacantha* PALL.

β) Fl. hermaphroditi.

○ Folia subtus glanduloso-punctata.

\* Bracteolae lineares; bacca nigra...*R. nigrum* L.

\*\* Bracteolae ovatae; bacca lurida.....*R. procumbens* PALL.

○○ Folia subtus non glanduloso-punctata; bacca rubra, racemis  
pendulis .....*R. manshuricum* KOM.

*Ribes burejense* Fr. SCHMIDT. Reis. in Amur. u. Insel Sachl. p.  
42. n. 151. t. 1. f. 1. Maxim. in Mél. Biol. IX. p. 216. Kom.  
Fl. Mansh. II. p. 425.

HAB. in Korea bor.—ex Kom.

DISTR. Manshuria et Amur.

*Ribes fasciculatum* SIEB. et ZUCC. Fl. Jap. Fam. Nat. I. n. 196.  
Miq. Prol. Fl. Jap. p. 264. Maxim. in. Mél. Biol. IX. p. 237.  
S. Moore in Journ. Bot. (1878). p. 138. Forbes et Hemsl. Ind.



Fl. Sin. in Journ. Linn. Soc. XXIII. p. 279. Palib. Consp. Fl. Kor. I. p. 91.

R. chifuense Hance in Journ. Bot. (1875) p. 36.

NOM. JAP. Yabusanzashi.

HAB. Hoang-Hai (黃海道), inter Ka-chyang-ko-ri (加將去里), et Nam-chhyön (南川), Sept. 7. 1902 fr. (T. Uchiyama).

Kyöng-geui (京畿道), Syong-do (松都), Oct. 23. 1900 fr. (T. Uchiyama).

Chemulpo (仁川—Carles) ex Hemsl. et Palib.

DISTR. Japonia et China bor.

*Ribes Maximowiczii* KOM. Fl. Mansh. II. p. 443.

R. alpinum L.  $\beta$ . manshuricum Maxim. in Mém. Biol. IX. p. 239.

R. alpinum Hemsl. (var. L). Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 279. Palib. Consp. Fl. Kor. I. p. 91.

HAB. Kang-uön (江原道), monte Kum-gang-san (金剛山), Aug. 18. 1902. fr. mat. (T. Uchiyama).

in Korea bor.—ex Kom.

Sine loco speciali (James) ex Hemsl. et Palib.

DISTR. Manshuria.

*Ribes nigrum* L. Sp. Pl. (ed. II.) p. 291. DC. Prodr. III. p. 481. Ledeb. Fl. Alt. I. 269. Fl. Ross. II. p. 200. (excl. syn. Dikuscha et borealis). Maxim. Prim. Fl. Amur. p. 119. Regel Tent. Fl. Uss. n. 204. Fr. Schmidt Reis. in Amur. u. Insl. Sachl. p. 43. n. 156. Hook. fil. Fl. Brit. Ind. II. p. 411. Korsch. Act. h. Petrop. XII. p. 341. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 279. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 378. Kom. Fl. Mansh. II. p. 435.

HAB. in Korea bor.—ex Kom.

DISTR. Europa et Asia bor.

*Ribes procumbens* PALL. Fl. Ross. II. p. 35. t. 65. DC. Prodr.

III. p. 480. Ledeb. Fl. Ross. II. p. 198. Maxim. Prim. Fl. Amur. p. 117. in Mém. Biol. IX. p. 224. Fr. Schmidt Reis. in Amur. u. Insel Sachl. p. 43. n. 152. Kom. Fl. Mansh. II. p. 436.

HAB. in Korea bor.—ex Kom.

DISTR. Dahuria, Amur et Manshuria.

*Ribes manshuricum* KOM. Fl. Mansh. II. p. 437.

*R. multiflorum* Maxim. in Mém. Biol. XI. p. 228. Korsch. Act. h. Petrop. XII. p. 340. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 279.

HAB. Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 18. 1902. fr. (T. Uchiyama).

DISTR. Manshuria.

*Ribes diacantha* PALL. Maxim. in Mém. Biol. IX. p. 242. Korsch. Act. h. Petrop. XII. p. 341. Kom. Fl. Mansh. II. p. 445.

HAB. in Korea bor.—ex Kom.

DISTR. Sibiria, Amur et Manshuria.

## CRASSULACEÆ.

### Clavis generum.

A. Folia carnosa, infl. apice non recurvata.

a) Petala libera.....*Sedum* L.

b) Petala ad medium coalita .....*Cotyledon* L.

B. Folia non carnosa, infl. apice recurvata .....*Penthorum* L.

## SEDUM L.

### Clavis specierum.

A. Flores 4-meri.....*S. Rhodiola* DC.

## B. Flores 5-meri.

## a) Flores non lutei.

a) Pl. vivipara, petalis ovatis.....*S. viviparum* MAXIM.

## β) Non vivipara, petalis oblongis.

○ Folia sparsa sessilia, fl. purpurei

.....*S. Telephium* L. γ. *purpureum* MAXIM.

○○ Folia verticillata.

△ Stamina valde exerta, flores rosci...*S. spectabile* BOREAU.△△ Stamina vix exerta, flores virente albidis...*S. verticillata* L.

## b) Flores lutei.

## a) Folia crenata v. serrata.

○ Rhizoma brevissimum pluriceps .....*S. Aizoon* L.

○○ Rhizoma ramosum, ramis ascendentibus.

△ Folliculi ultra 1/3 connati, folia lata

.....*S. kamschaticum* FISCH.

△△ Folliculi e basi connati, horizontaliter patenti; folia angusta.

.....*S. Middendorffianum* MAXIM.

## β) Folia integra.

○ Folia verticillata.....*S. sarmentosum* BUNGE.

○○ Folia sparsa.

△ Folia semiteretia, lanceolato-lineararia...*S. kiusianum* MAKINO

△△ Folia plana.

\* Folia spatulata.....*S. Alfredi* HANCE.\*\* Folia oblonga v. obovata .....*S. orizifolium* MAKINO.

*Sedum Rhodiola* DC. Prodr. III. p. 401. Ledeb. Fl. Ross. II. p. 179. Maxim. in Mém. Biol. XI. p. 735. Kom. Fl. Mansh. II. p. 399.

HAB. Phyöng-an (平安道). monte Schan-pei-schan (長白山). Jul. 9. 1905. fl. et fr. (pl. masc. et fem.) (T. Imagawa). ibidem. (James) ex Hemsl. et Palib.

DISTR. Sibiria et Japonia.

*Sedum viviparum* MAXIM. in Mél. Biol. XI. p. 747. Kom. Fl. Mansh. II. p. 390.

HAB. in Korea bor.—ex Kom.

DISTR. Manshuria.

*Sedum Telephium* L. Sp. Pl. (ed. II). p. 616. DC. Prodr. III. p. 402. Maxim. in Mél. Biol. XI. p. 752. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 287. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 361. Korsch. Act. h. Petrop. XII. p. 340.

S. Fabria Koch. Maxim. Prim. Fl. Amur. p. 114. Fr. Schmidt Reis. in Amur. u. Insel Sachl. p. 42. n. 148. Fran. Pl. Dav. p. 130.

S. erythrosticum Miq. Prol. Fl. Jap. p. 87.

γ. *purpureum* L. Sp. Pl. (ed. II) p. 616. Maxim. in Mél. Biol. XI. p. 752.

NOM. JAP. Benkeisō.

HAB. Kang-uön (江原道): Peuk-tung-dji (北屯址). Aug. 9. 1902. fl. (T. Uchiyama).

DISTR. Europa, Sibiria, China et Manshuria.

*Sedum spectabile* BOREAU. Maxim. in Mél. Biol. XI. p. 751. Regel Gartenfl. (1872). t. 709. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 287. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 361. Kom. Fl. Mansh. II. p. 394.

HAB. Phyöng-an (平安道). Phyöng-yang (平壤). Sept. 12. 1902. fl. et fr. immat. (T. Uchiyama).

Hoang-hai (黃海道).—Phyöng-an (平安道): Hoang-jyu (黃州).—Phyöng-yang (平壤). Sept. 10. 1902. fl. et fr. immat. (T. Uchiyama).

Kyöng-geüi (京畿道).—Hoang-hai (黃海道). inter Kai-syöng (開

城). et Kunn-chhyön (金山). Sept. 6. 1902. fl. et fr. mat. (T. Uchiyama).

DISTR. China, Manshuria et Japonia.

*Sedum verticillatum* L. Sp. Pl. (ed. II) p. 616. DC. Prodr. III. p. 402. Ledeb. Fl. Ross. II. p. 181. Fr. Schmidt Reis. in Amur. u. Insel Sachl. p. 131. n. 164. Maxim. in Mél. Biol. XI. p. 750.

NOM. JAP. Mitsuba-benkeisō.

HAB. Kang-uön (江原道). monte Kunn-gang-san (金剛山). Aug. 20. 1902. fl. incip. (T. Uchiyama).

Kyöng-san (慶尙道). monte Chyang-ryöng (鳥嶺). Oct. 2. 1902. fr. (T. Uchiyama).

DISTR. Sibiria, Kamtschatica, Sachalin et Japonia.

*Sedum Aizoon* L. Sp. Pl. (ed. II) p. 617. Ledeb. Fl. Ross. II. p. 183. Maxim. Prim. Fl. Amur. p. 115. in Mél. Biol. XI. p. 756. Regel Tent. Fl. Uss. n. 301. Schmidt Reis. in Amur. u. Insel Sachl. p. 42. n. 149. p. 132. n. 167. Fran. et Sav. Enum. Pl. Jap. I. p. 159. Fran. Pl. Dav. p. 129. Baker et Moore in Journ. Linn. Soc. XVII. p. 382. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 282. Korsch. Act. h. Petrop. XII. p. 340. Kom. Fl. Mansh. II. p. 395. Palib. Consp. Fl. Kor. I. p. 92.

S. Maximowiczii Regel Gartenfl. (1866). t. 528.

NOM. JAP. Hosobano-kiriüsō.

HAB. Kyöng-geui (京畿道): Seoul (京城). Jun. 1886. fl. (Kalinowsky) ex Palib. monte Nam-san (南山). Sept. 16. 1902. fr.; Aug. 26. 1886. fr.; Oct. 10. 1900. fr. mat. (T. Uchiyama). ibidem. Aug. 1906. fl. (S. Shimogōriyama).

Phyöng-an (平安道): Phyöng-yang (平壤). colle Moran-bon (牡丹臺). Sept. 12. 1902. fr. mat. (T. Uchiyama)

Kyōng-san (慶尙道). Fusan (釜山). 1889. (Dr. Epow) ex Palib.  
 Distr. Sibiria, China, Amur, Manshuria et Japonia.

*Sedum kamtschaticum* FISCH. Ledeb. Fl. Ross. II. p. 182.  
 Maxim. in Mél. Biol. XI. p. 759. Fr. Schmidt Reis. in Amur.  
 u. Insel Sachl. p. 132. n. 168. Forbes et Hemsl. Ind. Fl. Sin.  
 in Journ. Linn. Soc. XXIII. p. 285. Palib. Consp. Fl. Kor. I.  
 p. 92.

S. Aizoon latifolium Miq. in Ann. Mus. Bot. Lugd. Bat. II. p.  
 155. Prol. Fl. Jap. p. 8.

NOM. JAP. Kirinsō.

HAB. ripa occidentalis ad 39° N. (Perry); in archipelago Koreano :  
 Port Hamilton (巨文島—Oldham Nr. 264) Tracey Isl. (Oldham  
 Nr. 265). ex Hemsl. et Palib.

DISTR. Sibiria, Kamtschatica, Manshuria et Japonia.

*Sedum Middendorffianum* MAXIM. Prim. Fl. Amur. p. 116. in  
 Mél. Biol. XI. p. 760. Fr. Schmidt Reis. in Amur. u. Insl.  
 Sachl. p. 42. n. 150. Kom. Fl. Mansh. II. p. 397.

HAB. in Korea bor.—ex Kom.

DISTR. Amur et Manshuria.

*Sedum sarmentosum* BUNGE Enum. Pl. Chin. bor. n. 183.  
 Walp. Rep. II. p. 262. Maxim. in Mél. Biol. XI. p. 764.  
 Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p.  
 286. Palib. Consp. Fl. Kor. I. p. 90.

S. lineare  $\delta$ . contractum Miq. in Ann. Mus. Bot. Lugd. Bat. II.  
 p. 156.

HAB. Kyōng-geui (京畿道). colle Nam-san (南山). Aug. 20. 1900.  
 rami repentes. (T. Uchiyama).

Chemulpo (仁川)—Carles). Seoul (京城). Aug. 1883. (Dr. Gottsche)  
 ex Hemsl. ibidem Jun. 1886. fl. (Kalinowsky). in cacumine montis

Nam-san (南山). prope Seoul (京城). Apr. 20. 1884. ster. (Sontag).  
ex Palib.

in archipelago Koreano: Port Hamilton (互文島)—Oldham Nr.  
261). ex Hemsl.

DISTR. China.

*Sedum kiusianum* MAKINO in Tokyo Bot. Mag. XVII. p. 60.

Illus. Fl. Jap. I. viii. t. LI.

HAB. Kyöng-geui (京畿道), colle Nam-san (南山). Jul. 18. 1902. fl.  
(T. Uchiyama).

DISTR. Japonia.

*Sedum Alfredi* HANCE in Journ. Bot. (1870) p. 7. Maxim. in  
Mél. Biol. XI. p. 768. Forbes et Hemsl. Ind. Fl. Sin. in Journ.  
Linn. Soc. XXIII. p. 283. Palib. Consp. Fl. Kor. I. p. 92.

*Sedum lineare*  $\gamma$ . floribundum Miq. Prol. Fl. Jap. p. 89.

*Sedum subtile*  $\alpha$ . obovatum Fran. et Sav. Enum. Pl. Jap. II. p.  
366.

HAB. in archipelago Koreano (Oldham) ex Hemsl. et Palib.

DISTR. China.

*Sedum orizifolium* MAKINO Illus Fl. Jap. I. viii tab. L. Review  
of some Jap. sp. of *Sedum* and *Cotyledon* in Tokyo Bot. Mag.  
XI. p. 428.

NOM. JAP. Taitogome.

HAB. Kyöng-san (慶尙道): insula Chyöl-yöng-do (絶影島). Nov. 16.  
1900. ster.; ibidem. Oct. 13. 1902. ster. (T. Uchiyama).

DISTR. Japonia.

## COTYLEDON L.

### Clavis specierum.

A. Flores racemosi.

a) Folia inermia elliptica v. oblonga.....*C. malacophylla* PALL.

b) Folia mucrone pungente terminata.

a) Folia non cartilagineo-appendiculata ; fl. albi...*C. japonica* MAXIM.

β) Folia cartilagineo-appendiculata ; fl. rubelli.....*C. minuta* KOM.

B. Planta diffusa v. caespitosa, humillima, fl. in cyma...*C. sikokiana* MAKINO.

*Cotyledon malacophylla* PALL. Fr. et Sav. Enum. Pl. Jap. I. p. 159. II. p. 365. Maxim. in Mél. Biol. XI. p. 723. Korsch. Act. h. Petrop. XII. p. 340. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 282. Palib. Consp. Fl. Kor. I. p. 93. Makino in Tokyo Bot. Mag. (1901). p. 65. Kom. Fl. Mansh. II. p. 401.

*Sedum malacophyllum* Fran. Pl. Dav. p. 129.

*Umbilicus malacophyllus* DC. Prodr. III. p. 400 Bunge Enum. Pl. Chin. bor. n. 181. Regel Tent. Fl. Uss. n. 198. Maxim. Prim. Fl. Amur. p. 114. Fr. Schmidt Reis. in Amur. u. Insel Sachl. p. 131. n. 163.

NOM. JAP. Iwarenge.

HAB. Ham-gyöng (咸鏡道). Kai-nei (會寧). Aug. 15. 1907. fl. (K. Maeda). ripa austro-orientalis Peninsulae (Perry).—ex Hemsl.

DISTR. Sibiria, China, Manshuria et Japonia.

*Cotyledon japonica* MAXIM. in Mél. Biol. XI. p. 724. Palib. Consp. Fl. Kor. I. p. 93. Kom. Fl. Mansh. II. p. 402.

*Sedum spinosum* Thunb. Fl. Jap. p. 186.

*Umbilicus spinosus* Miq. (non DC.) Prol. Fl. Jap. p. 89. Fran. et Sav. Enum. Pl. Jap. I. p. 158. II. p. 365.

NOM. JAP. Tsumerenge.

HAB. Ham-Gyöng (咸鏡道). Kai-nei (會寧). Oct. 15. 1907. fr. (K. Maeda).

Kyöng-geui (京畿道). circa Yöng-deung-pho (永登浦). Aug. 24. 1902. fl. ; colle Nam-san (南山). Oct. 11. 1903. fr. (T. Uchiyama).



Seoul (京城). Sept. 1886 fl. (Kalinowsky) Van-tang-san Jun. 2.  
1895. fl. (Sontag) ex Palib.

DISTR. Japonia et Manshuria.

*Cotyledon minuta* KOM. Fl. Mansh. II. p. 404.

HAB. in Korea bor.—ex Kom.

DISTR. Manshuria.

*Cotyledon sikokiana* MAKINO (Tab. nostra XI. f. IV.) in Illus. Fl.  
Jap. I. viii t. XLIX. in Tokyo Bot. Mag. XI. p. 431.

HAB. Kang-uön (江原道). monte Kum-gang-san (金剛山). Aug. 8.  
1902. fl. (T. Uchiyama).

DISTR. Japonia.

### PENTHORUM L. (sp. 1.)

*Penthorum chinense* PURSCH. DC. Prodr. III. p. 414. Regel  
Tent. Fl. Uss. n. 199. t. VI. f. 1-4. Hance in Journ. Bot.  
(1867). p. 152. Kom. Fl. Mansh. II. p. 405.

P. sedoides  $\beta$ . chinensis Maxim. in Mém. Biol. XI. p. 774. Fran.  
et Sav. Enum. Pl. Jap. I. p. 161. Fran. Pl. Dav. p. 124. Diels  
Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 363.

P. sedoides Hemsl. (non L.) Ind. Fl. Sin. in l.c. p. 288.

P. humile Regel et Maack. in Regel Tent. Fl. Uss. n. 200.

NOM. JAP. Takonoashi.

HAB. Kyöng-geui (京畿道). inter Pha-jyu (坡州). et Kai-syöng (開  
城). Sept. 5. 1902. fr. mat.; Syöng-do (松都). Oct. 23. 1900 fr.  
mat. (T. Uchiyama).

Kyöng-san (慶尙道) monte Chyang-ryöng (烏嶺). Oct. 2. 1902.  
fr. mat. (T. Uchiyama).

DISTR. Sibiria, China, Manshuria, Japonia et Amur. bor.

**HALORHAGINACEÆ.** (gn. 1.)**HALORHAGIS** L. (sp. 1.)

*Halorhagis micrantha* R. BR. Benth. Fl. Austr. II. p. 482. Clark in Hook. fil. Fl. Brit. Ind. II. p. 430. Hance in Journ. Bot. (1870). p. 276. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 292. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 484. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Coll. Imp. Univ. Tokyo XXII. p. 138.

Gonocarpus micranthus Thunb. Fl. Jap. p. 69. t. 15. DC. Prodr. III. p. 66.

NOM. JAP. Arinotō.

HAB. Kyōng-san (慶尙道): Mok-pho (木浦). Nov. 6. 1900 fr. insula Chyōl-yōng-do (絶影島). in Fusan (釜山). Oct. 13 1902. fr. (T. Uchiyama).

Kang-uōn (江原道): monte Kum-gang-san (金剛山). Aug. 20. 1902. fr. (T. Uchiyama).

DISTR. Asia orientalis, Australia et New Zealand.

**CALLITRICHACEÆ.** (gn. 1.)**CALLITRICHE** L. (sp. 1.)

*Callitriche verna* L. Sp. Pl. (ed. II.) p. 6. DC. Prodr. III. p. 70. Benth. Fl. Austr. II. p. 492. Miq. Prol. Fl. Jap. p. 264. Clark in Hook. fil. Fl. Brit. Ind. II. p. 434. Fran. et Sav. Enum. Pl. Jap. I. p. 165. (sub *a. terrestris*). Hegelmaier Monogr. Callitrich. p. 55. t. III. fig. 10. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 293.

HAB. Kyōng-san (慶尙道): Kum-san-ri (金山里). Oct. 14. 1902. fr. (T. Uchiyama).

DISTR. Europa, Asia, America bor. et Australia.

## LYTHRACEÆ.

## Clavis generum.

- A. Herba, capsulis horizontaliter striatis.....*Rotala* L.  
 B. Suffrutex, capsulis non striatis .....*Lythrum* L.

## ROOTALA L.

## Clavis specierum et varietatum.

- A. Calyx non appendiculatus.  
 a) Petala parva.  
 α) Caulis repens, ramosus.  
 .....*R. indica* (WILLD.) KœHNE var. *a. typica* KœHNE.  
 β) Caulis erectus, subsimplex.  
 Δ Internodiis foliisque elongatis.  
 .....*R. indica* var. *β. uliginosa* (MIQ.) KœHNE.  
 ΔΔ Internodiis foliisque abbreviatis.  
 .....*R. indica* var. *γ. koreana* NAKAI.  
 b) Petala desunt, folia linearia.  
 .....*R. mexicana* var. *Spruceana* (GRIESB.) KœHNE.  
 B. Calyx appendiculatus, fl. 3-merus.  
 .....*R. leptopetala* KœHNE var. *littorea* (MIQ.) KœHNE.

*Rotala indica* (WILLD.) KœHNE in Engl. Bot. Jahrb. I. p. 172.  
 Engl. et Prantl. Nat. Pfl. Fam. III. vii. (1891). p. 7. fig. 2.  
 F.-H. Pfl. Reich. IV. 216. p. 40. Kom. Fl. Mansh. III. p. 84.  
 Peplis indica Willd. Sp. Pl. II. p. 244.

*Ammannia nana* Roxb. Fl. Ind. I. p. 427.

*A. repens* Rottler et Martius. DC. Prodr. III. p. 80. ex Kœhne.  
*A. peploides* Spreng. Syst. I. p. 444. Clark in Hook. fil. Fl.  
 Brit. Ind. II. p. 566.

*Ameletia indica* DC. Prodr. III. p. 76. Wight Icon. I. t. 257.  
 Blume Mus. Bot. Lugd. Bat. II. p. 135. t. 47.

*A. acutidens* Miq. Fl. Ind. Bat. I. p. 617.

var. *α. typica* KÖEHN. in Engl. Bot. Jahrb. I. p. 173. Engl. Pfl. Reich. l.c. p. 41.

HAB. Kyōng-san (慶尙道): Chyang-chhyōn (長川). Oct. 6. 1902. fr., Mok-pho (木浦). Nov. 7. 1900. fr.; Kum-san-ri (金山里). Oct. 14. 1902. fr.; (T. Uchiyama).

DISTR. var. per tot. orb.

var. *β. uliginosa* (MIQ.) KÖEHN. l.c. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Coll. Imp. Univ. Tokyo XXII. p. 150.

NOM. JAP. Kikashigusa.

HAB. Kyōng-geui (京畿道): Chemulpo (仁川). Sept. 17. 1902. fl. et fr. (T. Uchiyama).

Kang-uōn (江原道): Kan-bal-ko-ryōng (干發告嶺). Aug. 21. 1902. ster. (T. Uchiyama).

Kyōng-san (慶尙道): Mok-pho (木浦). Nov. 7. 1900. fr. (T. Uchiyama).

DISTR. var. Japonia.

var. *γ. koreana* NAKAI. Tab. XII. f. III. Cespitosa, ramus simplex, internodiis abbreviatis, foliis oppositis oblongis v. obovatis, cartilagineo-marginatis, apice submarginatis; Fl. axillari-2, bracteolæ 2, linearis tubum calycis paullo superant; lobis calycis triangularibus acuminatis, petalis minimis lobis calycis multo brevioribus, capsulis ellipticis.

HAB. Kyōng-san (慶尙道). monte Chyang-ryōng (烏嶺). Oct. 3. 1902. fl. et fr. immat. (T. Uchiyama).

*Rotala mexicana* CHAM. et SCHLECHT. in Linnæa V. p. 567. Walp. Rep. II. p. 101. Kœhne in Engl. Bot. Jahrb. I. p. 150. in Engl. u. Prantl. Nat. Pfl. Fam. III. vii. p. 7. Fig. 2. A-E. in Pfl. Reich. IV. 216. p. 29. Kom. Fl. Mansh. III. p. 83. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo XXII. p. 150.

*Ammannia rosea* Poir. DC. Prodr. III. p. 80.

*Rotala verticillaris* Hiern. (non L.) in Oliv. Fl. Trop. Afr. II. p. 467.

var.  $\beta$ . *Spruceana* (GRISEB.) KOEHNE. l.c.

NOM. JAP. Mizumatsuba.

HAB. Kyöng-san (慶尙道): Kum-san-ri (金山里). Oct. 14. 1902. fl. et fr. (T. Uchiyama).

Kang-uön (江原道): Kan-bal-ko-ryöng (干發告嶺). Aug. 21. 1902. fl. (T. Uchiyama).

DISTR. var. Australia, China, Japonia et America bor.

*Rotala leptopetala* KOEHNE. in Engl. Bot. Jahrb. IV. p. 388. in Pfl. Reich. IV. 216. p. 34. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo XXII. p. 150.

var.  $\beta$ . *littorea* (MIQ.) KOEHNE. l.c.

NOM. JAP. Mizukikashigusa.

HAB. Kyöng-geui (京畿道): inter Pha-jyu (坡州) et Kai-syöng (開城). Sept. 5. 1902. fl. et fr.; Chemulpo (仁川). Sept. 17. 1902. fr. (T. Uchiyama).

Kang-uön (江原道): Kan-bal-ko-ryöng (干發告嶺). Aug. 21. 1902. fl. (T. Uchiyama).

Kyöng-san (慶尙道): Mok-pho (木浦). Nov. 7. 1900. fr. mat. (T. Uchiyama).

DISTR. var. Japonia.

## LYTHRUM L. (sp. 1.)

### Clavis varietatum.

A. Bractee subtus glaberrimæ.

.....*L. salicaria* var. *intermedium* subv. *gracilius* KOEHNE.

B. Bractee subtus pilosæ v. tomentosæ.

a) Bractee subtus pilosæ.

.....*L. salicaria* var. *vulgare* subv. *glaberrimæ* KOEHNE.

b) Bractee dense villosæ albicans .....*L. salicaria* var. *tomentosa* DC.

*Lythrum salicaria* L. Sp. Pl. (ed. II.) p. 640. DC. Prodr. III. p. 82. Maxim. Prim. Fl. Amur. p. 108. Fr. Schmidt Reis. in Amur. u. Insl. Sachl. p. 130. n. 154. Fran. et Sav. Enum. Pl. Jap. I. p. 167. Regel Tent. Fl. Uss. n. 186. Kœhne in Engl. Bot. Jahrb. I. p. 326. IV. p. 399. Pfl. Reich. IV. 216. p. 73. Korsch. Act. h. Petrop. XII. p. 338. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 304. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 484. Kom. Fl. Mansh. III. p. 85.

NOM. JAP. Misohagi.

var. *intermedium* (LEDEB.) KœHNE. l.c. Kom. l.c. p. 86.

HAB. Kyōng-geui (京畿道): Chemulpo (仁川) (Carles), Seoul (京城). Jun. 1886. fl. (Kalinowsky), ex Palib. Consp. Fl. Kor. I. p. 94. in archipelago Koreano: Hooper Isl. (Oldham. Nr. 276), ex Hemsl. l.c.

In Korea bor.—ex Kom. l.c.

subvar. *gracilius* (TURCZ.) KœHNE. l.c. Kom. l.c.

*L. salicaria* var. *gracilior* Turcz. in Bull. Soc. Nat. Mose. (1844). p. 235.

HAB. Kyōng-geui (京畿道): Syong-do (松都). Oct. 23. 1900. fr. mat.; monte Nam-han-san (南韓山). Aug. 2. 1902. fl. (T. Uchiyama). Hoang-hai (黃海道): inter Phung-syu-uön (風壽院) et Pong-san (鳳山). Sept. 9. 1902. fl. et fr. (T. Uchiyama).

DISTR. var. per tot. orb.

var. *δ. tomentosum* DC. Prodr. III. p. 82. Kœhne. l.c. Palib. Consp. Fl. Kor. I. p. 94. Kom. Fl. Mansh. III. p. 86.

HAB. Ham-gyōng (咸鏡道): Gen-san (元山). 1889. defl. (Dr. Epow). ex Palib.

DISTR. var. Europa et Asia.

var. *γ. vulgare* DC. Prodr. III. p. 82. Ledeb. Fl. Ross. II. p. 127.

subvar. *glabricaule* Kœhne. l.c. Kom. Fl. Mansh. III. p. 87.

HAB. Kang-tō (間島): Shi-dō-kō (四道溝). Sept. 11. 1907. fl. (K. Maeda).

DISTR. var. Europa et Asia.

## ŒNOTHERACEÆ.

### Clavis generum.

A. Calyx persistens.

a) Stamina 1-serialia ..... *Ludwigia* L.

b) Stamina 2-serialia ..... *Jussieuia* L.

B. Calyx deciduus.

a) Capsula elongata, multiseeminibus ..... *Epilobium* L.

b) Capsula obovata v. oblonga, 1-2 seminibus ..... *Circea* L.

### LUDWIGIA L. (sp. 1.)

*Ludwigia prostrata* Roxb. Fl. Ind. I. p. 420. Clark in Hook. f. Fl. Brit. Ind. II. p. 588. Fran. et Sav. Enum. Pl. Jap. I. p. 169. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 309. Kom. Fl. Mansh. III. p. 87. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo XXII. p. 155.

L. *epilobioides* Maxim. Prim. Fl. Amur. p. 104.

NOM. JAP. Chōjitade.

HAB. Chhyung-chhyōng (忠清道): prope Chyang-ho-uōn (長湖院). Sept. 29. 1902. fr. (T. Uchiyama).

Kyōng-geui (京畿道): Ō-ryu-kol (梧柳洞). Oct. 12. 1900. fr.; inter Pha-jyu (坡州) et Kai-syōng (開城). Sept. 5. fl. et fr. (T. Uchiyama).

DISTR. Asia orient.

**JUSSIEUA L.**

(Incertæ species 4.)

Nullis descriptionibus habitus, neque clavem specierum facere, neque decernere ut eae sunt vero certæ species, possumus.

*Jussieua japonica* LÉVE'L. in Bull. l'Acad. Int. Geo. Bot. (1903). p. 18.

HAB. Ham-gyöng: Ouen-San. in horto P. Bretianæ 1901. (U. Faurie).

Kyöng-geui: in palude Orizæ circa Chemulpo Sept. 28. 1901. (U. Faurie).

in media Koreæ Sept. 5. 1901. (Faurie).

*Jussieua Philippiana* LÉVE'L.

HAB. Ham-gyöng: Ouen-San; in horto P. Bretianæ Aug. 1901. (Faurie).

*Jussieua Fauriei* LÉVE'L.

HAB. Fossa in media Koreæ Sept. 3. 1901. (Faurie).

Kyöng-san: in palude Orizæ circa Fusan Oct. 4. 1901 (Faurie).

*Jussieua Parmentieri* LÉVE'L.

HAB. Kyöng-geui: ripa fluminis circa Seoul Sept. 24. 1901. (Faurie).

**EPILOBIUM L.**

Species a Léveillé determinatæ sunt plerique nobis incertæ, sed ex eis discriptionibus clavem temporarie feci.

**Clavis specierum.**

A. Stigma quadrifidum.

a) Stamina curvata .....*E. angustifolium* L.



- b) Stamina erecta .....*E. hirsutum* L.
- B. Stigma integrum.
- a) Folia alterna .....*E. angulatum* KOM.
- b) Folia opposita.
- a) Semina glaberrima, stigma clavatum .....*E. laetum* WALLICH.
- β) Semina papillosa.
- Folia ad brevem petiolem acuta.
- † Folia linearia .....*E. palustre* L.
- †† Folia plus minus dilatata.
- ( Coma sordide albida.
- △ Caulis elatus ultra pedalis.
- Sobolifera .....*E. cephalostigma* HAUSSKN.
- Rosulifera .....*E. amurense* HAUSSKN.
- △△ Caulis humilis 6-28 c.m. ....*E. tenue* KOM.
- (( Coma ferruginea .....*E. japonicum* HAUSSKN.
- Folia sessilia, basi cordata v. rotundata.
- † Coma ferruginea .....*E. pyrriholophum* FR. et SAV.
- †† Coma albida.
- ) Stigma capitatum.
- △ Folia oblonga. ....*E. Wallichianum* HAUSSKN.
- △△ Folia lanceolata .....*E. nullicarpum* KOM.
- △△△ Folia ovata.
- \* Dentes folii approximati .....*E. calycinum* HAUSSKN.
- \*\* Dentes folii remoti v. subnulli. *E. Rouyanum* LÉVE'L.
- ) Stigma clavatum.
- △ Flores mediocres 5-6 mm. longi.
- .....*E. nervosum* BOIS. et BUNSE.
- △△ Flores parvis 3-4 mm. longi.
- .....*E. minutiflorum* HAUSSKN.
- Quod a clave excluditur. ....*E. coreanum* LÉVE'L.

*Epilobium angustifolium* L. Sp. Pl. (ed. II.) p. 493. Miq. Prol. Fl. Jap. p. 258. Hausskn. Monogr. p. 37. et p. 190.

Clark in Hook. f. Fl. Brit. Ind. II. p. 582. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 307. Miyabe Fl. Kurile Isl. p. 235. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 485.

*E. spicatum* Lam. Fran. et Sav. Enum. Pl. Jap. I. p. 168. II. p. 380. Lève'l. in Bull. l'Acad. Int. Geo. Bot. (1903). p. 17. in Bull. Soc. Bot. Fr. (1907). p. 521.

*E. neriifolium* Lève'l. in Bull. l'Acad. Int. Geo. Bot. (1900). p. 210.

NOM. JAP. Yanagiran.

HAB. Ham-gyöng (咸鏡道): monte circa Ouen-san (元山). Aug. 1891. (Faurie). ex Lève'l.

DISTR. Europa, Asia bor. et Am. bor.

*Epilobium hirsutum* L. Sp. Pl. (ed. II. p. 494. DC. Prodr. III. p. 42. Hausskn. Monogr. p. 53. Fran. Pl. Dav. p. 139. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Loc. XXII. p. 307. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 485. Lève'l. l.c. (1903). p. 17.

HAB. Ham-Gyöng (咸鏡道): Ouen-san (元山). Aug. 1901. (U. Faurie) ex Lève'l.

Kang-nön (江原道): Meuk-kai (墨浦). Aug. 10. 1902. fl.; circa Chyang-yöng-ri (長淵里). Aug. 13. 1902. fl. et fr.; Peuk-tung-dji (北屯址). Aug. 21. 1902 fl. et fr. (T. Uchiyama).

DISTR. Europa et Asia bor.

*Epilobium angulatum* Kom. Fl. Mansh. III. p. 84. t. I. f. ii.

HAB. in Korea bor.—ex Kom.

DISTR. Manshuria.

*Epilobium latum* WALLICH. Hausskn. Monogr. 218. Lève'l. l.c. p. 17.

*E. tetragonum* Clark in Hook. fil. Fl. Brit. Ind. II. p. 586. p. p.

HAB. Loco humidoso in media Koreanæ Sept. 4. 1901. (T. Faurie)  
ex Léve'l.

DISTR. India orientalis.

*Epilobium palustre* L. Sp. Pl. (ed. II.) p. 495. Maxim. Prim.  
Fl. Amur. p. 105. Regel Tent. Fl. Uss. n. 179. Hausskn.  
Monogr. p. 128. et p. 146. Forbes et Hemsl. Ind. Fl. Sin. in  
Journ. Linn. Soc. XXIII. p. 308. Fran. Pl. Dav. p. 134.  
Korsch. Act. h. Petrop. XII. p. 335. Diels Fl. Centr. Chin.  
in Engl. Bot. Jahrb. XXIX. p. 485. Kom. Fl. Mansh. III. p.  
90.

NOM. JAP. Yanagi-akabana.

HAB. in media Koreæ Sept. 4. et Sept. 7. 1901. (U. Faurie) ex  
Léve'l.

Hoang-hai (黃海道): inter Ka-chyang-ko-ri (加將去里) et Nam-  
chyan (南川), Sept. 7. 1902. fl. et fr. (T. Uchiyama).

DISTR. Regio bor. ex temp.

*Epilobium cephalostigma* HAUSSKN. Monogr. p. 195. Léve'l.  
Bull. l'Acad. Int. Geo. Bot. (1903). p. 17.

E. leiospermum Léve'l. (non Hausskn.) in Bull. Acad. Int. Geo.  
Bot. (1900). p. 210.

E. roseum Léve'l. (non Hausskn.) in Bull. l'Acad. Int. Geo. Bot.  
(1900). p. 90.

NOM. JAP. Iwa-akabana! Kagon-akabana!

HAB. Monte Nai-piang. Aug. 24. 1901.; in media Koreæ Sept. 3.  
1901.; Ouen-san Aug. 1901. (U. Faurie) ex Léve'l.

Kang-nŏn (江原道): monte Kum-gang-san (金剛山). Aug. 20.  
1902. Fl. et Fr. (T. Uchiyama).

DISTR. Japonia.

*Epilobium amurense* HAUSSKN. Monogr. p. 203. Kom. Fl.  
Mansh. III. p. 92.

*E. origanifolium* (non L.) Maxim. Prim. Fl. Amur. p. 105.

HAB. in Korea bor.—ex Kom.

DISTR. Amur et Manshuria.

*Epilobium tenue* Kom. Fl. Mansh. III. p. 95. tab. I. f. i.

HAB. in Korea Sept.—ex Kom.

DISTR. Manshuria.

*Epilobium japonicum* HAUSSKN. Monogr. p. 209. Lève'l. Bull. Acad. Int. Geo. Bot. (1900). p. 20. (1901). p. 314. (1903). p. 17. in Bull. Soc. Bot. Fran. (1907). p. 521.

*E. tetragonum* var. *japonica* Miq. Prol. Fl. Jap. p. 258.

*E. affine* Maxim. (non Bong.) p. p. Fran. et Sav. Enum. Pl. Jap. I. p. 168.

NOM. JAP. Akabana.

HAB. Kyōng-geui (京畿道): monte Nani-san (南山). Jul. 30. 1902. Fl.; Nam-han-san (南韓山). Aug. 2. 1902. fl. et fr. (T. Uchiyama).

DISTR. Japonia.

*Epilobium pyrriholophum* FRAN. et SAV. Enum. Pl. Jap. I. p. 168. II. p. 370. Sōmokusetsu VII. t. 41. Hausskn. Monogr. p. 210. Lève'l. Bull. Acad. Int. Geo. Bot. (1900). p. 211. (1901). p. 34. in Bull. Soc. Bot. Fran. (1907). p. 522.

NOM. JAP. Akabana.

HAB. Kyōng-geui (京畿道). Ō-ryu-kol (梧柳洞). Oct. 12. 1900. fr. (T. Uchiyama).

DISTR. Japonia.

*Epilobium Wallichianum* HAUSSKN. Monogr. p. 218. Lève'l. Bull. Acad. Int. Geo. Bot. (1903). p. 18.

*E. tetragonum* Clark in Hook. f. Fl. Brit. Ind. II. p. 586. p. p.

HAB. Ham-gyōng (咸鏡道). Aug. 1901. (U. Faurie) ex Lève'l.

DISTR. India.

*Epilobium nudicarpum* KOM. Fl. Mansh. III. p. 94.

HAB. in Korea bor.—ex Kom.

DISTR. Manshuria.

*Epilobium calycinum* HAUSSKN. Monogr. p. 196. Lève'l. Bull. l'Acad. Int. Geo. Bot. (1903). p. 17.

E. affine Maxim. (non Bong.) Ind. Hort. Petrop. ex Hausskn.

HAB. monte in media Koreae Sept. 4. 1901. (U. Faurie) ex Lève'l.

DISTR. Japonia.

*Epilobium Rouyanum* LÉVE'L. in Bull. l'Acad. Int. Geo. Bot. (1900). p. 210. (1903). p. 17.

E. arcuatum Lève'l. in Bull. Herb. Boiss. (1907). p. 587.

HAB. Ham-Gyöng (咸鏡道): loco humidoso circa Ouen-san Aug. 1901.  
(U. Faurie) ex Lève'l.

DISTR. Japonia.

*Epilobium nervosum* BOISS. et BUNSE. Hausskn. Monogr. p. 197. Lève'l. Bull. Acad. Int. Geo. Bot. (1903). p. 17.

E. roseum Ledeb. Fl. Alt. II. p. 69.

HAB. monte prope Ouen-san Aug. 1901; loco humidoso in monte Nai-piang. Aug. 24. 1901. (U. Faurie) ex Lève'l.

DISTR. Europa bor., Sibiria et Amur.

*Epilobium minutiflorum* HAUSSKN. Monogr. p. 212. t. IV. f. 40. Lève'l. l.c. p. 18.

NOM. JAP. Karafuto-akabana.

HAB. Kyöng-san: Fusan. Oct. 1901. (U. Faurie) ex Lève'l.

DISTR. Syria et Sachaline.

*Epilobium coreanum* LÉVE'L. in Bull. l'Herb. Boiss. (1907). p. 507.

HAB. Korea, sine loco speciali (U. Faurie) ex Lève'l.

DISTR. Japonia.

**CIRCÆA** L.**Clavis specierum.**

A. Fructus 1-locularis.....*C. alpina* L.

B. Fructus bi-locularis.

a) Pedicelli fructus valde superantes, planta glabra

.....*C. quadrisulcata* MAXIM.

b) Pedicelli fructus subæquans, planta pubescens.....*C. cordata* ROYLE.

*Circæa alpina* L. Sp. Pl. (ed. II). p. 12. DC. Prodr. III. p. 63. Ledeb. Fl. Ross. II. p. 114. Maxim. Prim. Fl. Amur. p. 106. A. Gray. Bot. Jap. p. 389. Clark in Hook fil. Fl. Brit. Ind. II. p. 589. Ascher. et Magn. in Bot. Zeit. (1870). p. 748. Fran. et Sav. Enum. Pl. Jap. I. p. 170. Fr. Schmidt Reis. in Amur. u. Insel Sachl. p. 42. n. 143. p. 129. n. 149. Fran. Pl. Dav. p. 134. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 310. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 485. Kom. Fl. Mansh. III. p. 98.

NOM. JAP. Miyama-tanitate.

Kang-uön (江原道): monte Kum-gang-san (金剛山). Aug. 18. 1902;  
Aug. 14. 1902. fl. et fr. (T. Uchiyama).

DISTR. Europa, Asia bor. et America bor.

*Circæa quadrisulcata* MAXIM. Fran. et Sav. Enum. Pl. Jap. I. p. 169. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 485. Léve'l. Bull. l'Acad. Int. Geo. Bot. (1903). p. 18. Kom. Fl. Mansh. III. p. 100.

*C. lutetiana* var. *quadrisulcata* Maxim. Prim Fl. Amur. p. 106.

*C. lutetiana* subsp. *quadrisulcata* Maxim. Ascher et Magn. in Bot. Zeit. (1870). p. 783. Korsch. Act. h. Petrop. XII. p. 335.

*C. lutetiana* Regel Tent. Fl. Uss. n. 181. Fran. Pl. Dav. p.

135. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 310.

*C. coreana* Léve'l. in Fedd. Rep. (1907). p. 226.

NOM. JAP. Mizutamasō.

HAB. Kyōng-geui (京畿道): monte Nam-san (南山). Jul. 30. 1902. fl. (T. Uchiyama).

Kang-uön (江原道): circa Chho-mok-dong (草木洞). Aug. 11. 1902. fl. et fr.; monte Kum-gang-san (金剛山). Aug. 20. 1902. Fl. et Fr. (T. Uchiyama).

Ham-gyōng (咸鏡道): Mu-san-ryōng (茂山嶺). Aug. 11. 1907. Fl. (K. Maeda). Ouen-san. Aug. 1901. (U. Faurie) ex Léve'l.

DISTR. Japonia, Manshuria et China centralis.

*Circea cordata* ROYL. Illus. Bot. Himal. p. 211 t. 43. f. Ascher. et Magn. in Bot. Zeit. (1870). p. 784. Fran. et Sav. Enum. Pl. Jap. I. p. 170. Clark in Hook. fil. Fl. Brit. Ind. II. p. 589. Fran. Pl. Dav. p. 135. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 310. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 485. Kom. Fl. Mansh. III. p. 102.

*C. mollis* Maxim. (non S. et Z.) Prim. Fl. Amur. p. 105. Regel Tent. Fl. Uss. n. 180.

NOM. JAP. Ushitakisō.

HAB. Kang-uön (江原道): monte Kum-gang-san (金剛山). Aug. 15. 1902. fl. (T. Uchiyama).

in Korea bor.—ex Kom.

DISTR. Himalaya, China, Manshuria, et Japonia.

## HYDROCARYACEÆ. (gn. 1.)

### TRAPA L.

*Trapa Maximowiczii* KORSCH. Act. h. Petrop. XII. p. 220. Kom. Fl. Mansh. III. p. 109.

HAB. in Korea bor.—ex Kom.

DISTR. Amur, et Manshuria.

## CUCURBITACEÆ.

### Clavis generum.

A. Semina pendula, stamina 3 v. 5.

a) Stamina 5.....*Actinostemma* GRIFF.

b) Stamina 3.....*Schizopepon* MAXIM.

B. Semina horizontalia, stamina 5.

a) Andræcium in 3 stamina coalita .....*Trichosanthes* L.

b) Stamina libera .....*Thladiantha* BUNGE.

### **ACTINOSTEMMA** GRIFF. (sp. 1.)

*Actinostemma racemosum* MAXIM. Cogn. in DC. Monogr. Phan. III. p. 922. Forbes et Hemsl. Ind. Fl. Sin in Journ. Linn. Soc. XXIII. p. 320. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo XXII. p. 165.

*Mitrosicyos racemosus* Maxim. Prim. Fl. Amur. p. 112.

*Pomasterium japonicum* Miq. Ann. Mus. Bot. Lugd. Bat. II. p. 80. Prol. Fl. Jap. p. 12.

*Actinostemma japonicum* Miq. Ann. Mus. Bot. Lugd. Bat. III. p. 188. Prol. Fl. Jap. p. 352. Fran. et Sav. Enum. Pl. Jap. I. p. 175.

NOM. JAP. Gokizuru.

HAB. Chhyung-chhyöng (忠清道); circa Chyang-ho-uön (長湖院).  
Sept. 29. 1902. fr. (T. Uchiyama).

DISTR. China et Japonia.

### **SCHIZOPEPON** MAXIM. (sp. 1.)

*Schizopepon bryoniæfolius* MAXIM. Prim. Fl. Amur. p. 111. t.



6. Fr. Schmidt Reis. in Amur. u. Insl. Sachl. p. 131. n. 157. Cogn. in DC. Monogr. III. p. 917. Korsch. Act. h. Petrop. XII. p. 339. Müller et Pax. in Engl. Prantl. Nat. Pfl. Fam. IV. 5. p. 21. Makino in Tokyo Bot. Mag. VI. p. 54. XX. p. 26. t. II.

NOM. JAP. Miyama-nigauri.

HAB. Kang-uön (江原道): monte Kum-gang-san (金剛山). Aug. 14. fl. et fr. planta femina (T. Uchiyama).

DISTR. Manshuria et Japonia.

### TRICHOSANTHES L. (sp. 1.)

*Trichosanthes Kirilowii* MAXIM. Prim. Fl. Amur. p. 482. Cogn. in DC. Monogr. III. p. 370. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 313. Palib. Consp. Fl. Kor. I. p. 95. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 603.

*T. palmata* Clark (non Roxb.) in Hook. f. Fl. Brit. Ind. II. p. 606. p. p.

HAB. Kyöng-geui (京畿道).—Hoang-Hai (黃海道): inter Kai-syöng (開城). et Kum-chhyön (金川). Sept. 6. 1902. fl. (T. Uchiyama). Chemulpo (仁川)—Carles—ex Hemsl.

DISTR. China et Manshuria.

### THLADIANTHA BUNGE. (sp. 1.)

*Thladiantha dubia* BUNGE. Enum. Pl. Chin. Bor. n. 173. Bot. Mag. t. 5469. (excl. pl. fem. et fr.) Cogn. in DC. Monogr. III. p. 422. Fran. Pl. Dav. p. 135. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 316. Müll. et Pax. in Engl. Prantl. Nat. Pfl. Fam. IV. 5. p. 13. fig. 11. Palib. Consp. Fl. Kor. I. p. 95.

HAB. Kang-uön (江原道): monte Kum-gang-san (金剛山). Aug. 14. 1902. fl. (T. Uchiyama).

Kyōng-geui (京畿道): Seoul Aug. 1886. fl. (Kalinowsky), ex Palib.

DISTR. China bor. et Japonia.

## AIZOACEÆ.

### Clavis generum.

- A.* Calycis tubus ovarium adnatus ..... *Tetragonia* L.  
*B.* Calyx profunde 5-partitis ..... *Mollugo* L.

### TETRAGONIA L. (sp. 1.)

*Tetragonia expansa* Murr. Ait. h. Kew. (ed. II.) III. p. 211. DC. Prodr. III. p. 452. Fran. et Sav. Enum. Pl. Jap. I. p. 177. Bot. Mag. t. 2362. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 323.

*T. japonica* Thunb. Fl. Jap. p. 206. Miq. Prol. Fl. Jap. p. 89. NOM. JAP. Tsuruna.

HAB. Kyōng-san (慶尙道): Pusan (釜山). Nov. 17. 1900. fl. et fr. (T. Uchiyama).

in archipelago Koreano: Port Hamilton (巨文島). Wilford n. 659. Oldham. n. 267.) ex Hemsl. et Palib.

DISTR. Asia orientalis et Australia.

### MOLLUGO L. (sp. 1.)

*Mollugo stricta* L. Sp. Pl. (ed. II.) p. 131. DC. Prodr. I. p. 391. Benth. Fl. Hongk. p. 23. Miq. Prol. Fl. Jap. p. 11. Fran. et Sav. Enum. Pl. Jap. I. p. 177. Fran. Pl. Dav. p. 137. Clark in Hook. fil. Fl. Brit. Ind. II. p. 663. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 324. Fenzl in Walp. Ann. II. p. 241. Itō et Matsum. Tent. Fl.

Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 523.

Matsum. et Hayata Enum. Pl. Jap. in l.c. p. 169.

Mollugo triphylla Lour. Fl. Cochinch. p. 62.

NOM. JAP. Zakurosō.

HAB. Kyōng-geui: inter Pha-jyu (坡州) et Kai-syōng (開城). Sept.  
5. 1902. fl. et fr. (T. Uchiyama).

DISTR. Asia orient. et trop.

## UMBELLIFERÆ.

### Clavis tribuum.

A. Endocarpium lignosum, vittæ 0. ....I. *Hydrocotylinae*.

B. Endocarpium molle.

a) Styli elongati stylopodio circumdantur; fructus echinati...II. *Saniculae*.

b) Styli ad apicem stylopodii adherentes.

a) Juga primaria vix elevata v. in alas late expansa, juga secundaria  
subnulla.

○ Semina ad gynophorum profunde sulcata.

\* Fructus oblongo-cylindræus v. longe-rostratus.

.....III. *Scandicinae*.

\*\* Fructus ovatus, compressus.....IV. *Caucalinae*.

○○ Semina ad gynophorum plana v. plus minus convexa.

\* Costæ omnes æquantes; sectio seminis transversalis semilunaris.

△ Juga parum elevata .....V. *Carinae*.

△△ Juga valde elevata. ....VI. *Seselinae*.

\*\* Costæ laterales valde expansæ, semina plus minus compressæ.

△ Alæ membranacæ.

† Costæ dorsalis nerviformes, sectio seminis transversalis  
ovata .....VII. *Ferulinae*.

†† Costæ dorsalis plus minus elevatae, semina compressa.

.....VIII. *Angelicinae*.

△△ Alæ coriacæ.....IX. *Trodyliinae*.

β) Juga secundaria juga primaria subæquantia.....X. *Silerinae*.

## I. HYDROCOTYLINÆ.

## Clavis generum.

- A. Mericarpium 7-9 costatum.....*Centella* L.  
 B. Mericarpium 5-costatum.....*Hydrocotyle* L.

**CENTEELLA** L. (sp. 1.)

*Centella asiatica* URB. in Mart. Fl. Brasil. XI. fasc. 1.! Drude in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 119. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 491. Yabe Rev. Umb. Jap. in Journ. Sci. Col. Imp. Univ. Tokyo XVI. p. 16. in Tokyo Bot. Mag. XVII. p. 105. Boiss. in Bull. PHerb. Boiss. (1902). p. 802.

*Hydrocotyle asiatica* L. Sp. Pl. (ed. II.) p. 338. Willd. Sp. Pl. I. p. 1362. Thunb. Fl. Jap. p. 116. DC. Prodr. IV. p. 62. Wight Ic. Pl. Ind. Or. t. 565. Hook. et Arn. Bot. Beech. Voy. p. 26. Benth. Fl. Hongk. p. 134. Fl. Austr. III. p. 346. Miq. Prol. Fl. Jap. p. 243. Fran. et Sav. Enum. Pl. Jap. I. p. 177. Harvey et Sonder Fl. Cap. II. p. 525. Clark in Hook. fil. Fl. Brit. Ind. II. p. 669. Maxim. in Mém. Biol. XII. p. 561. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 324. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 257.

II. nummularioides A. Rich. Spr. Syst. I. p. 875. DC. Prodr. IV. p. 63.

NOM. JAP. Tsubo-kusa.

HAB. Kyōng-san : Pusan : insula Chyōl-yōng-do (絶影島). Oct. 13. 1902. fr. (T. Uchiyama).

DISTR. America bor., Asia, Australia et Afr. austr.

**HYDROCOTYLE** L. (sp. 1.)

*Hydrocotyle Wilfordii* MAXIM. in Mém. Biol. XII. p. 463. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 326. Palib. Consp. Fl. Kor. I. p. 96. Yabe Rev. Umb. p. 14. in Tokyo Bot. Mag. XVII. p. 105.

NOM. JAP. Nochidome.

HAB. Chhyung-chhyöng: Mok-chhyön (木市). Nov. 9. 1900. ster. (T. Uchiyama).

Kyöng-san: Fusan (釜山). Wilford. Nov. 904.—ex Hemsl. et Palib.

DISTR. Japonia.

## II. SANICULÆ. (gn. 1.)

**SANICULA** L.**Clavis specierum.**

A. Calycis tubus non tuberculatus.....*S. elata* HAMILT.

B. Calycis tubus tuberculatus .....*S. tuberculata* MAXIM.

*Sanicula elata* HAMILT. in D. Don Prodr. Fl. Nepal. p. 138. (1825).! Wight et Arn. Prodr. Fl. Ind. Orient. I. p. 361. Wight Ic. Pl. Ind. t. 334. et 1004. Miq. Prol. Fl. Jap. p. 244. Fran. et Sav. Enum. Pl. Jap. I. p. 178. Fran. Pl. Dav. p. 137. (var. acaulis). Kom. Fl. Mansh. III. p. 130.

*S. canadensis* Thunb. (non L.) Fl. Jap. p. 116.

*S. chinensis* Bunge Enum. Pl. Chin. bor. (1831). n. 189. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 472. Hance in Journ. Bot. (1874). p. 260. Palib. Consp. Fl. Kor. I. p. 96.

*S. europæa* (non L.) Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 326. Yabe Rev. Umb. in Journ. Sei. Col. Imp. Univ. Tokyo XVI. p. 19.

NOM. JAP. Umamo-mitsuba.

HAB. in archipelago Koreano (Oldham. Nr. 294.)—ex Hemsl. et Palib.

DISTR. China, Manshuria et Japonia.

*Sanicula tuberculata* MAXIM. in Mém. Biol. VI. p. 204. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 327. Palib. Consp. Fl. Kor. I. p. 96.

HAB. in æstuario Chusan peninsulae Koreanæ, 1859. fr. immat. (Wilford).—ex Maxim.

Planta endemica.

### III. SCANDICINÆ. (gn. 1.)

#### **ANTHRISCUS** HOFFM. (sp. 1.)

*Anthriscus sylvestris* HOFFM. Umb. 40. 46. t. 1. f. 19. p. 210. t. 1. fig. 19. DC. Prodr. IV. 223. Ledeb. Fl. Ross. II. p. 346. A. Gray Pl. Jap. p. 390. Miq. Prol. Fl. Jap. p. 252. Fran. et Sav. Enum. Pl. Jap. I. p. 183. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 330. Miyabe Fl. Kurile Isl. p. 235. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 492. Yabe Rev. Umb. in Journ. Sci. Col. Imp. Univ. Tokyo XVI. p. 22. Boiss. in Bull. l'Herb. Boiss. (1903). p. 955.

*A. nemorosa* Schmidt (non Spr.) p. 140.

*Chærophyllum sylvestre* L. Sp. Pl. (ed. II.) p. 369.

NOM. JAP. Shaku.

HAB. in sylvis Kan-uön Jun. 1901. (U. Faurie).—ex Boiss.

DISTR. Japonia, Sibiria, China, Rossia et Africa bor.

### IV. CAUCALINÆ. (gn. 1.)

#### **TORILIS** ADANS. (sp. 1.)

*Torilis japonica* DC. Prodr. IV. p. 219. Hook. et Arn. Bot.

Beech. Voy. p. 189. et p. 264. A. Gray Pl. Jap. p. 312. Fran. Pl. Dav. p. 145. Kom. Fl. Mansh. III. p. 134.

*Caucalis anthriscus* Itō et Matsum. (non Scop.) Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 532.

*C. japonica* Houth. Nat. Hist. XXVI. p. 42. t. 1. A. Spr. Syst. Veg. I. p. 896. Fran. et Sav. Enum. Pl. Jap. I. p. 190. T. Makino in Tokyo. Bot Mag. VII. p. 44.

*Chærophyllum scabrum* Thunb. Fl. Jap. p. 119.

*Torilis Anthriscus* in Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 337. Palib. Consp. Fl. Kor. I. p. 98. Yabe. Rev. Umb. p. 25.

NOM. JAP. Yabu-jirami.

HAB. Kyōng-geui: Seoul (京城). Jun. 1886. (Kalinowsky)—ex Palib. monte Nam-san (南山). Aug. 20. 1902 fl. et fr. immat., Namhan-san (南韓山). Oct. 18. 1900. fr. mat. (T. Uchiyama).

Kang-nōn: monte Kum-gang-san (金剛山). Aug. 20. 1902. fl. et fr. immat (T. Uchiyama).

Kyōng-san: Fusan (釜山). Nov. 17. 1900 fr. mat. (T. Uchiyama).

Nai-piang Jul. 1901 (Faurie)—ex Boiss.

in archipelago Koreano (Oldham Nr. 308).—ex Hemsl. et Palib.

in Kerea septentr. (Kom)—ex Kom.

DISTR. China, Manshuria et Japonia.

## V. CARINÆ.

### Clavis generum.

A. Folia omnia sessilia, integra.....*Bupleurum* L.

B. Folia inferiora petiolata.

a) Valliculæ 1-vittatæ.

a) Fructus late-ovatus v. latior quam longus.....*Cicuta* L.

β) Fructus oblongo-ovatus v. cylindricus.

○ Folia 3-5 secta.....*Cryptotaenia* DC.

- ○ Folia pinnata v. ternatim pinnata ..... *Carum* L.  
 b) Vallecuke multivittatæ v. o.  
 a) Vittæ o, juga primaria tenuis ..... *Aegopodium* L.  
 β) Vittæ ∞.  
 ○ Calycis dentes acuti ..... *Sium* L.  
 ○ ○ Calycis dentes obsoleti ..... *Pimpinella* L.

## BUPLEURUM L.

### Clavis specierum.

A. Foliis basi attenuatis.

- a) Foliis caulinis linearibus 9–11 nerviis ..... *B. scorzoneraefolium* WILLD.  
 b) Foliis caulinis lineari-lanceolatis 7–nerviis ..... *B. falcatum* L.

B. Foliis oblanceolatis basi auriculatis

..... *B. longiradiatum* var. *breviradiatum* SCHMIDT.

*Bupleurum scorzoneraefolium* WILLD. Enum. Suppl. p. 30. DC. Prodr. IV. p. 132. Schmidt in Maxim. Prim. Fl. Amur. p. 125. Amur. p. 44. n. 167. Fran. Pl. Dav. p. 137. Kom. Fl. Mansh. III. p. 139.

*B. falcatum* β. *scorzoneraefolium* Ledeb. Fl. Ross. II. p. 267. Regel Tent. Fl. Uss. n. 212. Korsch. Act. h. Petrop. XII. p. 343. Boiss. in Bull. Herb. Roiss. (1903). p. 953. Palib. Consp. Fl. Kor. I. p. 97.

*B. falcatum* Yabe Rev. Umb. p. 30. (p. p.) in Tokyo Bot. Mag. XVII. p. 105.

NOM. JAP. Hosobano-mishimasaiko.

HAB. Hoang-Hai: inter Syö-heung (瑞興), et Phung-Syu-nön (風壽院). Sept. 7. 1902. fl. et fr. jun. (T. Uchiyama).

Ham-gyöng: Kai-nei (會寧). Aug. 15. 1907. (K. Maeda) fl. in collibus Quen-san (元山). Aug. 1901. (U. Faurie)—ex Boiss.



Phyöng-an: in collibus Chinampo (鎮南浦). Sept. 1901. (U. Faurie)—ex Boiss.

DISTR. Sibiria, Manshuria, Japonia et Sachalin.

*Bupleurum falcatum* L. Sp. Pl. (ed. II.) p. 341. Willd. Sp. Pl. II. p. 1372. DC. Prodr. IV. p. 132. Miq. Prol. Fl. Jap. p. 246. Fran. et Sav. Enum. Pl. Jap. I. p. 180. (saltem p. p.) Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 327. Yabe Rev. Umb. p. 30. (p. p.).

*Bupleurum falcatum* var. *scorzoneræfolium* Yabe (non Ledeb.) in Tokyo Bot. Mag. XVII. p. 105.

NOM. JAP. Mishimasaike.

HAB. Kyöng-geui: Syong-do (松都). Oct. 23. 1900 fr.; Chemulpo (仁川). Sept. 17. 1902 fl. et fr. jun., monte Nam-han-san Oct. 18. 1900 fr. mat. Aug. 2. 1902. fl. (T. Uchiyama).

Kang-uön: Menk-kai (墨浦). Aug. 12. 1902. fl. (T. Uchiyama)

DISTR. Europa et Asia.

*Bupleurum tongeradiatum* TURCZ. Cat. Baic. n. 515! Ledeb. Fl. Ross. II. p. 264. Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 125. Amur. 44. n. 166. (var. *breviradiatum*). Regel Tent. Fl. Uss. n. 211. ( $\beta$ . *breviradiatum*) Korsch. Act. h. Petrop. XII. p. 343. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 493. Boiss. in Bull. Herb. Boiss. (1903). p. 953. Kom. Fl. Mansh. III. p. 137. ( $\beta$ . *breviradiatum*).

*B. sachalinense* Yabe (non Schmidt) in Tokyo Bot. Mag. XVII. p. 105.

HAB. Kang-uön: monte Kum-gang-san (金剛山). Aug. 14. 1902. fl. et fr. immat. (T. Uchiyama).

in Corea media Sept. 5. 1901. (U. Faurie)—ex Boiss.

DISTR. Sibiria, Manshuria et China centr.

**CICUTA** L. (sp. 1.)

*Cicuta virosa* L. Sp. Pl. (ed. II.) p. 368. Willd. Sp. Pl. I. p. 1445. Ait. Hort. Kew. II. (ed. II.) p. 149. Spr. Syst. Veg. I. p. 894. DC. Prodr. IV. p. 99. Ledeb. Fl. Alt. I. p. 359. Fl. Ross. II. p. 241. Miq. Prol. Fl. Jap. p. 245. Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 124. Sachl. p. 134. n. 177. Fran. et Sav. Enum. Pl. Jap. I. p. 80. Clark in Hook. fil. Fl. Brit. Ind. II. p. 679. Fran. Pl. Dav. p. 138. Korsch. Act. h. Petrop. XII. p. 342. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 328. Boiss. in Bull. Herb. Boiss. (1903). p. 954. Kom. Fl. Mansh. III. p. 142.

NOM. JAP. Dokuzeri.

HAB. Ham-gyöng: in pratibus humidis Ouen-san Aug. 1901. (Faurie)  
ex Boiss.

DISTR. Europa, Asia bor. et America bor.

**CRYPTOTÆNIA** DC. (sp. 1.)

*Cryptotænia japonica* HASSK. Retz. I. p. 113.! Maxim. in Mém. Biol. XII. p. 467. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 528. Yabe Rev. Umb. p. 39. in Tokyo Bot. Mag. XVII. p. 105.

*Cryptotænia canadensis* Sieb. et Zucc. (non. DC.) Fl. Jap. Fam. Nat. n. 424. A. Gray Bot. Jap. p. 391. Miq. Prol. Fl. Jap. p. 246. Hance in Journ. Bot. III. p. 340. V. p. 114. VIII. p. 276. Fran. et Sav. Enum. Pl. Jap. I. p. 182. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 329.

*Sison canadense* Thunb. Fl. Jap. p. 118.

NOM. JAP. Mitsuba-zeri.

HAB. Kang-uön: monte Kum-gang-san (金剛山). Aug. 18. 1902. fr.  
(T. Uchiyama).

DISTR. China.

**CARUM** L. (sp. 1.)

*Carum neurophyllum* (MAXIM.) FRAN. et SAV. Enum. Pl. Jap. I.  
p. 180. Yabe Rev. Umb. p. 41. in Tokyo Bot. Mag. XVII. p. 106.  
*Edosmia neurophyllum* Maxim. in Mém. Biol. IX. p. 16.

NOM. JAP. Shimura-ninjin.

HAB. Kyöng-geui: Chyöng-nyang-ri (清凉里). Jul. 27. 1902. fl. (T.  
Uchiyama).

DISTR. Japonia.

**AEGOPODIUM** L. (sp. 1.)

*Aegopodium alpestre* LEDEB. Fl. Alt. I. p. 354. Fl. Ross. II.  
p. 248. Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 124. Amur.  
p. 44. n. 165. Sachl. p. 135. n. 178. Miyabe Fl. Kuril. Isl. p.  
235. Diels Fl. Centr. Chin. in. Engl. Bot. Jahrb. XXIX. p.  
497. Yabe Rev. Umb. p. 44. Boiss. in Bull. l'Herb. Boiss.  
(1903). p. 954. Kom. Fl. Mansh. III. p. 147.

NOM. JAP. Shimura-ninjin.

HAB. Ham-gyöng: in montibus Ouen-san, Aug. 1901. (Faurie) ex Boiss.

DISTR. Sibiria, China, Manshuria et Japonia.

**SIUM** L.

**Clavis specierum.**

A. Folia caulina superiora omnia ternata ..... *S. Ninsi* L.

B. Folia excepta superrima 1-2, omnia pinnata.

a) Folia lanceolata v. oblongo lanceolata

..... *S. cicutaeifolium* GMEL. a. *latifolium* KOM.

b) Folia lineari-lanceolata... *S. cicutaeifolium* GMEL. b. *angustifolium* KOM.

*Sium Ninsi* L. Sp. Pl. (ed. II.) p. 361. Maxim. in Mél. Biol. IX. p. 18. Frau. et Sav. Enum. Pl. Jap. I. p. 181. Yabe Rev. Umb. p. 52. in Tokyo Bot. Mag. XVII. p. 106.

NOM. JAP. Mukago-ninjin.

HAB. Kyōng-geui: monte Peuk-han-sau (北漢山). Oct. 14. 1900 fr. mat., monte Nam-sau (南山). Jul. 20. 1902. fl. Sept. 1. 1902. fl. et fr. jun. (T. Uchiyama).

DISTR. Japonia.

*Sium cicutaeifolium* GMEL. Syst. II. p. 482. Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 125. Sachl. p. 135. n. 179. Regel Tent. Fl. Uss. n. 210. Harm. in Engl. Prantl. Nat. Pfl. Fam. III. viii p. 197. Korsch. Act. h. Petrop. XII. p. 343. Kom. Fl. Mansh. III. p. 149.

Critanus dauricus Hoffm. Umb. p. 189!

Falcaria daurica DC. Prodr IV. p. 110.

*Apium cicutaeifolium* Benth. et Hook. Gen. Pl. I. p. 888. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 328. Boiss. in Bull. Herb. Boiss. (1903). p. 953.

HAB. in herbidis Chemulpo (仁川). Sept. 1901. in collibus Ouen-san (元山). Aug. 1901. in vallibus Coreæ mediæ Sept. 1901. in Collibus Nai-piang secu aqua Aug. 1901. (Faurie)—ex Boiss.

var. a. *latifolium* Kom. l.c. p. 150.

*C. nipponicum* Yabe (non Maxim.) in Tokyo Bot. Mag. XVII. p. 106. (p. p.)

HAB. Kyōng-geui: Ō-ryu-kol (梧柳洞). Oct. 12. 1900 fr. mat. v. fl. (T. Uchiyama).

Chyung-Chhyōng: Mok-Chyang (木市). Nov. 9. 1900 fl. (T. Uchiyama).

var. b. *angustifolium* Kom. l.c. p. 150.

*C. nipponicum* Yabe l.c. p. p.

HAB. Kyöng-geui : Yöng-deung-pho (永登浦). Jul. 24. 1902. fl. (T. Uchiyama).

DISTR. sp. Reg. bor. et temp.

### PIMPINELLA L.

#### Clavis specierum.

A. Folia ternata, segmentis late-lanceolatis, grosse-serratis.

.....*P. brachycarpa* (KOM.) NAKAI.

B. Folia 1-2 ternata, segmentis inciso-serratis.

a) Segmentis inciso-serratis v. profunde inciso-laciniatis.

.....*P. koreana* (YABE) NAKAI.

b) Segmentis pinnatisectis, laciniis linearibus.

.....*P. koreana* var. *Uchiyamana* (YABE) NAKAI.

*Pimpinella brachycarpa* (KOM.) NAKAI.

*P. calycina* var. *brachycarpa* Kom. in Fl. Mansh. III. p. 145.

HAB. in Korea bor. (Kom.)—ex Kom.

Kang-uön : monte Kum-gang-san (金剛山). Aug. 15. 1902. fl. (T. Uchiyama).

DISTR. Manshuria.

*Pimpinella koreana* (YABE) NAKAI.

*P. nikoensis* Yabe var. *koreana* Yabe in Tokyo Bot. Mag. XVII. p. 106. (descriptiones excellentes ibi inveniuntur). Boiss. in Bull. l'Herb. Boiss. (1903). p. 955.

*P. Fauriei* Boiss. in Schéd.—ex Boiss.

HAB. in lacunis montis Nam-san (南山). Seoul Sept. 25. 1901. (Fauriei).—ex Boiss.

in humidis silvarum Ouen-san (元山). Sept. 25. 1901. (Faurie).—ex Boiss.

Kang-uön : monte Kum-gang-san (金剛山). Aug. 15. 1902. fl. (T. Uchiyama).

Folia hujus species in nullo modo similitudinem cum *P. nikoense* præbent.

var. *Uchiyamana* (YABE) NAKAI. Tab. XIV.

*P. nikoensis* Yabe var. *Uchiyamana* Yabe in sched. Herb. Imp. Univ. Tokyo. Caule 8–9 d.m. alto, flaccido v. apice flexuoso, foliis omnibus ternatis, segmentis petiolulatis, pinnatisectis v. subpinnato-ternatisectis, laciniis linearibus, cæ. ut typica.

HAB. Kyöng-geui: monte Nam-san (南山). Sept. 1. 1902. fl. (T. Uchiyama).

Plantæ endemicæ.

## VI. SESELINEÆ.

### Clavis generum.

- A.* Juga primaria exalata ..... *Oenanthe* L.  
*B.* Juga primaria in alas expansa.  
 a) Vittæ ad vallecultas solitariae.  
   ○ Stylophorum conicum ..... *Cnidium* Cuss.  
   ○○ Stylophorum inflatum ..... *Selinum* L.  
 b) Vittæ ad vallecultas 2–3 ..... *Ligusticum* L.

### **ŒNANTHE** L. (sp. 1.)

*Oenanthe stolonifera* DC. Prodr. IV. p. 138. Wight Illus. Ind. Bot. 571. Ic. Pl. Ind. Or. t. 571. Clark in Hook. fil. Fl. Brit. Ind. II. p. 696. Hance in Journ. Linn. Soc. XVIII. p. 81. et in Journ. Bot. (1878). p. 228. Fran. et Sav. Enum. Pl. Jap. I. p. 185. Henry List. Pl. Form. p. 47. Fran. Pl. Dav. I. p. 140. Maxim. in Engl. Bot. Jahrb. VI. p. 61. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 331. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 269. Diels Fl. Centr. Chin. in Engl. Bot.

Jahrb. XXIX. p. 498. Yabe Rev. Umb. p. 54. in Tokyo Bot. Mag. XVII. p. 108. Boiss. in Bull. l'Herb. Boiss. (1903). p. 955. Kom. Fl. Mansh. III. p. 153.

*Dasyloma subpinnata* Miq. Prol. Fl. Jap. p. 247.

*Phellandrium stoloniferum* Roxb. Fl. Ind. II. p. 93.

NOM. JAP. Seri.

HAB. Kang-uön: monte Kum-gang-san (金剛山). Aug. 27. 1902. fl. (T. Uchiyama).

in fossis Ouen-san (元山). Aug. 1901. (Faurie).—ex Boiss.

DISTR. Japonia, Manshuria, China, India et Java.

### CNIDIUM Cuss.

#### Clavis specierum.

A. Fructus cylindricus.....*C. davuricum* FISCH. et MEY.

B. Fructus rotundatis.

a) Lacinis foliorum obovatis mucronatis. ...*C. japonicum* MIQ.

b) Lacinis foliorum linearibus. ....*C. Monnieri* Cuss.

*Cnidium davuricum* FISCH. et MEY. Ledeb. Fl. Ross. II. p. 284.

Turez. Cat. Baik. n. 527.! Kom. Fl. Mansh. III. p. 153.

*Laserpitium davuricum* Jacz. in Willd. Sp. Pl. I. p. 1417.

*Selinum sibiricum* Retz. in Willd. Sp. Pl. I. p. 1394. Spr. Syst. I. p. 901.

HAB. in Korea bor. (Kom.)—ex Kom.

DISTR. Dahuria, Baikal et Manshuria.

*Cnidium japonicum* MIQ. Prol. Fl. Jap. p. 248. Yabe Rev.

Umb. p. 60. in Tokyo Bot. Mag. XVII. p. 106. Boiss. in Bull. l'Herb. Boiss. (1903). p. 956.

*Selinum japonicum* Fran. et Sav. Enum. Pl. Jap. I. p. 186.

NOM. JAP. Hama-zeri

HAB. Kyöng-san : Pusan (釜山). Nov. 17. 1900. fr. mat ; Mok-pho (木浦). Nov. 6. 1900. fr. mat. (T. Uchiyama).

DISTR. Japonia.

*Cnidium Monnieri* Cuss. DC. Prodr. IV. p. 152. Ledeb. Fl. Ross. II. p. 283. Maxim. Prim. Fl. Amur. p. 126. Ind. Fl. Pek. p. 472. Regel Tent. Fl. Uss. n. 213. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 498. Yabe in Tokyo Bot. Mag. XVII. p. 106. Kom. Fl. Mansh. III. p. 154. *Selinum Monnieri* L. Sp. Pl. (ed. II.) p. 351. Hance in Journ. Linn. Soc. XIII. p. 81. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 332.

HAB. Kyöng-geui : Yöng-deung-pho (永登浦). Jul. 24. 1902. fl. et fr. mat. (T. Uchiyama).

DISTR. China, Dahuria, Manshuria, Europa et America bor.

## SELINUM L.

### Clavis specierum.

A. Dentibus folii acutis mucronatis .....*S. coreanum* Boiss.

B. Dentibus folii acutissimis subspinescentibus .....*S. melanotilingia* Boiss.

*Selinum coreanum* Boiss. in Bull. l'Herb. Boiss. (1903). p. 956.

HAB. in collibus Ouen-san (元山). Aug. 1901. (Faurie).—ex Boiss.

*Selinum melanotilingia* Boiss. l.c.

HAB. montis Fusan (釜山). 500 m. Oct. 1901. (Faurie).—ex Boiss.  
in vallibus Nai-piang. Aug. 1901. (Faurie).—ex Boiss.

## LIGUSTICUM L.

### Clavis specierum.

A. Segmentis foliorum lanceolatis.....*L. acutilobum* S. et Z.

B. Segmentis foliorum linearibus .....*L. multijidum* SMITH.



*Ligusticum acutilobum* S. et Z. Fl. Jap. Fam. Nat. I. n. 428. Maxim. in Mél. Biol. IX. p. 247. Fran. et Sav. Enum. Pl. Jap. I. p. 186. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 372. Palib. Consp. Fl. Kor. I. p. 98. Yabe Rev. Umb. p. 66. Boiss. in Bull. l'Herb. Boiss. (1903). p. 956. *Sium triternatum* Miq. Prol. Fl. Jap. p. 245.

NOM. JAP. Tōki.

HAB. Ham-gyōng: in collibus Ouen-san (元山). Aug. 1901. (Faurie).  
—ex Boiss.

DISTR. Japonia.

*Ligusticum multifidum* SMITH. in Rees. Cycl. V. p. 21. n. 8. ex DC. Prodr. IV. p. 159. Ledeb. Fl. Ross. II. p. 286.

*Ligusticum* sp.? Yabe in Tokyo Bot. Mag. XVII. p. 107.

Planta est a Yabe bene descripta, sed valecula dorsalis 1-, lateralis 2-, commissuris utrinque 2-vittata, segmentis foliorum linearibus.

HAB. Kang-uön: mont: Kum-gang-san (金剛山). Aug. 18. 1902. fl. (T. Uchiyama).

DISTR. Sibiria.

## VII. FERULINÆ. (gn. 1.)

### PEUCEDANUM L.

#### Clavis specierum.

A. Folia 1-3 ternatisecta.

a) Folia ternata, segmentis trisectis .....*P. japonicum* THUNB.

b) Folia 3-ternatisecta. ....*P. podagraria* BOISS.

B. Folia 1-3 pinnatisecta.

a) Laciniis foliorum anguste-linearibus .....*P. elegans* KOM.

b) Laciniis foliorum lanecolatis v. ovato-lanceolatis.

.....*P. terebinthaceum* FISCH.

*Peucedanum japonicum* THUNB. Fl. Jap. p. 117. Spr. Syst. I. p. 911. DC. Prodr. IV. p. 182. Fran. et Sav. Enum. Pl. Jap. I. p. 189. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 264. Yabe Rev. Umb. in ibidem XVI. p. 95. in Tokyo Bot. Mag. XVII. p. 108.

NOM. JAP. Botan-niujin. Botan-bōfū.

HAB. Kyōng-san: Pusan (釜山). Nov. 17. 1900. fl. et fr. (T. Uchiyama).

DISTR. Japonia.

*Peucedanum podagraria* Boiss. Bull. l'Herb. Boiss. (1903). p. 957.

HAB. monte Koreae Sept. 1901. (Fauriei).—ex Boiss.

Planta endemica.

*Peucedanum elegans* KOM. in Act. h. Petrop. XVIII. p. 430. XXII. p. 758. tab. XVI! Fl. Mansh. III. p. 176 et II. tab. XVI.

HAB. in Korea bor.—ex Kom.

DISTR. Manshuria.

*Peucedanum terebinthaceum* FISCH. Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 128. Sachl. p. 138. n. 191. Fran. Pl. Dav. p. 143. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 335. Korsch. Act. h. Petrop. XII. p. 225. Palib. Consp. Fl. Kor. I. p. 98. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 502. Yabe Rev. Umb. p. 97. in Tokyo Bot. Mag. XVII. p. 108. Kom. Fl. Mansh. III. p. 174.

*P. deltoideum* Makino in Schéd. Yabe Rev. Umb. p. 99. Boiss. Umb. Kor. p. 957.

HAB. Kyōng-geui: Chemulpo (仁川). Oct. 30. 1900 fr.; Nam-han-san (南韓山). Aug. 2. 1902. fl. Oct. 19. 1900 fl. et fr. Kwa-oi (蟹岩). Oct. 20. 1900 fl. et fr. jun.; Nam-san (南山). Oct. 10.

1900 fl. et fr. mat.; Peuk-han-san (北韓山). Oct. 14. 1900 fl. et fr. (T. Uchiyama).

Kyöng-san: Phal-cho-ryöng (八肋嶺). Oct. 8. 1902. fl. et fr.; Fusan (釜山). Nov. 15. 1900. fr. mat. (T. Uchiyama).

Phyöng-an: Phyöng-yang (平壤). Sept. 12. 1902. fl. (T. Uchiyama).

Kang-uön: Meuk-kai (墨浦). Aug. 12. 1902. fl. (T. Uchiyama). Chhyun-chhyön (春川). Aug. 1906. (S. Shimogöriyama).

Chyöng-Chyang: Mok-pho (木浦). Nov. 6. 1900 fl. et fr. mat. (T. Uchiyama).

Korea: sine loco speciali 1883. fl. (M. Enuma).

DISTR. Europa, Asia bor. et temp.

### VIII. ANGELICINÆ.

#### Clavis generum.

- A. Fructus orthospermis.....*Angelica* L.  
 B. Fructus campylospermis .....*Phellopterus* BENTH.

#### ANGELICA L.

#### Clavis specierum.

- A. Folia trisecta v. 1-3 ternata v. ternato-pinnatisecta.  
 a) Folia trisecta v. ternato-pinnatisecta.  
 a) Umbellis 10-40 radiatis.  
 ○ Umbellis 10-20 radiatis.  
 △ Segmentis foliorum late-lanceolatis.  
 \* Fl. purpurascens.....*A. decursiva* FRAN. et SAV.  
 \*\* Fl. albis.....*A. decursiva forma albiflora* (YABE.)  
 △△ Segmentis foliorum anguste-lanceolatis  
 ... ..*A. cartilagino-marginata* (MAKINO).  
 ○○ Umbellis 30-40 radiatis, segmentis foliorum oblongis  
 ..... *A. kiusiana* MAXIM.

- β) Umbellis 40-70 radiatis, caule elatissimo robusto. *A. anomala* LALLEM.
- b) Folia 2-3 ternata.
- a) Vittæ commissuræ utrinque 2.
- Involucro 1-3.....*A. koreana* MAXIM.
- Involucro 5-8.....*A. Uchiyamana* YABE.
- β) Vittæ commissuræ utrinque 3-4 .....*A. Miqueliana* MAXIM.
- B. Folia 1-3 pinnatisecta.
- a) Involucro 1-4 phyllo.
- a) Commissura utrinque 1-vittata, folia bipinnatisecta  
.....*A. Maximowiczi* BENTH. f. *australis* KOM.
- β) Commissura utrinque 2-vittata.....vide *A. cartilagino-marginata*.
- b) Involucro subnullo.
- a) Segmentis foliorum oblongo-ovatis...*A. megaphylla* DIELS.
- β) Segmentis foliorum anguste-lanceolatis.....*A. flaccida* KOM.

*Angelica decursiva* FRAN. et SAV. Enum. Pl. Jap. I. p. 187.  
 Fran. Pl. Dav. p. 142. Diels Fl. Centr. Chin. in Engl. Bot.  
 Jahrb. XXVI. p. 500. Kom. Fl. Mansh. III. p. 167.  
 Peucedanum decursivum Maxim. in Mém. Biol. XII. p. 472.  
 Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p.  
 335. Henry List. Pl. Form. p. 47. Palib. Consp. Fl. Kor. I.  
 p. 98. Yabe Rev. Umb. p. 96. in Tokyo Bot. Mag. XVII. p. 108.  
 Porphyroscias decursiva Miq. Prol. Fl. Jap. p. 250.

NOM. JAP. Nodake.

HAB. Kyōng-geui: Peuk-han-san (北漢山). Oct. 14. 1900 fr. (T. Uchiyama).

Kyōng-san: Chyang-ryōng-san (頂嶺山). Oct. 2. 1902 fl. Syn-an-  
 pho (水安浦). Oct. 2. 1902 fl. (T. Uchiyama).

DISTR. China et Japonia.

forma *albiflora* (YABE).

Peucedanum decursivum forma albiflorum Yabe Rev. Umb. p. 97.  
 in Tokyo Bot. Mag. XVII. p. 108. p. p.

*P. decursivum* var. *albiflorum* Maxim. in Mél. Biol. XII. p. 472.

NOM. JAP. Shirobana-nodake.

HAB. Kang-uön: Kang-bal-ko-ryöng (干發告嶺). Aug. 21. 1902 fl.  
(T. Uchiyama).

DISTR. Japonia.

*Angelica cartilagino-marginata* (MAKINO)†NAKAI.

Peucedanum cartilagino-marginatum Makino in Schéd. Herb. Imp. Univ. Tokyo. Yabe Rev. Umb. p. 100. in Tokyo Bot. Mag. XVII. p. 108. (p. p.). Boiss. in Bull. du l'Herb. Boiss. (1908) p. 642.

Peucedanum decursivum forma albiflorum Yabe in Tokyo Bot. Mag. XVII. p. 108. (p. p.)

*Angelica crucifolia* Kom. Fl. Mansh. III. p. 170. ex descrip.

*Sium Matsumuræ* Boiss. in l.c. p. 642.

NOM. JAP. Hosobanodake.

HAB. in Korea Sept.—ex Kom.

Kyöng-geui: Syong-do (松都). Oct. 23. 1900 fr. mat.; Peuk-han-san (北漢山). Oct. 14. 1900. fl. et fr.; Syöng-työng (松亭). Sept. 28. 1902. fl. et fr. jun. (T. Uchiyama).

Kang-uön: Chho-mök-dong (草木洞). Aug. 11. 1902 fl. (T. Uchiyama).

DISTR. Japonia

*Angelica kiusiana* MAXIM. in Mél. Biol. IX. p. 14. Fran. et Sav. Enum. Pl. Jap. I. p. 187. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 334. Palib. Consp. Fl. Kor. I. p. 98. Itö et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo XII. p. 531. Yabe Rev. Umb. p. 78.

*Angelica Sieboldi* Miq. Prol. Fl. Jap. p. 249.—teste Maxim.

NOM. JAP. Oniudo.

HAB. in archipelago Koreano: Port Hamilton (巨文島). Oldham Nr. 303.—ex Hemsl. et Palib.

DISTR. Japonia.

*Angelica anomala* LALLEM. Ind. Sem. Hort. Petrop. p. 57. Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 127. Sachl. p. 137. n. 200. Amur. p. 46. n. 173. Fran. et Sav. Enum. Pl. Jap. I. p. 187. Regel Tent. Fl. Uss. n. 219. Fran. Pl. Dav. p. 141. Korsch. Act. h. Petrop. XII. p. 344. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 333.

*A. montana* Schleich.  $\beta$ . *angustifolia* Ledeb. Fl. Ross. II. p. 295.

*A. sachalinensis* Maxim. Prim. Fl. Amur. p. 127.

NOM. JAP. Ezo-niü.

HAB. Kang-uön: monte Kum-gang-san (金剛山). Aug. 16. 1902. fl. et fr. jun.

DISTR. Asia bor. et orient.

*Angelica koreana* MAXIM. in Mél. Biol. XII. p. 471. Palib. Consp. Fl. Kor. I. p. 98. Kom. Fl. Maush. III. p. 161.

HAB. ad limites Koreæ—ex Maxim.

in Korea sept.—ex Kom.

DISTR. Manshuria.

*Angelica Uchiyama* YABE. (Tab. nostra III.) in Tokyo Bot. Mag. XVII. p. 107.

HAB. Kang-uön: monte Kum-gang-san (金剛山). Aug. 20. 1902 fl. (T. Uchiyama).

Phyöng-an: Mo-ran-bön (牡丹峯). Sept. 12. fl. et fr. jun. (T. Uchiyama).

Plante endemica.

*Angelica Miqueliana* MAXIM. in Mél. Biol. IX. p. 225. Fran. et Sav. Enum. Pl. Jap. II. p. 375. Fran. Pl. Dav. p. 142. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 334. Yabe Rev. Umb. p. 87. in Tokyo Bot. Mag. p. 107.

NOM. JAP. Yama-zeri.

HAB. Kyöng-san: Fusan. Nov. 15. 1900 fr. mat. (T. Uchiyama).

Hoang-hai: inter Ansyöng (安城) et Syö-heung (瑞興). Sept. 8. 1902 fl. (T. Uchiyama).

Hoang-hai—Kyöng-geui: inter Kai-syöng (開城) et Kum-Chhyön (金川). Sept. 6. 1902 fl. (T. Uchiyama).

DISTR. Japonia.

*Angelica Maximowiczii* BENTH. et Hook. fil. Gen. Pl. I. p. 916. Maxim. in Mém. Biol. IX. p. 253. Drude in Engl. Prantl. Nat. Pfl. Fam. III. viii p. 221. Kom. Fl. Mansh. III. p. 163.

Gomphopetalum Maximowiczii Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 126. Amur. p. 45. n. 171. Sachl. p. 136. n. 186.

forma *australis* Kom. l.c. p. 165.

HAB. in Korea sept.—ex Kom.

Planta endemica.

*Angelica megaphylla* DIELS Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 500. Kom. Fl. Mansh. III. p. 168.

Prophyroscias megaphylla Boiss. in Bull. du l'Herb. Boiss. (1908) p. 643.

HAB. in Korea sept.—ex Kom.

DISTR. Manshuria et China centr.

*Angelica flaccida* Kom. in Act. h. Petrop. XVIII. p. 430. XXII. p. 758. Fl. Mansh. II. t. XVII., III. p. 166. Boiss. in Bull. Herb. Boiss. (1903), p. 957.

Peucedanum cartilagino-marginatum Yabe in Tokyo Bot. Mag. XVII. p. 108. p. p.

HAB. in Korea bor.—ex Kom.

in media Koreæ, sept. 1901.—ex Boiss.

Phyöng-an: Mo-ran-bon (牡丹峯). Sept. 12. 1902. fl. et fr. jun. (T. Uchiyama).

DISTR. Manshuria.

**PHELLOPTERUS** BENTH. et Hook. fil. (sp. 1.)

*Phellopterus littoralis* (A. GRAY) BENTH. et Hook. fil. Gen. Pl. I. p. 905. Fr. Schmidt Sachl. p. 138. n. 192. Fran. et Sav. Enum. Pl. Jap. I. p. 185. Hance in Journ. Bot. (1878). p. 11. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 331. Palib. Consp. Fl. Kor. I. p. 98. Itō et Matsum. Tent. Fl. Lutch. in Journ. Sci. Col. Imp. Univ. Tokyo p. 262. Yabe Rev. Umb. p. 93. Boiss. in Bull. Herb. Boiss. (1903). p. 355. Kom. Fl. Mansh. III. p. 174.

*Cymopterus littoralis* A. Gray Bot. Jap. p. 391.

*Geehnia littoralis* Schmidt. ex Miq. Prodr. Fl. Jap. p. 249.

NOM. JAP. Hama-bōfū.

HAB. Kyōng-san: Fusan (釜山). Wilford. Nr. 913.—ex Hemsl. et Palib.

Kyōng-geui: Chemulpo (仁川). Carles—ex Hemsl. et Palib.

Ham-gyōng: in littore maris Ouen-san, Aug. 1901.—ex Boiss.

DISTR. China, Manshuria, Sachalin, et Japonia.

## IX. TORDYLINÆ. (gn. 1.)

**HERACLEUM** L. (sp. 1.)

*Heracleum lanatum* MICX. Fl. Bor. Am. I. p. 166.! DC. Prodr. IV. p. 192. Hook. fil. Fl. Bor. Am. I. p. 269. Ledeb. Fl. Ross. II. p. 328. A. Gray Bot. Jap. p. 391. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 336. Miyabe Fl. Kurile Isl. p. 236. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 503. Yabe Rev. Umb. p. 102. in Tokyo Bot. Mag. XVII. p. 108. Kom. Fl. Mansh. III. p. 177. H. barbatum Ledeb. Fl. Alt. I. p. 300. Fl. Ross. II. p. 322.



Schmidt in Maxim. Prim. Fl. Amur. p. 129. Sachl. p. 138. n. 191. Regel Tent. Fl. Uss. n. 221. Fr. et Sav. Enum. Pl. Jap. I. p. 189. Korsch. Act. h. Petrop. XII. p. 344. Boiss. in Bull. Herb. Boiss. (1903) p. 958.

H. dissectum Ledeb. Fl. Alt. I. p. 301. Fl. Ross. II. p. 323.

H. Moellendorffii Hance in Journ. Bot. (1878). p. 12.

NOM. JAP. Hana-udo.

HAB. Kyöng-geui: Nam-san (南山). Jul. 30. 1902. fl. et fr. juu. (typicum lanati).—T. Uchiyama).

Kang-nön: monte Kum-gang-san (金剛山). Aug. 16. 1902. fl. (typicum barbati).—T. Uchiyama).

monte Koreæ Sept. 1901. (Faurie)—ex Boiss.

DISTR. Asia et America bor.

## X. SILERINÆ. (gn. 1.)

### SILER SCOP (sp. 1.)

*Siler divaricatum* (TURCZ.) BENTH. et HOOK. fil. Gen. Pl. I. p. 909. Fran. et Sav. Enum. Pl. Jap. I. p. 186. Fran. Pl. Dav. p. 141. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 332. Yabe in Tokyo Bot. Mag. XVII. p. 108. Kom. Fl. Mansh. III. p. 179.

Stenocælium divaricatum Turcz. Ledeb. Fl. Ross. II. p. 332. Fr. Schmidt in Maxim. Prim. Fl. Amur. p. 128. Regel Tent. Fl. Uss. n. 222. Korsch. Act. h. Petrop. XII. p. 344.

NOM. JAP. Bōfū.

HAB. Phyöng-an: Man-gyöng-dai (望景岱). Sept. 13. 1902 fr. (T. Uchiyama).

DISTR. China, Manshuria et Sibiria.

## ARALIACEÆ.

## Clavis generum.

## A. Petala imbricata.

a) Ovarium 5-loculis .....*Hedera* L.

b) Ovarium 2-loculis.

a) Folia palmata .....*Acanthopanax* DCNE. et PL.

β) Folia simplicia v. lobata.

○ Arbor aculeatus; styli ad apicem connati.....*Kalopanax* MIQ

○○ Frutex densissime echinatus, styli ad medium vix connati.

.....*Echinopanax* DCNE. et PL.

## B. Petala valvata.

a) Folia palmata. ....*Panax* L.

b) Folia pinnata. ....*Aralia* L.

**HEDERA** L. (sp. 1.)

*Hedera colchica* K. Koch in Linnæa XVI. p. 365. Seem. in Journ. Bot. (1864). p. 307. Harms in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 42. Palib. Consp. Fl. Kor. I. p. 99.

*Hedera rhombea* Sieb. et Zucc. Fl. Jap. Fam. Nat. I. n. 94.

*Hedera Helix* Fran. et Sav. Enum. Pl. Jap. I. p. 174. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 343.

(p. p.)

NOM. JAP. Kizuta.

HAB. Korea sine loco speciali (Schlippenbach)—ex Hemsl. et Palib.

Kyöng-san : insula Chyöl-yöng-do (絶影島) circa Pusan (釜山).  
Oct. 13. 1902. alab.; (T. Uchiyama).

Chyöl-la : Mok-pho (木浦). Nov. 5. 1900. fr. jun. (T. Uchiyama).

DISTR. China et Japonia.

**ACANTHOPANAX** DCNE. et PL. (sp. 1.)

*Acanthopanax sessiliflorum* (RUPR. et MAXIM.) SEEM. in Journ. Bot. (1867). p. 239. Fran. Pl. Dav. p. 145. Kom. Fl. Mansh. III. p. 117.

*Panax sessiliflorum* Rupr. et Maxim. in Maxim. Prim. Fl. Amur. p. 131. Fran. et Sav. Enum. Pl. Jap. I. p. 132. Regel Tent. Fl. Uss. n. 228. Gartenfl. (1862). p. 238. t. 369.

HAB. Phyöng-an: ad superiorem fluminis Jalu Aug. 1907. fl. (Shiki).

Kang-uön: monte Kum-gang-san (金剛山). Aug. 18. 1902. fl. (T. Uchiyama).

Chyung-chyang: Syu-an-pho (水安浦). Oct. 1. 1902. fl. et fr. (T. Uchiyama).

Kyöng-geui: monte Nam-han-san (南韓山). Oct. 18. 1900. fr. mat. (T. Uchiyama).

DISTR. Manshuria et Amur.

**KALOPANAX** MRO. (sp. 1.)

*Kalopanax ricinifolium* MRO. in Ann. Mus. Bot. Lugd. Bot. I. p. 16. Prol. Fl. Jap. p. 90. Harms in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 50. Palib. Consp. Fl. Kor. I. p. 99.

*Acanthopanax ricinifolium* Seem. in Journ. Bot. (1868). p. 140. Fran. et Sav. Enum. Pl. Jap. I. p. 193. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 340.

*Panax ricinifolium* Sieb. et Zucc. Fl. Jap. Fam. Nat. I. p. 91. NOM. JAP. Hari-giri.

HAB. Kang-uön: Peuk-tung-dji (北屯址). Aug. 22. 1902. fr. jun. (T. Uchiyama).

Kyöng-geui: Chemulpo (仁川). Oct. 30. 1900. fr. mat. (T. Uchiyama).

In Korea bor. (Komarov)—ex Kom.

DISTR. China et Japonia.

### **ECHINOPANAX** DCNE. et PL.

#### **Clavis specierum.**

*A. Umbellula racemosa* ..... *E. horridus* DCNE. et PL.

*B. Umbellula stricte umbellata.* ..... *E. elatus* NAKAI.

*Echinopanax horridus* (SEEM). DCNE. et PL. in Rev. Hort. IV. iii. (1854). p. 105. Harms in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 34. Kom. Fl. Mansh. III. p. 116.

*Fatsia horrida* Benth. et Hook. fl. Gen. Pl. I. p. 939. Fran. et Sav. Enum. Pl. Jap. I. p. 194.

*Oplopanax horridus* Miq. Prol. Fl. Jap. p. 90.

NOM. JAP. Hari-buki.

HAB. in Korea bor. (Komarov)—ex Kom.

DISTR. Japonia et America bor.

*Echinopanax elatus* NAKAI. sp. nov. Tab. XV. Caule 4–5 pedali v. ultra, erecto v. flexuoso v. interdum subtortuoso, dense echinato, longissimis spinis 7–8 m.m. longis, ad apicem atrofuscis; foliis ad apicem caulis confertis, petiolatis; petiolis 8–12 c.m. longis, dense echinatis, spinis longissimis autem 3 m.m. non excedentibus, laminis ambitu subreniformibus, vulgo 20–35 c.m. latis, 15–25 c.m. longis, 5–7 lobatis, lobis ovatis, duplicato serrulatis, apice subito attenuatis, supra ad venas sparse brevi-echinati, infra ad venas dense pubescentibus, inflorescentia umbellulifera ad apicem caulis racemosa, dense pubescentibus, bracteatis, bracteis membranaceis lanceolatis, subfuscis, deciduis, *umbellulis stricte umbellatis* (non racemosis), bracteolis linearibus subfuscis, dense pubescentibus, pedicellis ad medium et apicem 1-bracteolatis,

bracteolis setaceis, fl. ignotis, fr. 2-rarissime 3-loculatis, stylis persistentibus  $\frac{1}{2}$  fructus æquantibus, glabris, vulgo ad medium connatis apiceque recurvatis, rarissime ad basin divisis, fructus maturati nigri.

HAB. Kang-uön: monte Kum-gang-san (金剛山). Aug. 18. 1902.  
(T. Uchiyama).

Planta endemica.

### PANAX L.

*Panax Ginseng* C. A. Mex. in Bull. Acad. Sc. St. Petersburg. I. p. 340. Walp. Rep. V. p. 924. Maxim. in Mém. Biol. VI. p. 265. Seem. Journ. Bot. (1864). 320. (1867). p. 54. Harms in Engl. Bot. Jahrb. XXIII. p. 10. in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 59. Fig. 10. et 11. Palib. Consp. Fl. Kor. I. p. 100. *Panax quinquefolium* var. *Ginseng* Regel et Maak in Regel Gartenfl. (1862). p. 314. t. 375.

*Aralia quinquefolia* Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 338.

NOM. JAP. Ninjin.

HAB. in Korea bor. (Komarov)—ex Kom.

DISTR. Manshuria.

In Manshuria et Japonia etiam colitur.

Res sequentes sunt quæ a T. Uchiyama nobis dictæ sunt.

In Korea, *Panax Ginseng*, maxime in Syong-dō (松都) colitur, et quæ ex illo, specialem medicam potestatem habere a populis creduntur.

Longos sulcos arbitriæ longitudinis in hortis faciunt et regulariter plantatæ ibi sub peculiare umbraculum coluntur.

Observit etiam cultivatas in Tai-ku (大邱), sed illæ atque ex aliis ut cruda specimina venduntur.

Radix unica spontaneæ plantæ 20–30 Yen. Jap. licet, ita ea est populis gratissima, sed propter eas impigras naturas invenire non audent. etc. etc.

### ARALIA L.

#### Clavis specierum.

*A. Suffrutex*, inermis ..... *A. cordata* THUNB.  
*B. Frutex*, spinosus. .... *A. chinensis* L.

*Aralia cordata* THUNB. Fl. Jap. p. 127. DC. Prodr. IV. p. 258. Miq. in Ann. Mus. Bot. Lugd. Bat. I. p. 9. Prol. Fl. Jap. p. 90. Fran. et Sav. Enum. Pl. Jap. I. p. 191. Kom. Fl. Mansh. III. p. 125.

*A. edulis* Sieb. et Zucc. Fl. Jap. I. p. 57. t. 25. Seem. in Journ. Bot. (1868). p. 134.

NOM. JAP. Udo.

HAB. in Korea bor.—ex Kom.

DISTR. Japonia et Manshuria.

*Aralia chinensis* L. Sp. Pl. (ed. II.) p. 393. DC. Prodr. IV. p. 259. Seem. in Journ. Bot. (1868). p. 133. Harms in Engl. Bot. Jahrb. XXIII. p. 17. in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 57. Palib. Consp. Fl. Kor. I. p. 99.

*A. spinosa* in Miq. Ann. Mus. Bot. Lugd. Bat. I. p. 8. Regel Tent. Fl. Uss. n. 229. Fran. et Sav. Enum. Pl. Jap. I. p. 191. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 338.

*A. canescens* Sieb. et Zucc. Abh. Acad. Münch. IV. p. 202.

*A. elata* Seem. in Journ. Bot. (1868). p. 134.

*A. mandshurica* Rupr. et Maxim. Bull. Cl. Phys. Math. Acad. St. Petersb. XV. p. 134! Seem. in Journ. Bot. (1868). p. 134.

Harms in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 57. Kom. Fl. Mansh. III. p. 123.

*Dimorphanthus elatus* Miq. Comm. Phyt. 98. t. 12! Walp. Rep. II. p. 430.

*D. mandshuricus* Maxim. Prim. Fl. Amur. p. 133.

NOM. JAP. Taranoki.

HAB. Kyöng-geui: Seoul Jun. 1886. fl. (Kalinowsky)—ex Palib.

Nam-san (南山). Sept. 1. 1902. fl. (T. Uchiyama). foliis moderate serrulatis, subtus ad venas pubescentibus, non canescentibus.

Kyöng-san: Chyang-ryöng-san (頂嶺山). Oct. 2. 1902. (M. Uchiyama). foliis plus minus argute serratis, subtus ad venas pubescentibus, non canescentibus.

Ibidem (T. Uchiyama). foliis argute duplicato-serratis, subtus ut præced.

DISTR. Japonia, Manshuria, China et Amur.

## CORNACEÆ.

### Clavis generum.

A. Flores hermaphroditi.

a) Petala loriformia. .... *Alangium* L.

b) Petala brevia, regularia..... *Cornus* L.

B. Flores unisexuales; caulis viridis ..... *Aucuba* THUNB.

### ALANGIUM L. (sp. 1.)

*Alangium platanifolium* (SIEB. et ZUCC.) HARMS. in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 261. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 505. Kom. Fl. Mansh. III. p. 185.

*Marlea platanifolia* Sieb. et Zucc. Fl. Jap. Fam. Nat. I. p. 26. Miq. Prol. Fl. Jap. p. 91. Fran. et Sav. Enum. Pl. Jap. I. p. 195. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 344. Palib. Conspect. Fl. Kor. I. p. 101.

NOM. JAP. Urinoki.

HAB. in archipelago Koreano (Oldham Nr. 471).—ex Hemsl. et Palib.

in Korea bor. (Komarov)—ex Kom.

DISTR. Japonia.

## CORNUS L.

### Clavis specierum.

A. Involucra petaloidea ; fl. capitati v. subcapitato-aggregati.

a) Arbor .....*Cornus Kousa* BUERG.

b) Herba perennia .....*Cornus canadensis* L.

B. Involucra petaloidea desunt.

a) Inflorescentia umbellata, flores flavi...*Cornus officinalis* S. et Z.

b) Inflorescentia paniculata, flores albi.

a) Folia alterna .....*Cornus macrophylla* WALL.

β) Folia opposita .....*Cornus brachypoda* C. A. MEY.

*Cornus Kousa* BUERG. Fran. et Sav. Enum. Pl. Jap. I. p. 196.

Harms in Engl. Prantl. Nat. Pfl. Fam. III. viii. p. 267. Palib.

Consp. Fl. Kor. I. p. 101.

*Benthamia japonica* Sieb. et Zucc. Fl. Jap. I. p. 38. t. 16. Miq.

Prol. Fl. Jap. p. 91.

NOM. JAP. Yamabōshi.

HAB. Kyōng-geui : Seoul Jun. 1886. fl. (Kalinowsky)—ex Palib.

DISTR. Japonia.

*Cornus canadensis* L. Sp. Pl. (ed. II.) p. 172. DC. Prodr.

IV. p. 274. Maxim. Prim. Fl. Amur. p. 134. Fr. Schmidt

Amur. p. 47. n. 181. Sachl. p. 141. n. 202. Fran. et Sav.

Enum. Pl. Jap. I. p. 197. Kom. Fl. Mansh. III. p. 181.

NOM. JAP. Gozentachibana.

HAB. in Korea bor. (Komarov)—ex Kom.

DISTR. Regio bor. et are.



*Cornus officinalis* SIEB. et ZUCC. Fl. Jap. I. p. 100. t. 50. Miq. in Ann. Mus. Bot. Lugd. Bat. II. p. 160. Prol. Fl. Jap. p. 92. Fran. et Sav. Enum. Pl. Jap. I. p. 196. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 345. Palib. Consp. Fl. Kor. I. p. 101.

NOM. JAP. Sanshiyu.

HAB. Kyöng-geui: Seoul (京城). Carles—ex Hemsl. et Palib.

DISTR. Japonia et China.

*Cornus macrophylla* WALL. in Roxb. Fl. Ind. I. p. 433. DC. Prodr. IV. p. 272. Clark in Hook. fil. Fl. Brit. Ind. II. p. 744. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 345. Palib. Consp. Fl. Kor. I. p. 101. Kom. Fl. Mansh. III. p. 184. (probabiliter p. p.)

NOM. JAP. Mizuki.

HAB. in Korea Septentr. (Komarov)—ex Kom.

Kyöng-san: Port Fusan (釜山). Wilford Nr. 945.—ex Hemsl. et Palib.

Kyöng-geui: *Seoul Van-Tang-San. Jun. 2. 1895. fl.* (Sontag).—ex Palib.

Phyöng-an: Sin-ryöng (新嶺) in Heui-chhyön (熙川郡). Sept. 11. 1905. ster. (T. Imagawa).

Kang-uön: monte Kum-gang-san (金剛山). in aestate anni 1895. (K. Hayashi).

DISTR. China, Manshuria, Himalaya et Japonia.

*Cornus brachypoda* C. A. MEY. in Mém. Acad. Petrop. I. p. 222. Miq. Prol. Fl. Jap. p. 92. Fran. et Sav. Enum. Pl. Jap. I. p. 125.

*C. ignorata* C. Koch Dendr. I. p. 684.

*C. sanguinea* (non L.) Thunb. Fl. Jap. p. 62. Sieb. et Zucc. Fl. Jap. Fam. Nat. I. n. 401.

*C. macrophylla* Kom. Fl. Mansh. III. p. 184. (probabiliter p. p.)

NOM. JAP. Kumano-mizuki.

HAB. Hoang-hai: inter Syö-heung (瑞興) et Phung-syu-uön (風壽院). Sept. 7. 1902. fr.; inter Phyung-syu-uön (風壽院) et Pong-san (鳳山). Sept. 8. 1902. fr. (T. Uchiyama).

Phyöng-an: ad superiorem fluminis Jalu Aug. 1907. (M. Shiki).

DISTR. China et Japonia.

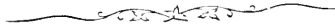
**AUCUBA** THUNB. (sp. 1.)

*Aucuba japonica* THUNB. Fl. Jap. p. 64. tt. 12 et 13. DC. Prodr. IV. p. 274. Miq. Prol. Fl. Jap. p. 92. Fran. et Sav. Enum. Pl. Jap. I. p. 197. Bot. Mag. tt. 1197, 5512. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 346. Palib. Consp. Fl. Kor. I. p. 102.

NOM. JAP. Aoki.

HAB. in archipelago Koreano: Port Hamilton (巨文島). Oldham Nr. 469.—ex Hemsl. et Palib.

DISTR. Japonia.



## GAMOPETALÆ.

## CAPRIEOLIACEÆ.

## Clavis generum.

- A. Folia pinnata.....*Sambucus* L.  
 B. Folia simplicia.  
 a) Herba repens.....*Lonicera* GRONOV.  
 b) Frutex.  
 a) Fructus in drupa v. in bacca.  
   ○ Flores corymboso v. subumbellato-decompositi ....*Viburnum* L.  
   ○○ Flores cymosi v. capitati.....*Lonicera* L.  
 β) Capsula dehiscentia .....*Diervilla* TOURN.

**SAMBUCUS** L. (sp. 1.)

*Sambucus racemosa* L. Sp. Pl. (ed. II.) p. 386. DC. Prodr. IV. p. 323. Pall. Fl. Ross. II. p. 29. Hook. et Arn. Bot. Beech. Voy. p. 115. Ledeb. Fl. Alt. I. p. 420, Fl. Ross. II. p. 380. Bunge Enum. Pl. Chin. bor. n. 193. Maxim. Prim. Fl. Amur. p. 135. Miq. Prol. Fl. Jap. p. 56. Fran. et Sav. Enum. Pl. Jap. I. p. 198. Baker et Moore in Journ. Linn. Soc. XVII. p. 383. Herder in Pl. Radd. III. i. p. 4. n. 2. Fran. Pl. Dav. p. 148. Forbes et Hemsl. Ind. Fl. Sin. in. Journ. Linn. Soc. XXIII. p. 348. Korsch. Act. h. Petrop. XII. p. 345. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 584. Gilg. et Loes. in Engl. Bot. Jahrb. XXXIV. Beiblatt. p. 68.

*S. pubescens* Pers. Syn. Pl. I. p. 328.

NOM. JAP. Niwatoko.

HAB. Kyōng-geui: Nam-san (南山). Oct. 13. 1900 fr. mat. (T. Uchiyama).

Seoul (京城—Carles)—ex Hemsl.

Seoul; 1886 fl. (Kalinowsky); Theo-Muu-An-'Tai-Kul. Apr. 29  
1894, *Hut-Tschai-Meo. Mai. 1. 1894. fl.* Pauk-han Mai 9. 1894.  
fl. (Sontag).....ex Palib.

in archipelago Koreano: Port Hamilton (巨文島).—Oldham. n.  
472,.....ex Hemsl. et Palib.

DISTR. Europa, Asia et Am. bor.

### LINNÆA GRONOV. (sp. 1.)

*Linnæa borealis* L. Sp. Pl. (ed. II.) p. 886. DC. Prodr. IV.  
p. 340. Hook. et Arn. Bot. Beech. Voy. p. 125. Lessing in  
Linnæa IX. p. 157. Ledeb. Fl. Alt. I. p. 464. Fl. Ross. II.  
p. 392. Turcz. in Linnæa III. p. 137. Maxim. Prim. Fl. Amur.  
p. 139. Koch. Syn. Fl. Germ. et Helv. (ed. III.) p. 280.  
Benth. et Hook fil. Fl. Brit. Isl. (ed. V.) p. 211. Herder in  
Pl. Radd. III. i. p. 20. n. 14. Korsch. Act. h. Petrop. XII. p.  
346. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc.  
XXIII. p. 359. A. Gray Manual. p. 202. Miyabe Fl. Kurile  
Isl. p. 238. Palib. Consp. Fl. Kor. I. p. 103.

NOM. JAP. Ezo-Aridōshi.

HAB. sine loco indicatione (Bushell h. b. Hance. Nr. 653).....ex  
Palib.

DISTR. Europa occident.; Asia bor. et centr.; Japonia et Am. bor.

### VIBURNUM L.

#### Clavis specierum.

A. Stipulæ nullæ.

a) Bacca rubra.....*V. dilatatum* THUNB.

b) Bacca atro-purpurea.

a) Folia elliptica v. lanceolata .....*V. davuricum* PALL.

β) Folia dilalata, ovata v. rotundata .....*V. Carlesii* HEMSL.

B. Stipulae evolutae v. minutissimae.

a) Folia trilobata .....*V. Opulus* L.

b) Folia non lobata.

a) Stipulae petiolum subaequilongae, folia basi rotundata  
.....*V. erosum* THUNB.

β) Stipulae minutissimae, petiolo multo breviores  
.....*V. Wrightii* MIQ. var. *stipellatum* NAKAI.

*Viburnum dilatatum* THUNB. Fl. Jap. p. 124. DC. Prodr. IV. p. 329. Sieb. et Zucc. Fl. Jap. Fam. Nat. II. p. 171. A. Gray Bot. Jap. p. 393. (excl. syn. *V. erosi*). Miq. Prol. Fl. Jap. p. 134. Bot. Mag. t. 6215. Moore in Journ. Bot. XIII. p. 231. Lind. in Journ. Hort. Soc. III. (1848) p. 247. ! Fran. et Sav. Enum. Pl. Jap. I. p. 200. Maxim. in Mém. Biol. X. p. 664. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 351. Palib. Consp. Fl. Kor. I. p. 102. Gilg. et Loes. in Engl. Bot. Jahrb. XXXIV. p. 68.

*V. erosum* A. Gray (non Thunb.) in Perry's exped. II. p. 313.

NOM. JAP. Gamazumi.

HAB. Kyōng-geui: Syong-tyōng (松亭), Sept. 28. 1902 fr. mat. (T. Uchiyama).

Korea: sine loco indicato (Schlippenbach)—ex Maxim, Hemsl. et Palib.

DISTR. China, Japonia, Himalaya orient.

*Viburnum davuricum* PALL. Fl. Ross. II. p. 30. t. 58. DC. Prodr. IV. p. 328. Ledeb. Fl. Ross. II. p. 386. Herder in Pl. Radd. III. p. 11. n. 6. t. 1. f. 2. Maxim. in Mém. Biol. X. p. 654. Fran. Pl. Dav. p. 149. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 351.

HAB. Kang-üön : m'te Kum-gang-san (金剛山). Aug. 15. 1902 fr. mat. (T. Uchiyama).

DISTR. Sibiria, China et Dahuria.

*Viburnum Carlesii* HEMSL. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 350. Palib. Consp. Fl. Kor. I. p. 102.

HAB. Kyöng-geui : Chemulpo (仁川). Oct. 31. 1900 fr. mat. (T. Uchiyama). Ibidem (Carles)—ex Hemsl.

Korea occidentalis (Perry)—ex Hemsl.

Planta endemica.

*Viburnum Opulus* L. Sp. Pl. (ed. II.) p. 384. DC. Prodr. IV. p. 328. Pall. Fl. Ross. II. p. 31. Ledeb. Fl. Alt. I. p. 420. Fl. Ross. II. p. 284. Koch Syn. Fl. Germ. et Helv. I. (ed. III.) p. 278. Miq. Prol. Fl. Jap. p. 153. A. Gray Bot. Jap. p. 393. Fran. et Sav. Enum. Pl. Jap. I. p. 199. Benth. et Hook. fil. Fl. Brit. Isl. (ed. V.) p. 209. Herder in Pl. Radd. III. i. p. 6. Baker et Moore in Journ. Linn. Soc. XIII. p. 383. Maxim. in Mém. Biol. X. p. 670. Korsch. Act. h. Petrop. XII. p. 345. Gray Manual. p. 207. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 354. Palib. Consp. Fl. Kor. I. p. 103. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 590. Gilg. et Loes. in Engl. Bot. Jahrb. XXXIV. Beiblatt. p. 68.

NOM. JAP. Kanboku.

HAB. Kyöng-geui : Chemulpo (Carles)—ex Hemsl.

Seoul (京城). Mai 1886. (Kalinowsky); Hut-Tschai-Meo, Mai 1. 1894 fl. incip.; Hon-Tschu-Wan, Mai 4. 1894 fl.; in ditione Seoulensi, Pauk-Han Mai 9. 1894, fl. incip.; Seoul prope viam ad Peking ducentem, Mai 25. 1894. fl. (Sontag).—ex Palib.

Pha-juu (坡州). Oct. 22. 1900 fr. mat. (T. Uchiyama).

f. *sterile* DIPP. in Palib. Consp. Fl. Kor. l.c.

HAB. in ditione Seoulensi: Pank-Han Mai 9. 1894 fl., in monte  
Yisan Mai 28. 1894 fl.—ex Palib.

DISTR. Europa, Asia et Am. bor.

*Viburnum erosum* THUNB. Fl. Jap. p. 124. DC. Prodr IV. p. 327. Sieb. et Zucc. Fl. Jap. Fam. Nat. n. 585. Miq. Prol. Fl. Jap. p. 154. Fran. et Sav. Enum. Pl. Jap. I. p. 200. Maxim. in Mél. Biol. X. p. 669. Fran. Pl. Dav. p. 148. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 351. Palib. Consp. Fl. Kor. I. p. 103. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 589. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Col. Imp. Univ. Tokyo XXII. p. 180.

NOM. JAP. Ko-gamazumi.

HAB. Kyöng-geui: Seoul (京城).—Dr. Gottsche.; ibidem: prope Tap-Tong Mai 20. 1895 fl.; *Van-Tung-Son*, Jun. 2. 1895. fl. (Sontag)—ex Palib.

Peuk-han-san (北漢山). Oct. 14. 1900 fr. mat.; Nam-san (南山). Jul. 20. 1902 fr.; (T. Uchiyama).

Chöl-la: Mok-chyan (木市). Sept. 9. 1900 fr. (T. Uchiyama).

in archipelago Koreano (Oldham n. 477)—ex Hemsl.

DISTR. China et Japonia.

*Viburnum Wrightii* MIQ. Prol. Fl. Jap. p. 155. Fran. et Sav. Enum. Pl. Jap. I. p. 200. Maxim. in Mél. Biol. X. p. 667.

var. *stipellatum* NAKAI. Folia omnia minute stipellata, stipulis persistentibus l. 5–2. 5. mm. longis, linearibus, cct. ut typ.

HAB. Kang-uön: m'te Kum-gang-san (金剛山). Aug. 16. 1902. fr. mat. (T. Uchiyama).

Plantæ typicæ quæ in Japonia crescent, etiam, rarissime minutissimas stipulas portant, ita hac planta cum varietate nostra conjungunt et sect. *Viburnum* et sect. *Opulus*.

**LONICERA L.****Clavis specierum.**

A. Caulis volubilis .....*L. japonica* THUNB.

B. Caulis non volubilis.

a) Pedunculis petiolis longiores, baccis coccineis.

α) Corolla bilabiata.....*L. chrysantha* TURCZ.

β) Corolla 5-lobata.....*L. hispida* PALL.

b) Pedunculis petiolis multo breviores.

α) Bacca coccinea, folia acuminata .....*L. Maackii* RUPR.

β) Bacca atro-cærulea, folia obtusa .....*L. cærulea* L.

*Lonicera japonica* THUNB. Fl. Jap. p. 89. Miq. Prol. Fl. Jap. p. 157. Fran. et Sav. Enum. Pl. Jap. II. p. 651. I. p. 203. Maxim. in Mém. Biol. X. p. 56. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 364. Palib. Consp. Fl. Kor. I. p. 104. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 594. Gilg. et Lœs. in Engl. Bot. Jahrb. XXXIV. Beiblatt p. 68. Hayata Enum. Pl. Form. p. 181.

*L. chinensis* Wats. Dendr. Brit. t. 117. ex DC. Prodr. IV. p. 303.

*L. flexuosa* Thunb. in Trans. Linn. Soc. II. p. 330. Miq. Prol. Fl. Jap. p. 158.

*L. confusa* Miq. l.c. p. 157. Fran. et Sav. Enum. Pl. Jap. I. p. 203.

*L. brachypoda* DC. Prodr. IV. p. 335. Sieb. et Zucc. Fl. Jap. Fam. Nat. II. p. 171.

NOM. JAP. Suikazura.

HAB. Kyōng-san : Fusan (Wilford)—ex Maxim, Hemsl. et Palib.

Chyōl-yōng-dō (絶影島). Oct. 13. fl. (T. Uchiyama).



Chyöl-la : Mok-pho (木浦). Sept. 27. 1902. fl. et fr. (T. Uchiyama).

Kyöng-geui : Seoul : Jun. 1886. fl. (Kalinowsky)—ex Palib.

Peuk-han-san (北漢山). Oct. 14. 1900 fr.; Chhyöng-nyang-li (清涼里). Sept. 27. 1902. fl. et fr. (T. Uchiyama).

Kang-uön : Kum-syöng (金城). Aug. 8. 1902 fl. et fr. (T. Uchiyama).

Ham-gyöng : Gen-san 1889 (Dr. Epow)—ex Palib.

in archipelago Koreano (Oldham Nr. 485).—ex Hemsl.

DISTR. China et Japonia.

*Lonicera chrysantha* Turcz. in Ledeb. Fl. Ross. II. p. 388. Maxim. Prim. Fl. Amur. p. 135. Ind. Fl. Pek. p. 472. Ind. Fl. Mong. p. 482. in Mél. Biol. X. p. 68. Regel Gartenfl. (1863). p. 211. t. 404. Uss. n. 237. Fr. Schmidt Sachl. p. 142. n. 209. Korsch. Act. h. Petrop. p. 346. Herder in Pl. Radd. III. i p. 14. n. 8. Forbes et Hemsl. l.c. p. 360. Palib. l.c. p. 104. Gilg. et Loes. l.c. p. 68.

*L. xylosteum* Regel Uss. n. 238.

NOM. JAP. Nemuro-bushidama.

HAB. Kang-uön : Kum-gang-san (金剛山). Aug. 16. 1902 (T. Uchiyama).

Kyöng-san : monte Chii, Aug. 1907. fr. (Shiki).

DISTR. Sibiria, Manshuria, China et Japonia.

*Lonicera Maackii* Rupr. Pl. Maack. n. 55. Maxim. in Mél. Biol. X. p. 66. Fran. et Sav. Enum. Pl. Jap. II. p. 652. Herder in Pl. Radd. III. i. p. 15. n. 11. Forbes et Hemsl. Ind. Fl. Sin. I. p. 364. Palib. l.c. I. p. 104. Diels, Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 594. Gilg. et Loes. l.c. p. 68.

HAB. Kyöng-geui : Seoul. Mai 1886. fl. (Kalinowsky).

M'te Nam-han-san (南漢山). Oct. 18. 1900 fr. (T. Uchiyama).  
DISTR. China, Manshuria et Japonia.

*Lonicera hispida* PALL. in Schult. Syst. V. p. 258! Ledeb. Fl. Ross. II. p. 389. DC. Prodr. IV. p. 338. Clark in Hook. fil. Fl. Brit. Ind. III. p. 11. Maxim. in Mél. Biol. X. p. 72. Hook. fil. et Thom. in Journ. Linn. Soc. II. p. 165. Forbes et Hemsl. l.c. I. p. 363. Palib. l.c. I. p. 164. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 596.

HAB. in litore orientali (Schlippenbach).—ex Hemsl. et Palib.

DISTR. Asia tota.

*Lonicera caerulea* L. Sp. Pl. (ed. II.) p. 249. DC. Prodr. IV. p. 337. Ledeb. Fl. Ross. II. p. 390. Bot. Mag. t. 1965. Koch Syn. Fl. Germ. et Helv. I. (ed. III). p. 279. Maxim. in Mél. Biol. X. p. 75. Gray Manual p. 204. Forbes et Hemsl. Ind. Fl. Sin. I. p. 360. Diels l. Centr. Chin. in. Engl. Bot. Jahrb. XXIX. p. 596.

NOM. JAP. Kuromino-uguisukazura.

HAB. Schang-pei-shan (長白山). Jul. 5. 1905. fr. (T. Uchiyama).

DISTR. Reg. bor. et temp.

## DIERVILLA TOURN.

### Clavis specierum.

- A. Calycis laciniae lanceolate, semina exalata.....*D. florida*, S. et Z.  
B. Calycis laciniae lineares, semina alata .....*D. floribunda* S. et Z.

*Diervilla florida*, SIEB. et ZUCC. Fl. Jap. I. p. 75. Carr. Rev. Hort. (1853), p. 309! Hance in Journ. Linn. Soc. XIII. p. 81. Maxim. in Mél. Biol. XII. p. 482. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 368. Palib. Consp. Fl.

Kor. I. p. 105. Gilg. et Loes. in Engl. Bot. Jahrb. XXXIV. Beiblatt. 68.

*Calysphyrum floridum* Bunge Enum. Pl. Chin. bor. n. 196.

*Weigela rosea* Lindl. in Journ. Hort. Soc. I. (1846). p. 65 t. 6. Bot. Mag. t. 4396.

*Diervilla rosea* Walp. Ann. I. p. 365. Fran. Pl. Dav. p. 151.

*Weigela pauciflora* DC. et *W. florida* DC. in Ann. Sc. Nat. 2. ser. XI. p. 450!

*Diervilla pauciflora* Carr. Rev. Hort. (1853). p. 310!

*Diervilla amabilis* Carr. ibid. p. 305! Planch. in V. Htte d. Serr. VIII. p. 287. t. 855! Bot. Mag. t. 4893.

HAB. Korea (Schlippenbach) archipelago Koreano (Oldham Nr. 490)  
—ex Maxim.

Kyöng-geui: Seoul (Carles)—ex Hemsl.

ibidem Aug. 1883. fl. (Dr. Gottsche) Shin-ku-kai Apr. 18. 1883. fl.; *Thee-Mun-An-Tai-Kul* Apr. 29. 1894 fl.; *Hut-Tschai-Meo-Mai* 1. 1894. fl.; *prope Tap-Tong Mai* 20. 1895. fl.; Van-Tang-San Jun. 2. 1895 fl. (Sontag).—ex Palib.

Nam-san (南山). Sept. 25. 1902 fr.; Peuk-han-san (北漢山). Oct. 10. 1900 fr.; Jun. 28. 1902. fl. (T. Uchiyama).

DISTR. China et Manshuria.

*Diervilla floribunda* SIEB. et ZUCC. Fl. Jap. I. p. 73. t. 32. Miq. Prol. Fl. Jap. p. 157. (excl. syn. *D. hortensis* S. et Z.) Carr. l.c. p. 307! Fran. et Sav. Enum. Pl. Jap. I. p. 202. Maxim. in Mél. Biol. XII. p. 485. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 369. Palib. Consp. Fl. Kor. I. p. 105. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 597. Gilg. et Loes. l.c. p. 68.

NOM. JAP. Nishiki-utsugi.

HAB. Kyöng-geui: Seoul Mai 1886 fl. (Kalinowsky); *Thee-Mun-An-*

Tai-Kul. Apr. 29. 1894. fl. ; Hut-Tschai-Meo. Mai 1. 1894 fl. ; Tun-Kwan-Tai-Kul. Apr. 1895 fl. (Sontag)—ex Palib.

DISTR. China et Japonia.

## RUBIACEÆ.

### Clavis generum.

- A. Ovula in loculis  $\infty$ , planta carnosa ..... *Oldenlandia* L.  
 B. Ovula in loculis solitaria.  
   a) Ovula basilaria ..... *Pederia* L.  
   b) Ovula septo affixa.  
     a) Flores 5-meri, fructus drupacei ..... *Rubia* L.  
     β) Flores 4-meri, fructus siccati.  
       ○ Corolla rotata v. rotato-campanulata ..... *Galium* L.  
       ○○ Corolla infundibularis v. tubuloso-infundibularis... *Asperula* L.

### OLDENLANDIA L. (sp. 1.)

*Oldenlandia paniculata* L. Sp. Pl. (ed. II). p. 1667. DC. Prodr. IV. p. 427. Benth. Fl. Hongk. p. 152. Miq. Fl. Ind. Bat. I. ii. p. 191. Hook. fil. Fl. Brit. Ind. III. p. 69. Maxim. in Mém. Biol. XI. p. 785. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 377. Matsum. et Hayata Enum. Pl. Form. in Journ. Sci. Coll. Imp. Univ. Tokyo XXII. p. 186.

NOM. JAP. Sonare-mugura.

HAB. Kyōng-san : Fusan : Chhöl-yōng-dō Nov. 16. 1900 fr. mat. (T Uchiyama).

DISTR. China et Japonia.

### ÆDERIA L. (sp. 1.)

*Pederia tomentosa* Bl. DC. Prodr. IV. p. 471. Miq. Fl. Ind. Bat. II. p. 258. Hook. fil. Fl. Brit. Ind. III. p. 197. Maxim.

in M $\acute{e}$ l. Biol. XI. p. 798. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 389. Palib. Consp. Fl. Kor. I. p. 106. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 583. Gilg. et L $\acute{a}$ es. in Engl. Bot. Jahrb. XXXIV. Beiblatt. p. 67. Matsum. et Hayata Enum. Pl. Form. p. 198.

*Pæderia fœtida* Thunb. Fl. Jap. p. 106. Hook. et Arn. Bot. Beech. Voy. p. 194. Benth. Fl. Hongk. p. 162. Miq. Prol. Fl. Jap. p. 275. Fran et Sav. Enum. Pl. Jap. I. p. 210. Hance in Journ. Bot. (1874). p. 261.

*Pæderia chinensis* Hance in Journ. Bot. (1878). p. 228. et (1879). p. 12. Fran. Pl. Dav. p. 155.

NOM. JAP. Yaitobana; Hekuso-kazura.

HAB. Ch $\acute{o}$ l-la: Mok-pho (木浦). Nov. 6. 1900 fr. (T. Uchiyama).

Ky $\acute{o}$ ng-san: Fusan: 1889 fl. (Dr. Epow) ex Palib. ibidem Chy $\acute{o}$ l-y $\acute{o}$ ng-d $\acute{o}$  Oct. 13. 1902 fr. (T. Uchiyama).

DISTR. India, China, Manshuria et Japonia.

## RUBIA L.

### Clavis specierum et varietatum.

A. Verticilli foliorum stricte 4.

a) Caulis subsimplex, suberectus; folia lanceolata

.....*R. chinensis* REGEL et MAACK.

b) Caulis scandens, ramosus; folia cordato-ovata

.....*R. cordifolia* L. var. *laxa* NAKAI.

B. Verticilli foliorum 4-10 vulgo 5-8; folia cordato-v. subtruncato-oblonga.

.....*R. cordifolia* L.  $\beta$ . *pratensis* MAXIM.

*Rubia chinensis* REGEL et MAACK. Regel Tent. Fl. Uss. n. 241 t. 8. ff. 1. et 2. Maxim. in M $\acute{e}$ l. Biol. IX. p. 266. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 392. Korsch. Act. h. Petrop. XII. p. 346.

*Rubia mitis* Miq. in Ann. Mus. Bot. Lugd. Bat. III. p. 112.  
Prol. Fl. Jap. p. 276.

NOM. JAP. Ō-kinutasō.

HAB. Kang-uön: m'te Kum-gang-san (金剛山). Aug. 16. et 18.  
1902. fr. (T. Uchiyama).

DISTR. Asia orient.

*Rubia cordifolia* L. Mant. p. 197. DC. Prodr. IV. p. 588.  
Roxb. Fl. Ind. I. p. 374. Wight. Ic. I. p. 187. [Miq. Fl. Ind.  
Bat. II. p. 337. Prol. Fl. Jap. p. 275. Ledeb. Fl. Ross. II. p.  
405. Bunge Enum. Pl. Chin. bor. n. 200. Maxim. Prim. Fl.  
Amur. p. 139. in Mém. Biol. IX. p. 266. Regel Tent. Fl. Uss.  
n. 240. Hook. fil. Fl. Brit. Ind. III. p. 202. Herder in Pl.  
Radd. III. i. p. 21. n. 15. Fran. Pl. Dav. p. 155. Forbes et  
Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 393.  
Palib. l.c. I. p. 106. Diels Fl. Centr. Chin. in Engl. Bot.  
Jahrb. XXIX. p. 583. Gilg. et Lœs. in Engl. Bot. Jahrb.  
XXXIV. beiblatt. p. 68.

*R. Mungista* Thunb. Fl. Jap. p. 60.

HAB. Kyōng-geui: in ditione Seoulenſi: Yisan. Mai. 28. 1894.  
(Sontag) ex Palib.

var. *pratensis* MAXIM. l.c. Regel l.c. Herder in Pl. Radd. III.  
i. p. 22. Korsch. Act. h. Petrop. XII. p. 346.

HAB. Kyōng-geui: In-chon (仁川). Oct. 30. 1900. fr.; Nam-san  
(南山). Jul. 18. 1902. fl. Oct. 11. 1900. fr. (T. Uchiyama).

var. *laxa* NAKAI nov. Aculeis sparsis brevibus, internodiis distan-  
tibus, foliis longissime petiolatis, petiolis laminis subduplo  
longioribus; laminis cordato-ovatis, acuminatis, 7-nerviis, infloresc.  
laxa. Cct. ut typ.

HAB. Kang-uön: m'te Kum-gang-san (金剛山). Aug. 20. 1902. fl.  
incip. (T. Uchiyama).

DISTR. sp. Asia trop. et temp. et Afr. trop.

**GALIUM L.****Clavis specierum.***A.* Caulis firmus erectus.

*a)* Folia latiora trinervia .....*G. boreale* L. var. *latifolium* TURCZ.

*b)* Folia linearia uninervia. ....*G. verum* L.

*B.* Caulis tenuis flaccidus, suberectus.

*a)* Verticilli foliorum 8 .....*G. Aparine* L.

*b)* Verticilli foliorum 4-6.

*a)* Verticilli foliorum stricte 4.

○ Folia rotundato-subspatulata ; caulis simplex.

.....*G. kantschaticum* STELLER.

○○ Folia oblonga 1-nervia ; planta caespitosa.

.....*G. setuliflorum* MAKINO var. *koreanum* NAKAI.

*β)* Verticilli foliorum inferiores 6, ramuli 4.

○ Folia oblonga v. lineari-oblonga.

.....*G. asprellum* MICHX. a. *typicum* MAXIM.

○○ Folia oblongo-obovata v. elliptica.

.....*G. pseudo-asprellum* MAKINO.

*Galium boreale* L. Sp. Pl. (ed. II). p. 156. DC. Prodr. IV. p. 600. Hook. et Arn. Bot. Beech. Voy. p. 349. Ledeb. Fl. Ross. II. p. 412. Miq. Prol. Fl. Jap. p. 276. Koch in Linnæa XVII. p. 33. Regel Tent. Fl. Uss. n. 244. Koch Syn. Fl. Germ. et Helv. I. (ed. II.) p. 284. Benth. et Hook. fil. Fl. Brit. Isl. (ed. V.) p. 215. Hook. fil. Fl. Brit. Ind. III. p. 205. Maxim. in Mém. Biol. IX. p. 264. A. Gray Manual. p. 210. Korsch. Act. h. Petrop. XII. p. 347. Fran. Pl. Day. p. 155. Herder in Pl. Radd. III. i. p. 28. n. 22. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 393. E De Halacsy Consp. Fl. Græc. I. p. 707.

var. *latifolium* Turcz. in Maxim. Mél. Biol. IX. p. 264.

*G. boreale* *a. foliis latioribus, acutis etc.* Herder l.c. p. 29.

*G. boreale* forma *latifolia* Turcz. in Fr. Schmidt Amur. p. 48. n. 192.

HAB. Kang-uön : Shun-sen (春川). Aug. 1906. fr. (S. Shimogōriyama).

DISTR. Reg. bor et temp.

*Galium verum* L. Sp. Pl. (ed. II.) p. 155. DC. Prodr. IV. p. 602. Ledeb. Fl. Ross. II. p. 414. A. Gray Bot. Jap. p. 393. Manual. p. 210. C. Koch Syn. Fl. Germ. et Helv. I. (ed. III). p. 285. Miq. Prol. Fl. Jap. p. 277. Maxim. Prim. Fl. Amur. p. 141. in Mél. Biol. IX. p. 265. Regel Tent. Fl. Uss. n. 245. Herder in Pl. Radd. III. i. p. 32. Hook. fil. Fl. Brit. Ind. III. p. 208. Fr. Schmidt Amur. p. 48. n. 193. Fran. et Sav. Enum. Pl. Jap. I. p. 215. Fran. Pl. Dav. p. 156. Korsch. Act. h. Petrop. XII. p. 347. Forbes et Hemsl. l.c. p. 395. Thomè Fl. Deutsch. Öst. u. Schw. IV. p. 220. Palib. Consp. Fl. Kor. I. p. 107. Hálaesy Consp. Fl. Græc. I. p. 715. Gilg. et Lœs. l.c. p. 67.

NOM. JAP. Kibanano-Kawaramatsuba.

HAB. Kyōng-san : Pusan (Wilford).—ex Palib. ibidem (Y. Hanabusa)

Kyōng-geui : Seoul Jun. Julio 1886. fl. (Kalinowsky); Hon-tschuwan. Oct. 19. 1893. ster., ibidem prope montis Nanton Oct. 23. 1893. fr. immat. (Sontag)—ex Palib.

Nam-san (南山). Jul. 16. 1902. fl.; Oct. 11. 1900. fr.; Paukham-san (北漢山). Jul. 28. 1902. fl. (T. Uchiyama).

DISTR. Europa et Asia temp.

*Galium Aparine* L. Sp. Pl. (ed. II.) p. 157. DC. Prodr. IV. p. 608. Ledeb. Fl. Alt. I. p. 134. Fl. Ross. II. p. 419. Cham. et Schlecht. in Linnæa III. p. 222. Benth. Fl. Hongk. p. 164. Fl. Austr. III. p. 447. Koch Syn. Fl. Germ. et Helv. I. (ed.



III.) p. 283. Benth et Hook. Fl. Brit. Isl. (ed. V.) p. 215. A. Gray Bot. Jap. p. 393. Manual. p. 208. Miq. Prol. Fl. Jap. p. 276. Fran. et Sav. l.c. I. p. 213. Maxim. in Mél. Biol. IX. p. 259. Hook. fil. Fl. Brit. Ind. III. p. 205. Harvey et Sonder. Fl. Cap. III. p. 38. Oliver Fl. Trop. Afr. III. p. 245. Herder in Pl. Radd. III. i. p. 23. n. 16. Fran. Pl. Dav. p. 156. Forbes et Hemsl. l.c. p. 393. Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 583. Palib. Consp. Fl. Kor. I. p. 106. Gilg. et Lœs. in Engl. Bot. Jahrb. XXXIV. beiblatt. p. 67. Thomè Fl. Deutsch. Öst. u. Schw. IV. p. 217. t. 545. Hálaacsy Consp. Fl. Gæc. I. p. 721.

*G. pauciflorum* Bunge Enum. Pl. Chin. bor. n. 199.

*G. sororium* Hance in Walp. Ann. II. p. 734.

*G. strigosum* Thunb. Nov. Act. Upsal. VII. p. 141. t. 4. f. 1-9! Sieb. et Zucc. Fl. Jap. Fam. Nat. II. n. 330. Miq. Prol. Fl. Jap. p. 276.

*G. uliginosum* Thunb. Fl. Jap. p. 58.

*G. Vaillantii* DC. Prodr. IV. p. 608.

NOM. JAP. Yaemugura.

HAB. Kyōng-geui: Seoul Jun. 1885. fr. immat. (Kalinowsky); inter Seoul et Chemulpo Mart. 17. 1894. ster.; prope Seoul: in declivitate meridionale montis Nam-san. Mart. 28. 1895. (Sontag).—ex Palib.

In archipelago Koreano: Port Hamilton (Wilford)—ex Maxim. et Hemsl.

DISTR. Asia, Europa, Africa, Australia et American bor.

*Galium kamtschaticum* STELLER. Schult. Mant. p. 186. Miyabe Kurile p. 239. Gray. Syn. Fl. N. Amer. I. ii. p. 37.

*G. obovatum* Ledeb. Fl. Ross. II. p. 412. Maxim. in Mél. Biol. IX. p. 263.

NOM. JAP. Ōbano-yotsubamugura.

HAB. Kang-uön: M'te Kum-gang-san (金剛山). Aug. 18. 1902. fr.  
(T. Uchiyama).

DISTR. Kamtschatica, Japonia et America boreali-occidentalis.

*Galium setuliflorum* MAKINO in Tokyo Bot. Mag. XVII. p. 75.  
var. *koreanum* NAKAI. Cæspitosa, caule 6-12 c.m. alto, quadrangulo,  
glabro, verticilli 4 is, foliis lanceolatis, ad basin acuminatis, subtus  
pallidioribus, unguis obsolete antrosum curvatis; fl. terminali  
trifidis, ramulis inflorescentiæ trifidis, fr. brevissime sed dense  
unguiculatis.

HAB. Kyöng-san: monte Chhyang-ryöng (頂嶺山). Oct. 7. 1902. fr.  
(T. Uchiyama).

*Galium asprellum* MICUX. DC. Prodr. IV. p. 598. Maxim.  
Prim. Fl. Amur. p. 140. in Mém. Biol. IX. p. 262. A. Gray  
Manual. p. 209. Fran. Pl. Dav. p. 156. Forbes et Hemsl. Ind.  
Fl. Sin. in Journ. Linn. Soc. XXIII. p. 393. Diels Fl. Centr.  
Chin. in Engl. Bot. Jahrb. XXIX. p. 583.

*a. typicum* MAXIM. in Mém. Biol. l.c. (p. p.) Korsch. Act. h.  
Petrop. XII. p. 347.

*G. davuricum* Turcz. *β. fructu hispido* Fr. Schmidt Amur. p.  
48. n. 191.

HAB. Kyöng-gei: Seoul: monte Nam-san (南山). Jul. 20. 1902. fr.  
(T. Uchiyama).

DISTR. Am. bor. Amur. et China.

*Galium pseudo-asprellum* MAKINO in Tokyo Bot. Mag. XVII.  
p. 110. (excl. syn.)

*G. asprellum β. lasiocarpum* Makino in ibid. p. 76. (excl. syn.)

? *G. asprellum a. typicum* Fr. et Sav. (non Maxim.) Enum. Pl.  
Jap. I. p. 215.

? Maxim. in Mém. Biol. l.c. p. p.

NOM. JAP. Ōba-yaemngura.

HAB. Kyōng-geui: m'te Nam-han-san (南韓山). Oct. 18. 1900. fr.;  
Aug. 1. 1902. fr. (T. Uchiyama).

DISTR. Japonia.

**ASPERULA** L. (sp. 1.)

*Asperula Platygali* MAXIM. in Mém. Biol. IX. p. 267. Forbes  
et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 395.  
Gilg. et Lœs. l.c. p. 67.

Rubia? gracilis MIQ. in Ann. Mus. Bot. Lugd. Bat. III. p.  
111.

*β. pratensis* MAXIM. l.c. p. 268. Palib. l.c.

HAB. Kyōng-geui: m'te Nam-san (南山). Jul. 18. et 20. 1902. fr.;  
Nam-han-san (南漢山). Oct. 18. 1900. fr.; Peuk-han-san (北漢山).  
Jul. 28. 1902. fl.; In-chon (仁川). Oct. 30. 1902. fr. (T. Uchi-  
yama).

Seoul Jul. 1886. fl. (Kalinowsky).—ex Palib.

In archipelago Koreano: Long reach. (Oldham n. 523.)—ex  
Maxim. et Hemsl.

DISTR. Manshuria.

**VALERINACEÆ.**

**Clavis generum.**

- A. Ovarium 3-loculatum ..... *Patrinia* JUSS.  
B. Ovarium 1-loculatum ..... *Valeriana* L.

**PATRINIA** JUSS.

**Clavis specierum.**

A. Flores lutei.

- a) Folia radicalia palmatilobata ..... *P. saniculifolia* HEMSL.

b) Folia radicalia simplicia v. pinnatifida.

a) Fructus alatus.

○ Folia pinnata, segmentis lateralibus subintegris.

.....*P. rupestris* JUSS.

○○ Folia bipinnatifida .....*P. intermedia* REEM. et SCHULT.

β) Fructus exalatus .....*P. scabiosifolia* LINK.

*B. Flores albi, planta villosa* .....*P. villosa* JUSS.

*Patrinia saniculifolia* HEMSL. Ind. Fl. Sin. I. p. 397. Palib.  
I. p. 107.

HAB. Kyōng-geui: in montibus prope Seoul (Carles)—ex Hemsl.

m'te Peuk-han-san (北漢山). Jul. 28. 1902. fr. (T. Uchiyama).

Kang-uōn: monte Kum-gang-san (金剛山). Aug. 18. 1902. fr.  
(T. Uchiyama).

DISTR. Manshuria.

*Patrinia rupestris* JUSS. DC. Prodr. IV. p. 624. Ledeb. Fl.  
Ross. II. p. 427. Forbes et Hemsl. Ind. Fl. Sin. in Journ.  
Linn. Soc. XXIII. p. 396. Fr. Schmidt Amur. p. 48. n. 195.  
Höck in Engl. Prantl. Nat. Pfl. Fam. IV. iv. p. 176. f. 61.  
*Patrinia rupestris* var. *typica* Regel Uss. n. 246. Korsch. Act.  
h. Petrop. XII. p. 348.

*Valeriana sibirica* Willd. (non L.) Sp. Pl. I. p. 181.

*Valeriana floribus tetrandris* etc. in Gmel. Fl. Sib. III. p. 123.  
t. 24.

HAB. Kang-uōn: Chang-dō (昌道). Aug. 9. 1902. fl.; Kan-bal-ko-  
ryōng (干發告嶺). Aug. 10. 1902. fl. (T. Uchiyama).

β. *laciniata* REGEL. Uss. n. 246.

HAB. Hoang-hai: inter Syō-heung (瑞興) et Phung-syu-uōn (風壽院).  
Sept. 8. 1902. fr. (T. Uchiyama).

DISTR. Sibiria, China et Amur.

*Patrinia intermedia* REEM. et SCHULT. Syst. Veg. III. p. 70.  
DC. Prodr. IV. p. 624. Ledeb. Fl. Ross. II. p. 427. Höck in  
Engl. Prantl. Nat. Pfl. Fam. IV. iv. p. 176.

*P. rupestris*  $\gamma$ . *intermedia* Regel Uss. n. 246.

*P. rupestris* Bunge in Ledeb. Fl. Alt. I. p. 130.

HAB. Kang-tō: Sai-rin-ka (細林河). Sept. 10, 1907. fl. (K. Maeda).

DISTR. Sibiria.

*Patrinia scabiosæfolia* FISCH. in Link. Hort. Berol. I. p. 131.  
ex DC. Prodr. IV. p. 624. Ledeb. Fl. Ross. II. p. 427. Max.  
Prim. Fl. Amur. p. 142. Miq. Prol. Fl. Jap. p. 279. Regel  
Uss. n. 247. Fr. Schmidt Amur. p. 48. n. 196. Sachl. p. 145.  
n. 222. Herder in Pl. Radd. III. i. p. 37. Hance in Journ.  
Bot. (1870). p. 225. (1883). p. 322. Fran. et Sav. Enum. Pl.  
Jap. I. p. 216. Korsch. Act. h. Petrop. XII. p. 348. Fran.  
Pl. Dav. p. 158. Forbes et Hemsl. Ind. Fl. Sin. in Journ.  
Linn. Soc. XXIII. p. 397. Palib. Consp. Fl. Kor. I. p. 108.  
Græbner in Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX.  
p. 597. Gilg. et Lœs. in Engl. Bot. Jahrb. XXIX. beiblatt.  
p. 69.

*P. parviflora* Sieb. et Zucc. Fl. Jap. Fam. Nat. I. p. 678. Miq.  
Prol. Fl. Jap. p. 279.

NOM. JAP. Ominaeshi.

HAB. Kyōng-geui: Chemulpo (Carles)—Inchon Aug. 1883. fl. (Dr.  
Gottsche).—ex Palib.

Phyōng-an: Phyōng-yang (平壤). Sept. 12, 1902. fl. (T. Uchi-  
yama).

Kang-uōn: Meuk-kai (墨浦). Aug. 10, 1902. fl. (T. Uchiyama).

Kyōng-geui: Yōng-deung-pho (永登浦). Jul. 24, 1902. fl. incip;

Peuk-han-san (北漢山). Jul. 28, 1902. fl. incip. (T. Uchiyama).

DISTR. Dauria, Sibiria, China et Japonia.

*Patrinia villosa* Juss. in Ann. Mus. Par. X. p. 311. ex DC. Prodr. IV. p. 624. Miq. Prol. Fl. Jap. p. 280. Fran. et Sav. Enum. Pl. Jap. I. p. 216. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 398. Palib. Consp. Fl. Kor. I. p. 108. Græbner in Diels Centr. l.c. p. 597. Matsum. et Hayata Enum. Pl. Form. p. 200. Gilg. et Lœs. in Engl. Bot. Jahrb. XXXVII. beiblatt. p. 69.

*P. ovata* Bunge in Fran. Pl. Dav. p. 157.

*Valeriana villosa* Thunb. Fl. Jap. p. 32. t. 6.

NOM. JAP. Otokoeshi.

HAB. Kyōng-geui : Chemulpo (仁川)—ex Hemsl.

Seoul Jun. 1885. fl. (Kalinowsky). prope Tap-Tong. Aug. 25. 1895. (Sontag)—ex Palib.

Nam-san (南山). Aug. 30. 1902. fl. (T. Uchiyama).

Kang-uōn : monte Kum-gang-san (金剛山). Aug. 20. 1902. fl. (T. Uchiyama).

Phyōng-an : Phyōng-yang (平壤). Sept. 12. 1902. fr. (T. Uchiyama).

DISTR. Japonia et China.

### VALERIANA L. (sp. 1.)

*Valeriana officinalis* L. Sp. Pl. (ed. II.) p. 45. Thunb. Fl. Jap. p. 31. DC. Prodr. IV. p. 641. Ledeb. Fl. Ross. II. p. 438. Miq. Prol. Fl. Jap. p. 278. Regel Uss. n. 248. Schmidt. Amur. p. 48. n. 197. Benth et Hook. fil. Fl. Brit. Isl. (ed. V). p. 218. Fran. et Sav. Enum. Pl. Jap. I. p. 217. Clark in Hook. fil. Fl. Brit. Ind. III. p. 211. Baker et Moore in Journ. Linn. Soc. XVII. p. 383. Herder in Pl. Radd. III. i. p. 39. Koch Syn. Fl. Germ. et Helv. (ed. III.) p. 288. Fran. Pl. Dav. p. 158. Korsch. Act. h. Petrop. XII. p. 348. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 398. Palib.

Consp. Fl. Kor. I. p. 108. Græbner in Diels Fl. Centr. Chin. in Engl. Bot. Jahrb. XXIX. p. 599. Halacsy Consp. Fl. Græc. I. p. 745. Thomè Fl. Deutsch. Öst. u. Schw. IV. p. 234. Gilg. et Læs. l.c. p. 69.

V. dubia Bunge in Ledeb. Fl. Alt. I. p. 52. Maxim. Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 472.

NOM. JAP. Kanokosō; Haruominaeshi.

HAB. In ripa occidentali peninsulae Koreanæ (Perry).

In archipelago Koreano: Herschel Isl. (Oldham. Nr. 526.)—ex Hemsl.

DISTR. Europa, Asia bor. et Japonia.

## DIPSACACEÆ.

### Clavis generum.

- A. Planta sparce aculeata, involucri apice hispidum.....*Dipsacus* L.  
 B. Planta pubescens v. glabra, involucri acutum.....*Scabiosa* L.

### DIPSACUS L. (sp. 1.)

*Dipsacus japonicus* Miq. Prol. Fl. Jap. p. 278. Fran. Pl. Dav. p. 159. Forbes et Hemsl. Ind. Fl. Sin. in Journ. Linn. Soc. XXIII. p. 400.

G. Gmelini Maxim. (non Bieb.) Prim. Fl. Amur. Suppl. Ind. Fl. Pek. p. 472.

NOM. JAP. Nabena.

HAB. Kyōng-sang: M'te Chhyang-ryōng-san (頂嶺山). Oct. 12. 1902. fr. (T. Uchiyama).

DISTR. China et Japonia.

### SCABIOSA L. (sp. 1.)

*Scabiosa Fischeri* DC. Prodr. IV. p. 658. Ledeb. Fl. Ross.

II. p. 456. Maxim. Prim. Fl. Amur. p. 142. Suppl. Ind. Fl. Pek. p. 472. Fran. Pl. Dav. p. 159. Korsch. Act. h. Petrop. XII. p. 349.

*S. comosa* Rœm. et Schult. Syst. Veg. III. p. 84.

*a. carulea* HERDER in Pl. Radd. III. i. p. 45.

1. *glabra* NAKAI Planta tota glabra, pedunculī apice sub flores puberuli.

HAB. Hoang-hai: inter An-syōng (安城) et Syō-heung (瑞興). Sept. 8. 1902. fl. et fr. (T. Uchiyama).

Kang-nōn: Peuk-tung-dji (北屯址). Aug. 22. 1902. fl. (T. Uchiyama).

2. *pubescens* NAKAI Planta tota pubescens.

HAB. Ham-gyōng: Mu-san-nyōng (茂山嶺). Aug. 11. 1907. fl. (K. Maeda).

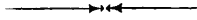
Kyōng-san: Tai-ku (大邱). Oct. 7. 1902. fl. et fr. (T. Uchiyama).

DISTR. sp. Amur et Maushuria.





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 Phellodendron Rupr. p. 117  
 Phelepterus Benth.  
   et Hook. .... p. 272  
 Philadelphus L. .... p. 221  
 Physocarpus Maxim. p. 175  
 Picrasma Bl. .... p. 118  
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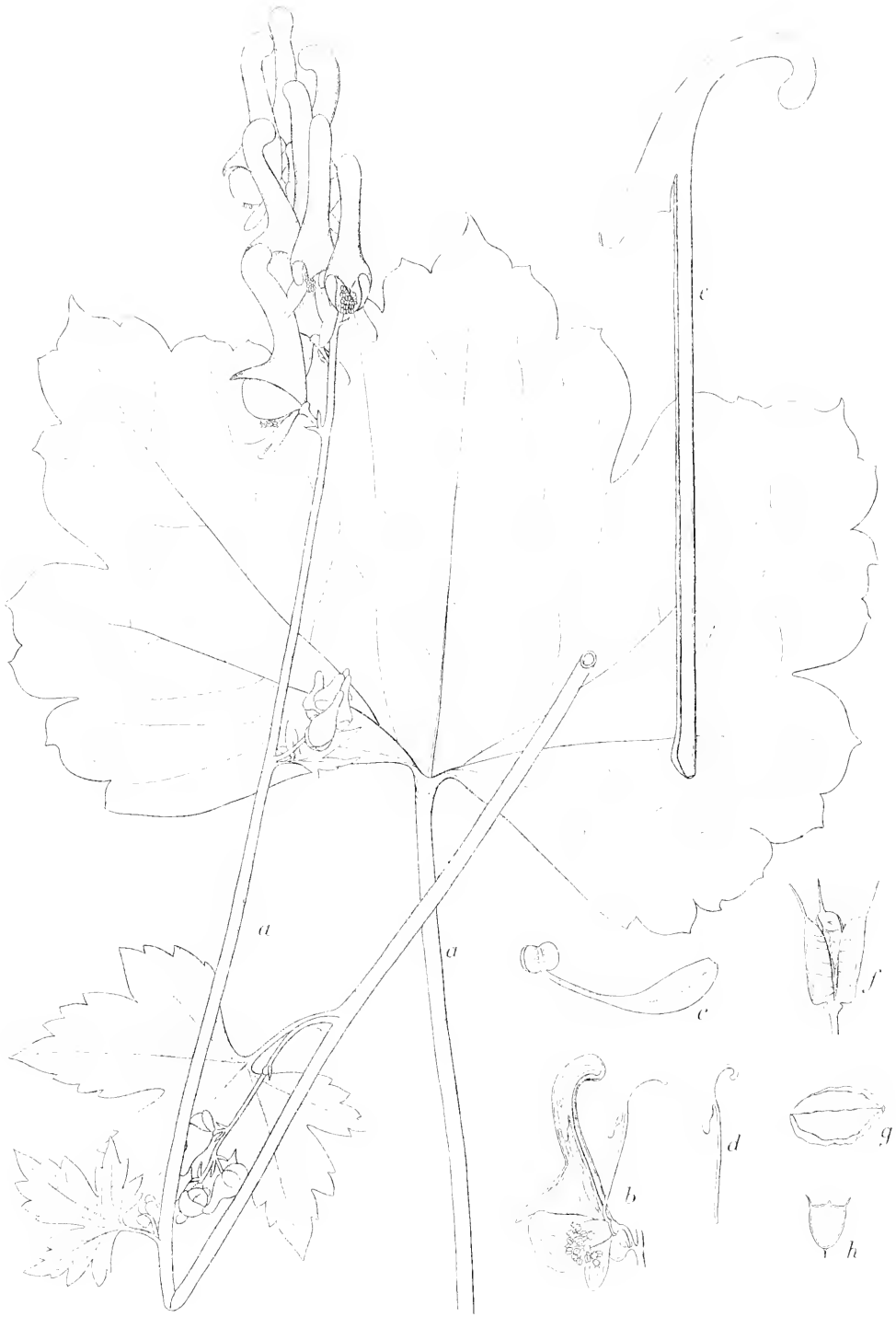
**T. NAKAI:**  
FLORA KOREANA.

TABULA I.

## Explicatio tabulæ I.

Aconitum longe-cassidatum NAKAI.

- a. a.* Partes plantæ (mag. nat.)
- b.* Interior floris manifestatur ( „ ).
- c.* Stamen a latere videtur (aug.)
- d.* Nectarium a latere videtur (mag. nat.)
- e.* Idem, augetur.
- f.* Carpella maturata, a latere videtur (mag. nat.)
- g.* Semen, augetur.
- h.* Sectio seminis transversalis.



*Aconitum longe-cassidatum* NAKAI.



**T. NAKAI:**  
FLORA KOREANA.

TABULA II.

## Explicatio tabulæ II.

Aconitum koreanum NAKAI.

- a. a.* Partes plantæ (mag. nat.)
- b.* Nectarium (aug.)
- c.* Stamen a latere videtur (aug.)
- d.* Pistilum a latere videtur (aug.)
- e.* Carpella maturata, (mag. nat.)
- f. f.* Semina (aug.) alterum a dorso, alterum a latere videtur.





*Aconitum koreanum* NAKAI.



**T. NAKAI:**  
FLORA KOREANA.

TABULA III.

### **Explicatio tabulæ III.**

Aconitum Uchiyamai NAKAI.

- a.* Partes plantæ (mag. nat.)
- b.* Floris interior manifestatur (mag. nat.)
- c.* Nectarium a latere videtur (aug.)
- d.* Stamen a latere videtur (aug.)
- e.* Pistillum (aug.)



*Aconitum Uchiyamai* NAKAI.



**T. NAKAI:**  
FLORA KOREANA.

TABULA IV.

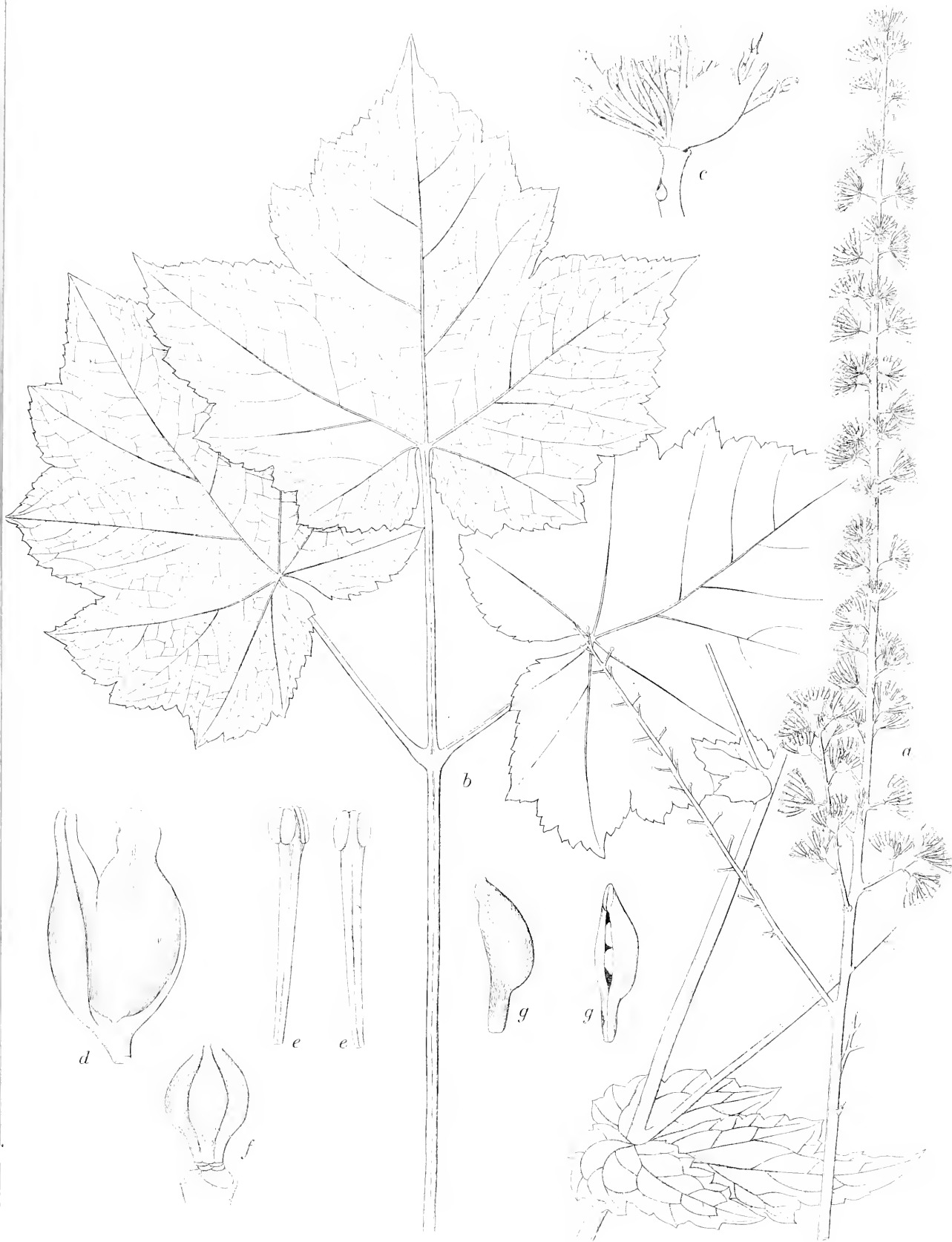
### Explicatio tabulæ IV.

*Cimicifuga heracleifolia* Kom.

var. *bifida* NAKAI.

- a. a.* Partes plantæ (mag. nat.)
- b.* Folium ( $\frac{1}{2} \times$  mag. nat.)
- c.* Flos, sepalis decisis (aug.)
- d.* Staminodium (valde aug.)
- e. e.* Stamina (valde aug.)
- f.* Pistilum (valde aug.)
- g. g.* Fructus juniores; alter a latere, alter a ventre videtur. (valdissime aug.)





T. Nakai del.

*Cimicifuga heracleifolia* Kom. var. *bifida* NAKAI.

K. Nakazawa, sculp.



T. SAKAI:  
FLORA KOREANA.

TABULA V.

## Explicatio tabulæ V.

Fig. I. *Thalictrum coreanum* Léve'l.

- a. a.* Partes plantæ (mag. nat.)
- b.* Fructus juniores (aug.)

Fig. II. *Berberis koreana* Palib.

- a.* Ramulus fructiferus (mag. nat.)
- b.* Ramulus floriferus (mag. nat.)
- c.* Pars ramuli inferioris (mag. nat.)
- d.* Flos (aug.)
- e. e.* Stamina, alterum a ventro, alterum a latere videtur  
(valdissime aug.)
- f.* Sectio semini verticalis (aug.)
- g.* Stigma in carpella (valdissime aug.)
- h.* Semen (aug.)
- i.* Embryo (aug.)



A.

B.

T. Nakai del.

A. *Thalictrum coreanum* Lével.  
B. *Berberis koreana* Palib.

K. Nakazawa, sculp.



F. SARAI:  
FLORA KOREANA.

TABULA VI.

## Explicatio tabulæ VI.

Fig. I. *Sisymbrium Maximowiczii* Palib.

- a. a.* Partes plantæ (mag. nat.)
- b.* Flos (aug.)
- c.* Petalum (aug.)
- d.* Stamina majora (aug.)
- e.* Stamina minora (aug.)
- f.* Pistillum (aug.)
- g.* Interior fructus junioris manifestatur (aug.)

Fig. II. *Silene capitata* Kom.

- a.* Pars plantæ (mag. nat.)
- b.* Flos (aug.)
- c.* Petalum (aug.) a dorso videtur.
- d.* Interior floris manifestatur (aug.)
- e.* Capsula cum parte sepali sublata (aug.)
- f.* Semen (valde aug.)



I

II



I. *Sisymbrium Maximowiczi* Palib.

II. *Silene capitata* Kom.

T. Nakai del.

K. Nakazawa. sculp.



F. NAKAI:  
FLORA KOREANA.

TABULA VII.

## Explicatio tabulæ VII.

*Silene seoulensis* NAKAI.

- a. a.* Partes plantæ (mag. nat.)
- b.* Folium (mag. nat.)
- c.* Flos (ang.)
- d.* Calyx (aug.)
- e.* Interior floris manifestatur (aug.)
- f.* Carpella maturata (aug.)
- g.* Semen (valdissime ang.)



*Silene seoulensis* NAKAI.



T. NAKAI:  
FLORA KOREANA.

TABULA VIII.

### Explicatio tabulæ VIII.

Impatiens koreana NAKAI.

- a.* Pars plantæ (mag. nat.)
- b.* Sepalum, a dorso videtur (mag. nat.)
- c. d. e.* Petala a latere videtur ( , , ).
- f.* Stamina, a latere videtur (aug.)
- g.* Pistilum a latere videtur (aug.)





*Impatiens koreana* NAKAI.



T. NAKAI:  
FLORA KOREANA.

TABULA IX.

### **Explicatio tabulæ IX.**

*Corchoropsis psilocarpa* Harms et Læs.

- a.* Pars plantæ (mag. nat.)
- b.* Flos a latere videtur (aug.)
- c.* Stipula (valdissime aug.)
- d.* Bractea, a dorso videtur (valdissime aug.)
- e.* Sepala, a dorso videntur ( „ ).
- f.* Petala „ „ „ ( „ ).
- g.* Staminodes et Stamen ( „ ).
- h.* Pistillum ( „ ).
- i.* Columella cum seminibus (mag. nat.)



*Corchoropsis psilocarpa* Harms et Loes.



T. NAKAI:  
FLORA KOREANA.

TABULA X.

**Explicatio tabulæ X.**

Fig. I. Acer Pseudo-Sieboldianum (Pax.) Kom.

var. koreanum NAKAI.

*a.* Pars plantæ (mag. nat.)

*b.* Samara ejusdem (mag. nat.)

Fig. II. Samara Acer Pseudo-Sieboldiani.





I. *Acer Pseudo-Sieboldianum* (Pax) Kom var. *koreanum* NAKAI.

T. Nakai del.

II. *Acer Pseudo-Sieboldianum* (Pax) Kom.

K. Nakazawa, sculp.



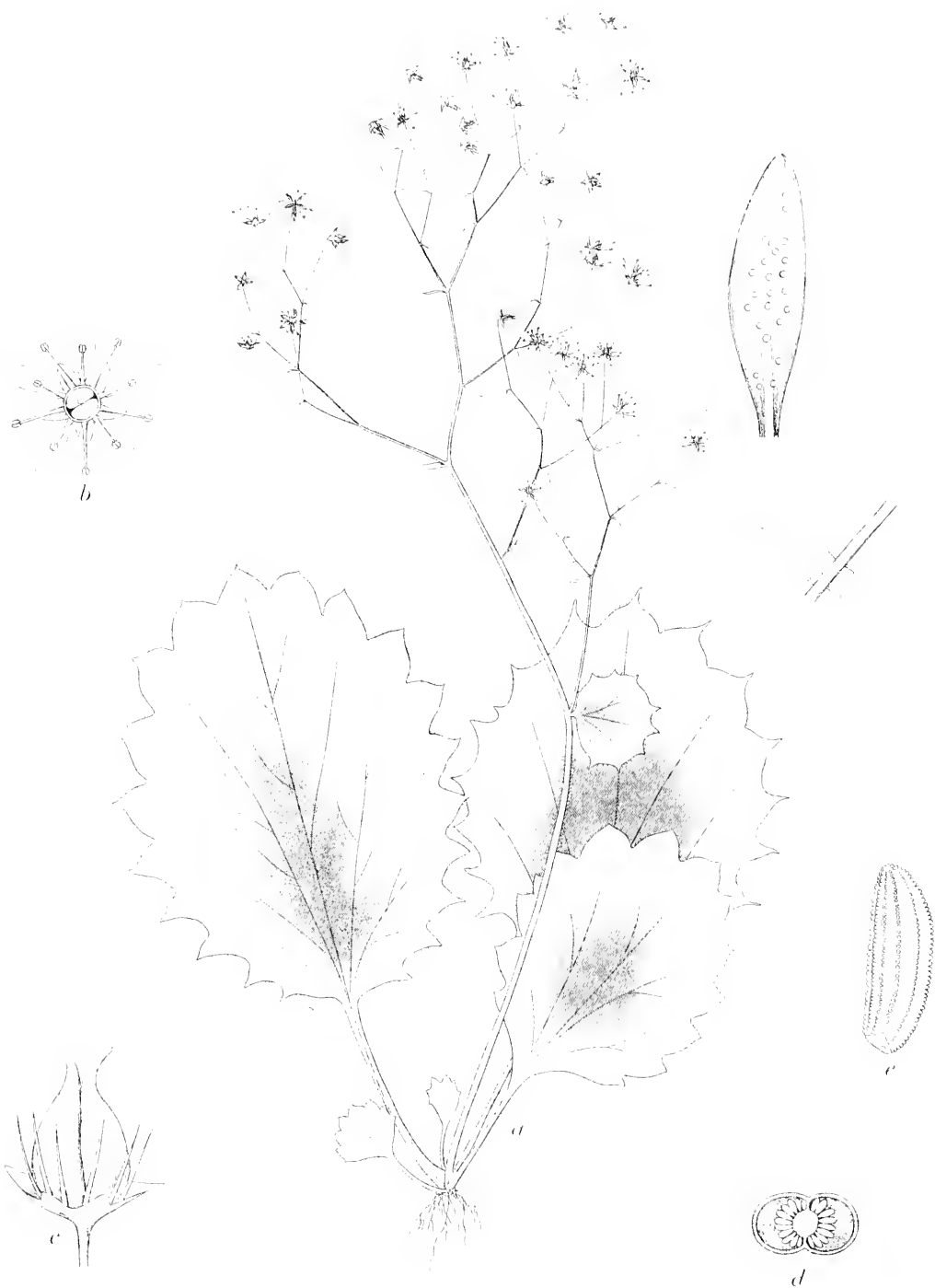
T. NAKAI:  
FLORA KOREANA.

TABULA XI.

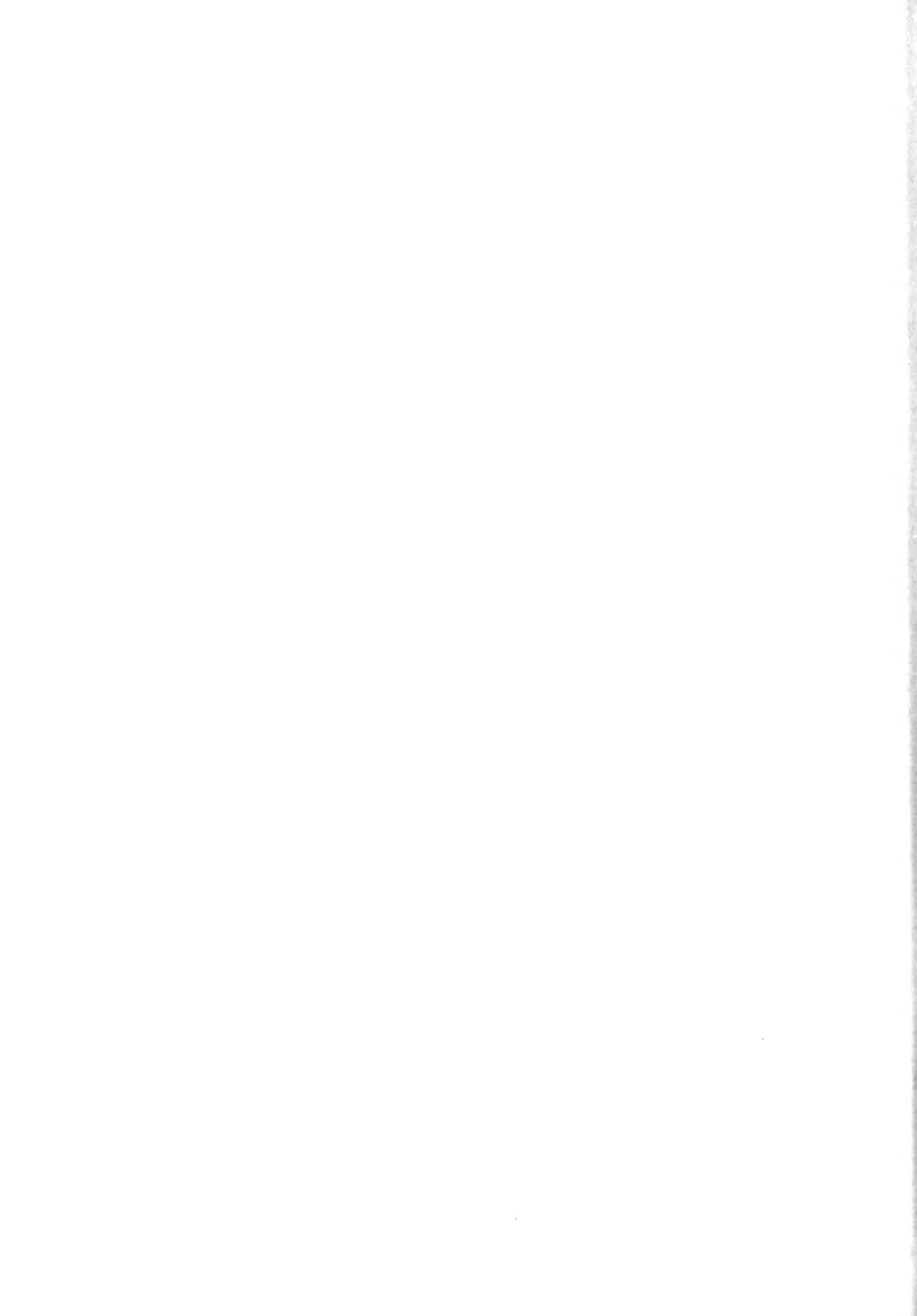
### **Explicatio tabulæ XI.**

*Saxifraga oblongifolia* NAKAI.

- a.* Planta in mag. nat.
- b.* Flos (aug.) plus minus diagrammaticus.
- c.* Carpella semimaturata (aug.)
- d.* Sectio carpellæ transversalis (aug.)
- e.* Semen ( $2 \times \Lambda$ . Zeiss.)



*Saxifraga oblongifolia* NAKAI.



T. NAKAI:  
FLORA KOREANA.

TABULA XII.

## Explicatio tabulæ XII.

Fig. I. *Deutzia glabrata* Kom.

*a. a.* Rami floriferi et fructiferi (mag. nat.)

*d.* Flos (aug.) *c.* Sepala (aug.) *d.* Petalum (valde aug.)

Fig. II. *Flatina orientalis* MAKINO.

*a.* Fragmentum plantæ (mag. nat.) *b.* Nodus cum radicibus, folio et flore (valdissime aug.) *c.* Flos, plus minus diagrammaticus. *d.* Semen a ventro videtur (valdissime aug.)

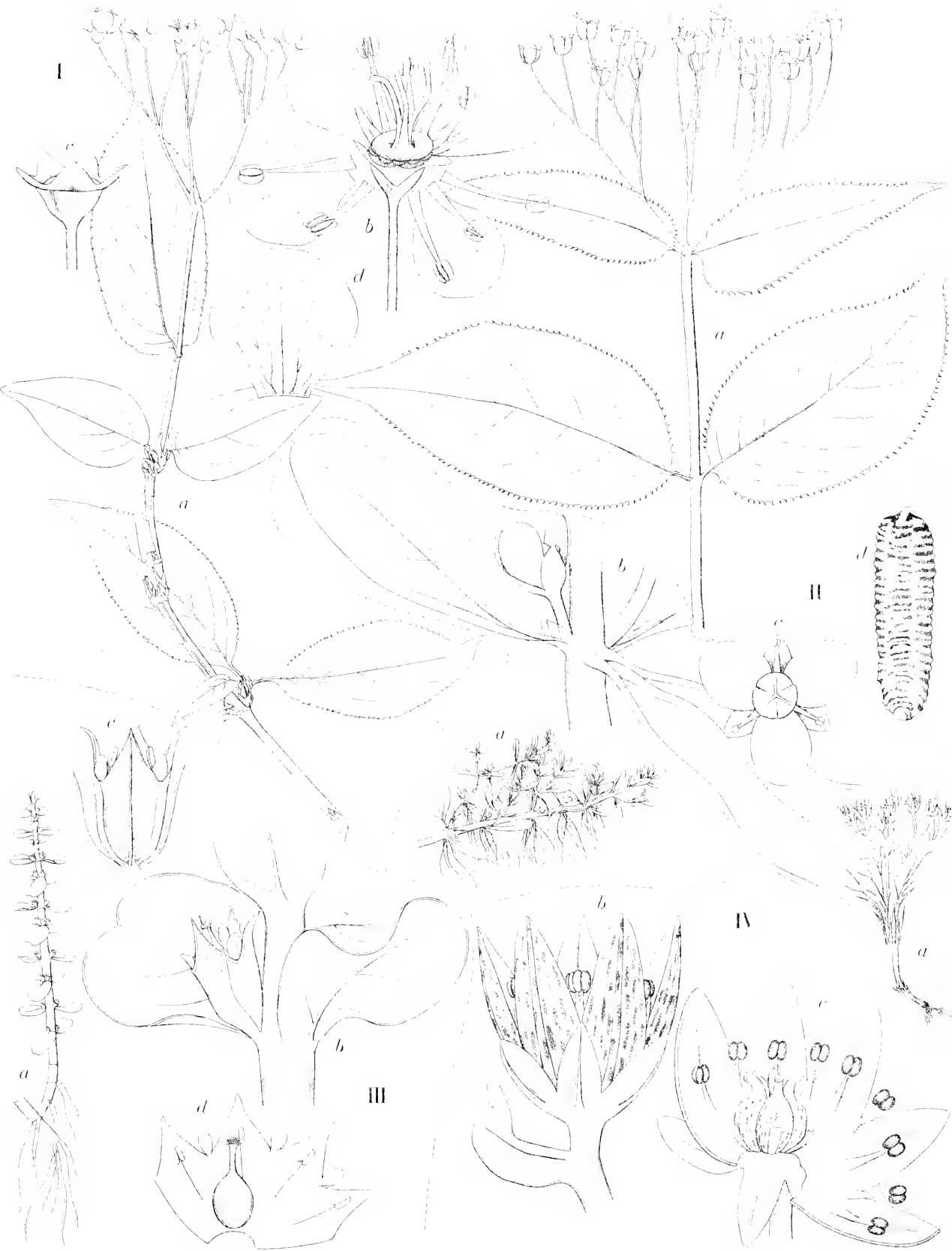
Fig. III. *Rotala indica* var. *koreana* NAKAI.

*a.* Fragmentum plantæ (mag. nat.) *b.* Fragmentum rami, cum flore (valdissime aug.) *c.* Flos cum duabus bracteis (valdissime aug.) *d.* Pistillum, cum alteris floris partibus expansis (valdissime aug.)

Fig. IV. *Cotyledon sikokiana* MAKINO.

*a.* Planta mediocris (mag. nat.) *b.* Flos (valdissime aug.) *c.* Interiores floris partes manifestantur (valdissime aug.)





I. *Deutzia glabrata* Kom. II. *Elatine orientalis* MAKINO.

III. *Rotala indica* Koehne var. *koreana* NAKAI.

IV. *Cotyledon sikokiana* MAKINO.

T. Nakai del.

K. Nakazawa. sculp.



T. NAKAI:  
FLORA KOREANA.

TABULA XIII.

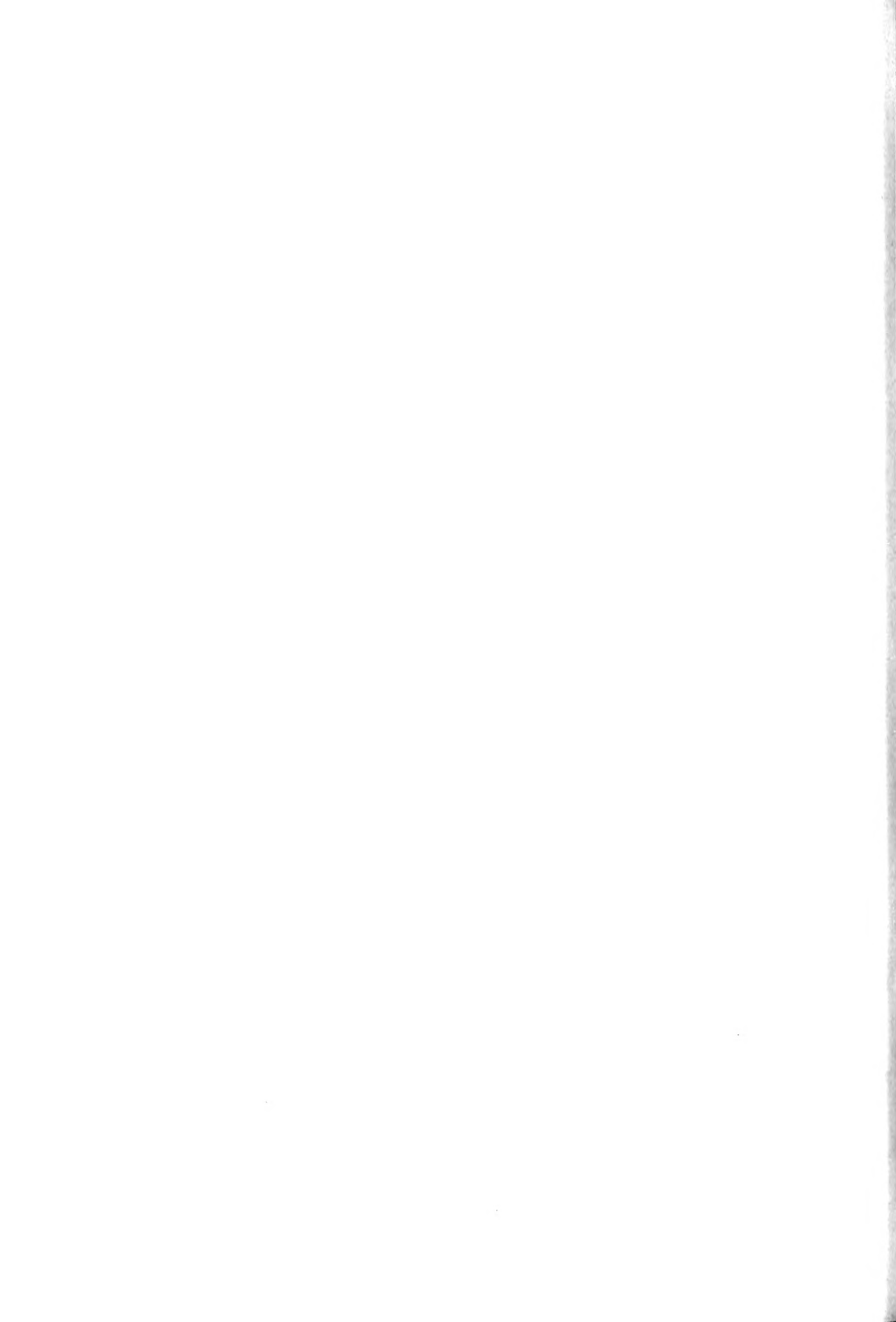
### Explicatio tabulæ XIII.

Angelica Uchiyamana Yabe.

- a. a.* Partes plantæ (mag. nat.)
- b.* Flos (aug.)
- c.* Petalum (valdissime aug.)
- d.* Stamina ( , ).
- e.* Ovarium ( , ).
- f.* Carpella ( , ).
- g.* Carpella maturata ( , ).
- h.* Sectio semini transversalis (1 × 1 Reiz.)



*Angelica Uchiyamana* YABE.



T. NAKAI:  
FLORA KOREANA.

TABULA XIV.

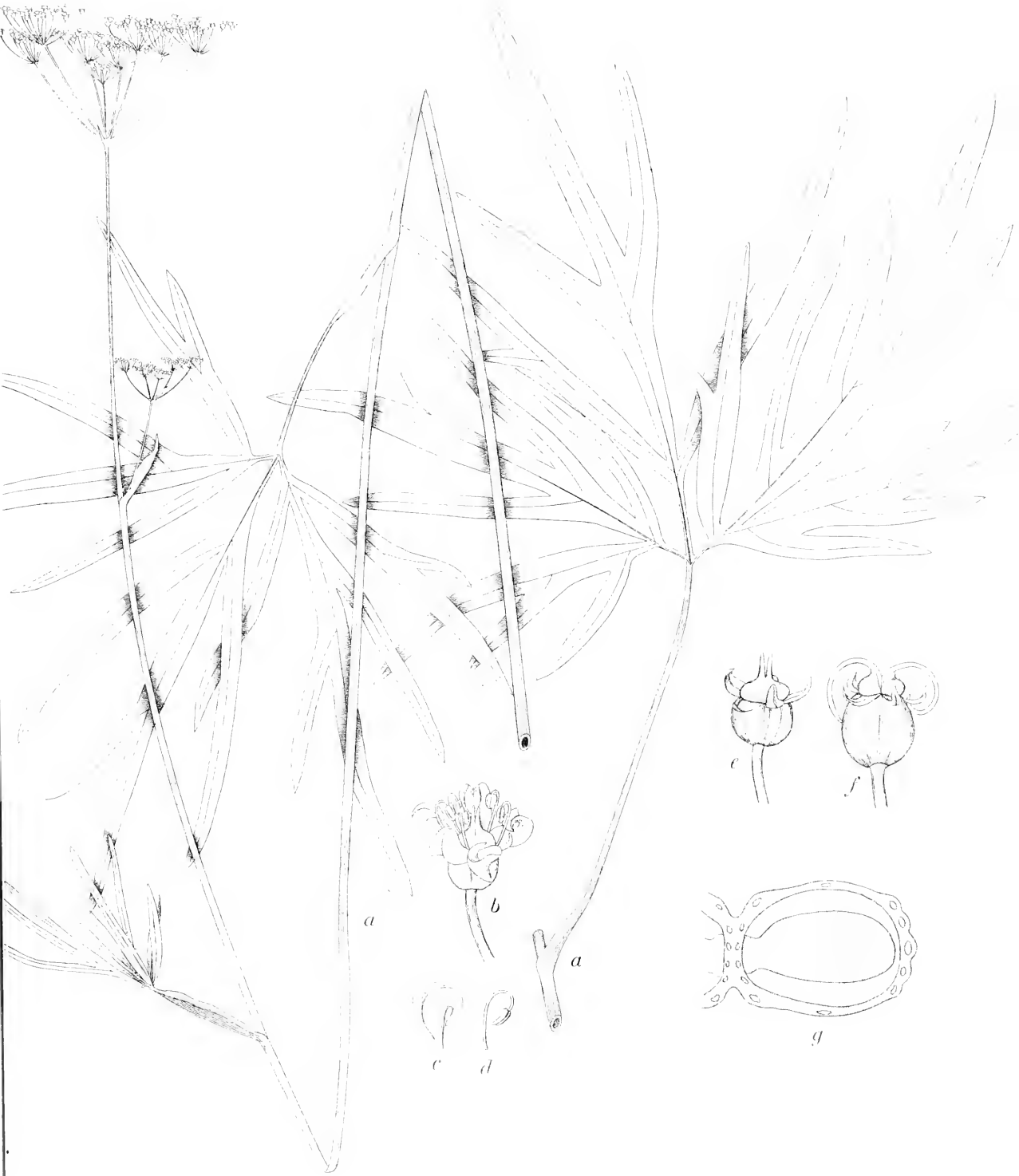
**Explicatio tabulæ XIV.**

*Pimpinella koreana* (Yabe) NAKAI.

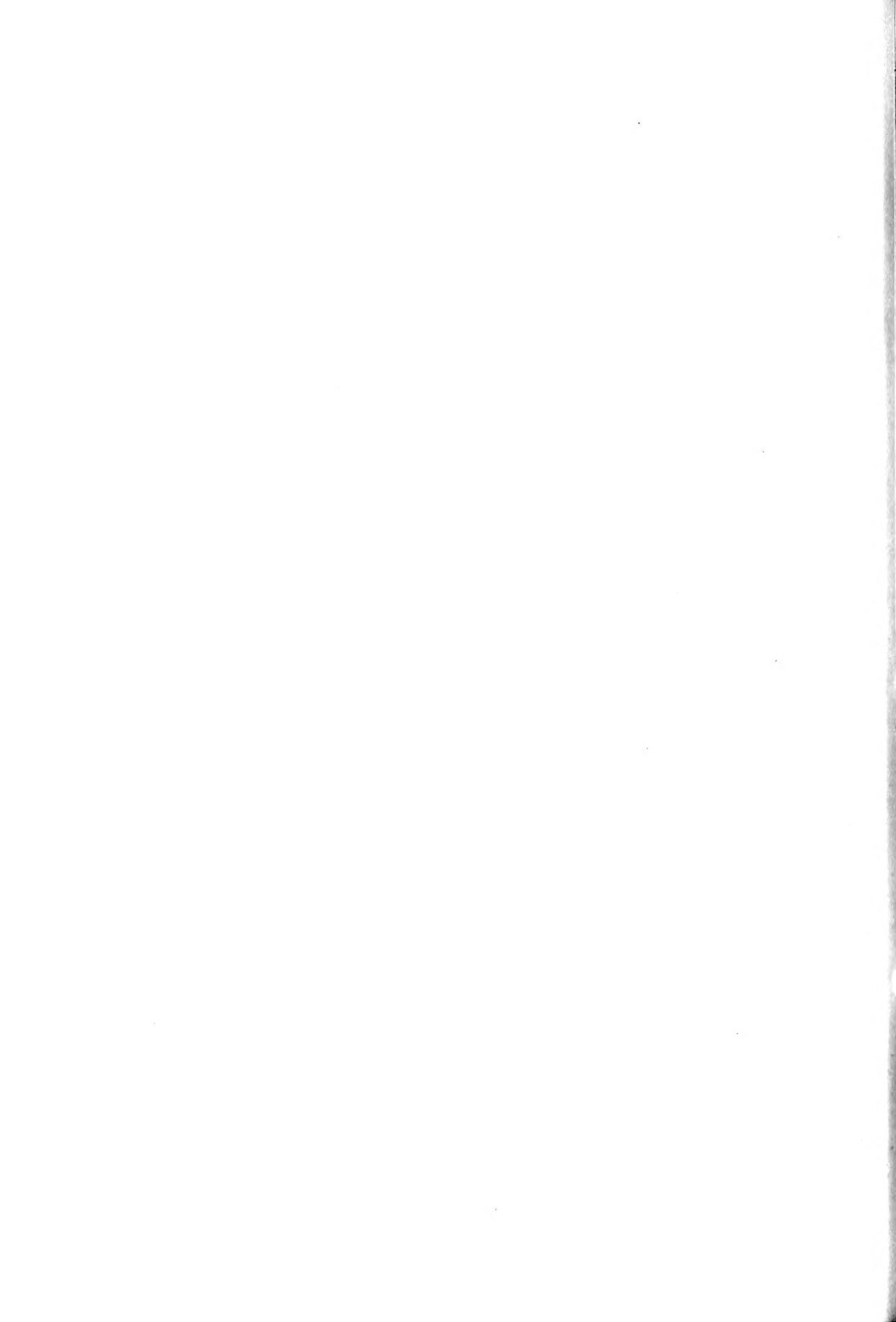
var. *Uchiyamana* (Yabe) NAKAI.

- a. a.* Partes plantæ (magnitudo naturalis.)
- b.* Flos, (valdissime augetur.)
- c.* Petalum ( ,, ).
- d.* Stamen ( ,, ).
- e.* Ovarium ( ,, ).
- f.* Ovarium semimaturatum ( ,, ).
- g.* Sectio ovarii transversalis (1× $\alpha$  Reiz.)





*Pimpinella koreanum* (YABE) NAKAI.  
var. *Uchiyamana* (YABE) NAKAI.



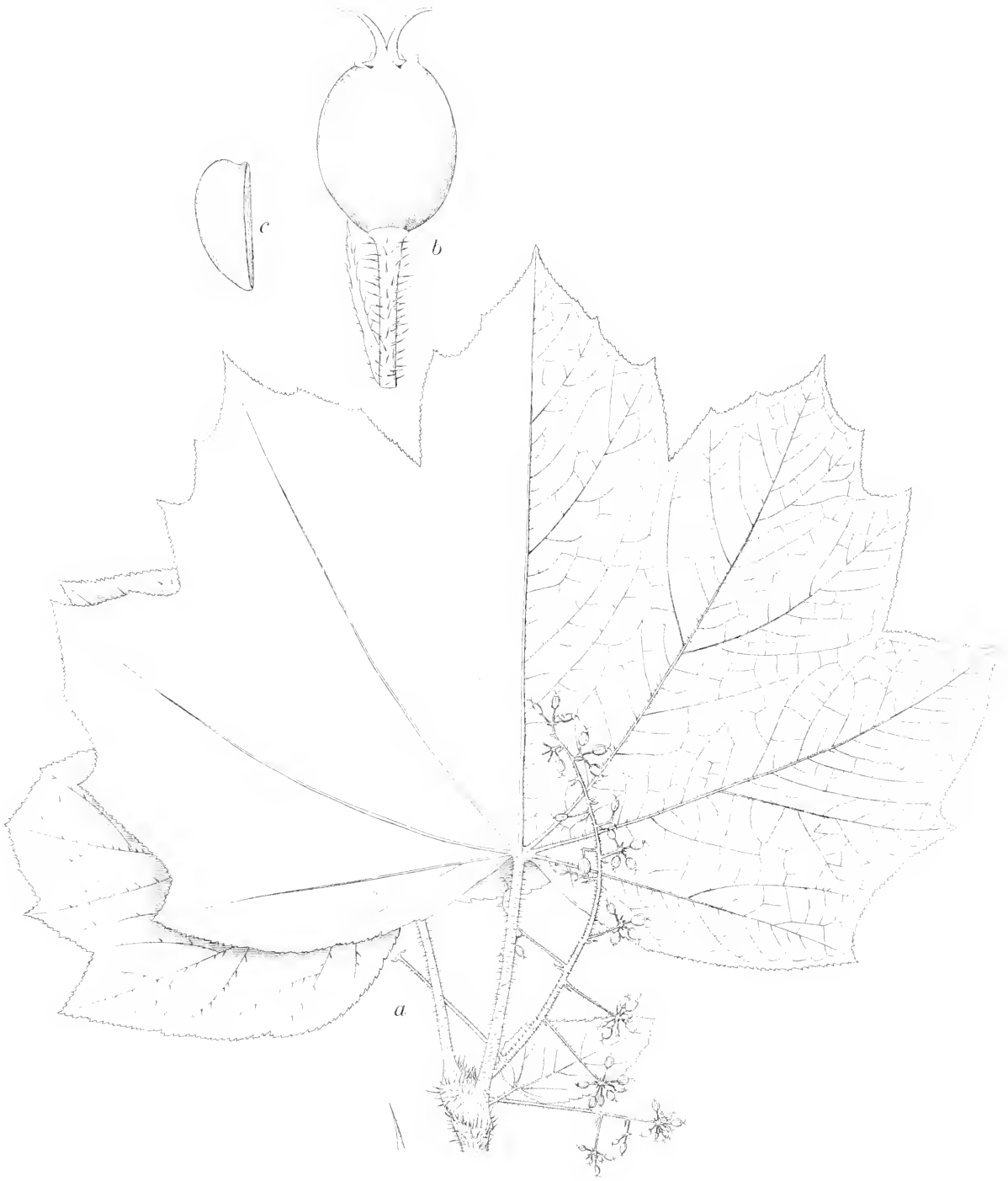
I. NAKAI:  
FLORA KOREANA.

TABULA XV.

**Explicatio tabulæ XV.**

*Echinopanax elatus* NAKAI.

- a.* Partes plantæ ( $\frac{1}{2} \times$  mag. nat.)
- b.* Fructus maturatus cum bractea (augetur.)
- c.* Semen maturatum (augetur.)



*Echinopanax elatus* NAKAI.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE I.

## PLATE I.

- Fig. 1. Chyöl-lyöng-do or "Deer Island," viewed southeastwards from the Japanese settlement in Fusan, beyond the narrow strip of water that separates it from the mainland. The island appears like a bare volcano-ruin, though in reality it is built up of a complex of sheets of green porphyrite and its breccia, regularly dipping eastwards. Geologically speaking, it is a part of, and now detached from, the mainland. The settlement itself has been greatly altered in form since the opening of the Seoul-Fusan railway, the shore being reclaimed by dyking and filling in (pp. 12-14, 106, 135).
- Fig. 2. The ferry across the Nak-tong-gang (p. 16) between Kui-pho and Söm-bahoi, the latter (at the foot of a granitic hill) in view westwards beyond the western arm of the river, the photograph being taken from sandy bar in mid-channel. To the left of it is seen in the distance the isolated pointed hill of Im-ho-san (p. 18), built up of quartz-porphry. To the right, on a granitic slope is located the *annai* of Kim-häi (see fig. 3 below), an ancient capital of the defunct kingdom of Ka-nak (p. 17). In the distant background is seen the granitic Na-rim-san capped with a green breccia (p. 19).
- Fig. 3. The *annai* or town of Kim-häi (金海) (see fig. 2), viewed westwards. It is an assemblage of low thatched cottages on the southern spur of a hill on which is seen a forested elevation where are interred the remains of the queen Su-no, the founder of Ka-nak in 12 A.D. (p. 17).



THE FIRST TRAVERSE



Fig. 1.



Fig 2



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE II.

## PLATE II.

Fig. 1. The stone-walled, thriving *emuni* of Chhyang-nön (昌寧), located on the southern foot of a granitic mountain (p. 21). The low neck of the mountain is the granitic Kal-thö-chhi pass (105 *m*) which leads northwards to the Ku-ryong copper mine (p. 22).

Fig. 2. The western continuation of Fig. 1, with the well-known Chyön-chyu-san (天柱山) in full view. The latter is built up of masanite covered half way up by green porphyrite (p. 22). Both rocks can be easily distinguished in field by the difference in colors. It is one of the characteristic bare mountains of Korea. It is a prominent point seen from a distance.

Fig. 3.—View northwards from the granitic Pam-chhi pass towards Ma-san-pho and the bay of the same name. To the left, on the delta-like sloping plain, streets, large and small, had been laid out for the new foreign settlement, Uöl-gyöng-dong, though only a few houses had been built at the time of my visit in 1901 (p. 26). A little further northwards an isolated granitic hill is seen on which was built a fortress during the invasion of Hideyoshi, and at its eastern foot is situated the populous native village of Ma-san-pho. This was formerly called Hap-pho (合浦), and is the place where the combined forces under the Mongol and Korean generals made their preparations and set sail for the ever memorable invasion of Hakata, northern Kyû-shû (p. 24). This was the first and the last attack of any historical note made by foreign powers on Japan.

The mountain faintly seen in the middle of the background is Chyön-chyu-san (fig. 2). To the right in the shadow of a tree is seen the inlet of Pam-ku-mi, the much talked of Russian naval station, now entirely abandoned. I took this photo with some risk in 1901.

THE FIRST TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE III.

### PLATE III.

Fig. 1.—An equatorial valley seen westwards from Tol-mit (p. 28) which lies to the west of Chín-hǎi (鎮海). It is a tectonic valley with the east-west trend, and the road goes over the stratification-plane of the “black series”—the barren black marls and greenish flinty tuffite, dipping slightly southwards, as may be seen in a large block in the foreground and also on cliffs to the left. In the rear we see the Pal-chhi pass (100 *m*) (p. 29).

Fig. 2.—The equatorial romantic No-uön-san ridge as seen northwards from the plain of Pan-söng (p. 30), which is in the terrane of red marls—the “red formation.” The ridge is built up of greenish flinty metamorphics. Few travellers cross the ridge and tigers haunt the rocky cliffs.

Fig. 3.—View of Chín-jyu (普州), the seat of the local magistrate of South Kyöng-sang-Do, as seen westwards from the Mal-chhi pass (pp. 32-33) where Hideyoshi made a careful plan for the attack upon the city, and on March 19th, 1597, the bloody battle was fought in which sixty thousand soldiers and citizens within the city-walls were massacred. The city is enclosed on the west, north and east sides by a water-filled moat which is probably a dead arm or “cut-off” of the Nam-gang which is seen on our left. At the rear in the distance runs the meridional granitic Chi-ri-san massif, the giant of south Korea, separating the two provinces, this side being Kyöng-sang-Do, that side Chyöl-la-Do.

The hilly region in the foreground is the sandstone terrane of the Lower Kyöng-sang-formation (p. 33). The rocks are fast falling into disintegration, presenting the “bad lands” scenery.



THE FIRST TRAVERSE



Fig. 1.

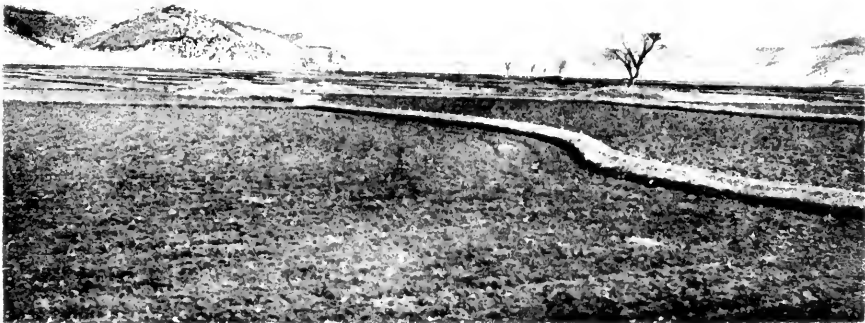


Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE IV.

#### PLATE IV.

Fig. 1.—View of the castle-hill of Chin-jyu from the south, overhanging the Nam-gang (the Yöng-gang) river. There are three red shrines built on it, commemorating the sad event already mentioned in reference to Pl. III. fig. 3. The large two-storey hall of Chyu-sök-ru on the left where the citizens enjoy the river's view is a fine specimen of Korean architecture. On the cliff we see the benches of micaceous sandstone of the Lower Kyöng-sang formation dipping eastwards (p. 34).

Fig. 2.—The Hoang-tai-chhi pass (黃大峙) (280 *m*), as seen from the east (p. 38). It is a meridional ridge of an ortho-hornblende-gneiss with its schistose plane toward us, and forming the basement of the Kyöng-sang formation. The ridge forms the eastern margin of the Chi-ri-san *massif* which may be traced northeastwards for a long distance. It was the first high pass crossed between Fusan and Ha-dong during my journey, and a battle-ground where our soldiers had a hard fight with the Koreans during Taikô's expedition (p. 39).

Fig. 3.—View from the ascent of the Hoang-tai-chhi pass (fig. 2 above) towards the east. Here I took a retrospect, in the direction of Chin-jyu, of the tectonic physiography of the country traversed, seeing before me the low regular ridges which run meridionally, corresponding to the uplifted crest of the sandstone series of the Lower Kyöng-sang formation (p. 39).

THE FIRST TRAVERSE

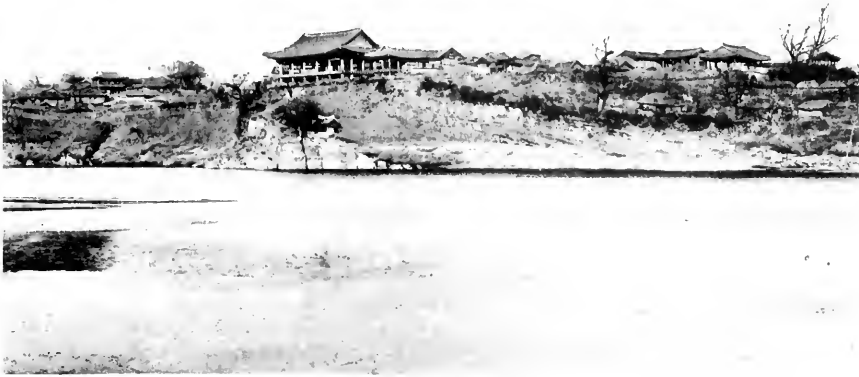


Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÓ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE V.

## PLATE V.

Fig. 1. A bird's-eye view *westwards* from the Hoang-tai-chhi pass, showing before us high ridges lying parallel to one another and all running meridionally (p. 39). The one nearest to us is a granulite ridge, the other behind is built up of eye-gneiss, and is separated from the distant high ridge of Päk-un-san (1234 *m*) by the meridional course of the Söm-jin-gang which flows past the *cunnaï* of Ha-dong. To the right is seen the peak of Pang-jyang-bong (1942 *m*), the highest point of the Chiri-san massive (eye-gneiss), and to the left in the corner the peculiarly pointed Ök-kul-bong whose geological nature is unknown (p. 39, 42).

Fig. 2. The frozen Söm-jin-gang at the turning point of its course in the defile of the Chiri-san mountains. The large, fissured, scalenohedral block of eye-gneiss in front is popularly called *mil-bahoi* or the 'buckwheat stone' (p. 43) and serves as a landmark separating the two provinces of Kyöng-sang-Do and Chyöl-la-Do. The high point in the distance is the already-mentioned Pang-jyang-bong (fig. 1 above) of the Chiri-san mass (eye-gneiss). Kai-chi in the middle of the picture is at the fork formed by a tributary. The scenery here is sublime and often sung by Korean poets (p. 42). At another fork behind is Hoa-kai-jyang (p. 43) whence a road leads to the monastery of Ssang-gyöi-sä. The meridional parallel ridges are cut off equatorially by dislocation at about Kai-chi, as may be seen in the photograph. See page 42.

Fig. 3. View of a transverse valley of the frozen Söm-jin-gang, as seen westwards from a point at the upper end of the course in photo 2. above. The topography is here rather open as the defile of the Chiri-san mass is left behind. To the left one sees masses of mountains which have slipped down into the gorge from the high peak of Päk-un-san by equatorial lines of the dislocation which gave rise to the present valley.



THE FIRST TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÓ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE VI.

## PLATE VI.

Fig. 1.—The plain of Ku-ryöi (求禮) bounded on the west by a meridional ridge (para-gneiss?) on whose eastern foot lies the *omui* of the same name which we see faintly from the east in the plate. See page 44.

Fig. 2.—View from the Sol-chhi pass (松峙), lying between Ku-ryöi and Sun-chyön, toward the north looking down the V-shaped valley in the terrane of the green breccia of porphyrite of the Upper Kyöng-sang formation. The stratification-plane and columnar structure of the rock produce a series of falls and rapids in the streamlet (p. 45).

Fig. 3.—View of the Sol-chhi pass (fig. 2 above), as seen from the south near Sun-chyön (順天). The top of the pass is eye-gneiss capped by red, quartziferous tuffs of porphyrite. The pass, as may be seen in the picture, is the uplifted edge of eye-gneiss with sheets of green porphyrite, and the south descent is dropped down to the gneiss terrane by equatorial lines of dislocation. Consequently, the pass appears for a long distance in sharp escarpment which corresponds to the basset of the sheets of porphyrite (p. 46). The topographic features of the porphyrite formation are characteristically angular and rugged as in figs. 2 and 3.

THE FIRST TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



B. KOTO:  
JOURNEYS THROUGH SOUTH KOREA

PLATE VII.

## PLATE VII.

Fig. 1.—The equatorial flat of Kang-jin (庚津), as seen from the east. The northern hill is built of sericite-schist interbanded with psammitic quartz-schist, both together forming the so-called Kang-jin schist series, striking N. E.—S. W. with the dip N. W. (p. 54). The *cumuli* lies in a hollow slope of the hill and is enclosed by mounds on three sides—a characteristic feature of *cumulis* in Korea. The plain extends to the left terminating at the head of a deep inlet. Anciently the Quelpartians usually landed here, when this place was called Tam-jin (耽津), in order to pay tribute to the court of the kings of Sil-la in Kyöng-jyu. A king of Sil-la therefore gave the name of Tam-na or the 'land of Tam' to the island of Chyöi-jyu (p. 138).

Fig. 2.—A reef of quartz-schist and muscovite-schist of the Kang-jin series, standing almost vertical. It runs southwestwards as the prolongation of that already noticed as occurring in Kang-jin (fig. 1 above). Once a copious stream had eroded the reef across its whole breadth in its southward course making a narrow gorge here, and the wind-gap so formed is called Söng-mun-san or the 'stone-gate' (p. 55).

Fig. 3.—The eastern entrance of the well-known whirlpool of Myöng-yang-jin, as seen from Sam-chi-nön (三枝院) at the foot of Ok-mäi-san (p. 58). The snow-clad, highly-sculptured hillocks across the sea are the island of Chin-do which is built up of brecciated felsophyre of the Upper Kyöng-sang formation (p. 61).



THE FIRST TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



B. KOTÔ:  
JOURNEYS THROUGH SOUTH KOREA

PLATE VIII.

## PLATE VIII.

Fig. 1.—The low narrow neck or ‘haulover’ of Uön-mun (轅門), which once protected the naval port of U-su-yöng on the land side. A stone-gate supporting a guard tower is in the village. The ground is brecciated felsophyre (p. 59). A quarter of an hour is sufficient to reach the naval port.

Fig. 2.—U-su-yöng (台水營) is at the western entrance of the far-famed whirlpool (Pl. VII. fig. 3), and was the naval base of the Korean Admiral I-sun-sin (李舜臣) who annihilated the Japanese armada during the war of 1592-1598 by luring our armed junks into the fatal whirlpool. See page 59.

Fig. 3.—The narrowest part of the whirlpool, called Myöng-yang-jin, the other side being the island of Chin-do. The ferry across the channel is only 1 *km.* Here the current is like a rapid river, and the agitated water rushes over a rough bottom of volcanic rock at the rate of 7 knots an hour, surging like rapids and roaring like a storm: hence the name Myöng-yang or ‘roaring sea.’ The rock is grayish brecciated felsophyre with green flecks, and abundant bipyramids and corroded crystals of quartz which project like needle-heads on the wave-beaten surface at the water’s edge on both sides of the ferry. Here again we have the Upper Kyöng-sang formation (p. 61).

THE FIRST TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig 3.



**B. KOTO:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE IX.

## PLATE IX.

- Fig. 1. Another point of the narrows and whirlpool of Myōng-yang ferry, just in front of the gate of the old naval station. It is the very spot where the Japanese armada was totally annihilated during Taikō's Korean expedition from 1592-1598. I actually photographed an ancient anchor which for three centuries had lain half-buried in sand, as in the photo, at the whirlpool's edge. It is to be seen no more, however, owing perhaps to the Korean's fear that I might come again and steal away the historic relic (p. 60).
- Fig. 2. The third point of the whirlpool showing special topography with narrows and indentations to which is due, in my opinion, the generation of the eddy which is produced in the shore current by the reflex motion within the widened sack (p. 60).
- Fig. 3. The free port and Japanese settlement of Mok-pho (木浦) at which I landed in snowy weather on February 16 th, 1901. The photo was taken from the background of our Consulate at the foot of Yu-dal-san which is built up of rugged masanite having the appearance of rhyolite for which it is often mistaken. At the time of my visit the streets had just been laid out, and only a small portion was occupied by buildings. The state of things must have been greatly changed since 1901. Beyond the inlet I saw then the snow-covered mountains of Yōng-am.



THE FIRST TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



B. KOTÔ:  
JOURNEYS THROUGH SOUTH KOREA.

PLATE X.

## PLATE X.

Fig. 1.—Yudal-san (Pl. IX, fig. 3) as seen beyond a shallow inlet from the north in the terrane of porphyritic masanite on the way to Mu-an. On the eastern slope and at its foot are located the Japanese settlement and port of Mok-pho. The mountain appears at first sight to be a volcano-ruin for which it might be easily mistaken especially in consideration of the rhyolitic aspect of the rock which builds up the elevation (p. 70).

Fig. 2.—View from a denuded hilly flat east of Mu-an (務安) toward the northwest in the direction of Ham-phyöng. In background may be seen a regular crest of uplifted graphite-schist (the Metamorphic Mesozoic) and in foreground eroded hills of purplish claystone-porphry (p. 72).

Fig. 3.—An Alluvial tract of paddy fields to which I descended from the hill (fig. 2 above). To the southwest is seen the flat-topped Kong-su-bong (公水峰) of red porphyry on a base of masanite which rises on the south of the *omnāi* of Mu-an.

THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



B. KOTÓ:  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XI.

## PLATE XI.

Fig. 1.—View from Chho-dong, west of Na-jyu, on a small tributary of the Yöng-san-gang looking toward the open south. In the distance on the left the snow-covered Uöl-chhyul-san, (the ‘Small Diamond Mountain’) of Yöng-am should be seen, but unfortunately it has disappeared from the plate during collotyping. It towers beyond the Yöng-san-gang, and has an eastwest trend and a northern precipice. The ground is full of the gravels of claystone-porphry, greenish porphyrite and their derivatives—a characteristic landfeature of Korea. We are now in the terrane of the Upper Kyöng-sang formation.

Fig. 2.—Keun-söng-san (錦城山), the castle mountain of Na-jyu, as seen westwards from the plain, lying to the left of picture fig. 3 below. The sharp ridge trends northsouth, and is probably built up of felsophyre. The Koreans are in one sense a hermit nation, as Griffith, the author of the ‘Hermit Nation,’ fitly calls them; for, at the time of any danger the harmless citizens quickly retire into the recess in the heart of this mountain which they call *san-söng* or ‘mountain castle.’ Such a recess is a characteristic adjunct of almost every Korean *emnaï* in the peninsula.

Fig. 3.—View from a low mountain of felsophyre, west of Na-jyu (羅州), toward the *emnaï* of the same name in a granitic depression (p. 74). The fertile, rice-producing plain, the largest in southwest Korea, is in full view toward the east, and beyond this plain is seen a meridional ridge, the highest point of which is Mu-töng-san (無等山) of Koang-jyu which we shall reach presently (PL. XII. fig. 2. p. 74). The plain is a denudation-basin in granitic rocks. The *emnaï* of Na-jyu (p. 74) is a large one as compared with other *emnaï*s, being surrounded by a wall of massive granite solidly *cemented*.



THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTO:**  
JOURNEYS THROUGH SOUTH KOREA

PLATE XII.

## PLATE XII.

- Fig. 1.—The head of the Na-jyu plain (cfr. Pl. XI. fig. 3) near Tam-yang (潭陽) looking southwestwards towards Na-jyu. The distant mountain range faintly seen beyond the plain is Uöl-chhyul-san (p. 65, cfr. Pl. XI. fig. 1) of Yöng-am. Page 76.
- Fig. 2.—Koang-jyu (光州), the magisterial town of South Chyöl-la-Do. It is located in a basal granitic hollow of Mu-temng-san (cfr. Pl. XI. fig. 3) which is built up of sheets of porphyrite. This view is taken from the outer gate leading eastwards to the inner one, within which there is nothing but confused groups of thatched cottages like those seen in the foreground (p. 75).
- Fig. 3.—The cliff of Chyök-söng-jin (赤城津) beyond the river of the same name, exposing a basset of a complex of orthogneiss conformably overlaid by a psammitic sericite-schist of the Kang-jin type (cfr. Pl. VII. fig. 1. and p. 51). This is the prolongation of the belt of Kang-jin. The road leads through a wind-gap of excellent rock exposures to the Pi-hong-chhi pass (p. 78).

THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XIII.

### PLATE XIII.

- Fig. 1.—View from Nam-nön (南原) toward the *south*, looking at the barrier-like, equatorial Pam-chhi, the ‘Chestnut-tree pass,’ which separates us from the plain of Ku-ryöi (cfr. Pl. VI. fig. 1), touched in my First Traverse (p. 44). In the corner to the left, one sees the slope of Chiri-san with the monastery of Hoa-am-să (p. 44). The region is in the terrane of eye-gneiss.
- Fig. 2.—To the *west* we see the Pi-hong-clhi pass. This meridional ridge is sharply delineated and characterized by its regularity of trend, marking the western margin of the ‘Chiri-san sphenoid’ which is constituted almost entirely of several varieties of eye-gneisses.
- Fig. 3.—Nam-nön, an important *emniü*, is located in the centre of an intermontane in-filled *sandy* basin, only 50 *m* above sea-level (p. 78). It is enclosed, as usual, with a stone-wall, and to the left is seen a small group of tile-roofed houses outside the wall. It is the *syömy-öp* (先業) or Royal shrine at which the *Kum-su* or district magistrate accompanied by all his subordinates pays reverence in the most ostentatious manner on certain fixed days. This is his chief official duty. This sort of building is very common in Korea, and, indeed, there is no town, however small it may be, without its *syömy-öp*. Beyond this shrine we see again the mountain-castle (cfr. Pl. XI. fig. 2), known as Kyo-ryong San-söng or ‘Dragon Castle’ (蛟龍山城). The *emniü* was destroyed in 1597, during Taik’ös expedition, which action left an indelible resentment in the heart of the people.



THE SECOND TRAVERSE



Fig. 1.

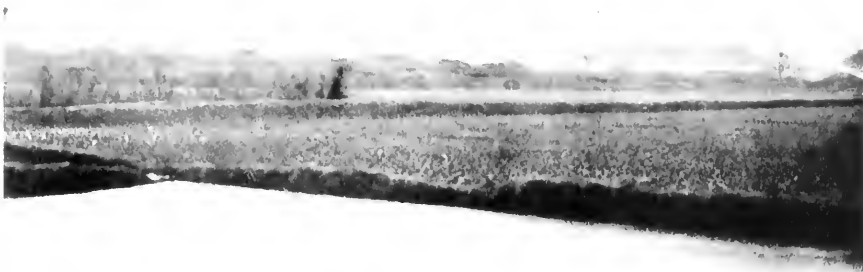


Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XIV.

## PLATE XIV.

Fig. 1.—From Nam-nön to the Yö-nön-chih pass (女院峙) (435 *m*), the road follows a stream of clear water with a bed of arcose gravel up to the pass where the rock is still sheared biotite-granite. The slope is thinly covered with pine forest on a granitic ground, and the scenery is said to be very fine, as there are only a few places in Korea where forest is found. The Pi-hong-chih ridge (cfr. Pl. XIII. fig. 2) is seen running with regular meridional trend on the western horizon (p. 80).

Fig. 2.—Toward the east from the same spot fig. 1, we see the axial ridge of the snow-covered Chiri-san range raising its submerged but regular crest (1239 *m*) with wall-like sharpness beyond the high in-filled flat of Un-bong (雲峰). Page 80.

Fig. 3.—At about 4 *km* northeast of the *emmi* of Un-bong is Pi-djön (碑殿村), literally the 'village of the temple of the stone monuments' (cfr. Pl. XV. fig. 1). This was an unfortunate battle ground for a Japanese band of freebooters who, in 1319 A. D., were defeated in two campaigns in which they lost their chief, Agibasuto (阿只拔都), who had come over with 500 junks from Kyû-shû. The Koreans were then under the command of I-Söng-kyöi who later rose in power and became the first sovereign of the present dynasty. The three shrines overshadowed by a group of *Celtis sinensis* commemorate the victories of that occasion.

THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÓ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XV.

## PLATE XV.

Fig. 1.—The high flat of Un-bong (Pl. XIV. fig. 2) as seen from the *north-east*, the forested hill in the foreground being the locality of the Hoang-san stone monuments (荒山大勝碑); the group of cottages nearby is Pi-djön (Pl. XIV. fig. 3). The distant elevation in the middle of the picture is the Yö-nön-ehhi pass which descends abruptly towards the west. Page 81.

Fig. 2.—Turning *east* from the last place (fig. 1), the road rises from In-nöl (once a battle ground) imperceptibly to the Plal-hyöng-ehhi pass (八兄峙) which forms the eastern edge of the Un-bong flat and the rim of the axial ridge of the Chiri-san range, serving at the same time as the boundary between Kyöng-sang-Do and Chyöl-la-Do. One sees in the picture three Korean ponies, two of them carrying the author's luggage.

Fig. 3.—From the top of the same pass a panoramic view opens disclosing the low, dark coulisse ridges (the distant parallel hills are unfortunately not seen) of Kyöng-sang-Do, which are of the Kyöng-sang formation. The road descends to Ham-yang which lies at the eastern foot of the pass (cfr. Pl. XVI. fig. 1). The pass is still built up of schistose granite traversed abundantly by aplite. Page 81.



THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÓ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XVI.

## PLATE XVI.

Fig. 1.—The *munni* of Ham-yang (咸陽), viewed from the *south*, in a depression of eye-gneiss at the eastern foot of the Pal-hyöng-chhi pass (cfr. Pl. XV. fig. 3). It is a type of small *munni*s which are comparatively clean (p. 82).

Fig. 2.—The *munni* of San-chhyöng (山淸) located on an erosion-hill of hornblende-gneiss on the east bank of the Nam-gang which flows southwards past Chin-jyu (p. 33, Pl. III. fig. 3). It is in an intermontane flat in a very fine scenic situation; hence the name 'mountain-clean.' The photo is taken from the north toward the open south. Here instead of following the river down-stream, I climbed the pass, fig. 3.

Fig. 3.—The Chhyöng-möri-chhi pass (尺旨峙), built up of orthogneiss (p. 84). From the pass (360 *m*) a view can be had, toward the *west*, of the inner Chiri-san whose low neck (in the right corner) we had passed over two days previously. It is the Pal-hyöng-chhi pass (Pl. XV. fig. 2, p. 81). San-chhyöng is at the foot in a depression. The whole terrane in view is entirely composed of eye-gneiss or its allies. Page 85.

THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XVII.

## PLATE XVII.

Fig. 1.—The *eastern* side of the Chhyöng-möri-chhi pass (cfr. Pl. XVI. fig. 3) is precipitous. One looks down upon the hilly lowland (70 *m*) of the Nak-tong-gang backed by a high ridge (faint in the picture) of the eruptive Kyöng-sang formation beyond the river. The relief of the meridional Nak-tong lowland is of the coulisse form with model-like regularity, all ridges running parallel to one another in the direction of the axis of the basin. The pass on which we stand is the eastern margin of the Chiri-san massive. See page 85.

Fig. 2.—View of the Chhyöng-möri-chhi pass (cfr. Pl. XVI. fig. 3, Pl. XVII. fig. 1) from Sam-ga which lies about 14 *km* to the east. The *cumt'ai* is at the right corner, and the neck in the left corner in the distance is the pass just mentioned. The foothills are the terrane of muscovite-sandstone of the Lower Kyöng-sang formation. (pp 85-86).

Fig. 3.—Again another view of the Chhyöng-möri-chhi pass, this time from the Tai-kok-chhi pass (大谷峠), which lies 8 *km* in a northeasterly direction from Sam-ga. The low parallel meridional ridges are all built up of the rocks of the Lower Kyöng-sang formation which we saw from the opposite side at the top of the Chhyöng-möri-chhi pass, fig. 1. See page 86.



THE SECOND TRAVERSE

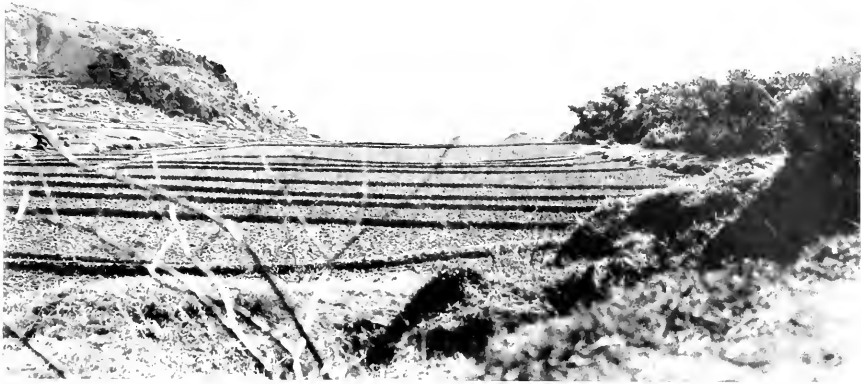


Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XVIII.

## PLATE XVIII.

Fig. 1.—View toward the *northeast* in the direction of Sam-ga (三嘉) from an elevation of piedmont hills of the sandy, Lower Kyöng-sang formation, as seen in Pl. XVII. fig. 2. It is a lonely tract covered with grass and a few pines on rusty weathered rocks. The *omniä* lies in a hill depression beyond which is seen in the right corner in the distance the Tai-kok-chhi pass (Pl. XVII. fig. 3). See page 86.

Fig. 2.—The north descent to Söng-am from the Tai-kok-chhi pass (Pl. XVII. fig. 3) on the terrane of green marl and sandstone of the higher horizon of the Lower Kyöng-sang formation with varying easterly dips. The pointed Kuk-sä-bong (國師峰) in front is built up of thick beds of strong conglomerate composed of the gravels of gneiss and porphyrite. It is the basal bed making the boundary of the non-volcanic Lower, and the volcanic Upper Kyöng-sang formations (p. 87).

Fig. 3.—View from a hill, south of Chhyang-nyöng, to the *west*, where one has an excellent opportunity to survey the physiography of the trench-like hilly land (Pl. XVII. figs. 1, 2, 3) beyond the Nak-tong-gang, being composed of the lower half of the Kyöng-sang formation. (pp. 32, 133). Cfr. Pl. XXXI. fig. 3.

THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÓ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XIX.

## PLATE XIX.

Figs. 1 and 2.—The general appearance of a large city in Korea. Tai-ku (大邱) on the Seoul-Fusan railway and high road is the fourth largest city of the peninsula and the largest in south Korea, having a population numbering 15814. The city lies in a dry sandy depression at the east foot of a hill of the 'red marls,' from which we took the panoramic view, the northern half is in the upper picture and the southern half in the lower. The south is closed in by the meridional fault-scarp of the 'red marl formation' which we passed at O-dong. To the northeast the sharp oblique ridge of the well-known Phal-kong-san (1138 *m*) screens the Tai-ku plain from the north wind, the lower two-thirds of the mountain being buff-colored masanite thinly covered with pines, while the upper third is capped with black shales and marls of the Upper Kyöng-sang formation. I touched here on March 8th, 1901, which happened to be a festival day. All the white-clothed citizens assembled on a southern hill (at the right of the lower picture) to see a grand game of tug-of-war (綱曳) which was honoured by the presence of the high magistrate or *Kam-sä* of South Kyöng-sang-Do and his whole suite including their wives. The two-storey tile-roofed houses are official buildings. See page 89.



THE SECOND TRAVERSE



Fig. 1.



Author photo.

Fig. 2.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XX.

## PLATE XX.

- Fig. 1.—The sandy somewhat sterile plain east of Tai-ku (Pl. XIX). On the *east* a sharp meridional ridge of the ‘flinty tuffite series’ runs along the distant horizon, and to the left at the foot of a spur of the hill is the *munai* of Ha-yang (河陽) in the direction of Yöng-chhyön (p. 91).
- Fig. 2.—The thriving *munai* of Yöng-chhyön in a depression in the ‘black shale series’ occasionally interstratified with sandstone layers which become almost horizontal as we go up eastwards along a fork of a river to the granite pass of the Chhyöng-gyöng-chhi (清鏡峙), 150 *m* high, which is the northern prolongation of the ridge starting from near the free port of Fusan (p. 92).
- Fig. 3.—View eastwards from the foot of the Chhyöng-gyöng-chhi, showing before us in the distance beyond the plain of An-gang (安康) the meridional coastal ridge of the ‘black series.’ On the other side is the Tertiary Bay of Yöng-il of the Japan Sea (p. 92). Cf. Pl. XXI. fig. 3.

THE SECOND TRAVERSE

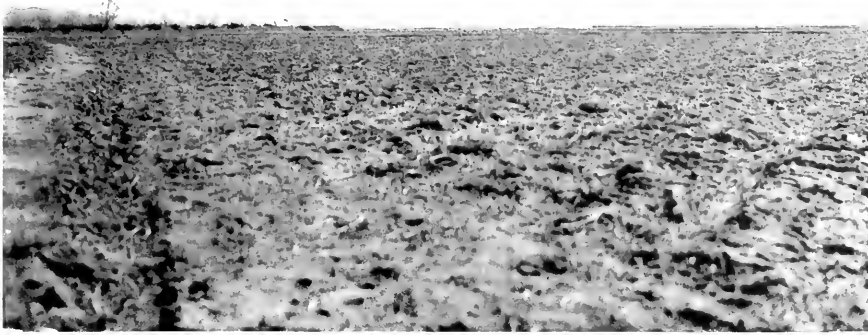


Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTO:**  
JOURNEYS THROUGH SOUTH KOREA

PLATE XXI.

## PLATE XXI.

- Fig. 1.—The reverse of Pl. XX. fig. 3, *i. e.*, viewed toward the west in the direction of the Chhyöng-gyöng-chhi pass from near An-gang. As before stated, it is a low but distinct ridge, running meridionally throughout south Korea, having been produced by faulting (p. 92).
- Fig. 2.—The head of the Bay of Yöng-il (迎日灣) in the Tertiary terrane, viewed from the southwest. The port of Pho-hang (浦項), the most frequented harbor on the east coast, is at the mouth of the Hyöng-san-pho river from the gorge of which we had just emerged (p. 93).
- Fig. 3.—View from a south hill of Yöng-il toward the northwest in the direction of Chhyöng-ha (清河), looking at the sharp regular coastal ridge with the Tertiary foothills beyond the Bay of Yöng-il. The view from the *west* side of the ridge is in Pl. XX. fig. 3. See page 94.



THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



B. KOTÔ:  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXII.

## PLATE XXII.

Fig. 1.—An exposure of a poor lignite seams, 2 *km* north of Chyang gi (長鬢). It occurs on the upper horizon of the interesting Tertiary deposits on the east coast, as may be seen in the sectional column (pp. 95–96).

Fig. 2.—The stone-walled *emmuñ* of Chyang-gi upon the sheet of blackish eruptive flows, as seen from its southeast foot. It is a poor *emmuñ* and the only one along the coast between the Yöng-il Bay and the cove of Ul-san. It was often a landing place of the Japanese bands which in former times threatened the peace of Kyöng-jyu, the ancient capital of Sil-la (p. 95). People told me that an enormously heavy bell of the Sil-la time was brought hither over the coastal mountain by the Japanese to be carried on a junk over the Sea of Japan; and even now it is rumoured that a number of speculative merchants at Fukuoka are endeavoring to organize a joint-stock company to raise the historic bell imagined to have been sunk in the sea near the coast of Hakata.

Fig. 3.—Turning from the *coast* at Oa-cup, my route led *westwards* up a desert-like valley to the Kana-chhi pass (加羅峙) in the terrane of the 'black shale series,' which is seen in the middle of the picture. The conical peak to the right is a trachytic andesite (pp. 97-98).

THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



B. KOTÔ:  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXIII.

### PLATE XXIII.

Fig. 1.—The *emniüi* of Kyöng-jyu, as seen from the west. It is the old capital of Sin-han (辰韓), and later the metropolis of the Kingdom of Sil-la (新羅) from 57 B. C. to 936 A. D. The rectangular-mural city is located on a flinty gravel flat in the fork of a river, one arm of which flows westwards down the Kana-ehli pass which we descended hither (see fig.). The plain of Kyöng-jyu lies between the ridges of the Tai-pük-san range, the western being that of the Chhyöng-gyöng-ehli pass already referred to (Pl. XXI. fig. 1, pp. 95—96), the eastern, that of T'o-ham-san (吐含山), just crossed. See pages 99, 101.

Fig. 2.—The thing that struck me as most remarkable was the artificial relief on the flat caused by a group of high mounds, about twenty in number, which resemble miniature volcanoes. These mark the sites where the remains of the kings of Sil-la were interred, and under these sovereigns the once enlightened people of the peninsula left the impress of a high civilization on the history of Korea (p. 101).

Fig. 3.—The southward extension of the plain of Kyöng-jyu toward Ul-san, showing to the left the coastal ridge of T'ong-tai-san (通大山) of the 'black series,' which terminates at the headland of Yöm-pho (Cape Tikhmenef) (pp. 101—102).



THE SECOND TRAVERSE

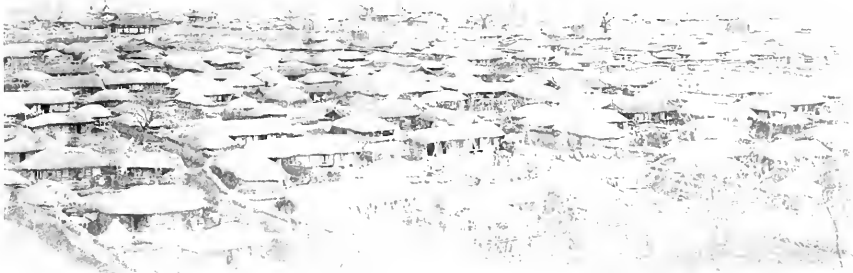


Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA

PLATE XXIV.

## PLATE XXIV.

Fig. 1.—A plank-bridge supported by piers of sand and gravel bags on the sandy Nam-chhyön at the foot of the 'Left Garrison' (p. 102). The flat-topped, isolated butte-like hill overlooking the surrounding Alluvium is the ancient fortress of Cheung-söng (甌城) where the struggle centred in the closing phase of Hideyoshi's invasion during the years 1592—1598. The fight is usually called the battle of Ul-san (p. 103). The hill is built up of the 'red formation,' a part of an extensive inlier around Ul-san (尉山), which crops out from beneath the 'black series.'

Fig. 2.—The road near Sö-chhang (西倉) between Ul-san and Fusan ascends two successive terraces (in the middle of the figure) of porphyrite gravel within the two meridional ridges of green porphyrite-breccia of the uppermost Kyöng-sang formation. Terraces are extremely rare in Korea (p. 104).

Fig. 3.—The hot spring of Tong-näi (東萊) at the southeast foot of the granitic Keum-jyöng-san (p. 15); it bubbles up from sand near the bank of a dry rivulet. It is a clean bath-resort near the Japanese settlement of Fusan. The high building in the centre is the bath (p. 105). The top of the mountain is the old castle of Keum-jyöng on the nasanitic laccolith (p. 15).

THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA

PLATE XXV.

## PLATE XXV.

Fig. 1.—The *emnai* of Tong-nǎi, as seen northwards from Fusan-chin (fig. 2), lies only 2 *km* east of the hot-spring (Pl. XXIV. fig. 3). It is a place frequently mentioned in the Japan-Korean diplomatic history, as it is the first *emnai* of the peninsula on the Korean side of the Tsushima Strait (p. 106).

Fig. 2.—Fusan-chin (釜山鎮) or the fortress of Pu-san at the head of the harbor of the same name, viewed from the ruined castle (masanite) of General Konishi, a hero of Taikó's expedition. The ruin of the fort or *chin* itself is on the two forested hills (pp. 14, 106). The mountains beyond the cove is built up of porphyrite and its breccia.

Fig. 3.—View of the island of Chyöl-lyöng-do (絶影島) (p. 12, Pl. I. fig. 1) from Fusan-chin (fig. 2 above). This volcano-like island is seen to the right beyond the harbor of Fu-san. Plate I. fig. 1 represents the western slope of this mountain island.



THE SECOND TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXVI.

## PLATE XXVI.

Fig. 1.—View toward the mouth of the Keum-gang river (錦江) which flows by the free port of Kun-san, hidden from view by a bare hill to the left. The hill as well as the mountains behind are the terrane of the Mesozoic metamorphic schists (pp. 108, 109).

Fig. 2.—The new Japanese settlement of Kun-san (群島), as seen from the bare hill on the east already mentioned (fig. 1). The free port was opened in 1898, and there were few houses in 1901 at the time of my visit. The state of things must be greatly changed now. The landing place is a bluish ottrelite-schist (pp. 108-109).

Fig. 3.—View of Kun-san from the opposite (west) side, looking up the wide Keum-gang which is 1-2 fathoms deep during the spring-tide for 35 *km* as far up as Kang-gyöng (江景 p. 108), which is really the port in the interior. The Japanese Consulate is on a hill on the left.

THE THIRD TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÓ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXVII.

## PLATE XXVII.

Fig. 1.—A bridge on the high road from Seoul to Chyön-jyu, the provincial capital of North Chyöl-la-Do, the bridge on the other arm of the river seemed to have been carried away by flood, and I was obliged to wade through it. This is the usual condition of Korean high roads; consequently travelling is almost impossible during rainy seasons. The hills on the foreground is a sericite-Lagen-gneiss; and the pointed mountain behind is Mo-ak-san (母岳山) which is well seen from Kum-san (Pl. XXVI. figs. 2, 3). A flat topped mountain on the left is the castle-ruin of Nam-ko san-söng (metamorphic schist, p. 115), at its foot lies in a depression the *emumäi* of Chyön-jyu with a population of 15094 (p. 112).

Figs. 2 and 3.—The grand *emumäi* of Chyön-jyu, the fifth city of the peninsula next in magnitude to Taiku (Pl. XIX. figs. 1 and 2). Fig. 2 represents the southern quarter and fig. 3 the northern, viewed *eastwards* from a western hill. Right through the southern mountains goes the high road to Nam-üön over the pass of Man-mal-koan (sketch map p. 113). A low neck of eastern mountains (on the left in fig. 2, middle in fig. 3) is the Chyöng-nai-chhi (筍川峙) pass (450 *m*) which we shall pass over presently (p. 122). It is an orthogneiss ridge. A multitude of white flecks on the sandy bank of a river, appearing just like a laundryman's yard, was a group of white-clothed citizens, as it happened to me to take the photo on the occasion of a fair (pp. 112, 121).



THE THIRD TRAVERSE



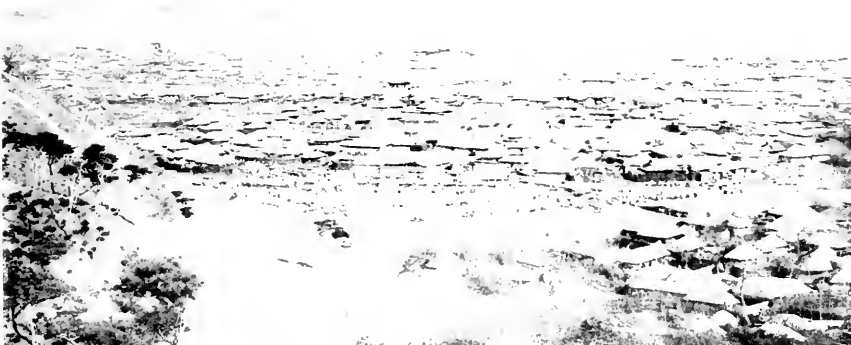
Fig. 1.

×



Fig. 2.

×



Author photo.

Fig. 3.



B. KOTÔ:  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXVIII.

## PLATE XXVIII.

- Fig. 1.—The plain of Ku-jin-ni (九津里) at the western foot of the Chyöng-nai-chih pass (Pl. XXVII. fig. 2 on the left, and fig. 3 in the middle). Feldspar-conglomerate is found abundantly as blocks in the plain, but the geological relation is yet unknown to me. The foothills are of sheared gneiss (p. 122).
- Fig. 2.—The remarkable erosion-form, viewed from the *south*, looking like a pair of erect pony's ears; hence the name of Mal-i-san (馬耳山). It is a transgressing double-peak of the Mesozoic conglomerate resting directly upon a gneiss-granite, and is regarded sacred by, and well known among the people, like the Tertiary conglomerate of Kalabaka in Thessalia (pp. 121, 123).
- Fig. 3.—The stretch between Keum-san (錦山) and Mu-jyu is mainly occupied by an orthogneiss, as may be seen in the background, but 4 *km* toward the latter an iron-glance-mica-schist was observed by Mr. Yabó, having an appearance of a glaucophane-schist (the hills in front). The view was taken by him toward the north from Kachhon-chä (柯村子). See page 124.
- Fig. 4.—Chyök-sang-san (赤裳山) or "Mt. Red Skirt" of Mu-jyu (茂朱), viewed from the southwest. The basement of this castle-mountain is built up of a porphyritic masanite capped with red, calcareous tuffite and red felsophyre together with sandstone and conglomerate having a slow southwest dip. The complex represents the Upper Kyöng-sang formation, being at the east end of the Mesozoic of the "spatulate area" (p. 124).

THE THIRD TRAVERSE



Fig. 1.



Fig. 2.



Yabé photo,

Fig. 3.



Fig. 4.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXIX.

## PLATE XXIX.

Fig. 1.—Northern view of the same Mal-i-san from near Chin-an (鎮安)  
(*cf.* Pl. XXVIII. fig. 2).

Fig. 2.—There is a pass between Chin-an and Song-dam (松潭), called the Pha-kogäi, which we had just passed over and now cast a retrospective glance upon it. It is built of metagneiss with injected pegmatite, perthite and tourmaline dyke-rocks. It is an important topographic element which coming northwards from the Pi-hong-chih (Pl. XIII. fig. 2, p. 78) passes here farther northwards to the Chhyu-phung-nyöng pass (秋風嶺) (p. 125).

Fig. 3.—Eastward view from the top of the Phan-kogäi on an orthogneiss terrane, looking down, in a snowy morning, the little intermontane flat of Chyang-gyöi-jyang (長溪場) beyond which was seen on the eastern horizon the mighty ridge of the snow-covered Yuk-sim-nyöng pass at the boundary between the two provinces of Kyöng-sang-Do and Chyöl-la-Do (p. 127).



THE THIRD TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXX.

### PLATE XXX.

Fig. 1.—We rode up from Chyang-gyöi-jvang (II. XXIX. fig. 3) a gradual slope along a valley (see picture) of porphyritic gneiss-granite, and finally reached the steep pass (900 *m*) of the Yuk-sim-nyöng (六十嶺). This was the highest point of the present Traverse, being also one of the highest points in the high interior of Chyöl-la-Do. (p. 127).

Fig. 2.—About 5 *km* west of the *omni* of An-eui we came out from the mountainous tract of white eye-gneiss into a rather low tract of open topography. Here a clear stream ran down a tortuous channel with deeply eroded bed broken by low cataracts. We saw on the corraded bank a fine summer house, Nopheun-chyöng—a choise spot for lovers of scenery (p. 128). We saw far behind a high crest of Hoang-sök-san, a high ridge running parallel to and east of the Yuk-sim-nyöng, already referred to (fig. 1 above). See page 128. It is a characteristic feature of drainage of Kyöng-sang-Do that all the waters coming from the west to the main of the Nak-tong-gang are torrential, while those from the east pursue a slow meandering course.

Fig. 3.—At Kuöl-pho (關浦) where the Nak-tong-gang makes a temporary equatorial course, I took a view toward the east, looking in the front a granitic Mt. Pi-seul-san (琵琶山) rising direct and steeply from the *omni* of Hyön-phung (p. 132). The terrane in the front is the “red formation” of the Upper Kyöng-sang formation.

THE THIRD TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXXI.

### PLATE XXXI.

Fig. 1.—The ferry of Hyön-phung (玄風) whence we looked backwards toward Kuöl-pho (Pl. XXX. fig. 3). This photo represents the typical scenic aspect of the Nak-tong-gang while draining the hilly land of the Upper Kyöng-sang formation. It is a mature river. See page 132.

Fig. 2.—The *emnaï* of Hyön-phung in the terrane of the “black shale series” at the western foot of the granitic Mt. Pi-seul-san (p. 132).

Fig. 3.—The general view of the hilly land of the Nak-tong-gang region from a hill-top on the east bank north of the *emnaï* of Chhyang-nyöng (cfr. XVIII. fig. 3, pp. 32, 133).



THE THIRD TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



B. KOTÓ:  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXXII.

## PLATE XXXII.

Fig. 1.—The *munai* of Chhyang-nyōng (昌寧) with the usual adjunct of mountain-castle behind. The precipitous mountain is built up of aplitic masanite capped with reddish and greenish beccias which correspond to the uppermost member of the Kyōng-sang formation. The masanite here, as in other occurrences, is an intrusive rock; but how it came to be exposed in steep walls is not exactly known to me (p. 133). It may be attributed either to erosion or to slipping on the west or the Nak-tong-gang side.

Fig. 2.—An equatorial valley between Yōng-san (靈山) at the angle of the Nak-tong-gang and Sam-nang-jin station, running parallel to the course and north of the river. I consider this to be a typical dislocation-valley cutting through the almost horizontally bedded breccia. At Ku-pak, gold dust is washed in the gravel of porphyrite-breccia and it is a new type of the occurrence of gold in Korea (p. 134).

Fig. 3.—The Kkachhi-nōn gate (鵲院關) on the eastern bank of the Nak-tong-gang in the terrane of felsophyre (pp. 16, 134).

THE THIRD TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXXIII.

### PLATE XXXIII.

Fig. 1.—The same gorge (Pl. XXXII. fig. 3) of the Nak-tong-gang, as seen northwards from Mul-geum, now a railway station. The river is making its way across an equatorial ridge of the Han-san system (p. 16).

Fig. 2.—View from the same spot, as in fig. 1, toward the south in the direction of the debouchure of the Nak-tong-gang. On the left we see Ku-dök-san, built up of tuffs and sheets of porphyrite, and on the right in the distance the mountains of the same formation on the coast near Ung-elhyön (熊川) (footnote p. 17).

Fig. 3.—Chyöl-lyöng-do (絶影島) or “Deer Island” beyond the harbor of Fusan, as seen from a hill of the Chinese settlement at Fusan (cfr. Pl. I. fig. 1, Pl. XXV. fig. 2, p. 135).



THE THIRD TRAVERSE



Fig. 1.



Fig. 2.



Author photo.

Fig. 3.



**B. KOTÔ:**  
JOURNEYS THROUGH SOUTH KOREA.

PLATE XXXIV.

## PLATE XXXIV.

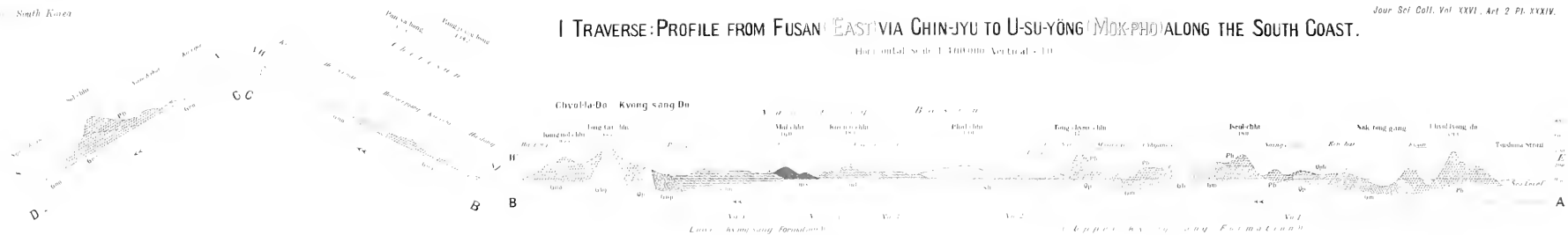
The First Traverse: Profile from Fusan to Usu-yöng.

The Third Traverse: Profile from Kun-san to Fusan.

I. Basal gneiss .....	$\left\{ \begin{array}{l} a. \text{ The Pong-göi gneiss} \\ b. \text{ The Tong-chhang gneiss} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Gnp} = \text{Paragneiss} \\ \text{Gnp} = \text{..} \end{array} \right.$
II. Kang-jin mica-schist. ....	$\left\{ \begin{array}{l} a. \text{ The Kang-jin mica-schist} \\ b. \text{ The Mul-kö-sil mica-schist} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Qss} = \text{Sericite-quartz-schist} \\ \text{Ph} = \text{Phyllite} \end{array} \right.$
III. Phyllite schist .....	$\left\{ \begin{array}{l} a. \text{ The Tong-pok complex} \\ b. \text{ The Mu-an complex} \\ c. \text{ The Chyön-jyn complex} \\ d. \text{ The Kun-san complex} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Ph} = \text{..} \\ \text{Ph} = \text{..} \\ \text{Ph} = \text{..} \\ \text{Ph} = \text{..} \end{array} \right.$
IV. Great granitoid series...	$\left\{ \begin{array}{l} a. \text{ Palaeogranite} \\ b. \text{ Melanocrate} \\ c. \text{ Leucoerate} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Gno} = \text{Orthogneiss, Gna} = \text{An-} \\ \text{gengneiss} \\ \text{G} = \text{Granite, Gmy} = \text{Mylonit-} \\ \text{ized Granite} \\ \text{Gh} = \text{Hornblende-granite, Ghy} \\ = \text{Gneissoid} \\ \text{Lc} = \text{Aplite, Plagioclasite} \end{array} \right.$
V. Kyöng-sang formation..	$\left\{ \begin{array}{l} a. \text{ The Lower} \\ b. \text{ The Upper} \end{array} \right.$	$\left\{ \begin{array}{l} \text{sdm (No. 5)} = \text{Muscovite-sand-} \\ \text{stone} \\ \text{ms (No. 4)} = \text{Gray Marl and} \\ \text{Sandstone} \\ \text{ml (No. 3)} = \text{Red and Green} \\ \text{Marls} \\ \text{sh (No. 2)} = \text{Shale} \\ \text{Pb (No. 1)} = \text{Porphyrite and} \\ \text{breccia} \end{array} \right.$
VI. Felsophyre and its allies	$\left\{ \begin{array}{l} a. \text{ Felsophyre} \\ b. \text{ Masanite} \\ c. \text{ Grano-masanite} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Qp} = \text{Quartz-} \left\{ \begin{array}{l} \text{Gpf} = \text{Felsophyre} \\ \text{porphyry} \end{array} \right. \\ \left\{ \begin{array}{l} \text{Gpb} = \text{Breccia} \\ \text{Gm} = \text{Masanite} \end{array} \right. \end{array} \right.$
VII. Tertiary formation		t = Tertiary
VIII. Diluvium and younger effusives		Ah = Hornblende-andesite
IX. Alluvium		r = Recent

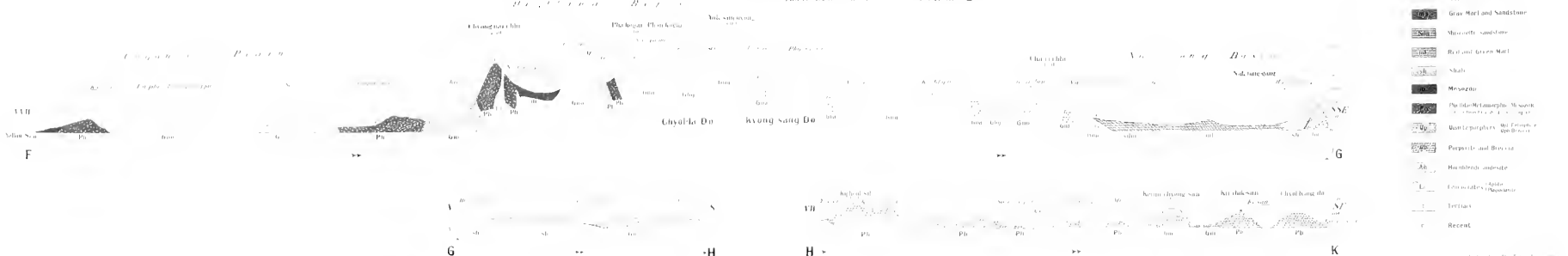
# I TRVERSE: PROFILE FROM FUSAN (EAST) VIA CHIN-JYU TO U-SU-YONG (MOK-PHO) ALONG THE SOUTH COAST.

Horizontal Scale 1:100,000 Vertical 1:10



# III TRVERSE: PROFILE FROM KUN-SAN (YELLOW SEA) TO FUSAN (TSUSHIMA STRAIT) OBLIQUELY THROUGH SOUTH KOREA.

Horizontal Scale 1:100,000 Vertical 1:20



- Patagites
- Sandstone
- Shale
- Argillaceous sandstone
- Sandstone
- Metamorphosed granite
- Marble
- Hornblende granite
- Gray Marl and Sandstone
- Shale and sandstone
- Red and brown Marl
- Shale
- Mesozoic
- Paleozoic Metamorphic
- Devonian Limestone
- Purple and Blue clay
- Hornblende andesite
- Eocene andesite
- Tertiary
- Recent



**B. KOTÔ:**  
JOURNEYS THROUGH SOUT KOREA.

PLATE XXXV.

## PLATE XXXV.

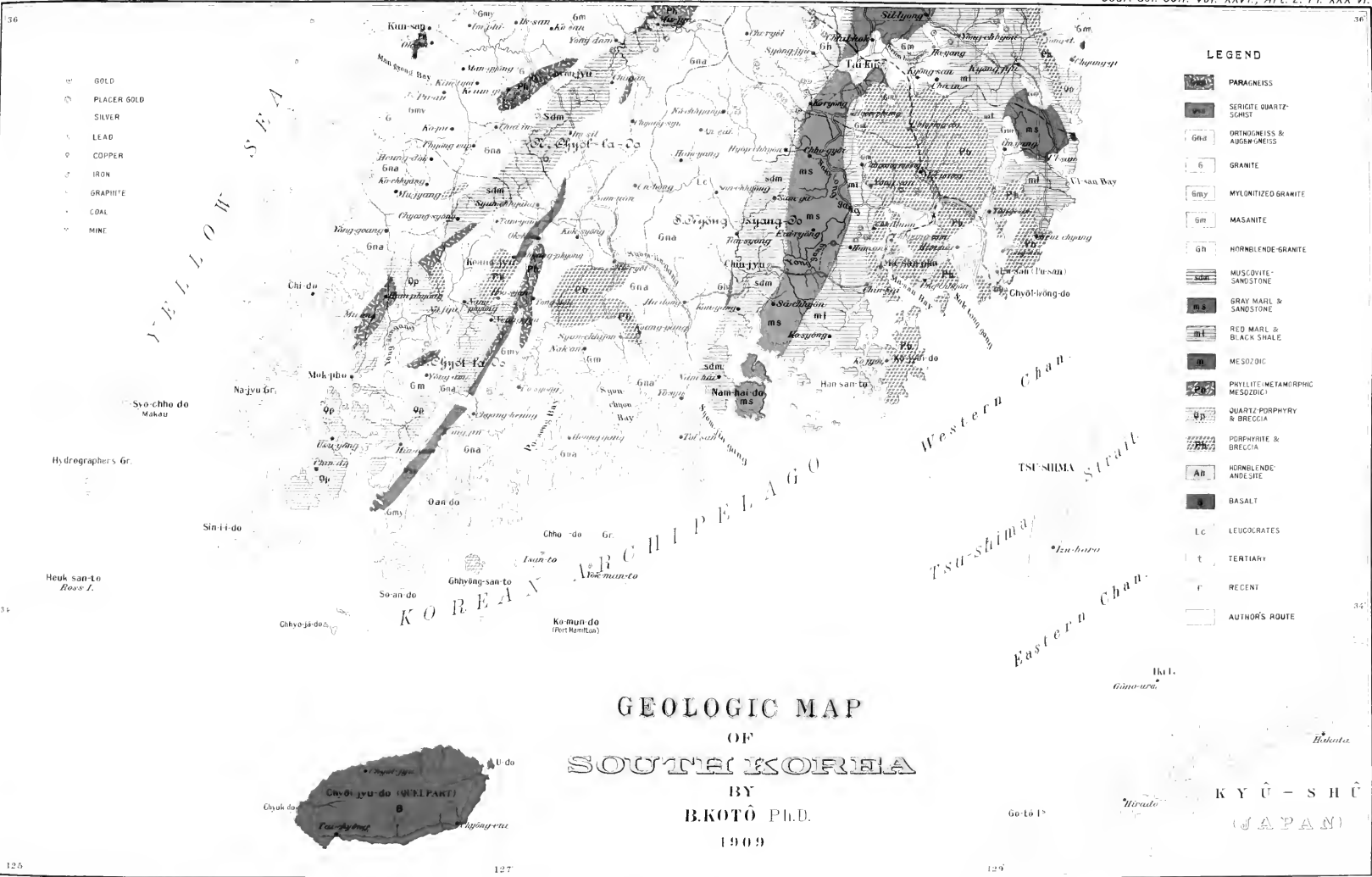
The Second Traverse: Profile from Mok-pho via Kyöng-jyu to Pusan.

I. Basal gneiss .....	$\left\{ \begin{array}{l} a. \text{ The Pong-göi gneiss} \\ b. \text{ The Tong-chhang gneiss} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Gnp} = \text{Paragneiss} \\ \text{Gnp} = \text{,,} \end{array} \right.$
II. Kang-jin mica-schist....	$\left\{ \begin{array}{l} a. \text{ The Kang-jin mica-schist} \\ b. \text{ The Mul-kö-sil mica-schist} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Qss} = \text{Sericite-quartz-schist} \\ \text{Ph} = \text{Phyllite} \end{array} \right.$
III. Phyllite schist..... (Metamorphic Mesozoic)	$\left\{ \begin{array}{l} a. \text{ The Tong-pok complex} \\ b. \text{ The Mu-an complex} \\ c. \text{ The Chyön-jyu complex} \\ d. \text{ The Kun-san complex} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Ph} = \text{,,} \\ \text{Pn} = \text{,,} \\ \text{Ph} = \text{,,} \\ \text{Ph} = \text{,,} \end{array} \right.$
IV. Great granitoid series...	$\left\{ \begin{array}{l} a. \text{ Palaeogranite} \\ b. \text{ Melanocrate} \\ c. \text{ Lencocrate} \end{array} \right.$	$\left\{ \begin{array}{l} \text{Gno} = \text{Orthogneiss, Gna} = \text{An-} \\ \text{gengneiss} \\ \text{G} = \text{Granite, Gmy} = \text{Myloni-} \\ \text{tized Granite} \\ \text{Gh} = \text{Hornblende-granite, Ghy} \\ = \text{Gneissoid} \\ \text{Lc} = \text{Aplite, Pagioglace.} \end{array} \right.$
V. Kyöng-sang formation... (Mesozoic)	$\left\{ \begin{array}{l} a. \text{ The Lower} \\ b. \text{ The Upper} \end{array} \right.$	$\left\{ \begin{array}{l} \text{sdm (No. 5)} = \text{Muscovite-sand-} \\ \text{stone} \\ \text{ms (No. 4)} = \text{Gray Marl and} \\ \text{Sandstone} \\ \text{ml (No. 3)} = \text{Red and Green} \\ \text{Marls} \\ \text{sh (No. 2)} = \text{Shale} \\ \text{Pb (No. 1)} = \text{Porphyrite and} \\ \text{breccia} \end{array} \right.$
VI. Felsophyre and its allies	$\left\{ \begin{array}{l} a. \text{ Felsophyre} \\ b. \text{ Masanite} \\ c. \text{ Grano-masanite} \end{array} \right. \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Neogranite}$	$\left\{ \begin{array}{l} \text{Qp} = \text{Quartz-} \\ \text{porphyry} \end{array} \right. \left\{ \begin{array}{l} \text{Gpf} = \text{Felsophyre} \\ \text{Gpb} = \text{Breccia} \end{array} \right.$ $\text{Gm} = \text{Masanite}$
VII. Tertiary formation		$t = \text{Tertiary}$
VIII. Diluvium and Younger effusives		$\text{Ah} = \text{Hornblende-andesite}$
IX. Alluvium		$r = \text{Recent}$









- GOLD
- PLACER GOLD
- SILVER
- LEAD
- COPPER
- IRON
- GRAPHITE
- COAL
- MINE

- LEGEND**
- PARAGNEISS
  - SERICITE QUARTZ-SCHIST
  - Gnd
  - Gna
  - Gmy
  - Gm
  - Gh
  - Gsb
  - Gms
  - Gp
  - Gq
  - Gt
  - Gv
  - Gw
  - Gx
  - Gy
  - Gz
  - Lc
  - t
  - r
  - AUTHOR'S ROUTE

**GEOLOGIC MAP  
OF  
SOUTH KOREA**

BY  
**B.KOTÔ Ph.D.**  
1909

**KYŪ-SHŪ  
(JAPAN)**



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## Journeys through Korea

(First Contribution)

By

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Professor of Geology, Science College, Imperial University, Tōkyō

### INTRODUCTION

The present paper is, strictly speaking, my second contribution to the geology and physiography of Korea. The first was published in 1903, and was entitled, 'An Orographic Sketch of Korea.'<sup>1)</sup> In it the pioneer works on the geology of the peninsula were epitomized, especially the writings of the late BARON F. v. RICHTHOFEN<sup>2)</sup> and Prof. C. GOTTSCHÉ.<sup>3)</sup>

Since the publication of that paper, it has been constantly

---

1) This *Journal*, Vol. XIX, Art. 1, 1903.

2) 'China,' II, S. 131. 'Geomorphologische Studien aus Ostasien', I, II, III, IV, and V, 1900-1903.

3) 'Geologische Skizze von Korea.' *Sitzungsberichte der Kön. Preuss. Akad. der Wissenschaften zu Berlin*, XXXVI, 1886.

Also by the same author:

'Ueber Land und Leute in Korea.' *Verhandl. Gesell. f. Erdkunde z. Berlin*, Bd. XIII, No. 5, 1886.

'Ueber den Mineralreichtum von Korea.' *Mitteil. Geogr. Gesell. zu Jena*, Bd. VIII, 1889.

referred to both at home and abroad<sup>1)</sup> in works on the geology and geography of Korea, sometimes being subjected to severe criticism.<sup>2)</sup>

Deferring my rejoinder to these criticisms to another occasion, I shall here correct but two statements.

Monsieur l'Professeur L. Pervinquière, after giving a faithful epitome of my work, says: . . . . . 'Mais j' ne saurais dissimuler que cette théorie compliquée (of mountain-formation by dislocation) ne force pas la conviction. Il est un peu à craindre que l'auteur, cédant à l'instinct d'imitation qui est une caractéristique de sa race, n'ait voulu appliquer là des idées théoriques, émises à diverses reprises (et souvent d'une manière peu heureuse) pour expliquer tel ou tel phénomène.'

The learned Chef des travaux pratiques de géologie à la Sorbonne probably means that I rather imitate the manner of Richthofen in explaining the mountain-building of Korea just as that great authority explained the mountain-chains in the continental border of Eastern Asia. It is well known that Prof. E. Suess<sup>3)</sup> considers the gigantic mountain-chains in China and Eastern Siberia as the stern mass of the waves of the earth's crust originating in the region near Lake Baikal, while the late Prof. F. v. Richthofen<sup>4)</sup> looked at the same from another standpoint, dividing each mountain-arc into two components, viz., the older folded, equatorial component and the younger, ruptured, meridional one. The latter view is of special interest to me.

- 
- 1) *a.* F. v. Richthofen. *Loc. cit.* IV and V, 1903.  
*b.* Hobbs, 'Tectonic Geography of Eastern Asia'. *American Geologist*, Vol. XXXIV, 1904.  
*c.* Gallois, 'La structure de l'Asie orientale.' *Annales de Géographie*, No. 75, XIV<sup>e</sup> Année, 1905.  
*d.* *Geographical Journal*. London, 1903, Vol. XXII, p. 567.  
*e.* *Geological Magazine*. London, 1903, p. 324.
- 2) *a.* Pervinquière, 'Constitution géologique et ressources minérales de la Mandchourie et de la Corée.' *Revue Scientifique*, 1904, 5<sup>e</sup> Serie, Tome I, p. 552.  
*b.* Lorenz, 'Beiträge zur Geologie und Paläontologie von Ostasien.' I Theil. *Zeitschrift der Deutschen geologischen Gesellschaft zu Berlin*, Bd. 57, 1905, S. 495.
- 3) 'Das Antlitz der Erde.' Bd. III, Erste Hälfte, 1901.
- 4) 'Geomorphologische Studien,' IV und V, 1903.



In 1899, the writer, after giving a summary of the progress of geological knowledge about Japan, said<sup>1)</sup> of the Japanese arc:..... 'and at present, we can say positively that North and South Japan differ in that the prevailing direction of the *South* is greatly influenced by *folding axes*, while that of the *North* is affected by *meridional rupture-lines*.'

In 1902, when speaking of the meridional Korean system, I made the following statement<sup>2)</sup>: 'Five components of the Tai-paik-san (of the Korean system) are cliffs of tilted blocks sweeping along the coast of the Sea of Japan, from which the right wing was successively thrown down to the sea-bottom, as if it originated in *disjunctive* faults as an after-effect of the piling and pressing up of Hondo (Japan) toward the Pacific Ocean.'

The disjunctive fault, an invention of a Russian geologist and popularized by Prof. E. Suess<sup>3)</sup> is the result of 'Zerrung.' This 'Zerrung'<sup>4)</sup> and the separation of the equatorial and meridional components of mountain-axes are the kernels of the 'Geomorphologische Studien aus Ostasien,'<sup>5)</sup> which is the concluding chapter of F.v. Richthofen's monumental work, 'China', and so the last work of that great authority on modern geography.

In passing, it is to be noted that Prof. Willis discarded all the older views substituting the monoclinical flexure hypothesis for them<sup>6)</sup>. It is a delicate matter to differentiate between dislocation and flexure.

These happy and remarkable coincidences between the great German authority and the writer on some points in tectonic problems

1) Kotô: 'The Scope of the Vulcanological Survey of Japan.' *Publication of the Earth-quake Investigation Committee in Foreign Languages*, No. 3, Tokyo, 1900, p. 99.

2) Ditto: 'Orographic Sketch', p. 57.

3) 'Das Antlitz der Erde'. Bd. III, Erste Hälfte.

4) It is this term, *Zerrung*, which gave rise to a heated polemic taken part by Lorenz and Friederichsen, the outcome of which was an exchange of bitter words between them. *Petrmanns Mitteil.*, Vol. 52, 1906, S. 284; Vol. 53, 1907, S. 93-96.

5) Part IV and V, 1903. I received the papers from the author's hand but only during the Vienna Congress in August, 1903.

6) 'Research in China'. Publication No. 54 of the Carnegie Institute of Washington.

are purely accidental, and I confess that I am not a little proud of them; but though I am always ready to follow the good example of others, I emphatically deny the charge of having simply imitated the master in my mode of explaining the orogenesis of the Korean mountains. It was unfortunate that my paper appeared during the first phase of the Russo-Japanese war when the blood of patriotic Frenchmen was hot with russophile sentiment.

Herr Dr. Th. Lorenz made a journey in Shan-tung, and is enthusiastically engaged in interpreting the mountain-building of that peninsula, as well as of Korea, by dislocation originating in the torsion of tectonic lines corresponding to the resultant of the parallelogram of forces. In 1903, we met frequently in Freiberg i.S. and I enjoyed hours of conversation with him. Afterwards he wrote an elaborate work<sup>1)</sup>, and I found in it to my great astonishment the following clause: "Ich bin sicher, dass Kotô heute seine Einteilung der Gebirge Koreas gern preisgeben wird. In winter 1903 hatte ich Gelegenheit, mich mit ihm persönlich ueber die geomorphologischen Probleme Ostasiens auszusprechen. Ich hatte die Genugtuung, dass mir Kotô in allem zustimmte." At the time I simply listened to all that it pleased him to say; but whether I accepted his views or not is quite another thing. So far as my present knowledge of Korea is concerned, I have not the slightest inclination to withdraw the statement made in my paper.

It is a mistake to say that I was much influenced by hypotheses or theories in constructing tectonic trend-lines in my paper. I simply recorded what I had seen or thought I had seen in the field.

But it is out of place here to indulge any further in these or other comments. I shall take up the subject again on another occasion.

Mr. YABÉ, on my suggestion, made two trips to the south of Korea, in 1903 and 1904, thus supplementing my journeys during

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1) *Loc. cit.*, p. 195, footnote.

1900-'02, by frequent departures by side-roads from my route. Moreover he made a happy discovery of fossil-plants in the upper course of the *Nak-tong* river, and after careful study he proved them to be of the Jurassic species.<sup>1)</sup> Later he made two other contributions<sup>2)</sup> to the palæontology of the peninsula; the one refers to a *Fusulina* and two other Foraminifers, found near *Phyöng-yang*, establishing the presence of the Anthracolithic bed in the peninsula beyond all doubt; the other has to do with the Triassic *Müngyöng* series with the impressions of *Gigantopteris*. YABÉ'S paper on the palæontology of Korea, the only work on the subject, really forms a part of the present series, and a not unimportant portion of it.

During and after the late war, a number of specialists were sent out to Manchuria and Korea to gather information on the natural resources<sup>3)</sup> of the countries, and one party of geologists went to the latter country to make a preliminary survey of the geology and the mineral resources of the peninsula.

Messrs. FUKUCHI, IKI, INOUYÉ, KANEHARA, MATSUDA, and OKADA, all graduates of our University, took part in the expedition, the results of which have already appeared in a series of works<sup>4)</sup> with geologic maps and illustrations. To each of the members of the

1) 'Mesozoic Plants from Korea'. *This Journal*, Vol. XX, Art. 8, 1905.

2) a. 'A Contribution to the Genus *Fusulina*, with Notes on a *Fusulina*-Limestone from Korea.' *This Journal*, Vol. XXI, Art. 5, 1905.

b. 'On the Occurrence of the Genus *Gigantopteris* in Korea.' Vol. XXIII, Art. 9, 1908.

3) On the mineral resources of the peninsula, we have a short note by Mr. K. Nishiwada: 'Useful Minerals of Korea'. *The Korean Repository*, Seoul, Sept., 1897.

4) a. Fukuchi, 'On the Coal-fields of *Phyöng-yang*, *Sam-deung*, and *Sari-uön*, *Phyöng-an-Do*.' (in Japanese.) Department of War, Tokyo, 1905, pp. 21, with sketch maps.

b. ———, 'The Gold field of *Syun-an*, *Phyöng-an-Do*.' (in Japanese.) Department of War, Tokyo, 1905, pp. 4, with sketch maps.

c. Iki and Suzuki, 'Report on the Mineral Resources of *Hoang-hai-Do*, *Kyöng-geui-Do*, *South Chhyung-chhyöng-Do*, and the Southern Part of *South Phyöng-an-Do*.' (in Japanese.) Mining Bureau, Tokyo, 1906.

above-mentioned party was allotted one of the departments or a part of one of the departments into which the country is divided, as his field; and all had ample means and time for their work which was carried out under military escort. Their circumstances were thus so favorable that it is scarcely possible that my work, undertaken with slender support and with little assistance on my journeys, will bear comparison. Indeed it seemed so hopeless to try to equal either in quantity or detail the results secured by them under such favorable conditions, that I once thought it would be better to abandon my plan of writing up my journeys. However, I had started and could not well draw back. So I continued the work which I had begun soon after the appearance of my first paper; but my official duties and my visit to Europe and America greatly hampered its progress.

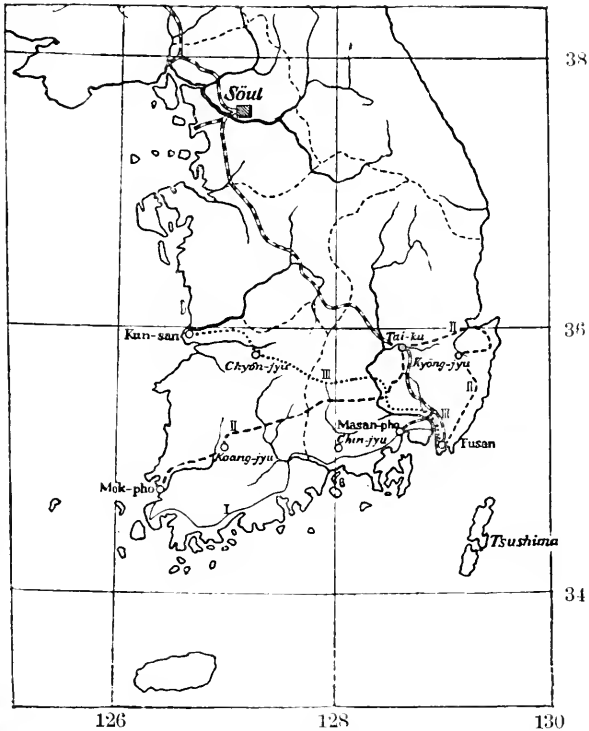
The present portion of this series is intended to give both the diary of my journey in Korea and also the results of laboratory work, supplemented by the facts and geologic specimens kindly placed at my disposal by the members of the above-mentioned Commission. I also entertain the hope that I may continue the work in order to bring it to a close in the definite shape originally intended.

Korea is but a small patch of land on the globe in the east corner of Eurasia; nevertheless it has an area of 218,170 square

- d.* Inouyé, 'The Mining Industry in Korea. (in Japanese.) Mining Bureau, Tokyo, 1906.
- e.* —, 'Geology and Mineral Resources of Korea.' Mem. Imp. Geol. Surv., Tokyo, 1907.
- f.* Inouyé and Niiyama, 'Report on Mineral Resources of Chyŏl-la-Do, and Kyŏng-sang-Do.' (in Japanese.) Mining Bureau, Tokyo, 1906.
- g.* Kanehara and Nakagawa, 'Report on Mineral Resources of Ham-gyŏng-Do. (in Japanese.) Mining Bureau, Tokyo, 1906.
- h.* Matsuda and Sasao, 'Report on Mineral Resources in Phyŏng-an-Do.' (in Japanese.) Mining Bureau, Tokyo, 1906.
- i.* Okada and Nishio, 'Report on Mineral Resources of Kang-nŏn-Do.' (in Japanese.) Mining Bureau, Tokyo, 1906.

kilometres, which is nearly equal to half of that of all Japan <sup>1)</sup>, and is consequently large enough for a single person to make geologic reconnaissances for a numbers of years. As regards the areal extent, the present paper deals with only about a quarter of the peninsula, comprehending the southernmost region, including the island of Quelpart, the northern limit being 36 N. Lat. The region under question therefore comprises the Department of *Chyöl-la-Do* and a large part of *Kyöngsang-Do*.

I first give the diary of my *Three Traverses* through Korea, and from the itinerary record and observations already stated, propose to give in the *Summary* a general picture of the geology, geomorphology and physiography of the region under consideration.



Index map to show the route of the three traverses

In the course of this work I have come under obligations to many persons who, both in official and personal relations, have

1) The area of all Japan 27,061 sq. ri = 417,362 sq. kilom.  
 Ditto of Korea 14,147 „ „ = 218,170 „ „ Residency-General (1906).  
 Ratio 100,00 : 52,28  
 Population of Korea = 10,520,000.

given me their help. The University authorities not only gave aid officially, but were also interested personally in the work. BARON Y. SAKATANI, then vice-minister of Finance, and Mr. TERADA, treasurer of the Department of Education, gave material support for the journeys. BARON G. HAYASHI, then minister to the court of Korea, and many Consular agents stationed at various posts and places, facilitated in every way my travelling, and without their assistance it would have been almost impossible to have made extended and adventurous traverses in the interior of the peninsula. I am also indebted to Prof. J. T. SWIFT for valuable suggestions in the preparation of the manuscript.

To the many colleagues and friends who have thus assisted to make the work possible, my sincere acknowledgements are due.

The following is a list of the words which occur most frequently in Korean geographical names, singly or in compounds; and in the latter case either as the first or second (succeeding) member.

Ak ( <i>noi, san</i> )	A peak; a mountain.	Chyang-thö	Market place.
Ap ( <i>chjön</i> )	Before in place; front.	Chyöl ( <i>sü</i> )	A monastery.
Arai ( <i>ha</i> )	Lower; inferior.	Chyöm	A shop.
Böl ( <i>öl, teul, phjönng</i> )	A plain.	Chyön ( <i>ap</i> )	Front; before in place.
Chakeun ( <i>syo, aŕj</i> )	Small.	Chyu-mak ( <i>sul-mak</i> )	An inn; a tavern.
Chiham	A stage in a journey; a post-station.	Chyung ( <i>kaontüi</i> )	The middle; straight.
Chhi ( <i>hjön, rjönng, njjönng, koküi</i> )	A pass.	Do ( <i>to, sjön</i> )	An island.
Chhon ( <i>naeul</i> )	A village.	Dong ( <i>kol, tong</i> )	Small village; a valley.
Chhyön ( <i>nai, mul</i> )	A mountain stream.	Eumnüi ( <i>koaul</i> )	Magisterial town.
Chhyöng-in-nara ( <i>Sjang-kul</i> )	China.	Eup ( <i>koaul</i> )	Magisterial town.
Chou ( <i>öl</i> )	The left side.	Gil	A road; a way
Chyang ( <i>örun</i> )	Long.	Gyöi ( <i>hjön, sin i</i> )	A stream; a creek.
Chyang ( <i>jjatng</i> )	Market place; a fair.	Ha ( <i>arü, arü</i> )	Lower; inferior.
		Hang ( <i>mok</i> )	The neck of a hill.
		Hata ( <i>jjang</i> )	An ocean or sea.
		Hu ( <i>tü</i> )	Behind; after.

Il-bong	Japan.	Oil ( <i>choa</i> )	The left side.
Il-bong-saram	A Japanese.	Öku	An entrance of a valley.
Jin ( <i>chin, naru, komi</i> )	Ferry.	On-chhyön ( <i>ön-syu</i> )	A hot spring.
Jyang ( <i>chyang</i> )	Market place; a fair.	On-tol	A Korean fire-place.
Jyn ( <i>chyu</i> )	Magisterial town of the first class.	Oreul ( <i>u</i> )	The right side.
Kam-ni	The superintendent of trade.	Pat ( <i>chjön</i> )	A paddy field.
Kam-sä	A provincial governor.	Penk	The north; northern.
Kheun ( <i>lai, thai</i> ), <i>adj.</i>	Great; tall.	Phai-gang ( <i>phai-syu</i> )	A large river.
Kaontäi ( <i>chyang</i> )	The middle.	Pho ( <i>kai</i> )	An anchorage; a river bank.
Kil	A road; a way.	Phyöng ( <i>bül, deul</i> )	A plain.
Koent ( <i>eumnäi</i> )	Magisterial town.	Pöl ( <i>teul, deul, phyöng</i> )	"
Kokäi ( <i>hyön, chhi</i> )	A pass.	Pot ( <i>oi</i> )	Outside.
Kol ( <i>kok, sil</i> )	A valley.	Pu	A city.
Kol ( <i>dong</i> )	Small village; a valley.	Pul ( <i>hoa</i> )	Fire.
Komi ( <i>jin, naru</i> )	Ferry.	Ryöng ( <i>nyöng, chhi, kokäi</i> )	A pass.
Kopheun ( <i>kok</i> ), <i>adj.</i>	Crooked.	Sä ( <i>chjöi</i> )	A monastery.
Köri	A street; thoroughfare.	Sai ( <i>sin</i> )	New.
Kot	A promontory.	Sai sul-mak	A new tavern.
Ku-gyöng	A sight-seeing.	San ( <i>moi, ak</i> )	A peak; a mountain.
Kubi ( <i>kupi</i> )	A bend; a curve.	Sil ( <i>kok, kol</i> )	A valley.
Kun-syu	A district magistrate.	Sin ( <i>sai</i> )	New.
Kyöi ( <i>gyöi, sinai</i> )	A stream; a creek.	Sinai ( <i>gyöi, kyöi</i> )	A stream; a creek.
Ma-bang	A horse-stable.	Sul-mak ( <i>chyu-mak</i> )	An inn; a tavern.
Maeul ( <i>chhon, kun</i> )	A village; a district.	Syang-kuk ( <i>Chhyö uq-in-nara</i> )	China.
Man ( <i>oan</i> )	A bay.	Syo ( <i>chal-ean</i> ), <i>adj.</i>	Small.
Mok ( <i>hnyg</i> )	A neck of a hill.	Syö	The west; western.
Möri ( <i>tu</i> )	The top; the head.	Syöm ( <i>to</i> )	An islet.
Mörn ( <i>u</i> )	A corner; a nook.	Syöng-öp	A royal shrine.
Mul ( <i>nai, chjön</i> )	A mountain-stream.	Tai ( <i>thai, kheun</i> ), <i>adj.</i>	Great; tall.
Mul-kubi	The curve of a river.	Tari ( <i>dari, kyo</i> )	A bridge.
Mnt gil	An overland road.	Teung ( <i>tol-tari</i> )	A stone-bridge.
Nai ( <i>mul, chjön, näi</i> )	A mountain stream.	Thong-sä	An interpreter.
Nam	The south; southern.	To ( <i>syöm</i> )	An island.
Naru ( <i>jin, komi</i> )	Ferry.	Tol-tari ( <i>teung</i> )	A stone-bridge.
Nölp ( <i>dölp, nörän</i> ) <i>adj.</i>	Wide.	Tong	The east; eastern.
Nopheun ( <i>ko</i> ), <i>adj.</i>	High.	Tui ( <i>lou</i> )	Behind; after.
Noro-mok	A hill-neck of a river-curve.	Työm ( <i>sulmak</i> )	An inn; a storc-house.
Nyöng ( <i>ryöng, hyöng</i> )	A pass.	U ( <i>oreul</i> )	The right-side.
Oan	A bay.	Ut ( <i>syung</i> )	Upper.
Oi ( <i>pot</i> )	Outside.	Yöul ( <i>than, dan</i> )	A rapid.

The orthography of the geographical names of Korea will at first appear strange to those who are not accustomed to it. The system which I have used is that adopted in the work: 'A Catalogue of the

Romanized Geographical Names of Korea' by KOTÔ and KANAZAWA. I wish here to draw the attention of readers to the use of the two letters, *y* and *h*.

***y*.**

When preceded by *s* or *ch*, the *y* is mute; as in *syang* or *chyang*, which may be spelled or pronounced equally well as *sang* or *chang*.

***h*.**

The reduplicated *h*, as in *chhi* (a pass), merely signifies an intensification of the same sound, and may be expressed by an apostrophe [ ' ]; e. g. *ch'i*, and *ch'on* for *chhi*, and *chhon*.

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Japanese measure of length 1 *ri* = 3927.27 meters.

Korean        „        „        „        1 *li* = 392.73 or approximately 1/10 of a *ri*.

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## CHAPTER I.

### THE FIRST TRAVERSE

(Plates I-IX.)

My first trip was along the southern coast of Korea from the free port of *Fu-san* to that of *Mok-pho*. This occupied a fortnight, the distance in a straight line being over 242 *km*, which corresponds to the breadth of the southern extremity of the peninsula. The coast abounds in indentations with headlands and promontories as counterparts of bays and inlets. The labyrinthic coast is fringed with countless islands, a feature without a parallel in Eastern Asia, if we except the southeast coast of China. Both coasts belong to a special type to which FRH. v. RICHTHOFEN has given the name *rias*.

The islands are so numerous that no one except the natives knew them all, this part, called *Nam-hăi* or the "South Sea," was until recently when surveyed by the Japanese Hydrographical Office. One can best form a rough idea of the complexity of the archipelago from the following general description by Captain Basil Hall, who navigated the sea early in the nineteenth century. He says: "We threaded our way for upwards of a hundred miles amongst islands (of *Nam-hai*), which lie in immense clusters in every direction. At first we thought of counting them, and even attempted to note their places on the charts which we are making of this coast; but their great number completely baffled these endeavours"<sup>1)</sup>.

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1) 'Account of a Voyage of Discovery to the West Coast of Corea and the Great Loo-Choo Islands.' London. Also, Keane: 'Asia,' p. 332, London, 1896.

My route, with occasional deviations, followed the coast usually genial, sunny, and dotted with the *Camellia japonica*; but I happened to have chosen the worst and the coldest part of the year, the first half of February, when the region was buried under snow, especially in the *Chyöl-la-Do* portion, and the rapid *Syöm-jin-gang* was then entirely frozen, appearing like a glacier stream. This unfavorable climatic condition greatly limited my geological observations.

FU-SAN I started from *Fu-san* (*Pu-san* in Korean) on January 24th, 1901. Opposite to *Fu-san* lies *Chyöl-lyöng-do* or "Deer Island" (Pl. I, *Fig. 1*), called Maki-no-shima in Japanese, 68 km long and 26 km broad, formerly a haunt of deer, and for sometime devoted to the breeding of horses which, the historical records tell us, the Koreans at one time sent to the Chinese Emperors as annual tribute.

The island is a rather high hill (303 m) having the appearance of a dissected volcano, the western half of it together with the bottom of the supposed crater having been blown off almost down to the edge of the narrow strip of water which separates the island from our settlement of *Fusan*. This outward look is in a certain degree justified by the occurrence of volcanic rocks whose inclined bedding perfectly assimilates the inner structure of a strato-volcano. The beds strike south-east by south, while at the east end they are almost horizontal.

The effusives and their derivatives, which constitute the entire island, are thick banks of various shades of greenish color and of different types of rocks.

- (1) One rock is uniformly dark-gray and compact with few

flecks of feldspar which can only be recognized by reflected light. Despite the fresh appearance, the rock under the microscope is seen to be very much altered. The original ferro-magnesian mineral or minerals have been entirely altered into epidote-grains; but the silicate-mineral in question was in all probability an augite. The structure of the rock is pilotaxitic; the groundmass is made up of the lath-shaped, twinned feldspar together with an interstitial, amorphous substance in which are imbedded the phenocrysts of plagioclase. The rock is probably an *augite-porphyrite*.

(2) The second is also a dark greenish-gray, compact rock with angular flecks. Under the microscope, it is seen to be composed of angular crystals of plagioclase imbedded in the matrix which is made up of polarizing particles together with crystals of magnetite and fine grains of epidote. The striped feldspar is partly epidotized, forming clusters with regenerated plagioclase. The rock seems to be a compact *porphyrite-tuff*.

(3) The third has a greenish-blue, compact flinty structure with conchoidal fracture. It might easily be taken for a green jasper. The mass consists microscopically of fragments of plagioclase and round chalcedonic patches, a leucoxene-like substance and minute glittering particles, intermixed with amorphous dust. It may be an indurated *porphyrite-tuff*.

Various modifications of dark-grayish, compact augite-porphyrite together with their derivatives, of the three types of which a brief description has just been given, build up not only *Chyöl-lyöng-do*<sup>1)</sup> and outlying small island of *Töng-päik-syöm*<sup>2)</sup>, but also a not-inconsiderable portion of the south-eastern province of *Kjöng-sang*.

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1) C. Gottsche mentioned felsite-porphyrity from Deer Island, though it is not represented in my specimens; but the possibility of its occurrence may not be denied, for the same kind of rock is found in many localities in the South Korean Archipelago, belonging to the formation in question. C. Gottsche: 'Ueber Land und Leute in Korea.' *Verhandl. d. Gesell. f. Erdkunde*, S. 218. 1886. Berlin.

2) 冬栢嶋

The hill at the back of *Fusan* (Pusan), on a spur of which the Japanese settlement is located, is made up of the same rocks as those of Deer Island. Here we find a poor, discontinuous vein of magnetite, 5 to 10 *cm* thick, intergrown with quartz, accompanied on both sides by selvages of *skarn* consisting of epidote and actinolite-like hornblende. The vein strikes regularly E. 20 S., with a north-easterly dip, and continues from here through the Chinese settlement to the north-eastern shore of Deer Island, in the same direction as the green bedded country-rocks. This epigenetic ore-body is probably the in-filling of a strike-fault having with the dip of the surrounding rocks. I cannot say positively whether the formation of the ore has anything to do with the up-welling of the granitic laccolith which crops out along the coast, 2 *km* northwards near the old fort of *Fusan-chin*.

Proceeding on our journey from *Fusan* our way led north-westwards up the pass of *Ku-dök-san*<sup>1)</sup> on the already-mentioned complex of green tuffs and eruptive sheets, dipping slightly north-eastwards, and followed the same rocks as far as the northern foot of the pass where the said laccolith of granite reappears on this side. Our route now joined the main road to *Fusan*, which goes over the slight elevation of the *Kam-kogai*<sup>2)</sup> pass. Here again we observe that the north side of the elevation is composed of granite, while the south side exposes a granitic base capped with green rocks.

As may be seen on the geological map, the granite-laccolith forms an irregularly triangular area stretching along both banks of the *Nak-tong-gang* with its apex in the *Fusan* harbor, and with

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1) 九德山 2) 甘峴

its base in the interior, extending over 80 kilometers. The kernel of the laccolith lies to the east of the *Nak-tong* river, culminating on the height of *Keum-jyöng-san*, on the top of which is situated the spacious walled castle of the same name which once served as a stronghold against the ingression of the Japanese. The *Keum-jyöng* laccolith is limited on the north by the valley of *Yang-san*<sup>1)</sup>, and the south-eastern slope is mantled with the green rocks. Especially instructive is the remnant of this mantle as an inlier on the north-eastern slope. Deep in its recesses we find the Buddhist monastery of *Po-ma-sä*,<sup>2)</sup> much frequented by foreigners.

*The granite of the Keum-jyöng*<sup>3)</sup> laccolith presents special features which characterize the rock as distinguished from the rest of this group, and its distribution is by no means confined to this region, but is scattered over many parts of the peninsular area where the same condition obtains. It has a buff-color and a medium to rather coarse structure, easily crumbling into débris and sand so as to make it a very difficult task to get a fresh specimen. It is poor in colored minerals and accessories, consisting mainly of quartz and orthoclase accompanied with a little biotite and *oligoclase*. The components of this simple, monotonous leucocrate are all of equal size, having the appearance of simultaneous crystallizations intergrowing one another pegmatically, though lacking the regularity of the structure of graphic granite. With this coarseness of the structure the so-called implication-structure disappears, finally presenting a mere interlocking of allotriomorphic components. Good crystals of the oligoclase sometimes serve as the *nucleous of flesh-colored*

THE  
KEUM-JYÖNG  
LACCOLITH

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1) 梁山 2) 梵魚寺 3) 金井山

*orthoclase*; <sup>1)</sup> both being to some extent kaolinized, but not altered into muscovite. Though the mineralogical composition of the rock approaches that of aplite, it is not proper to call this a granite, for it has the appearance of feldspar-greisen, though in its mode of occurrence and coarseness of structure it resembles granite. RIXNE <sup>2)</sup> gave the name *tsingtauite* to a granite having the *orthoclase-phenocrysts* in the granitic matrix. In our rock, quartz has sometimes a tendency to phenocrystic development in lieu of feldspar so that it is called the *quartz-tsingtauite*.<sup>3)</sup> Probably the *Kiau-tchau* and the Korean granite have the same genesis.

The main road led us from the *Kam-kogai* <sup>4)</sup> *-chyumak* to *Murang* <sup>5)</sup> over a spur of *Keum-kyöng-san*, and then across the river-flat to *Kui-pho* on the bank of the *Nak-tong-gang*. Then we crossed (Pl. I, *Fig. 2*) by ferry-boat the three arms, 6 km broad, into which the river is divided by intervening sandy bars which are partially under cultivation. There are also pools and little paddy fields. The deposition of sand is here specially favored by the surrounding topography and the paralyzing influence of tide water upon the current of the river. The *Nak-tong* river in its upper course runs through the gorge of *Kkachhi-uön-koan*.<sup>6)</sup> Here on a rocky cliff still stands an old gate of the same name, which once served as a watch-tower, where vigilant outlook was kept for foes approaching by land or sea, and was also made use of in collecting duties on the cargoes of junks. The river after leaving the narrows at *Mul-geun* <sup>7)</sup> enters an open flat where

1) This is a characteristic feature constantly recurring in the Korean granite-porphyrries.

2) *Zeitschr. d. D. geol. Gesell.* Bd. 56, S. 144, 1904.

3) Later I call it by the name of *mesanite*. See page 22.

4) 甘岷酒幕 5) 茨苒 6) 鵝院關 7) 勿禁

it deposits its load of sand. This little open space owes its origin to denuding action on the easily disaggregating granitic terrane. Most of the hollow basins that are frequently met with in the interior originated in the same way by differential denudation.

We landed at a place called *Sön-bahoi*<sup>1)</sup> with *mabangs* and *chyu-maks* (stalls and taverns) on the west bank (Pl. I. *fig.* 2), and then proceeded due west for a distance of 3 *km* to *Kim-häi*, along the southern foot of a mountain, all granitic (hornblende-granite?), excepting *Sin-ö-san*<sup>2)</sup> which is capped by the green rocks.

The *eummäi* of *Kim-häi*<sup>3)</sup>, the magisterial centre of the district of the same name, lies on the clean, south slope of a granitic hill (Pl. I. *fig.* 3) covered with a pine-forest. The *eummäi*, like most other *eummäis*, is square, and enclosed by a stone-wall 3 *m* high. On the slope back of the walled village, one finds a conical mound (see *fig.* 3) where are interred the remains of the queen of *Su-no*<sup>4)</sup>, the founder of the *Ka-nak*<sup>5)</sup> kingdom which existed from 42 A.D. to 533 A.D. between the rival kingdoms of *Sil-la*<sup>6)</sup> on the east and *Päk-chyöi*<sup>7)</sup> on the west, in the region lying between the *Nak-long-gang* river and the *Chi-ri-san* range. In this connection I may mention that the kingdom had been under a Japanese regent delegated by the Empress Dowager JIN-GÔ after

1) 仙岩 2) 神魚山

3) Mr. Inoué made a southerly roundabout trip from here to Masan-pho via Ung-chhyön, thereby supplementing and extending my observations in regard to the areal distribution of the three igneous rocks, viz., quartz-porphry, diopside-porphryrite, masanite, and their derivatives. After having gone southwest from Kim-häi across the Alluvial flat to the foot of the mountain, he traced the porphyrite as far south as the last hill towards Ung-chhyön. At about 2½ *km* on the east and west sides of the town he found a quartz-porphry, which seems to correspond to the southerly extension of the same rock met with between Kim-häi and Näing-djyöng on my route. Farther on he followed the porphyrite as far as the masanite terrane, 4 *km* east of Pong-bahoi near Masan-pho, to which I shall have to refer in the sequel (p. 23). The peak of Chyön-ji-bong is probably porphyrite.

4) 首露 5) 駕洛國 6) 新羅 7) 百濟

her subjugation of *Sil-la*, the country then being called *Mimana*<sup>1)</sup>. This was the first permanent occupation of land on the continent by our island nation.

From *Kim-hŭi*, we went round *Im-ho-san*<sup>2)</sup>. It is a low, isolated hill (Pl. I, *fig.* 2), made up of a blackish quartz-porphyrty in association with fine *masanite*<sup>3)</sup>. I did not ascertain whether the rock occurs in a dyke or a flow. The latter is the more probable. As the quartz-porphyrty is accompanied by breccia, it seems to have been erupted *prior* to the effusion of the porphyrite. A thorough understanding of the relation between the quartz-porphyrty and the porphyrite, the one acidic and the other intermediately acidic, is quite essential in deciphering the geology of the *Kyöng-sang* formation. But my observations were unfortunately too cursory to warrant a decisive opinion on this point.

At about 10 *km*, we were ferried across a reedy marsh, *Pu-dari*<sup>4)</sup>, and passed over a low hill-neck, of a greatly decomposed breccia of quartz-porphyrty, to a rivulet where our road joined that from *Kim-hŭi*. A light-colored and fine-banded felsitic tuff, weathering into red earth, is exposed in the valley bottom, lying almost horizontally though undulating in diverse ways. Microscopically it consists of fine polarizing splinters of feldspar and amorphous dust, which are so finely intermixed that further details cannot be brought out by microscopic analysis. It also constitutes the southerly extension of the elevation down to *Ung-chhyön*<sup>5)</sup> on the south coast: while a greenish breccia makes up the high craggy ridges on the north side, *overlying* the banded tuff already referred to. The same breccia continues westwards as far as *Nŏng-djyöng*<sup>6)</sup>, interstratified with massive sheets of hornblende-

1) 任那 2) 臨虎山 A conical hill in Pl. I, *fig.* 2. 3) See p. 21.

4) 浮橋 5) 熊川 See footnote p. 17. 6) 冷井店



porphyrite. What impressed me at *Nǎing-djyöng* and its neighborhood was the cleanliness of the villagers and their dwellings as compared with the habitual filthiness of other Koreans; and the four-cornered straw roofs instead of the round thatches of other villages reminded me vividly of rural scenes in Japan.

From here our way led up the low *Nǎing-djyöng-kogǎi*, of the same green rock<sup>1)</sup> and down to the talus slope of *Koan-jyang-thö*<sup>2)</sup>, which opens northwards towards the *Nak-tong* river. The *Nǎing-djyöng* ridge runs meridionally, covered with a thin pine forest, and its northern end disappears under the talus flat, exposing a highly sculptured, buff-coloured slope characteristic of a granitic rock. To the south we see the equatorial, granitic *Na-rim-san* (734 m)<sup>3)</sup>, capped with a greenish breccia, dipping slightly eastwards; while to the west lies the meridional, granitic *Yong-mol-san*<sup>4)</sup>. The capping green effusives, however, dipping westwards, expose a very precipitous wall. We crossed the neck of *Yong-mol-san*, named *Iscul-chhi*<sup>5)</sup>, 130 m high, strategically an important point between *Fusan* and *Ma-san-pho*, and once the battle-ground of the army-corps in HIDEYOSHI'S second invasion.

On the way from *Koan-jyang-thö* to the above-named pass, we walked about five kilometers over a gravelly talus-slope to the foot of the ascent where we met with a *peculiar* rock which also characterizes the basement of the neighboring region.

The rock is of a light ash-color with an appearance resembling in one respect a fine granite and in another a quartz-porphyrity. On the weathered surface it is not unlike a pumice in color and structure:

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1) A specimen collected by Mr. Inoué shows a very interesting feature. It is a breccia of augite-porphyrity enclosing fragments of felsophyre with corroded quartz. It is a greenish fusion-breccia or friction-breccia of porphyrite-mass. Here also we have an example of quartz-porphyrity and porphyrite coming together. See *ante*, page 18.

2) 關場基 3) 羅林山 4) 龍池山 5) 露峙

the feldspar of the orthoclase-quartz matrix has been removed by decomposition leaving hollows and producing thereby a grayish pumiceous aspect. Besides, the *plagioclase-phenocryst* about 5 mm in size has also been weathered away producing round depressions on the altered surface of the rock. There are also a very few macroscopic *patches of quartz* which, of course, resist atmospheric decomposition. By the simultaneous and perfect crystallization of both the orthoclase and the quartz, which are present in approximately equal quantities and sizes, the comparatively idiomorphic, isometric orthoclase<sup>1)</sup>, scattered in different directions, is soldered together by the quartz of a somewhat later crystallization.

Seen under the microscope, the form of both components, 1 mm in size, is polygonal, and the structure interlocked or implicated. The quartz, however, shows optical continuity extending through several grains, so that the mineral must be regarded as a plate in which the orthoclase is imbedded. It is therefore the *antipegmatitic* and not the normal pegmatitic structure, for in the latter the orthoclase serves as the base.

Another peculiar feature is the exclusively plagioclastic nature of the feldspar-phenocrysts of indefinite outline, gradually merging into the general mass, the myrmekitic intergrowth of it with the quartz being seen only at the peripheries of the phenocrysts. Sometimes I found patches of quartz in which the rudely *vermicular orthoclase* is disclosed by the staining method, contrary to the usual habit of the formation of the *quartz vermiculé* in granophyres.

The only other component is a little biotite. The orthoclase in the general mass is all kaolinized, but, as I have stated above, the plagioclase-phenocrysts are quite fresh and pure, though peculiarly traversed by numerous clefts, and therefore having a fritted appearance; the consequence being that the feldspar of the general mass and the phenocrysts, the latter on account of their friable nature, are easily

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1) In acid rocks the orthoclase is nearly equidimensional.

worn away producing a pumiceous appearance. The rock is a part of the marginal consolidation of the laccolite of *Chhyang-uön*.

The many peculiar features already briefly noticed make it no easy task to assign the rock to its proper place in the petrological system. It may be a porphyritic aplite, if it be proper to include the peripheral mass of the laccolite among dyke rocks, though our rock has rather a coarse structure. It is not a quartz-porphry, if that term be understood to be applied to effusives. It is not a microgranite-porphry in its structure, though the appearance is undoubtedly granitic. It is somewhat like the *tsingtauite* (with the orthoclase-phenocryst) of Rinne's which he considers to be a dyke-rock. As our porphyritic feldspar-greisen with quartz-anhedra and plagioclase-phenocrysts differs in some particulars from the rest of the granite family, I venture to propose for this leucocrate the name of *masanite* (plagioclase-tsingtauite) on account of the occurrence of a granite laccolite near the free port of *Ma-sun-pho*, of which the masanite forms the peripheral portion. The same rock recurs at the *Ku-ryong* copper mine near *Chhyang-uön* (p. 22), and mention has been already made of the rock which occurs as the laccolite of *Keum-jyöng* (p. 15).

MASANITE

On the top of *Iseulchhi* (390 *m*), we again met with the cover (the strike N. 10° E., the dip N.W.) of the green rock which soon disappeared, being replaced by the masanite as one comes down to *Iseul-chyunnak*. In passing over the low neck of a hill of the same rock to *Chä-yö*<sup>1)</sup>, we followed the foot of the bald mountain to *Syang-gol*<sup>2)</sup>, where our road joined that from *Mil-gang*<sup>3)</sup>. Then we crossed over a hill of masanite to *Chhyang-uön* which we reached on January 26th, 1901.

*Chhyang-uön*<sup>4)</sup> is a busy, stone-walled *cummäi*, and we found it crowded with people from neighboring villages, as it happened to be a *chhyang* or fair day. The *cummäi* (Pl. II. *jüg*. 1) is situated on a

CHHYANG-  
UÖN

1) 自如 2) 土谷 3) 密陽 4) 昌原

slope of a small erosion-hollow in granite, and to the northwest of it rises the steep, double-peaked *Chyön-chyut-sau*<sup>1)</sup> (Pl. II, *fig.* 2) with its base of masanite covered half way up by the green porphyrite, which can be seen distinctly from the *cummäi* by the difference of colors. The top descends abruptly northwards towards *Chhil-uön*.

KU-RYONG  
MINE

In order to make an inspection of the *Ku-ryong*<sup>2)</sup> copper mine, 4 km north of the *cummäi*, we made an ascent northwards to the pass (Pl. II, *fig.* 1) of *Kul-thö-chli*<sup>3)</sup> (105 m), the top of which approximately coincides with the boundary of the masanite and the green porphyrite. From the top I saw towards the north the equatorial *Mureung-san*<sup>4)</sup> ridge which culminates at *Mu-veung-san* in *Chhil-uön*<sup>5)</sup>, and consists probably of the same porphyrite and its derivatives. From the pass we followed a stream northwards down to *Ko-bahoi*<sup>6)</sup>, where a typical masanite is exposed having a pumiceous aspect on its weathered surface. A ten minute walk to a hill on the east brought us to the copper mine (6 km from the *cummäi*), then owned by Mr. MAKI. The mine<sup>7)</sup> is at the western foot of *Ku-ryong-san* (460 m).

The country-rock is the omnipresent green porphyrite<sup>8)</sup> in which five parallel veins of about 5 or 6 feet in thickness run N. 10 E. with a westerly dip. The vein stuff is a green matrix sprinkled with beautiful, curved and striped pyritohedrons of

1) 天柱山 2) 九龍銅山 3) 掘峙 4) 武陵山 5) 漆原 6) 高巖

7) According to Inonyé (*loc. cit.*), the mine was opened about 20 years ago and worked under the control of the King of Korea. In 1893 it was transferred to the management of a Japanese. The mine yielded about 20,000 *kin* of ore monthly in 1901, and the total output was sent to Osaka, but in 1905 the rich ores were worked out and the mine was abandoned in the same year. The vein runs N. 10° E., and extends 50-60 feet along the strike, gradually thinning at both extremities. The ores contain 35.25% of copper, but in general yield 20% of it.

8) The rock is green and aphanitic with small porphyritic plagioclase, clearly seen on weathered surfaces. The augite is diopsidic with a decomposed product similar to that of enstatite. The phenocrystic plagioclase has only a few lamellar twins, and the crystal is flattened on (010).

iron-pyrite, and at the centre is found the massive bornite and chalcopyrite mixed with iron-pyrite, of which the first is considered to be the best portion of the ore-body. The greenish muddy stuff makes up the vein, produced from the decomposition of porphyrite-flows by post-volcanic action with the help of water and gases laden with mineral substances. It is something like the so-called *Glauch* or *Glamn*, described from Hungary and Servia. At the time of my visit, a few people were doing open work for prospecting. Mr. MAKI, the owner, told me that 4 km northwards on the river bank in *Pan-ya-dong*<sup>1)</sup>, there exists an old pit where the Koreans once worked for the silver contained in the galena of the granitic rocks. Here I may mention that magnetite occurs on the top of *Chyön-chyu-san* in association with epidote rock. I have specimens of ores from both localities. The magnetite vein seems to belong to the same category as that at *Fu-san*, already mentioned (p. 14).

From *Chhyang-nön* we went half way round *Pal-lyong-san*<sup>2)</sup>, (Pl. II, *fig.* 3), first going south-eastwards on the masanite terrane, then turning to the west, and at last reaching the head of the harbor of *Ma-san-pho*, at *Pong-bahoi*<sup>3)</sup>, where we found the salt garden and a poor copper deposit, the latter cropping out along the bedding of green breccia overlying the masanite. *Pal-lyong-*

1) 班也洞 According to Inoué, the silver mines around *P'ük-ül-san* (白月山), 425 m high, are located about 4 km north from the copper mine. At the southern foot of the mountain lies the above-named *Pan-ya-dong*, and at the northern foot is situated another village, *P'ok-gyüi*. The district is likewise built up of green porphyrite. In the former village, numerous small ditches or basins where the ores mostly galenic were worked in former times, were arranged in the north-south direction. The dejected ores, still found in the neighborhood, contain generally 0.0010% of silver. In the latter, one finds a quartz vein of 0.2-1.0 foot thick, extending meridionally over one thousand feet. Numerous old mines are still seen along the vein.

2) 盤龍山 3) 鳳岩 See footnote, p. 17.

*san* is a detached outlier of green porphyrite, and its geology is the same as that of the neighboring regions.

MA-SAN-PHO

We finally reached the newly opened port of *Masan-pho* (Pl. II. *fig.* 3). This port was formerly called *Hap-pho*<sup>1)</sup>, and is the place where the combined forces under the Mongol General HUNG<sup>2)</sup> and the Korean General KIM<sup>3)</sup> made their preparations, and set sail for the ever memorable invasion of Hakata in northern Kyūshū, but were completely annihilated by a destructive gale in the Tsu-shi-ma Straits in 1281. We can still find a well here which is said to have been used by the Mongol invaders. There is still another relic of historic importance. I refer to the citadel of the Daimyo SHIMAZU<sup>4)</sup>? (see *fig.* 3) during the invasion of HIDEYOSHI from 1592 to 1598. The citadel lies behind the native village of *Ma-san-pho*, and is itself a low isolated hill of granite, capped as usual by the green eruptive. It is a detached orographic block thrown down by displacement to which also the formation of the harbor of *Ma-san-pho* is surely due.

The canal of *Ma-san-pho* and the gulf of *Chin-hai* are twin arms of the sea separated by a small tongue of land and protected in front by the large island of *Kō-jyōi*<sup>5)</sup>. They have a common entrance towards the south-east between this and the island of *Ka-dök*<sup>6)</sup>. Both harbors are well-protected by surrounding mountains, and are deep enough to afford good anchorage. They are destined to become the important harbors of the south-eastern extremity of the Korean peninsula.

In my former paper<sup>7)</sup>, I stated that several of the meridional

1) 合浦 2) 洪茶丘 3) 金方慶 4) 鄭月郎 5) 巨濟島

6) 加德

7) 'An Orographic Sketch of Korea.' *Journ. Coll. Sci.*, Vol. XIX, Article I, pp. 21 and 30.

Korean ridges terminate in headlands in the Southern Archipelago with corresponding incurves of the coast lines. The inlets of *Ma-san-pho* and *Chin-häi* are striking examples of these indentations; the narrowing and widening of the channels found there are surely due to the crossing of the equatorial *Ham-san* ridges.

From *Ma-san-pho* or *Ma-pho*<sup>1)</sup>, we proceeded towards *Chin-häi*

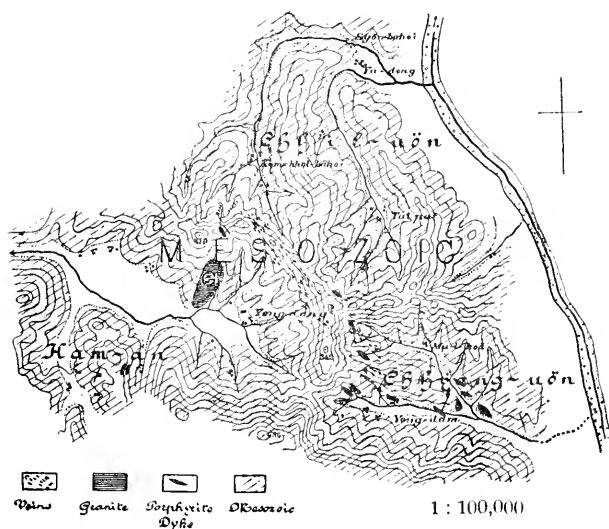
1) Inoué (*loc. cit.*) took the left road to Ham-an, and then joined ours at Pan-söng. About half way (7 km) to the *eumnäi* of Ham-an, a number of gold placers have been and still are at work at Yong-dam. The auriferous region of *Yong-dam* comprises an area of about twenty-five square kilometers, lying at the junction of three districts, Ham-an, Chhyang-uön and Chhil-uön, and is traversed by equatorial and meridional ridges 200 to 300 m high. It is built up of a complex of red and black marly shales, and green-banded, indurated, pelitic tuffite of the Upper Kyöng-sang formation, series No. 2, and also a part of No. 3 (Pl. XXXIV. Profile, Traverse I), which is intruded variously by dykes of porphyrite, entectophyre and granite-porphry (Yong-dam). The whole is capped on the eastern border with sheets of green porphyrite. The predominant dyke rocks are diopside-porphyrates, some of them containing a little hornblende which has suffered magmatic corrosion. Similar dykes, though much decomposed and therefore calcareous, were observed by Inoué in the same complex on the way from Ham-an to Pan-söng.

Gold occurs in veins and also intermixed with Alluvial sand. Calcareous and quartzose

veins, usually 2 to 5 inches thick, run N.N.W. for a distance of 4 km and hade S.W., in contrast to the country-rocks which dip in the opposite directions and occur in close proximity to the quartzporphyry with which the precious metal must have a genetic relation. The quartz vein contains 0.0002 % of gold, but none of silver, though in a concentrate the latter amounts to 0.0022 % and the former rises to 0.0024 %. The gold dust is washed at Yong-dam, Mu-i-kol, Tol-pat, Kam-chhol-bahoi, and Yong-dam, in an Alluvial bed of gravel covered with clay 2 to 3 feet thick. The gold is rich in basal gravel 5 to 10

THE YONG-DAM GOLD FIELD

AFTER INOUÉ



in a south-southwesterly direction for a distance of 13 kilometers. The western mountain-cliff (759 *m*) is as usual built up of the dual formation of saccharoidal masanite covered with the breccia and tuff of a green eruptive. From the south end of the foreign settlement (Pl. II. *fig.* 3), *Uöl-gyöng-dong*<sup>1)</sup>, we ascended a hill pass of *Pam-chhi* (masanite), the top of which is, however, covered by a whitish earthy quartz-porphyr (eutectophyre), cleaving into imperfect tablets. The same whitish rock extends down eastwards to the inlet of *Pam-ku-mi*<sup>2)</sup>, the much talked of Russian naval station.

In coming down to the poor *ch'yumak* of *So-möri*<sup>3)</sup>, whence the ascent begins to the rather high pass (347 *m*) of *Tong-chyön-chhi*<sup>4)</sup>, the quartz-porphyr is again covered and replaced by a green compact rock which is visible from the south foot of the pass in the village of *Tong-chyön*. Here I saw gravels of a gray porphyrite, a red sandy shale, and a *bluish-gray compact flinty rock*, the last being visible as far as *Chin-häi*. The third rock is seen to consist of splinters of quartz, feldspar and biotite, cemented by very fine polarizing minerals with biotite and coaly matter. It is a volcanic dust, sorted and deposited under the sea, mixed with silt, and the whole is metamorphosed into a compact rock by the intrusion of the laccolite.

In our journey hitherto we had gone over the geologically

feet thick, near the contact with the solid ground underneath. I conjecture that the concentration of gold dust at the bottom is probably due to gravity and the rearrangement of the gravel and sand. Inoué did not notice the rich coating on pebbles in the basal bed. The working of the mines of the Yong-dam region are at present in a state of decline, due partly to the exhaustion of the natural resources and partly to the scarcity of water. (龍潭砂金區)

1) 月影洞 2) 栗九味

3) 牛頭 ['an ox-head'] This is a commonplace name in Korea. The name of the well-known Japanese god *Sosano-o* or *Gozu-temō* (the ox-head god, who is said to have crossed the Sea of Japan to the province of Izumo), is, according to our historians, a corruption of the word *somōri*.

4) 東田峠



higher complex, *i.e.* masanite and its allied quartz-feldspar rock capped with the sheets of a green eruptive and its derivatives. We now entered a region composed of a geologically older complex, lower in stratigraphical position.

*Chin-häi* is a poor stone-walled town at the north head of the bay of the same name, and situated between the rivulet of *Thong-chhyön*<sup>1)</sup> which we had followed down to this point and a nameless streamlet, both draining into the bay. The bay or cove is well protected on the east by a rather steep, regular ridge which we had crossed at the *Tong-chyön* pass already mentioned, and which is bounded on the west by a low, hilly sinuating coast dotted with islets. The scenery of the environs is fine. A part of the arm of sea was the place much coveted by the Russians for their naval station to serve as a link between Vladivostock and Port Arthur. The *eumnäi* opens towards the north-west to *Ham-an*, and thence through a low elevation to the *Nak-tong-gang*.

Starting from the *eumnäi* of *Chin-häi*, we waded across a CHIN-HAI<sup>5)</sup> nameless streamlet to the west bank where we found a new series of black slate alternating with a banded, greenish-gray and light-yellow, flinty rock. Seen under the microscope, this flinty metamorphic consists of coaly particles and biotite in the quartz-feldspar mass, the light banding being excessively rich in fine epidote-like granules. The same metamorphic rock was abundantly seen 50 km northwards between *Yöng-san*<sup>2)</sup> and *Chhyang-uyöng*<sup>3)</sup> on the left bank of the *Nak-tong-gang*, from which I presume that the same rock extends meridionally, as nearly all the other rocks do in *Kyöng-sang-Do*. The metamorphic rock<sup>4)</sup> at *Chin-häi* dips slightly south-

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1) 通川 2) 靈山 3) 昌寧 4) Pl. xxxiv. Traverse I. Series No. 2 (sh) in the profile.  
5) 鎮海

wards, but after crossing a hill-neck (*Pang-kojāi*) southwards to *Tol-mit*<sup>1)</sup>, 4 km from the former, it has a northerly inclination, so there must exist synclinal beds with an equatorial trough-axis.

From *Tol-mit*<sup>2)</sup>, a narrow strip of rice-field stretches westwards between equatorial ridges (Pl. III. *fig.* 1), the rock being the same as before: the road goes over the stratification-plane of the marly and flinty rocks which dip slightly southwards as before. The overhanging cliffs of surrounding ridges, about 300 m high, tell the same story in respect to the nature of the rocks and the mode of their occurrence. Proceeding westwards along the margin of the rice-field (*fig.* 1) which gradually becomes narrower and higher, we finally came to a running streamlet, coming from the north laden with abundant cobbles, and the field was strewn throughout with the same gravel†. A steep mountain on the north side presented a deep gray color and its cliff was full of gravel-talus, partly hidden behind the thin pine-forest. It is rather strange to find groups of trees in this part of Korea.

At last we arrived at *Pong-am*<sup>3)</sup>, and ascended the low pass

1) 岩下

2) Yabé made a side trip of 34 km from *Tol-mit* to *Sä-chhyön* on the south coast along a short country road not marked on any map at my disposal. The first half of his route was in a mountainous region of marly shale and indurated greenish tuff, pierced through by fine-granular *masanite* at the *Sün-dong-chhi*. The second half was in a hilly tract of red tuff and green marl, at times *conglomeratic* at their bases. A complex of gray sandstone and *dark marl* was seen on the stretch of denuded hills (60 m) from *Sä-chhyön* to *Chün-ju*, and at the latter city our road joined Yabé's route. As will be seen from the descriptive section of my route, our observations concur beyond expectation. The above-mentioned *masanite* is the leucocrate named by Löwinson-Lessing the *alaskyte*. (See *ante*, p. 21.)

The *dark marl* contains chains of nodules (2 cm in diameter), which show under the microscope an organic structure of unknown nature. A partial analysis of it made by Mr. B. Kobayashi gave 0.31% H<sub>2</sub>O; 44.11% CaO; 0.689% MgO and a trace of P<sub>2</sub>O<sub>5</sub>. Yabé also found the same nodules in a shale near the post station *Nak-tong*, associated with the plant-bearing bed.

† See footnote p. 29.

3) 鳳岩

of *Pal-chhi*<sup>1)</sup> (100 m high) of the same grayish, banded compact rock. From the watershed the topography opens out and slopes to the west of north-west. The ridge *Nok-uön-san*<sup>2)</sup>, lying to the right, comes from *Pan-söng*<sup>3)</sup> in a south-easterly direction, and proceeds due east through the *Tong-chyön* pass already mentioned, between *Ma-san-pho* and *Chün-häi*, terminating at the mouth of the *Nak-tong-gang*, as may be traced on the map appended to my former paper<sup>4)</sup>. To the left, on the other hand, a ridge running parallel to that already mentioned becomes low and less-defined. We descended then through the unfruitful gravelly bottom of the valley to the apparently prosperous *chyumak Pan-söng*<sup>5)</sup>.

From knowledge gained during other traverses in *Kyöny-sang-Do*, I expected to meet with the underlying complex of *red marl*<sup>6)</sup> and *grey sandstone*, and my expectation was duly fulfilled in finding the beds near *Pan-söng*, dipping with varying angles to the east, creep-

† (Page 28) I took home a pebble with a label remark stating that the rock seemed to have some connection with the green porphyrite of the region. On close examination it proved to be andendiorite. It has a young aspect, though the appearance is dull; the texture is medium-granular and the colour light-gray. The components are, in order of quantity, plagioclase, orthoclase, quartz, hornblende, biotite, augite and titanite.

The plagioclase (1.4 mm in length) is of a microtine habit, fresh but full of fissures. It has liquid as well as air inclosures arranged in central zones. Twinned in the albite, carlsbad, and pericline laws, the suture-lines are clear and sharp, but the width varies from one lamella to another. By Becke's method  $\omega < \gamma'$  and  $\epsilon > \alpha'$ ; maximum equal extinction  $12^\circ$ - $14^\circ$ . From the above it may be inferred that the plagioclase is the one near andesine. The form is automorphic and zone-structured with largest extinction-angles on the periphery. The habit is dioritic and andesitic. The orthoclase enclosing the plagioclase builds up an interlocking, but not the pegmatitic, aggregation with quartz, and is extensively kaolinized. The common grayish-green hornblende resolves at terminal faces into fibres, and sometimes forms perimorphic shells around a light-green augite, the latter mineral is seen only in this form. The brown biotite is bleached green. Accessories are titanite in crystals and grains, magnetite in clumps and crystals. In mineralogical components and texture our rock is allied to Stelzner's *andendiorite*.

1) 發峙(王峙)      2) 龍航山      3) 丹城

4) 'Orographic Sketch of Korea.' This ridge separated us from the *emnäis* of Ham-an and Eui-ryöng.

5) The twin village, where we stayed is Il-Pan-söng (第一班城).

6) It effervesces with acid.

ing under the compact metamorphic rocks and slate hitherto traced.

As we entered the new geological terrane, a pronounced effect upon the topography of this new formation was readily perceived in the degradation of height, unfolding before us an open rolling, hilly lowland, in contrast to the sad-gray, rugged country behind us. Hand in hand with the change in the rocks, the soil became clayey and fertile, the people apparently prosperous and comparatively clean. By the way, I may mention that the north-south strike of the strata has no relation whatever to the equatorial trend of the surrounding mountains and hills. This is due to the fact that the so-called Korean or meridional ridges were first tilted, to which act the rock-complex owes its present strike and dips, while the *Han-san* or equatorial ridges were created by displacement at a geologically later period, the new dislocation alone deciding the modern land-features <sup>1)</sup>.

PAN-SÖNG <sup>2)</sup>

From the Korean point of view, *Pan-söng* must be regarded as a large village. There are about 200 houses, and also good taverns. The village lies in a depression of the hills at the junction of our road and that from *Han-an* on the north. The latter is said to be very rarely frequented by travellers, as the road climbs up and down two passes (160 m) on the equatorial mountain called *Nok-uön-san* already mentioned. Seen from a distance towards the north-east, the ridge (Pl. III, fig. 2) presents the appearance of a somewhat romantic escarpment of gray metamorphic rock. Tigers haunt the rocky cliffs, and travellers are few especially toward night-fall. At night the villagers blow horns, sounding like distant bellowing, to drive off the rapacious animals.

From *Pan-söng* to *Chin-ju* it is 18 km. We proceeded S. W.

1) These tectonic trend lines are marked on the map in my former paper. *Loc. cit.*

2) 班城

by W. through paddy fields, and after 2 km came to the *Neul-cum-chhi*<sup>1)</sup> pass (100 m). Here good exposures of red and green marls were seen striking E. 20 N. with the dip 5° S. E. We then went down to the *chyumak* of *Kui-năi*<sup>2)</sup>. To the north-west I saw two isolated mountains of greenish augite-porphyrite, whose southern neck (180 m) we passed over on our way to a flat gravelly valley with a streamlet, on the north side of which is located *Chhyu-chhon*<sup>3)</sup>, a large village of 200 houses.

We were still in the "red formation." The surrounding naked hills have suffered deep disintegration presenting a variety of strangely artificial colors, purple-red, carmine-red, and even orpiment-yellow. The topography is like that of the "bad lands" of Dakota. The benches of red and green marls dipping regularly with low angles to the east, were best seen on *Hu-nam-san*<sup>4)</sup>. We then entered a sandy flat, and crossed the river *Yöng-gang*<sup>5)</sup> by a boat. Near the ferry an alternation of wet-gray marl and thick sandstone appeared with a slow inclination to the east underlying the *red formation*. What causes the *red color* has long remained a mystery. It is a pure chemical process. Lately HORNUNG has paid a great deal of attention to this phenomenon. According to him, highly concentrated saline brine, produced by the evaporation of sea-water under certain physiogeographical conditions, is able to bring about a profound change in rocks. A characteristic feature of this *halurgometamorphosis* is the intense action of oxidation and the precipitation of red (anhydrous) oxide of iron (by the presence of NaCl), which effectuate the concentration of heavy metals in brine from diabase and the like<sup>6)</sup>. Probably this is the

RED FORMATION

1) 於音峙 2) 耳村 3) 招村 4) 後南山

5) 澗江 This part of the river is popularly spoken of as the Nam-gang (南江).

6) F. Hornung: "Formen, Alter und Ursprung des Kupfer-schiefererzes.—Zur Beurteilung der Mineralbildungen in Salzformation." *Z. d. D. Geol. Ges.*, Berlin, Bd. 54, 1904, S. 209.

reason why the soil is *rich in soda* and *poor in fossil remains* in the Upper *Kyōng-sang* formation, What I call the *marl gold* occurring in the said rock is due, it seems to me, to the same cause, and the ore-bringers are in all probability the diabasic rocks which never fail to appear in the formation.

One more hill-neck, called *Māl-chli*<sup>1)</sup>, had to be crossed, and from it we looked down (Pl. III. *fig.* 3) at our destination, *Chin-jyu*, 18 *km* from *Pan-sōng*. The rocks were the same as those at the ferry. Weathering had been working here deep into the roots of the mountain, producing a thick eluvial cover of red earth. The country would have been long ago base-leveled, or rather beveled, were it not for the presence of the hard gray sandstone which is intercalated with marls.

I must once more lay stress on the influence of the nature of the rocks upon the land-features. From *Pan-sōng* hither, I traced the *red* formation<sup>2)</sup> till we came to the ferry; and thence to *Chin-jyu* we saw the underlying beds of *gray* marl and sandstone.<sup>3)</sup> The red complex underlies the flinty tuffite and slate, and another complex of the green volcanic tuffs and breccias<sup>4)</sup>, which build up the region between *Pan-sōng* and *I'u-san*, so that as we go eastwards we ascend the geologically younger horizon. On the other hand the non-volcanic *red* and *gray* formations extend meridionally northwards for one and a half degrees as far as *Sang-jyu* along the eastern flank of the *Chiri-san* range with breadth of 30 *km*. The whole belt presents what the geographers of the Davis school call the mature and old-age topography. For the reason that the marls and sandstones of the west being soft as compared with the greenish-gray volcanics of the eastern half of *Kyōng-sang-Do*,

1) 馬峙 2) Pl. xxxiv. 1. Traverse, No. 3 (ml) in the profile.

3) The same, Nos. 4 and 5 (ms, sdm). 4) The same, No. 2 (sl).

they have fallen easy victims to atmospheric agencies, and the action of degradation has reduced the belt almost to a graded plain only about thirty or forty metres above the sea-level. One will be astonished to find the trench-like erosion belt in the interior of *Kyöng-sang-Do*. It may be clearly seen from the height either on the east<sup>1)</sup> or the west, whence all the rivers drain into this planated belt.

### Chin-jyu

*Chin-jyu* is a fortified town (Pl. III. *fig.* 3.) of considerable size from the Korean standpoint with one thousand houses, including the residence of the local magistrate of south *Kyöng-sang-Do*. It is located on a low hill on the north bank of the *Nam-gang*, its north and west sides being enclosed by a wide water-filled moat (see *fig.* 3), like those of Japanese feudal castles, while interiorly it is fortified with a stone-rampart. The ditch itself may be a dead arm or "cut-off" of the river. It is indeed the strongest fort on the peninsula, being in fact the Port Arthur of Korea. In March 1597, TAIKÔ dispatched against it twenty thousand troops from his Korean army under Hosokawa and six other *daimyôs*, but the commandant of the fort made a successful resistance, showering our troops with musket-bullets, as well as stones and white-hot iron. We were finally compelled to retire, owing chiefly to discord among the seven generals. Upon hearing of this, TAIKÔ's anger knew no bounds, and he sent hither in July, a large corps under KARÔ and KONISHI. The former made a carefully planned attack from the *Mal-chhi* pass

1) See Pl. XXXI. *fig.* 3. This view is taken from a height on the east side of the Nak-tong-gang at the north of the *eumnaï* of Yöng-san.

2) 普州—慶尙南道監察使所在地

already mentioned (Pl. III. *fig.* 3)<sup>1)</sup>, and on the 29th the bloody battle was fought in which sixty thousand soldiers and citizens within the city-wall were massacred and the whole city burnt with fire, so that literally every living thing, even down to the domestic animals and fowls, was annihilated. Thus TAİKŌ's thirst for vengeance was quenched.

I purposely mention this dreadful *Chin-jyu* battle, for it was the fiercest engagement during the Korean expedition of 1592 to 1598. Travellers will still find three red shrines built by the Koreans on the top of the castle-hill and commanding a view of the river. Each shrine encloses a large tablet with lengthy inscriptions; the eastern one commemorating the sad event; the middle the brave act of two generals; and the last, the western, that of the commandant *Kim-chhyön-il*<sup>2)</sup>. The white clothed Koreans are by nature out-door people and lovers of scenery. They usually view (Pl. IV. *fig.* 1) the shrines and the large two-storey hall of *Chyuk-sök-ru*<sup>3)</sup> from the south side of the river. On the cliff at the water's edge thick benches of gray calcareo-micaceous sandstone are well exposed (*fig.* 1), dipping at low angles to the east. This is the uppermost bed of the basal member of the *Kyöng-sang* formation.

Besides the strong fort, the position of *Chin-jyu* is, topographically speaking, of some significance. It is the turning point of the *Yöng-gang* (Nam-gang), which from this point flows towards the north-east to join the *Nak-tong-gang* at its bend at *Yöng-gang-jin*, instead of cutting a much shorter channel across the low hilly tract to the south sea only 10 km distant at *Sä-chhyön*<sup>4)</sup>.

1) The photographic view of *Chin-jyu* was taken from the pass.

2) 金子鑑 Hokuho (pseudonym): The Annals of the Korean Expedition of the Bunroku-Keichō period, p. 110. [北豊山人著文祿慶長朝鮮役]

3) 轟石樓 4) 泗川



It perhaps owes its sudden change in direction to the uplift of an equatorial ridge which ponded the water and thus deflected the course of the river. *Chin-ju* is also the converging point of communications from the sea on the south, from *Han-an*<sup>1)</sup> on the east, from the *Nak-tong-gang* on the northeast along the lower course of the *Nam-gang*, from *Ha-dong*<sup>2)</sup> and *Kon-yang*<sup>3)</sup> on the west, and lastly from *Chyöl-la-Do* and the *Chi-ri-san*<sup>4)</sup> region on the northwest along one of its tributaries. It is therefore a commercial centre and an important strategic point.

From *Chin-ju*<sup>5)</sup>, we proceeded southwestwards along edges of CHIN-JJU hills after crossing a streamlet, the rock being all the way an alternation of thick beds of gray marl and red mica-sandstone, all dipping regularly eastwards at about 10°, and weathering into red earth. This is the basal member of the Mesozoic in *Kyöng-sang-Do*. The general features of the land and the rocks reminded me of the red sandstone of the "Red Basin of Ssachuan"<sup>6)</sup> in China<sup>7)</sup>, if not of the same geological age. After about 6 km we were at *Phyöng-gö*<sup>8)</sup> in a flat full of an immense quantity of gravel of hornblende-metagneiss, and here we crossed the rapids of the *Nam-gang* which had discharged its load brought down hither from the *Hanyang*<sup>9)</sup>-*Sanchhyöng*<sup>9)</sup> region at the north foot of the *Chiri-san*<sup>10)</sup> mountains. After having crossed another arm of the

1) 咸安 2) 河東 3) 昆陽 4) 智異山

5) In continuation of the tour briefly sketched in the footnote p. 28(2), Yabé went up the *Nam-gang* from *Chin-ju* in a northwesterly direction for 20 km through the following series, counting upwards: 1) Sandstone and blackish marl, the former at times conglomeratic; 2) red tuff and green marl; 3) yellowish fragile sandstone, red tuff and green marl, with general easterly dips. At *Tan-söng* the complex came to an end, being replaced by the underlying ortho-hornblende-gneiss, corresponding exactly to the rock at the Hoang-tai-chhi pass, to which I shall have to refer in page 38, footnote(3). The same gneiss was seen farther on as far as *Sanchhyöng* which I touched in my second traverse.

6) 支那四川省 7) 平居 8) 咸陽 9) 山淸 10) 智異山 The *Chiri-san* is a group-name.

river at *Ka-kui-gol*<sup>1)</sup> from the sandstone hill-neck of *Ka-kui-bahoi*, we had for the first time in full view towards the west the celebrated, high massive of the *Chiri-san*<sup>2)</sup> (1842 m), which lies at the boundary of *Kyöng-sang-Do* and *Chyöl-la-Do*, trending N. 40° E. in conformity with the general strike of the topographic lineaments of South Korea. The *Chiri-san* consists of two ridges. The front one soon ends in the north, sending off a branch eastwards to the north of *Chin-jyu*, while the other, higher one<sup>3)</sup>, behind it runs to *Ha-dong*<sup>4)</sup> and still farther southwards. We took a short rest at *Oan-sa*<sup>5)</sup>, which is located in a flat within a hilly district of the same geologic formation, consisting of a gray, muscovite-bearing marl with a few traces of unidentified plant-remains, alternating with reddish muscovite-sandstone (the dip 10° E.). This is the geological horizon which corresponds to the plant-bearing bed of *Pultang-kokai*<sup>6)</sup> east of *Sang-jyu* in *North Kyöng-sang-Do*, where Mr. YABÉ was fortunate enough to find tolerably rich remains of plants of the type of the Tetori series of Japan. He calls the bed the *Nak-tong series* which, according to him, represents the *Dogger-Malm* epoch in Korea<sup>7)</sup>. I shall return to this point later on. Mr. K. INOUE afterwards found the same plant-bearing bed at the north of *Hyöp-chhyön*<sup>8)</sup>. The above-mentioned localities lie in the northern prolongation of the exposure at *Oan-sa*, at distances of 50 and 150 km, respectively.

1) 加耳洞

2) The Pang-jyang-bong range (方丈峰) which culminates at the highest point of the Chiri-san (1842 m).

4) 東河

5) Mr. Inoué followed the road thither from Sa-chhyön on the coast, on the wet-gray complex of shale (marl) and sandstone, weathering into red earth, as far as 4 km that side of Oan-sa. His side-trip was of importance in fixing the limit of the said beds which we had passed over in Chin-jyu.

6) 佛堂峴 7) H. Yabé: "Mesozoic Plants from Korea." This *Journal*, Vol. xx, Article 8, 1905. 8) 陝川 9) 鳳溪

On the south of *Oan-sa* the country is hilly, and at 4 km distance there is, as we were told, the *eumñi* of *Kon-yang* on the sea coast. From *Chin-ju* hither, travellers were few and all the surroundings were quite country-like. The people appeared honest. Having crossed three hills, all of them low, we finally came to *Pong-gyöi* where gray marly and red micaceous sandstones were seen all dipping regularly towards the east, and low, denuded, treeless red hills sloping in the same direction.

At *Pong-gyöi*, a streamlet comes from the west and empties into the sea, loaded with hornblende-metagneiss which bespeaks the proximity of a gneiss terrane. Our road led westwards through the same red sandstone along the rivulet, and at 4 km we turned a little to the north at a narrow gorge where a fine banded meta-biotite-gneiss<sup>1)</sup> made its appearance underlying the sandstone complex. My running journey did not allow time enough to establish beyond doubt the existence of the sediment-gneiss here, and we must leave the question to future researches. Here was the boundary of the *Kyöng-sang* formation and the Archaean

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1) Apparently the metagneiss underlies conformably the sandstone-complex with the meridional strike and easterly dip. The gneiss is the light-brown, fine-psammitic, parallel-planed variety in which quartz, orthoclase, plagioclase and biotite form the predominant ingredients building the honey-comb or cyclopic aggregates, characteristic of sediment-gneiss. The rock is variably broken, cemented and healed by rather coarse veinlets of dioritic material composed of hornblende, plagioclase, orthoclase and quartz, the last in the form of plate in which round feldspars are enclosed in the *poecilitic* fashion. This may fitly be called *antiperthite*. Whether the veinlets were formed from the direct consolidation of injected material; or by breaking and melting in the process of the so-called "stoping"; or thirdly, as advocated recently by some geologists, by the crystallization of a concentrated residual water exuded from eutectic magma, I cannot tell. At any rate the veinlets were formed under extraordinary circumstances. Mineralogically speaking, the material must have been partly derived from the magma which constitutes the orthogneiss of the Hoang-tai-chhi pass.

The gneiss itself resembles to all appearances the Lower Takanuki gneiss of the Abukuma Upland of Japan (This *Journal*, Vol. V. 1893, p. 197 *et seq.* Kotô: The Archaean Formation of the Abukuma Plateau). Like the Japanese equivalent, the Korean gneiss represents the oldest sediment gneiss of the peninsula, pressed up and intruded by a great laccolith which, according to my opinion, makes up the eye-gneiss and its allies of the Chirisan massive.

terrane of the west. At *Sang-göri*, a microgranitic-spherulitic porphyry<sup>1)</sup> appeared for a short distance with the phenocrysts of quartz, orthoclase, and a very little biotite, and thence onwards orthogneiss was seen. Whether the porphyry should be regarded as a marginal facies of orthogneiss or a later intrusion, it could not be decided.

The change of rock is accompanied by a change of the topography of the surrounding country. On the west we saw a regular meridional ridge of the *Hoang-tai-chhi*<sup>2)</sup> pass (Pl. IV. *fig.* 2) which was dislocated on the north by the equatorial ridge of *Chin-juu*. The former is built up of orthogneiss<sup>3)</sup> (the strike N. 20° E. with the slope to the east, which is at the same time the schistose plane of the rock (see *fig.* 1); the latter, the sandstone-complex with fault scarp on the north. The line of this dislocation runs through the *Chiri-san* massive to the west, as may be

1) It is a light-brown microgranitic rock in which orthoclase, quartz and biotite, especially the first two, are abundantly present so as to give to the intrusive a granular appearance. Seen under the microscope the microgranitic groundmass makes up half the bulk, while the rest is composed of corroded quartz and idiomorphic zonal orthoclase, encircled by a fringe of beautiful spherulite. It is macroscopically of diagnostic moment to observe the thin lamellae of biotite which appear like black rods.

2) 黃大峙

3) A dark, dioritic, half-schistose rock in which the white feldspathose ground is striped with black hornblende bands. Seen under the microscope it consists of a granular aggregate of plagioclase finely twinned after albite and pericline laws. Between crossed nicols the lamellae of plagioclase are bent and exhibit undulatory extinction, thus bearing testimony to having been placed under stress without having been shattered to a cataclastic mass. Confused aggregates of the shreds of grass-green hornblende and deep-brown biotite are strewn in bands, some hornblende heaps being immersed in, and fringed with an accumulation of mica as if the latter were derived from the former. Some zonally structured hornblende encloses a mass of whitish, round or elongated mineral (epidote?) in myrmekitic fashion, and the biotite contains minerals with the pleochroic halo. The former may appropriately be called the *hornblende-myrmekite* in order to distinguish it from the normal (quartz-feldspar) *teucomyrmekite*. The hornblende-myrmekite is, so far as I know, confined to orthogneiss and the marginal facies of deep-seated igneous rock.

From the brief description given, we have here an ortho-diorite-gneiss formed during the slow movement of an injection of viscous, intermediate-acid magma under the condition of piezocrystallization. *No quartz was seen.* It is strange that the rock was found within the acidic gneiss terrane.

seen by the sudden lowering of the *Chiri-san*. On the south, a rather irregular ridge was seen running equatorially, detached into many isolated crests.

We made an ascent from the east to the *Hoang-tai-chhi* (280m), (Pl. IV. *fig.* 2) where our soldiers had a hard fight with the Koreans during the TAIKÔ expedition. This was the first high pass between *Pu-san* and *Ha-dong*. From the pass I saw towards the east, beyond *Pong-gyöi*, low regular ridges running meridionally, corresponding to the crest of the uplifted sandstone series. Here we took a retrospect of the tectonic physiography of the country we had already traversed (Pl. IV. *fig.* 3), and bade farewell to *South Kyöng-sang-Do*. To the west the scenery was majestic (Pl. V. *fig.* 1). I saw a high ridge lying parallel (see *fig.* 1) to, and beyond the *Söm-jin-gang*<sup>1)</sup>, with the peculiarly pointed peak of *Ök-kul-bong*<sup>2)</sup>. I am still uncertain as to the nature of rock of which it is built up. To the north-west I saw the high snow-clad summit of the *Chiri-san* (1942m). (It was February 2nd, 1901.) Its southern prolongation was hidden by the front ridge lying on this side of the *Söm-jin-gang*.

HOANG-TAI-  
CHHI 3)

During the descent I observed a perfectly fissile gneiss rich in biotite which to all appearance looked like a normal sediment-gneiss. Examined under the microscope, it turned out to be a sheared *Orthogneiss*, all the components of biotite-granite being crushed and granulated, and the elastic biotite now being changed into chloritic matter drawn out into streams and confused threads. It is quite reasonable that this mylonitized ortho-gneiss should be found here on the boundary of the great *Chiri-san* massive; for the wedge-shaped massive was pressed up

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1) 蟾津江 2) 億窟峯 3) 廣大峙

or left as an outstanding block,—the *horst* behind the surrounding lowland which was thrown down to a lower level. The hornblende-orthogneiss<sup>1)</sup> on the ascent and top (Pl. IV. *fig.* 2) already referred to, was intrusive into the present rock, and compressed and sheared together into its gneissoid form. We had here before our eyes the marginal sheared zone of a large geologic body constrained and deformed by combined processes of mechanical, hydrochemical, and crystallizing forces during mountain-building. We were to meet with the counterpart of the shear zone on the western margin of this massive on the *Posöng-Sachhang-Pongnai-jyang* line. I had given many years before a description of a similar phenomenon on the *diagonal horst* of the *Abukuma* upland<sup>2)</sup> in North Japan.

We next came down to *Pöl-töq-göri*<sup>3)</sup> and *Hoing-bo*<sup>4)</sup>, and went up the low but steep pass of the *Kong-uöl-chhi*<sup>5)</sup>. Just at its foot, an *eye-gneiss* cropped out with white microcline crystals 2-4 *cm* in size. Up to the top and farther on, it became, however, a finer *eye-gneiss*<sup>6)</sup> finely banded, dipping 5° eastwards to the *Sö-chhi* pass when again the very coarse white eye-gneiss was seen on the road to *Ha-dong*, with extraordinarily large eyes (up to 8 *cm*) of orthoclase. Brownish-red almandine was observed as an accessory. I have never seen or heard of any such *giant-gneiss*.

1) See page 38, footnote 3.

2) This *Journal*. "On the Archaean Formation of the Abukuma Plateau." Vol. V. p. 197 *et seq.*

3) 伐徳瓦里 4) 横浦 5) 公月峠

6) The rock is the "*Augengranulite*" with a few eyes (1 *cm*) of dull whitish microcline. The color is light-brown with flowage stripes. Microscopically, it consists of quartz, microcline and plagioclase, all exhibiting undulatory extinctions, and forming a cataclastic-granular aggregate. Apatite is tolerably abundant. The microcline contains vermicular quartz. Shreds of biotite, much fibrillated, are strewn in schistose directions. The rock probably represents a marginal phase of the coarse eye-gneiss of *Ha-dong*, which had been subjected to the influence of the injection-flow after a nearly perfect consolidation of the granite-magma.

*porphyry* before, and it was very remarkable also in another respect, being white instead of reddish. Hereafter for the sake of simplicity it will be called the *Hadong eye-gneiss*.

How these remarkably large, lenticular eyes were formed is difficult to explain. According to a modern view, the magma seems to have been in such an eutectic condition that the orthoclase-molecule was predominant, its crystallizing force powerful, and mass-action great, while the pressure was relaxing at a moderately rapid rate.

The *eumnäi* of *Ha-dong* is situated at the foot of a hill of HA-DONG the eye-gneiss or a rather coarse porphyritic granite on the east bank of the debouchure of the *Söm-jim-gang*. All the ridges on the south of the *eumnäi* trend north-east by east in the *Han-san* direction. The sea backs the river-water up to this point at the spring-tides, and the place has served as a port of considerable importance to Japanese junks, being the terminus of the shortest overland road to the capital of the defunct kingdom of *Päik-chyöi* or *Kudara* in *Chyöl-la-Do* (17 B. C. to 660 A. D.), through *Nam-uön*, *Chyön-jju*, and the *Keum-gang*. This place was also the battle ground during TAIKÔ's Korean invasion<sup>1)</sup>.

The road led us along the precipitous bank of the river upwards through the eye-gneiss terrane (Pl. V. *figs.* 2 and 3). The weather was shivering cold in this part of South Korea, for we were in the heart of the *Chirisan* massive, and the river CHIRISAN in the defile of the mountain was entirely frozen. When the feeble sun shone upon us the central portion of the rapids shifted the ice-mass, but it soon congealed again, and the resulting

1) Hadong is noted for the production of edible sea-weed consumed in large quantities by the people; while Chin-jyu, for the large bulbous radish, *Raphanus sativus*.

surface reminded us of the moraine wall of the Alpine glaciers (*figs.* 2 and 3). At 8 *km*, *Kaichhi*<sup>1)</sup> was reached near an affluent along which a short way to *Chin-jyu* will probably be found skirting the north foot of the *Chin-jyu* ridge. Another 8 *km* in a north-westerly direction over the same rock brought us to *Hoa-kāi-jyang*<sup>2)</sup>. The *Chin-jyu* ridge evidently extends all the way here, as I have already indicated, exposing the fault scarps towards the north. The dislocation was of the distributive or step-form, and could not escape the eye of an observer on the opposite side of *Kai-chhi*. The north end (Pl. V. *fig.* 1) of *Päik-un-san*<sup>3)</sup> (1234 *m*) should be the point of detachment from the *Chiri-san* by the *Chin-jyu* ridge. The meridional and parallel ridges of *Päik-un-san* with the pointed *Ök-kul-bong* (*fig.* 1) on the south side of the river was thus disjoined from the main axis of the *Chiri-san* massive. We were in the core of the mountain at the defile of the *Söm-jin-gang*. The geologically speaking equatorial, transverse gorge from here to *Ku-ryöi*<sup>4)</sup> and further on, seemed to be a tectonic valley corresponding to the dropped side (Pl. V. *fig.* 3) of the *Chin-jyu* fault.

The *Chin-jyu* ridge surely lies at the north of *Kai-chhi*; for the east-west trend of the crests could be seen in the side-valley, while in the north-east dale of *Hoa-kāi-jyang* all the ridges ran in the *Chiri-san* direction (N. 20° E.). At *Kaichhi*, one delights to look up at the romantic castle-shaped *Ko-so-söng*<sup>5)</sup>, the isolated flat-top of *Pong-hoang-dai*<sup>6)</sup>, and the deep *Söm-jin-gang*<sup>7)</sup>, all named after classical Chinese,—sublime scenery often sung by Korean poets. This disrupted rugged landscape was created by the hands of Nature on the occasion of the displacement of the Hadong

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1) 介峰 2) 花開場 3) 白雲山 4) 求禮 5) 姑蘇城 6) 鳳凰台  
7) Here the river is called the lake of Tong-chyöng-ho (洞庭湖)



eye-gneiss of the *Chin-ju* ridge. The same Hadong gneiss constitutes the snow-clad *Chiri-san* massive (1942 m) and probably also the needle of *Ök-kul-bong*. At *Hoa-käi-jyang*, a copious supply of water was flowing from the *Chiri-san*, and I saw in the recesses of the mountains, four kilometres from us, a number of large monasteries, one being the *Ssang-gyöi-sa*<sup>1)</sup>, sheltering one hundred bonzes. This is one of the three celebrated monasteries of Korea.

We left *Hoa-käi-jyang*, and near by on the road side was found a large detached, scalenohedral block of the Hadong gneiss, called *Mil-bahoi*<sup>2)</sup>. It marked the boundary between *Kyöng-sang-Do* and *Chyöl-la-Do*. About a quarter of an hour later, we reached a place where a steep side-valley joined the river. This was the end of the Hadong rock, and further on towards the west a *gneissose granite* was seen with the axis of schistosity striking N. 20° E., and a slight dip to the west. It is a buff-coloured, friable, rather coarse-grained variety rich in biotite, representing the sort of rock whose terrane (the Hadong eye-gneiss) we had just gone over, but the characteristic large "eyes" are wanting, and sillimanite, a piezocontact mineral, can be seen on the sheared face.

The transverse gorge (Pl. V. *fig. 3*) ended at *Han-su-nai*<sup>3)</sup>, and we came out on an open flat from the defile of the *Chiri-san*. On the southeast side, masses of granite-gneiss had slipped (*fig. 3*) down into the gorge from the high peak of *Päik-un-san*, already mentioned, leaving slip-terraces on the steep slope. This was the *Chin-ju* fault-ridge which we had traced hither. To the south-west, massive beds of red and green breccia<sup>4)</sup>, interstratified with red tuff

1) 雙溪寺

2) 麥岩 Pl. V. *fig. 2*. The fissured block on the right side of the figure is the *Mil-bahoi*.

3) 寒水川 4) See *ante*, page 19 *et seq.*

overhung the river without impeding our way. These volcanics were of the formation that I have frequently mentioned as occurring near *Masan-pho*, and which will reappear on our way farther on. (See page 18. *et seq.*)

Proceeding from *Han-su-nai* via *Peuk-chhi-nai*<sup>1)</sup> to the *cummāi* of *Ku-ryōi* for a distance of 8 km we descended the flat westwards, seeing before us a meridional ridge of paragneiss; at the foot of which was our destination (Pl. IV. *fig.* 1). Behind it, still another parallel ridge was seen, through which the upper *Söm-jin-gang* according to the map makes its way obliquely. Towards the north for a distance of 8-12 km extends a plain bounded on the east by the *Chyöl-la-Do* portion of the *Chiri-san*, on which stands the monastery of *Hoa-am-sā*<sup>2)</sup>. Farther north we saw the equatorial ridge of the *Pam-chhi*<sup>3)</sup> pass, which separated us from the plain of *Nam-uön*. We saw the same ridge again from the north in our second traverse.

KU-RYŌI From *Ku-ryōi*, we took a southerly course to the coast as far as *Sum-chyön*<sup>4)</sup>, advancing first across rice fields, over gravel beds, then on paragneiss (the schistose axis N.—S.) until we came down to *Chan-su*<sup>5)</sup> at the outcurve of the *Söm-jin-gang* where we again met with the volcanics of the Upper *Kyöng-sang* formation (see page 43) composed of the sheet of greenish porphyrite, red tuff and green breccia<sup>6)</sup>. The augite-porphyrite had the pilotaxitic structure. The

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1) 北致川 2) 華巖寺 3) 栗峙 4) 順天 5) 潺水

6) This is a quartz-bearing fusion-tuff, or in a more strict sense Lacroix's *brèches de fusion*, and not a normal aqueous or aeolian tuff. It flowed from a certain volcanic vent with solid fragments floating on it, and partially fused during its flow. It makes massive beds, but sometimes cleaves into the pot-herd-like flakes, characteristic of tuffaceous rocks. Macroscopically, it has small angular fragments (1 cm) of black and sometimes greenish colour, imbedded in the greenish matrix. Microscopically, the *greenish* splinter is seen to be of porphyrite of fine pilotaxitic structure with phenocrysts of plagioclase, sometimes epidotized, and of a chloritized ferromagnesian mineral. The black splinter is the same volcanic in which magnetite-crystals are

complex was undoubtedly a continuation of that observed at *Han-su-nai*. We crossed the ferry and soon reached *Nam-bahoi*<sup>1)</sup> on the same formation; but at the latter place paragneiss and quartzite reappeared from the bottom of the green beds, the former continued to *Koi-nam-jyang*<sup>2)</sup>. From the last village were seen *Chyön-ji-bong* on the north-east and the hat-shaped *Kat-bahoi-san*<sup>3)</sup> on the east, both being built up of the green rocks separated by an equatorial valley of paragneiss due either to faulting or erosion. To the west the green rock mountain was seen trending north-west by west, but how far the formation extended to the west I could not tell. Green pebbles of white-spotted porphyrite were the principal stones in the river bed.

Farther southwards the topography became close and the cliffs on both sides were built up of the greenish fusion-tuff or friction-breccia with intercalation of green porphyrite; the former prevails from *Peuk-chhang*<sup>4)</sup> to *Sol-chhi*<sup>5)</sup> via *Yang-su-chyöng*<sup>6)</sup>, slightly dipping (3°) southwards. The defile from *Peuk-chhang* to *Yang-su-chyöng* is the tuff formation, sometimes columnar; and the stratification-plane and jointed character produce a series of falls and rapids.

The top of the *Sol-schhi* pass (Pl. VI. *figs.* 2 and 3) is a woody orthogneiss (the stretching axis N. W.—S. E.), capped by a red tufaceous formation with spots of plagioclase and quartz, dipping northwards. At the foot of the south descent the woody orthogneiss passes into the Hadong gneiss, keeping the same

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abundantly present. The grayish mass consists of minute grains, displaying aggregate-polarization colours. An important porphyritic component is the deeply corroded quartz which bespeaks some genetic relations with the tuffs and breccias to be mentioned later. See also *ante*, p. 19, footnote.

1) 南巖 2) 槐木場 3) 笠巖山 4) 北倉 5) 松峙 6) 兩水亭

stretching direction, while at *Pak-ku-chyöng*<sup>1)</sup> its axis is equatorial. At 2 km south of *Oa-deung*<sup>2)</sup>, the giant-gneiss-porphry (the Hadong gneiss) disappears and is replaced by the psammitic paragneiss of *Nam-bahoi* (the strike E. 20 N., the dip 30 S.); but this is only for a short distance, and the woody orthogneiss soon crops out again and continues down to *Sun-chyön*.

On our detour hither from *Ku-ryöi*, the basement was a complex of ortho- and para-gneiss whose mutual relations could not be made out. The complex was overlaid by a sheet of the Upper *Kyöng-sang* formation which described a trough at *Cham-su* and an air-saddle at *Koi-nam-jyung* with the axis (W.S.W.—E. N.E.) of the *Chin-jyu* ridge. The *Sol-chhi* ridge is the uplifted edge whose south side was dropped down to the gneiss terrane which has the equatorial axis. Looked at from the south (Pl. VI. fig. 3), the *Sol-chhi* ridge was seen for a long distance in sharp escarpment, corresponding to the basset of the green sheet upon a foundation of gneisses. In passing, it should here be remarked that the top of *Kuku-su-bong*<sup>3)</sup>, lying to the south-west of *Oa-deung* was seen capped with a detached mass of green tuff.

SUN-CHYÖN

*Sun-chyön* is an important walled *cummäi* on the south coast, being a landing place and the starting point of the meridional highway of *Chyöl-la-Do*, which passes through *Ku-ryöi*, *Nam-uön* and *Chyön-jyu*. It is also a place of some importance on the coast road to the west, which we followed. Here General KONISHI landed his men during TAIKÔ's invasion of Korea. The country around the town consists of bald, degraded gneiss hills.

After passing over the south-western hill-neck we followed

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1) 博口亭 2) 瓦薩 3) 國守峰

a tectonic valley to *Nak-an*<sup>1)</sup>. The southern hill-ridge which separated our route from the inlet of *Yö-chä*<sup>2)</sup> was less regular, while the northern one was rather high. On the way there were two passes, the *Chi-gyöng-chhi*<sup>3)</sup> and the *Pul-chhi*<sup>4)</sup>. From *Sun-chyön*, we trod the terrane of a lamellar orthogneiss rich in biotite, with small spots of white orthoclase as far as the east foot of the latter pass (320 m) when we came across a new rock which appeared in the form of a laccolith. My specimen<sup>5)</sup> is light, friable, reddish granite-porphry composed of flesh-colored and dull white (decomposed) orthoclase, rounded quartz and some idiomorphic biotite. Mirolitic druse is abundant with crystals of quartz and orthoclase of the usual habit hanging from the wall. The presence of these minute drusy spaces makes the rock so light and rough as to appear at first glance like a rhyolite, but the texture is holocrystalline and granitic. That the present rock is a laccolith, I am led to think from experience in *Chu-goku*<sup>6)</sup>, Japan, where similar rocks occur abundantly, in connection with the marginal facies of aplitic granophyres. The latter seem by no means rare in Korea and China. *RINNES tsingtauite*<sup>7)</sup> is likely one of these varieties found in *Kiau-chau*. The *Pul-chhi* pass with the rugged *Chyön-san*<sup>8)</sup> on the north on whose top is located the *Keum-gang-an* pagoda, and *O-bong-san*<sup>9)</sup> on the south are built up of the same rock, and the circus-like depression of *Nak-an*<sup>10)</sup>, to which the

1) 安樂 2) 汝自 3) 地境 4) 火峠

5) Mr. Inonyé collected a fresh specimen of buff-coloured rock with flesh-colored phenocryst of orthoclase (1 cm) and round quartz. The latter is remarkable for its enclosures of irregularly elongated orthoclase (decomposed), all oriented in the same direction,—it is *anti-myrmekite*. The groundmass is simply a coarse intergrowth of quartz and orthoclase, the former being continuous from phenocrystic quartz—a unique phenomenon. Only a few small and idiomorphic crystals of plagioclase, hornblende and biotite are present. It is *quartz-tsingtauite*.

6) For example near Takeda, 14 km north of the Ikuno mine, Tajima prov.

7) *Zeitschr. d. D. geol. Gesell.* Bd. 56, S. 144. 8) 金鑊山 9) 五峰山

10) This village is noted for linen, bamboo-goods, cotton-wool, and rice.

road leads down a steep descent, is created by subaerial erosion worked out into the core of this friable mass.

Seen from the top of the *Pul-chhi*, we observed a sudden change in topography from the hilly tract we had already passed over, to rather rough mountains on the west, but our view of them was at the time obscured by the hail storms which we unhappily experienced daily till our arrival at *Mok-pho*. From an inspection of the geologic map it was easy to understand the change of land-features; for here we were on the southern prolongation of the axis of the *Chirisan* massive, the backbone of South Korea. The peninsula of *Heung-yang*<sup>1)</sup> on the south seemed to me to be the continuation of this axis. Of what rock and formation it is composed I am up to the present entirely ignorant. The small land-projection may be the terrane of eye-gneiss or the *Pul-chhi* granite. I have two chips collected by Mr. T. Sarrô, of our Hydrographical Bureau, one from *Pul-kai-jin*<sup>2)</sup> at its southern extremity, and the other from an islet near by called *Chi-ori*<sup>3)</sup>. The former is a muscovite schist of fine-lamellar texture with abundant muscovite and a little quartz, the latter being highly granulated by mechanical action. The rock from *Chi-ori* is a spherulite-porphyr with the appearance of claystone-porphyr. The general mass consists of minute radial aggregates in which microporphyrific crystals of orthoclase are found imbedded. From our fragmentary knowledge nothing positive can be said of the geology of the promontory of *Heung-yang*.

NAK-AN From poverty-stricken *Nak-an* to the prosperous *Po-sông*<sup>5)</sup>,

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1) 興陽 2) 鉢浦鎮 3) 之五里島 4) 寶城 5) 洛昇

the first half of the way leads southwest, then due west. On the fresh snowy morning of February 7th, 1911, we started from *Nak-an* and walked over the granitic terrane of *Nak-seung*<sup>1</sup> up the *Chiyōku-sa-chhū*<sup>2</sup> (150 *m*) and the *Yō-ŭi-chhū*<sup>3</sup>, where again the Hadong eye-gneiss cropped out with smaller eyes and imperfect schistosity. Both passes trend E. 10–20 S., corresponding to the stretched direction of the orthogneiss, and culminate on the left in the high peak of *Chōn-ŭyōi-san*<sup>4</sup>. Our road, however, ran from the north-east to the south-west, obliquely crossing the hill-crests in the direction of the dislocations which have successively thrown down the terrane towards the south-east, thus creating the elongated cove of *Tōng-nyang*<sup>5</sup>, in the corresponding direction. The fault-scarp was typically observed a little farther on at *Sai-chhū-ŭm*<sup>6</sup>—a topographic element of wide significance governing the general trend of the south coast of *Chyō'ia-Do*. Our road ran parallel to the ridge on the shore of the shallow cove, on the opposite side of which we saw at a distance disconnected but regular low ridges, stretching parallel to the coast and making up the already-mentioned peninsula of *Hōng-gang* (see page 48).

1 尺沙峙 2 列開峙 3 露帶山 4 得標峯

5 鳥峙峯 From *Sai-chhū-ŭm*, Mr. Inoué struck on the north-west of *Tōng-nyang*, then due south to *Pōi-pō*. The latter lies nearly midway between the two coasts *Chōi-Pōi* and *Tōng-pōi*. His route to our one was quite welcome to me for various reasons: first, my route did not reach the hilly region in the centre of which *Tōng-pōi* is located; secondly, it was to be expected to my knowledge that the hill region is not simply built up of a sheet of porphyrite and its breccia in the Upper Eocene formation, but its geology is so complicated as to be very different in depth; thirdly, the region is the shore-parallel belt of the *Chōn-nyang* hills and lastly, it is the home of gabbro and granite. The trip was under consideration only to reach the south margin of the *Tōng-pōi* cove, which I shall have to refer later. Messrs. Inoué and Yabe made tours in *Tōng-pōi* on other occasions.

Not far from *Sai-chhū-ŭm*, already mentioned, still to be seen the eye-gneiss terrane. Mr. Inoué struck a specimen of it here with inter-stratified parts of megacrystic structure. Brown hornblende is abundant, *Chyōi* and its variations are also present. Plagioclase is usual structural. Farther on upon the summit of a pass he collected a very remarkably coarse specimen

From *Phu-chhyöng*<sup>1)</sup>, we left the coast and proceeded due west on the elevated ground of *Kun-möri*, then over the *Kiröki-chhi* pass, through the terrane of the *Hudong* gneiss. Here the eyes become gradually less numerous and smaller. At the country-town of *Po-söng*<sup>2)</sup>, the rock becomes normal orthogneiss composed of automorphic, twinned plagioclase, and rather large xenomorphic orthoclase with typical undulatory extinction, anhedral quartz, and deep-brown biotite with pleochroic halos. In short, it is a coarse granular, sheared granite rich in plagioclase. It is difficult to say how much it owes its present state to mechanical crushing and how much to piezocrystallization. Here we observed a sudden change in the axis of schistosity from S. 20 W. to N. 20 E.

Po-söng

Although *Po-söng*<sup>3)</sup> lies on a small elevated flat near the south coast, its waters drain northwards to the *Söm-jin-gang*, and we were told that along its course, in the river-bed gold

composed of only microcline and schorl. These seem to be dyke-rocks. Midway a dioritic dyke reappears.

Within a distance of 5 or 6 km, a black rock made its appearance with an external appearance of a *graphite-schist* with blue spots of quartz. The microscope proves it to be a sheared form of either quartz-porphry or quartz-diorite-porphryite. Its black color is due to the presence of magnetite in the chloritic film. All the components except quartz (abundant in liquid-inclusions) were reduced either to minute grains or threads. *Green schistose* rock was also found cleaving into irregular slabs. It contains a large amount of quartz (8 mm) which is crushed exhibiting undulatory extinction. Threads of chloritic matter, found in streams, color the rock green.

It is evident that these represent the *mylonitized margin of the Chiri-san sphenoid*.

Gold placer is found at *Pong-nai jyang*, but its original home is unknown. From here to *Po-söng* all the rocks are sheared forms as is evinced by the inspection of specimens. My route touched the cumula of *Po-söng*. See page 68.

1) 波背 2) See p. 49, footnote 5.

3) The stretch from *Po-söng* to *Neung-jju* was reconnoitered by Mr. F. Kobayashi who found at *Kat-tari* a bed of psammitic muscovite-schist, a prolongation of the schist of *Kang-jin*, overlaid by a grayish medium-grained sandstone and brownish felsophyre. The find of sandstone was of special interest to me; for by its presence I was enabled to understand the formation of the graphite and much-altered sedimentaries of *Tong-pak*, lying farther north.



sand is found at *Koang-dam*<sup>1)</sup>, *No-dong*<sup>2)</sup> (*Sa-dong*), and *Pong-nai*<sup>3)</sup> which are 4, 8, and 16 *km* from *Po-söng*, respectively.

About 6 *km* west, we reached the very low hill-neck of the *Pödcul-chhi*<sup>4)</sup> of the same spotted orthogneiss stretching northeast-southwest, and after an hour we were on the rather high pass of *Kammam-chhi*, where stands a single *Kammam* (persimmon) tree overshadowing a stone-tablet erected in honour of the heroic deed of a certain Korean at the time of TAIKÖ's expedition. The ascent was on the same orthogneiss<sup>5)</sup> rich in biotite, with dull white spots (4 *mm*) of orthoclase. From the top westwards, the overlying rock was the stiff lamellar orthogneiss<sup>6)</sup> consisting of alternating laminae of quartz and orthoclase, and biotite, with a

The sandstone is built up of angular splinters of quartz and orthoclase particles and muscovite, cemented with silicious crystalline particles mixed with coaly matter; and shows symptoms of having been subjected to shearing by the shattering and undulatory extinction of the quartz, its dirty aspect being caused by liquid inclusions of secondary origin. The rock is rather a metamorphic tuff than a normal sandstone. It is not easy to speak of the age of this sedimentary, but it appears to me to be of the same age as the *Upper Kyöng-sang formation* (Mesozoic). See *ante*, page 66.

1) 廣灘 2) 蘆洞 (所洞) 3) 福内

4) 柳峙. At about 6 *km* northwest from this point, Mr. Inonyé saw gold washing at the village Sa-chhang (社倉) on the sheared orthogneiss rich in quartz. It lies in the same belt as Pong-nai-jyang already referred to. The gold-dust is concentrated in the basal portion of a gravel bed 8 feet thick, which makes the river-bed and the underground of the paddy fields. The placer is now nearly exhausted.

5) Examined under the microscope the components are orthoclase altered into muscovite and strained quartz, sagenite-bearing biotite, and a few crystals of microcline. The mode of their aggregation is such that the biotite encloses the colourless components in an eye-like fashion so as to make them appear like white spots, and the high schistosity of the rock is caused by the stream-like arrangement of the flakes of biotite. The effect of mechanical action is not observable except in the undulatory extinction in the quartz. A peculiar feature is that the quartz encloses drop-like biotite, orthoclase and irregularly rounded quartz. In short, this schistose granite seems either to represent the extreme stage of metamorphism, or to have been formed during a slow movement of a margin of magma in a state of piezocrystallization.

6) The overlying stiff orthogneiss consists of an alternation of wavy and tapering laminae of quartz and orthoclase with the tissue-like bands and fibres of decomposed biotite. In consequence of this wavy structure, the colourless bands sometimes swell out almost into elongated eyes. Both the quartz and the orthoclase are so completely crushed and dragged as to appear in confused grains under crossed nicols. The rock represents the extreme product of mylonitization. It would be proper therefore to name it *mylonite*.

northwesterly dip. The boundary of the two orthogneisses was distinctly visible. Seen from the top, the region lying to the west of the *Kammam-chhi* pass presents a rough mountainous aspect, because of the oblique trend of the mountain-axis, terminating in the headland of *Chyön-goan-san* (721 m)<sup>1)</sup>; just as is the case of the ridge near *Nak-an*, already mentioned, with the corresponding peninsula of *Heung-yang*, though the trend of the latter approaches a meridional direction.

From *Chin-jyu* hither, the country is thinly populated and covered with a meagre growth of pine trees, and it is refreshing to see the real forest on the descent to *Chyang-noro-mok*<sup>2)</sup>.

At the westerly continuation of the little gravelly valley, we saw at a distance the rugged height of *Sai-in-san*<sup>3)</sup> with its perpendicular cliff of romantic aspect, at whose western foot on a small intermontane flat is situated, as the people told us, the Korean military station, *Pyöng-yöng*<sup>4)</sup>. It is unusual to find such volcanic topography in southern Korea, and my supposition was substantiated by finding young volcanics at *Chyang-heung*<sup>5)</sup>.

Our road now turned south to two little passes, *Phung-chhi*<sup>6)</sup>, of mylonitized gneiss, which here cross the equatorial ridge whose north foot we had followed. On the top we found the *Camellia japonica* which we had not seen before in Korea. We saw to the east and south-east *Chyöi-oang-san*<sup>7)</sup>, *Sä-chä-san*<sup>8)</sup>, and the rocky south ridge of the *Kammam-chhi*, capped with the fissile mylonitized orthogneiss upon a base of small eye-gneiss, dipping northwestwards at low angles. These capped outliers attracted our attention by their butte-like escarpments which were fully exposed. The isolated flat tops evidently once formed a shell

1) 天冠山 2) 長嶺項 3) 修仁山 4) 兵營 or Sam-ü-ri 三位里

5) 長興 6) 風峙 7) 帝王山 8) 獅子山

upon the kernel of eye-gneiss of deep-seated igneous origin.

On our way down to *Chyang-heung*, I saw for the first time in Korea a true Alluvial terrace of gravel deposited on a granitic base. Can the coast have been slightly rising in recent times? By the way, I should mention that it was not Diluvium. I have never found the genuine Diluvium in Korea. Its absence as well as that of clay soil must be counted as the two peculiarities of Korean geology.

ALLUVIAL  
TERRACE

We started down the depression which opens eastwards. In it is buried the *eumäi* of *Chyang-heung* out of whose poor south gate we passed through a narrow cutting made in a purplish-brown brecciated hornblende-andesite with northerly dips. The microscope revealed that the volcanic is made up of a devitrified glassy base with granules of sesquioxide of iron, in which corroded grass-green hornblende is porphyritically imbedded. A little colourless augite and much apatite are present as accessories. It is an acid volcanic.

CHYANG-  
HEUNG

On the north, the rugged crown-shaped *Sai-in-san*, which had already attracted our attention from *Chyang-noro-mok*, was seen raising its head; and from that direction a streamlet flowed down laden with abundant volcanic gravel, and pebbles of needle-diorite. We were here evidently in a young volcanic region. Similar, though decomposed, clay rock of this class is in my possession from *Keum-dang-do*<sup>1)</sup>, an islet at the entrance of *Teung-nyang* bay<sup>2)</sup>, not far from here. Its main mass consists of devitrified glass of flowage structure with axiolite. The porphyritic crystals are plagioclase and orthoclase. It seems very striking to find sporadic occurrences of young andesitic effusives on the

1) 金堂島 2) 得根灣

south coast of *Chyöl-la-Do*. Quelpart or *Chyöi-jyu*, 120 km distant, is the nearest island of volcanic nature; still the rock is not an andesite but a basic basalt.

After making 4 km on the volcanic terrane, we entered the equatorial flat of *Kang-jin*, the largest extent of plain, 12 km by 4, on the south coast (Pl. VII, fig. 1). It is bounded on the south by a low but sharp ridge of fissile orthogneiss of the *Kammam* type, dipping steeply toward the equatorial axis of the valley, while the north side exposes the back of the same rock. About 4 km before reaching *Kang-jin*, the northern hill-edge is overlaid by the muscovite-schist (Pl. VII, fig. 1) with interbanded white quartz-schist of a loaf-sugar-like structure (with strike N.E.—S.W., a high dip N.W.).

## KANG-JIN

*Kang-jin*<sup>1)</sup> lies at the end of the valley and at the head of a shallow meridional inlet whose entrance is protected by a group of four islands<sup>2)</sup>, the enclosed water forming a well protected harbour which served as a base for our Navy during the Japan-China war of 1894—'95. The bay of *Kang-jin* separates the headland of *Tai-dun* on the west from that of *Chyön-goan-san*<sup>3)</sup> on the opposite side. The backbone of the headland of *Tai-dun* is again a ridge which runs west of *Kang-jin*, culminating in the muscovite-schist height of *Chyön-dök-san*<sup>4)</sup>, easily seen from the *cummäi*. The road to *Yöng-am*<sup>5)</sup> runs along the eastern foot of the ridge. Our road went west, right through the ridge on the muscovite-schist up to a low pass<sup>6)</sup> where we again entered the terrane of small eye-gneiss, and followed it down to *Han-chhyön-*

1) 庚津 See the view cited above. 2) The forest-clad Oan-do (莞島), Ko-keun-do (古今島), Sin-ji-do (新智島), and Cho-ik-do (助箭島). 3) 天冠山

4) 天德山 5) 靈岩 6) Hyu-son-chhi (休乎峙)

*dong*<sup>1)</sup>. To the south, the reef of the quartz-schist and muscovite-schist<sup>2)</sup> standing vertical (the strike N.30°E., the dip 80°S.E. or vertical) was seen running southwestwards as the continuation of *Chyön-dök-san*, through which a streamlet flowed southwards in the narrow gorge of *Söng-mun-san* or stone gate (Pl. VII, fig. 2).

Not far from here towards *Häi-nam*<sup>3)</sup>, we were on a low elevation<sup>4)</sup> of spherulite-porphyr<sup>5)</sup> in direct contact with spotted gneiss. We now entered a new geological terrane whose geologic age and relation to other rock-complexes are up to the present not wholly clear to me. F.v. RICHTHOFEN<sup>6)</sup> and L.v. LÓCZY<sup>7)</sup> mention the occurrences of quartz-porphyr<sup>ies</sup> and their derivatives in China, and, apparently influenced by the European standard of geological formations assigned them to the Permian. T. LORENZ<sup>8)</sup> cites porphyrites, but not quartz-porphyr<sup>y</sup>, in his Permian of Schangtung. During my journey, I naturally looked upon the quartz-porphyr<sup>y</sup> and its diverse derivatives from the standpoint of the late v. RICHTHOFEN, and included the Korean rocks in the *Permo-Triassic*<sup>9)</sup> under the name of the *Kyöng-sang*

1) 寒泉洞

2) Under the microscope the rock is seen to be made up of flattened quartz grains together with light-brownish sericite. The schist is properly speaking a *sericite-quartz-schist* without a trace of orthoclase.

3) 海南 4) Phyöng-su-chli (平水峙) pass. 5) Light-brownish effusives with abundant grains and bipyramids of quartz (3 mm) set in the spherulitic groundmass. Altered orthoclase and biotite are also present.

6) The late v. Richthofen ("China" and "Schangtung") found quartz-porphyr<sup>ies</sup> and tuffs of probably Permian age in East China. Triassic quartz-porphyr<sup>ies</sup> and tuffs occur also according to him from Chu-san via Ning-po to Hong-kong (Zirker, "Petrographie").

7) L.v. Lóczy ("Die Reise des Grafen Sz'chenji in Ostasien," p. 681) mentions an occurrence of quartz-porphyr<sup>y</sup> in association with granite which had erupted at the beginning of the Mesozoic, underlying the Dogger coal seam at Tsin-tschhi-shien in western Sze-chuen. He, however, assigned a great age (pre-Carboniferous) to the quartz-porphyr<sup>y</sup> in Liang-Chau, Kansu (p. 657).

8) "Beiträge zur Geologie u. Palaeontologie von Ostasien," *Zeitschr. d. deutschen geol. Gesell.*, 57, 1905, S. 18.

9) "An Orographic Sketch of Korea." *This Journal*, Vol. XIX, Article 1, p. 15, footnote.

formation. Later, Mr. YABÉ<sup>1)</sup> on my suggestion made two journeys in Korea, and discovered a Jurassic bed in the *Kyöng-sang* formation whose higher horizon is built up of a complex of porphyrites and green breccias, of considerable thickness<sup>2)</sup>. Now at the base of the porphyrite rocks, there occurs not infrequently quartz-porphyrines (rhyolite) and their derivatives, for example near *Masan-pho*. So I am rather inclined to consider the quartz-porphyrines to be the basal member of the eruptive *Kyöng-sang* formation. So far as my knowledge goes, no young deposits are observed upon the formation except Alluvium; and from its close relation to the underlying Jurassic bed, *the Upper Kyöng-sang formation, including the quartz-porphyry, must be of Jurassic or post-Jurassic age.*

JURASSIC  
ROCKS

From the elevation, *Phyöng-su-chhi*, already mentioned, we saw to our left a low, regular equatorial ridge which is evidently the western continuation of that of *Kang-jin*. In front of us was a depression. On the south, the reef of *Söng-mun-san* runs westwards. Having crossed a flat of rice-field after about 6 km, we finally came to the foot of a pass where the road divides, one leading to *Yöng-au* and the other south-west to the monastery of *Tai-dun-san*. We climbed the pass<sup>3)</sup> and found the same quartz-porphyry, besides a pinkish compact felsophyre ex-

1) This *Journal*, Vol. 20, Article 8.

2) Rinne (*Zeitschr. d. D. geol. Gesell.* 56, 1904.) has given a partial profile of Schuilingshan (Ling-tan) off Kiau-chau Bay where a complex of shale and sandstone is interbanded with aplite and porphyrite, and the whole is covered with porphyrite-breccia. The Kiau-chau sedimentaries are said to be of the Carboniferous or Triassic, but ours are of the Jurassic or post-Jurassic. A feature of great interest attaching to Rinne's section is an intercalation of sheets, or eventually dykes of aplite and porphyrite with a top cover of breccia. The rocks and their mode of occurrence unmistakably resemble the Upper Kyöng sang formation. So far as I understand the geology of Korea, porphyrite and its derivatives together with felsophyre and its tufts are *older than mesanite* (graniteporphyry), which occurs in shallow laccoliths, arching up and intruding into the sheets of porphyrite and felsophyre.

3) U-seul-chhi 牛膝峙.

hibiting a beautiful fluidal structure<sup>1)</sup>. I did not ascertain the relation of the two rocks, as I was prevented by snow and hail storms which unfortunately persisted till our arrival at *Mok-pho*.

Having started from the orthogneiss basin of *Häi-nam*<sup>2)</sup> HÄI-NAM within the felsophyre terrane, then buried in deep snow, for three days we pushed on our way between felsophyre mountains, and came out unexpectedly on the open tract of *Yöho-dari*<sup>3)</sup>, which marks the beginning of a peninsular area, characterized by shallow waters and hillocks,—*a peculiar land-feature common to the coast of the Yellow Sea*. From here westwards the rock cleaves into irregular slabs on the horizontal plain. The appearance is sheared, bedded, tuff-like, with angular fragments, green chloritic patches and kaolinized feldspar crystals in a light-greenish matrix. It is the same brecciated felsophyre as that of *Häi-nam*, though perfectly decomposed and coloring the soils red and green.

After passing over three hill-necks, all trending characteristically north-south, within the distance of fourteen kilometres from *Häi-nam* in a thinly wooded region, we took the left-hand road

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1) Examined under the microscope, the rock consists of angular fragments cemented by a felsitic substance. Each *fragment* shows fluidal structure and is built up of pinkish felsitic bands with granules of sesquioxide of iron, showing optically *negative* character in the direction of flows in contrast to the positive character of the colorless alternating bands. Porphyritic crystals are somewhat corroded and kaolinized orthoclase. The *cementing* material is a confused aggregate of quartz grains with fragments of orthoclase crystals. The rock is a *brecciated felsophyre*. The bands are probably composed of chalcedony and its allies, either quartzin or luteite.

2) 狐橋

3) Mr. Inonyé took the shortest way from here to Mok-pho in crossing mountains on the north (120 m) to the head of a cove (Peuk-chhang). On the way, again, orthogneiss is overlaid by felsophyre which is in turn covered by a sheet of porphyrite. It is of great moment to geologists to know the relation of the two last-mentioned rocks, which he had an exceptionally good opportunity to observe here. Inonyé then proceeded northwest across the headland to Yong-dang opposite to Mok-pho. At about one-third of the way (Hu-tu 後頭) from the cove, he found a

from the divide at *Nām-ni-jyang*<sup>1)</sup>, and went along the south foot of *Ok-māi-san* to catch a glimpse of the southern entrance (Pl. VII. fig. 3) of the well-known *whirlpool* of *Myōng-yang-jin*<sup>2)</sup>. The channel between this (*San-chi-uōn*<sup>3)</sup>) and that (*Pyōk-pha-chyōng*) side of the Island of *Chin-do* is only  $1\frac{1}{2}$  km wide, popularly called the *Narrows of Pyōk-pha-chyōng*<sup>4)</sup>. The water was at the time running southeastwards like a rapid stream. The rock is the same brecciated felsophyre.

The above-mentioned *Ok-māi-san*<sup>5)</sup> stands close by the shore, and is composed of a thick, whitish clayey rock which is extensively quarried and carved into fine cigarette-boxes. In *Seoul* we find them abundantly in the shops side by side with the still finer, blue or yellow *ok-tol*<sup>6)</sup> boxes and utensils from *Yan-chhyŏn* in *Ham-gyōng-Do*. This unctuous white claystone of moderate compactness is seen under the microscope to consist of a pure amorphous and isotropic powder of clayey matter locally impregnated with beautiful hematite granules whose presence causes the carmine-red patches in the rock<sup>7)</sup>.

I attribute the formation of this thick white clay to a local sedimentation of decomposed felsophyric substance shortly after the eruption of the effusive, and the post-volcanic action upon

brownish-red felsophyre of the aspect and texture of schalstein, overlying the typical quartz-singtauite; the latter is developed all the way as far as Tok-nai-jyang. From Sŏ-chang westwards, the same red felsophyre with overlying, fine, parallel-planned tuffite and shale (N. 70°E., dip. S.E.) were seen as far as the ferry and even Mok-pho.

1) 南里場 2) 鳴洋津 3) 三枝院 4) 碧波亭 5) 玉埋山

6) The so-called Korean jade.

7) The stone quarried here is, therefore, called *hoa-ban-sŏk* or the dappled pink stone. A chemical analysis of it has not yet been attempted; but the experiment made on its refractory property gave the following result:

No. 1. ....	Above No. 30 of the Seger normal cone
No. 2. ....	" "
No. 3. ....	" "
No. 4. ....	" "



it generated the hematite now accumulated in patches. The present rock resembles, petrologically as well as geologically, the *mitsu-ishi* stone of Bizen province Japan, where the rock is now being extensively quarried making good refractory bricks and slate pencils. The *ok-măi* stone may be advantageously employed for the same purposes, and commercially it promises to be very valuable.

Retracing our snowy path for a short distance and then proceeding north-west, we passed a stone-gate supporting a guard tower, at the low and narrow haulover (Pl. VIII. *fig.* 1) of *Uön-mun*<sup>1)</sup>, which protected the Naval station of *U-su-yöng*<sup>2)</sup>. Here the people were working the *ok-măi* stone. In the vicinity of the place last-named, the same ash-gray brecciated felsophyre reappears with green flecks, this time with abundant bipyramids and corroded crystals of quartz which project like needle-heads on the wave-beaten surface at the water's edge, thus presenting a craggy appearance.

*U-su-yöng* (Pl. VIII. *fig.* 2) is the western entrance of the far-famed whirlpool already mentioned. It was the Naval base of the Korean Admiral I-SUN-SIN<sup>3)</sup> of well-deserved fame, who annihilated our armada during the war of 1592-1598 by luring our armed junks into the fatal whirlpool (Pl. VIII. *fig.* 3). I actually photographed an ancient anchor which for three centuries had lain

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No. 5. ....	Above No. 20 of the Seger normal cone.
No. 6. ....	Above No. 30 ..
No. 7. ....	" ..
No. 8. ....	Above No. 21 ..
No. 9. ....	Above No. 29 ..
No. 10. ....	Above No. 30 ..
No. 11. ....	" ..
No. 12. ....	Above No. 25 ..

1) 穢門 2) 右水營 3) 李舜臣

half-buried in the sand (Pl. IX, *fig.* 1) at the whirlpool's edge. It is to be seen there no more, however, owing perhaps to the Koreans' fear that I might come again and steal away the historic relic which they for ages had boasted of. I now repent of having misused my kodak before the envious eyes of the Koreans. It is my private opinion that the one cause of the failure of the ambitious TAIKÔ in his fruitless attempt to subjugate China was the total crushing of his Navy by I-SUX-SIX, not to speak of his untimely death.

## WHIRLPOOL

As to the whirlpool itself, it has full claim to rank with that of Euripus in Greece, and with the Naruto whirlpool near Kobé. As to the world-famed eddy of Negropont, some assign its action to the phenomenon of seiches in the arm of sea. Of Naruto or the roaring channel, I have heard nothing as to its cause<sup>1)</sup> excepting the common explanation, which is that the eddy is generated by the influx and efflux of the strong tidal current. The *Myöng-yang-jin* whirlpool is located between the channels of *Mäl-gil*<sup>2)</sup> and *Chyöng-deung*<sup>3)</sup>, and is well suited to the generation of an eddy on account of its special topography, having three narrows and three v-shaped indentations. At the time of my visit to the *Myöng-yang* ferry, the current was the up-current or that from the north-west which was sweeping the south (*Chin-do*) side, and by the reflex motion within the widened sack (Pl. IX.

2) 馬路灣 3) 丁隘灣

1) Lately some light has been thrown on the question as to the cause of the whirlpool of Naruto. The narrow channel of Naruto is famous for its rapid current and eddies accompanying it. That channel separates the Inland Sea or *Seto-uchi* from the Pacific by a narrow passage of water about 1.1 km wide. The phase of tide in the inland sea is just opposite to that of the Pacific, so that when the latter is at high water, the former is at the low water, and vice versa; accordingly, in the channel a difference of level of from 1 to 1.5 m is produced. Consequently a torrent of sea-water rushes from the ocean into the sea or in the contrary direction according to the tidal phase. When the current attains its maximum velocity, it exceeds 10 knots per hour. The current is always accompanied with a roaring sound, and eddies are usually

*fig. 2*) the back current was brushing along the northern margin. As the bottom was shallow and the ferry narrow (1 *km*), the agitated water was rushing over the rough bottom of volcanics at the rate of 7 knots an hour, surging like rapids and roaring like a storm; hence the name *Myöng-yang* or roaring sea.

*Chin-do.*<sup>b</sup>—As to the geology of the island of *Chin-do*, I have CHIN-DO no data upon which to base any conjectures. Its northern portion at least seems to be built up of the same rock as that of the opposite shore near *Usu-yöng*; but the greater portion of the incised island is, according to Mr. F. KOBAYASHI, composed of brownish-red felsophyre which affords good soil for the growth of cotton for which the climate also is favorable. While sailing along the coast, I saw at a distance at the southern extremity of the headland of *Tai-dun* a gneissic (?) rock striking north-south with a westerly dip. On the opposite point of

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formed behind the stream [which runs over a submarine ridge that traverses the narrows from Shikoku to the island of Awaji]. These eddies exceed 6 *m* in diameter and have a funnel-shaped surface. If a boat be drawn into them, it is difficult for it to get out.

Comparing the phases of the tide just within and outside the channel, we observe that they are nearly opposite to each other, a fact which at first sight appears paradoxical. The sea-level of this part of the Seto-uchi is principally determined by the tide from the *west*. The tidal wave of the Pacific enters the sea through the Bungo channel at the west end of the island of Shikoku, and proceeds eastwards towards the region under consideration, so that it requires about 5 hours to travel the entire distance. Consequently the phase inside and outside the channel of Naruto differs by about 6 hours, as actually observed, thereby producing the difference of level of 1 to 1.5 *m*, as already stated. This is the cause of the eddying of Naruto.

When the current was rushing from the Pacific into the sea, an interesting phenomenon was observed. As the current increased in velocity, a regular undulation of about 2.5 *m* became gradually conspicuous and attained a maximum amplitude of about 18 *cm*, and then gradually decreased with the diminishing velocity of the current. The torrent of water rushing from the Pacific into the channel excites a standing oscillation [due probably in part to the submarine elevation which crosses Naruto and obstructs the current in its course] of water in the neighborhood of the channel, just as a jet of air blown into the mouth of an organ-pipe causes a standing oscillation of the air column in the pipe. 'Secondary Undulations of Oceanic Tides' by Messrs. Honda, Terada, Yoshida, and Ishitani. *This Journal*, Vol. XXV, p. 37, 1908.

i) 珍島

the bay of *Mäl-gil* (Washington Bay) at the southern extremity of *Chin-do*, I saw a grayish-looking gneiss striking now N.N.W.—S.S.E. with the dip S.W. One peculiar feature to the eye of geologists is the direction (N.N.W.—S.S.E.) of the channel that separates the island from the mainland, and another is that the island is deeply indented in the same direction. This point must have some deep tectonic significance if we take into account the change of the strike of the rocks. *Chin-do* is the out-post of the south-west corner of the Korean peninsula, which divides the dirty waters of the Yellow Sea from the blue Tung-häi.

Usc-yöng

From the old naval station *U-su-yöng*, we advanced directly northwards on a red soil of decomposed felsophyre, which changed about 6 km further on to the green variety at the low and narrow neck of land. Here appear green and white banded rocks of porphyrite and its derivatives overlying felsophyre-breccia, striking eastwest and dipping southwards. The features of the landscape now entirely change, the peaks becoming rather high and trending east-west, and at the eastern foot I looked down on a large group of mud hovels on the shore, called *Mok-chhang*<sup>1)</sup>. After climbing over a few hill-necks of green tuff and a massive bed of porphyrite, we finally came to a brink of shallow water at the north extremity of the headland of *U-su-yöng*, near the islet *Morai-söm*<sup>2)</sup> which is connected with the land at low tide. The rock is a green sheet of augite-porphyrte<sup>3)</sup> (the strike N.W.—S.E., the dip N.E.).

1) 牧倉 (花源) or Hoa-nön    2) 沙島

3) Green aphanitic rock which, when examined under the microscope, is seen to be an aggregate of lath-shaped crystals of plagioclase arranged approximately parallel to one another. They are simple-twinned, and elongated on the a-axis with a negative character in the direction of the principal zone. The ferro-magnesian mineral is all chloritized, and the same chloritic substance together with yellow epidote fills up the interstices of the feldspar. The rock effervesces with acids. It is probably *augite-porphyrte*. The effusive alternates with a grayish compact marl.

After a boat-ride of 8 *km* between islets of the same porphyrite, which everywhere dotted the shallow water, I at last landed at the open port of *Mok-pho* (Pl. IX. *fig.* 3) on February 16th, 1901, thus ending my first traverse of the Korean peninsula.

*Notes on the Geology of the Tract between Mok-pho and  
Sun-chhyang via Nam-py yöng, Tong-pok, and Ok-koa*

Supplementary to the diary of my first traverse, I here put on record observations made by Messrs. K. IXOUYÉ and N. YABÉ, who, independently of my journey, and at a later time, went through the region lying between my first and second traverses, and who have been so kind as to let me look through their specimens of rocks and road-sketches.

Proceeding from *Mok-pho* along the north margin of the cove of the same name on the hilly terrane of red orthoclase-porphyrity for 20 *km*, Mr. IXOUYÉ found a greenish quartz-bearing porphyrite at the last point<sup>1)</sup> with phenocrysts of plagioclase besides rounded quartz fringed with needles of augite after the manner of quartz in quartz-basalt, the origin of which has been much discussed of late by petrologists. The groundmass consists of feldspar-microlites in fluidal arrangement, and the interstices of the microlites are filled with chloritic matter which gives to the rock a greenish tinge.

At the mouth of the *Yöng-san-gang* river, a remarkable

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1) Song-san (松山).

nevaditic, rapakiwi-like crystal-porphyr is found, composed of feldspar and quartz with an interstitial groundmass of microgranitic aggregate, besides bluish-green needles of hornblende and brown crystals of titanite. Some of the idiomorphic white plagioclase crystals (1-2½ *cm*) are inclosed in shells<sup>1)</sup> of flesh-colored orthoclase (the reverse of the Finnish rapakiwi), and the quartz (1 *cm*) is round, sometimes bipyramidal:—these two components make up the greater part of the bulk. The rock is a variety of quartz-masanite, and like the Finnish rapakiwi I assume it to be a species of granite-porphyr of which the oft-mentioned masanites are the representatives in Korea. Like its Finnish relative it may be used for decorative purposes: but the feldspar and quartz easily weather off, leaving hollows behind them, thus preventing its extensive employment.

This remarkable quartz-masanite extends as far as *Yöng-san-pho* near *Na-jju*, the limit of junk-navigation in the *Yöng-san-gang* river, where appears a greenish porphyrite with plagioclase-phenocrysts. It has a microfelsitic groundmass, sometimes with flüidal structure. Biotite is seen in the groundmass. It is of a unique type and probably represents the marginal facies of the preceding rock.

Claystone-porphyr is found not far from the locality where the preceding rock is found much decomposed.

1) A cleavage-piece, which is split off from the common face (001) of the feldspar-phenocryst, shows straight extinction in the laterally attached flesh-colored, simple *orthoclase*, while it extinguishes light at about  $\pm 1^\circ$  in the polysynthetically-twinned, white central portion. The latter may be oligoclase, albite-oligoclase or andesine, though it could not be decided to which variety it really belongs from the examination of the basal section alone. The face of basal cleavage of the central portion exhibits macroscopically the fine striations which are characteristic of a plagioclase.

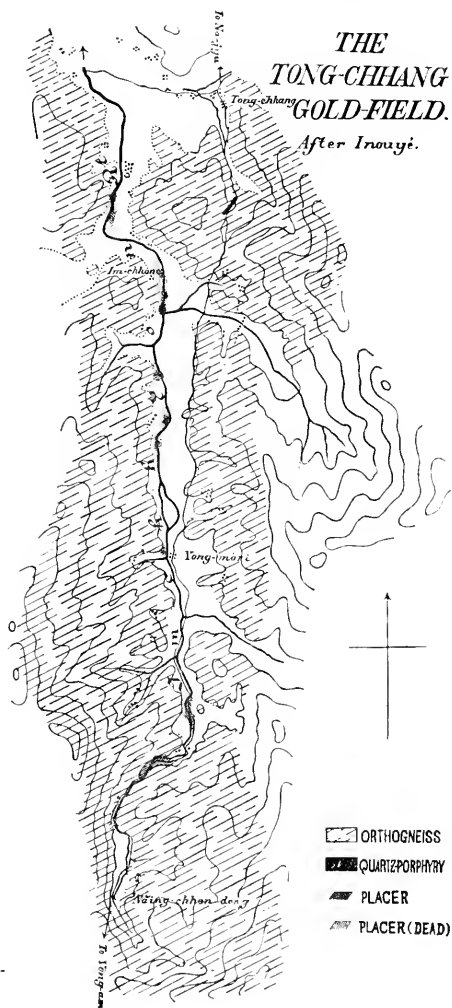
As the shell of the orthoclase can be easily detached from the rest, a section is made parallel to (010) of the white, central portion, and it shows under the microscope the extinction of  $+15^\circ 20'$  with reference to the edge P/M towards an obtuse angle, thus proving the nature of the central part to be that of *albite-oligoclase* with the composition of **Ab<sub>91</sub> An<sub>9</sub>**.

Mr. INOUÉ, then, took a turn south to *Yöng-am*, located at the foot of the well-known *Uöl-chhyul-san*<sup>1)</sup> ("Rising Moon Mountain," 775 m), in the recesses of which are found many Buddhist monasteries. The mountain is rugged, being built up of masanite, with nearly equatorial trend.

The first half of the way lies on a hilly terrane of *compressed granite* as far as the gold placer locality of *Tong-chhang*<sup>2)</sup>. On the south on the water-shed is found a normal paragneiss of true sedimentary origin with a fine-sandy appearance and a light-yellow color. It is the **TAKANUKI GNEISS** — a biotite-gneiss — of Japan and is the *oldest sediment in Korea*. It occurs in an elliptic patch

1) 月出山

2) 東倉 Tong-chhang lies about midway on the meridional road between Na-jyn and Yöng-am already mentioned (p. 54), and is 14 km distant from the latter. The auriferous region is a flat, meridional valley, in which a stream (lu-chhyön 林川) flows northwards towards the Yöng-san-gang. The placer is 8 km long in the river-bed, and at present from two to three hundred men are leisurely working the fluvial sand, but its total out-put is unknown, or rather kept secret for the interest of the undertaking. The washing, on either side of the stream, is confined to a strip some sixty feet wide, measured from the river bank; but it would probably pay if it were extended still further into the adjoining paddy fields. The auriferous bed is 10 to 20 feet thick, and the basal gravel bed,  $\frac{1}{2}$  to  $1\frac{1}{2}$  feet thick, is, as usual, rich in gold and the grains being rather large. Inoué: *Loc. cit.*



with the strike N. 25 E., and the dip N.W. South of the Archaean terrane is the masanite region of *Yöng-am*, already referred to.

NAM-PHYÖNG  
TO  
TONG-POK

From *Nam-pHYÖng* to *Hoa-sun*, we find at first felsophyre and its breccia which occupy a large area, extending as far as *Neung-jyu*<sup>1)</sup>, the rocks being light-green or brownish-red according to the stage of decomposition. Massive greenish porphyrite comes next, near *Hoa-sun*, where felsophyre reappears from below.

From here Messrs. YABÉ and INOUYÉ went sixteen kilometers to *Tong-pok*, finding at about one fourth of the distance (4 km) a schistose biotite-granite in which the eyes of feldspar are scarcely discernible. It is then replaced by a *wonderful complex* of highly altered rocks with the appearance of phyllite, sandstone, schalstein, and the like, which the microscope shows to be metamorphosed and crushed eruptives and sedimentaries.

i. One rock is a flagstone of fine-sandy appearance. It is composed of banded spherulite rocks, such as are frequently associated in the effusive form of liparite and quartz-porphyry.

ii. Another rock looks like a flaxseed iron ore—a kind of red hematite with granulated surface. The granules appear under the microscope to be fragments of quartz cemented by fine crystalline particles which are mixed up with lamellæ of muscovite and dust of red hematite. It is an altered ferruginous tuff.

iii. The third is a grayish, highly lamellar muscovite-schist with enclosed quartz grains which cause the wavy surface of its cleavage-plane. To my great astonishment, the grains under the microscope turned out to be the so-called porphyry-quartz with

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1) See footnote 3, p. 50.



corroded edges and embayments, which fact unequivocally proves the igneous origin of this mica-schist<sup>1)</sup>. The main mass consists of finely pulverized and polarizing particles mixed with membranes of sericitic mica produced by the shearing motion of the earth's crust, around the porphyritic quartz which itself did not escape a partial shattering by the general deformative action.

iv. The fourth is a crushed carbonaceous slab-stone in which are imbedded bluish vitreous dots of quartz. The crushed quartz fragments show pronounced undulatory extinction. Feldspars are drawn out and changed into aggregates of muscovite. The general mass is exactly the same as a section of common slate. It is no doubt of elastic origin.

v. The basal rock of the graphitoid bed is a blackish grit which, when examined under high powers, appears to consist of highly cataclastic quartz grains cemented with crushed products besides muscovite and graphitic particles; and the whole is variously traversed and healed by newly crystallized quartz and sericite. A few tourmaline grains are found. In the present deformed state, it is impossible to say whether the rock was originally igneous or sedimentary.

vi. A graphitoid bed<sup>2)</sup> of considerable thickness occurs

1) Salomon has lately discussed the origin of sericite-schist attributing it to the mylonitization of a quartz-porphry. He gives the analyses of both rocks and finds that the former is poor in soda and other alkalies, while on the other hand it is "saturated with alumina" showing that orthoclase is still largely represented in the sericite-schist. "Die Entstehung der Sericitschiefer in der Val Camonica (Lombardei)". *Bericht ueber die XXX. Versammlung des Oeerrheinischen geologischen Vereins zu Lindau, 1907.*

2) The present graphitoid is, mineralogically speaking, a variety standing midway between graphite and anthracite. The bed or seam of it is 30 feet strong, though the main bulk is built up of various siliceous admixtures. The foot-wall of the seam is composed of a fine sandstone, while its hanging wall is of clay-slate. According to Inoué (*loc. cit.*), the complex strikes N. 70° W. with the dip N.E. 70°. A chemical analysis made of the graphitoid gave the following result:—

Water.	Volatile Matter.	Coke.	Ash.	S.	Sp. Gr.
9.78	8.29	58.02	24.91	0.38	1.95

The color of the ash is yellowish-white. The graphitoid is brittle and non-caking.

associated with the preceding at *Kui-am*<sup>1)</sup>.

The series of which the above-mentioned rocks form the constituents, dips southeast, and makes up the terrane as far as *Tong-pok*. It is capped by green porphyrite and forms a hill which overlooks the *eumnäi* from the northwest.

The sudden appearance of this geologically interesting but stratigraphically doubtful complex in the heart of *Chyöl-la-Do* is foreign to my experience in Korea. As is clear from the brief description given, the rocks are very much crushed and deformed, owing to the intense shearing during the mountain-building of the CHIRI-SAN SPHENOID. They, therefore, bear the old aspect of crystalline and semi-crystalline schists. Originally, they were partly spherulitic, partly tuff-porphyröidic, partly sandy elastic rocks; and in the present state of my knowledge, I am rather disposed to include them in the *Metamorphic Mesozoic*. The complex greatly resembles the Taunus sericite-schist and gneiss of the Lower Rhine, and in another respect the "Bündner Schiefer"<sup>2)</sup> of eastern Switzerland.

METAMOR-  
PHIC  
MESOZOIC

An allusion has been already made to the same kind of rocks occurring at *Pong-näi-jyang*<sup>2)</sup>. Therefore, I may be justified in extending the area of this complex southwards toward *Po-söng*, and also northwards toward *Ok-koa*, which I shall presently describe.

TONG-POK  
TO  
OK-KOA

YABÉ and INOUYÉ took the north-south route from *Tong-pok* to *Oka-koa*, as in their trip from *Ho-a-sun* to *Tong-pok*, though at a different season. For the first six kilometers, a sheared, coarse muscovite-granite made its appearance with plenty of

1) 龜岩

2) See footnote 5, page 49.

microcline. Then the pass of *Tok-chhi*<sup>1)</sup> was reached where a typical greenish *ottrelite*-phyllite and hematite-schist with ottrelite were seen intercalated with a coarse, crushed rock of quartzose nature and of light color which had as accessories tourmaline and a violet-brown, highly refractive and double-refractive mineral (zircon?). It is probably the northern prolongation of the graphitoid bed of *Kui-am* already referred to. The same formation was constantly observed, sometimes covered with a conglomerate consisting of cobbles of grayish, crystalline limestone<sup>2)</sup>, as far as the next hill-pass (14 km from *Tong-pok*),—a watershed of the branches of the *Söm-jin-gang* river. From the said hill-pass to *Ok-koa* was seen a psammitic muscovite-schist which represents the northeastern extension of the belt of the same schist of *Kang-jin* and *Neung-jju*<sup>3)</sup>.

From *Ok-koa* to *Tari-möri* was seen a biotite-schist which had resulted from the granulation and compression of a granite rich in biotite, containing tourmaline as an accessory. Then a rather high, equatorial ridge was passed over to the eye-gneiss flat of *Sun-chhyang*<sup>4)</sup>. The ridge of this *Thong-myöng-san* is built up of the same psammitic muscovite-schist as that of *Ok-koa*, but how the two are connected tectonically I am not able to say. I shall touch *Sun-chhyang* again in my second traverse.

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1) 獨峙

2) A slide was made of it and examined with the hope of fixing the age of the complex, but not a trace of organic remains was discovered.

3) See *ante*, pp. 50 (footnote 3) and 55.

4) 淳昌 See page 76.

## CHAPTER II.

## THE SECOND TRAVERSE

(Plates IX.-XXV.)

The following descriptive section and diary begins at *Mok-pho* on the west coast, and covers a month's journey ending at Fusan.

The free port and Japanese settlement of *Mok-pho* is located at the southern extremity of a hilly headland which encloses the shallow bay into which the *Yöng-san-gang* river discharges its waters and their load. The main item of export is rice. The port is protected on the west by a labyrinth of islands called the *Na-jyu group*, which appear when seen from a distance like shark's teeth. Their geology is entirely unknown, but I presume it to be an orthogneiss representing the strike direction of *Yöng-goang*<sup>1)</sup>, *Mu-jyang*<sup>2)</sup>, and *Heung-dök*<sup>3)</sup>, where the same rock builds up the tiger-haunted mountainous tract.

MOK-PHO

As to *Mok-pho* itself, we find there a grayish, fine-banded, parallel-planed tuffite alternating with blackish bands of dirt bed and carbonized wood<sup>4)</sup>. These have the appearance of Tertiary rocks. They are overlaid and partly underlaid by breccia and a flow of masanite. A pointed hill, *Yu-dal-san*<sup>5)</sup>, on the eastern foot of which is located our Consulate (Pl. IX. *fig.* 3, and Pl. X. *fig.* 1), is built up of this *masanite*<sup>6)</sup> which looks at first sight like rhyolite for which it is often mistaken. It presents various

1) 靈光 2) 茂長 3) 興德 4) 儒達山 5) See *ante*, page 21.

6) This bed probably represents the pyroclastic series of the *Upper Kyöng-sang formation*, and geologically speaking, forms a part of *Morai-söm*. See *ante*, p. 62.

textures in different parts, some being brecciated, while one, the true flow, shows a fluidal texture. It is a coarse grayish rock containing a few crystals of biotite, flesh-colored plagioclase, and a large quantity of corroded grains and bipyramids of quartz. The round quartz shows the characteristic features common in quartz-porphiry. The groundmass consists of micro-granulocrystalline felsitic substance; but the porphyritic components are present in so large a quantity that the rock may properly be called a crystal-porphiry. The feldspar phenocrysts easily weather off leaving hollows presenting a rough rhyolitic aspect. The mass stands vertically and extends from the northwest to the southeast. This quartzporphiry-like rock contains microcline, or plagioclase in lieu of orthoclase; and I gave it the name *nevaditic masanite*, which I have repeatedly mentioned in the first traverse<sup>1)</sup>.

I started from *Mok-pho* on February 20th, 1901, when the snow was fast melting and the wheat was sprouting in the full vigor of spring. At about half the distance to *Mu-an*, *porphyritic masanite*, having the appearance of red feldspar-porphiry, was found at the head of a small inlet<sup>2)</sup>. It seems to be one of the preceding.

Near *Mu-an* our party rode along the boundary of two MU-AN formations. To the right we saw the flat-topped erosion-relief of *Kong-su-bong*<sup>3)</sup>, exposing, cliffs of a stratiform mass of red porphiry, in which quartz and reddish feldspar are visible macroscopically in the spherulitic and glassy groundmass with handsome fluidal structure. The higher portion is capped with red claystone-

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1) See page 21.

2) Tang-chhi (堂峙) in Sön-deung-ni (宣靈里).

3) 公水峰 Pl. X, fig. 3.

porphyry which has crystals but they are those of feldspar. The quartz is present in one and absent in the other, and its occurrence is not constant, as the quartz is often corroded and resorbed in this class of porphyries during their consolidation.

On the left we met with a graphite-schist, now decomposed into red earthy, thinly-split shingles, striking N. 45° E. with the dip S.W. The phyllite, having the uplifted ridge on the northwest side, runs in the direction of the strike forming a headland beyond the inlet along whose eastern shore we were passing. A microscopic slide reveals the fact that this phyllite is of the same kind as that of *Tong-pok*<sup>1)</sup>, and is probably of the same age (the *Metamorphic Mesozoic*). The slide shows a rounded quartz, which has pronounced undulatory extinction, being enveloped radially with phyllitic lamellæ; and the muscovitized crystals of feldspar are still seen within the phyllitic membranes. In short, it presents the appearance of an extremely deformed porphyritic igneous rock.

We next proceeded northeast from the forlorn *eumnai* of *Mu-an*<sup>2)</sup>, encircled as usual with a stone-wall built up of typical specimens of the purplish claystone-porphyry and porphyritic masamite. A denuded hilly flat (Pl. X. *fig.* 2) was then passed, and we plunged into an Alluvium tract of paddy fields (Pl. X. *fig.* 3.) 4 km wide, draining from the northwest (*Ham-phyöng*) into the *Yöng-san-gang* river. We then crossed the low *Ul-chin-chhi* pass to *Komang-gol*<sup>3)</sup>. The rocks of the pass are [alternations of red claystone-porphyry, greenish-brown variegated breccia with corroded quartz, and grayish sandy tuffite, having the strike N.N.W.

1) See *adv.* pages 66 (iii) and 68.

2) For a description of the route from Mu-an to Chyöng-eup via Chyang-söng, see the heading "Spatulate Mesozoic area" in Chyöl-la-Do in Chapter III. "The Second Traverse."

3) 古 蔡 洞

to S.S.E. with the dip N.E. The hill-ridge whose lowest neck we had just passed over runs in the same direction, separating on the west the small flat we had crossed from the eastern one we had still to go through. The geological formation was the same as that which we had seen from *Hai-nam* to *Mok-pho* throughout the headland of *U-su-yöng* (pp. 57-63); hence, it is the Upper *Kyöng-sang* formation.

It is worthy of note that we here met with a *new tectonic element*,—the strike direction from the northwest to the southeast—running at right-angles to the prevailing direction in *Chyöl-la-Do*. The same element had already been observed in the headland of *U-su-yöng* and in the Island of *Chin-do*<sup>1)</sup>

From *Komang-gol* we proceeded eastwards on denuded reddish hills of the same complex, viewing toward the northwest the mountains of the *No-ryöng system* with the N.E.—S.W. trend. Our route lay on a desolate monotonous tract of Diluvium-like<sup>2)</sup> elevation thinly covered with dwarf pine trees.

Finally, we crossed a small tributary of the *Yöng-san-gang* river at *Chho-dong*<sup>3)</sup>, full of gravel (Pl. XI. *fig.* 1) of claystone-porphry, greenish porphyrite, and their derivatives. The view opens towards the south, and in the distance the snow-covered *Uöl-chhyul-san*<sup>4)</sup> of *Yöng-am* was seen towering beyond the *Yöng-san-gang* and having an east-west trend and a northern precipice.

Proceeding towards *Na-jju*, we next crossed a low mountain-ridge, 4 km in breadth, consisting of felsophyres, one silicified and reddish, the other decomposed and greenish. During our descent

1) See page 62.

2) Diluvium is rarely met with in Korea.

3) 草洞 4) See *ante*, page 65.

to the *cummāi*, crushed *biotite-granite* was seen *cropping out from underneath* the felsophyre into which it intrudes.

From here towards the east the view (Pl. XI. *fig.* 3) is open, and we looked down the fertile expanse of *Na-jyu*, 18 *km* wide, skirted on the east by the precipitous porphyrite mountain, *Mu-teung-san*<sup>1)</sup> of *Koang-jyu* with foothills of granite, stretching in a meridional direction.

NA-JYU      The *cummāi* (30 *m*) of *Na-jyu* is of superior rank as compared with other *cummāis*, being in the shape of a square surrounded by a stone-wall of massive granite blocks solidly cemented together. The official buildings are comparatively large, but leer. Much of the space within the wall is left unoccupied. The people are dispirited and silent. The whole air is that of a place empty and vacant in consequence of sufferings from the *Tong-ak* rebellion that happened just before the Sino-Japanese war. The neighborhood is said to be the residence of nobles (*yang-ban*) belonging to the IM-GA<sup>2)</sup> family.

Thence our path led across paddy fields for 4 *km* from *Na-jyu* in a northeasterly direction, and then on eroded red hills of coarse granitic masanite, which under the microscope shows distinct traces of having been subjected to great stress. We finally descended to a narrow Alluvial flat and took the ferry over the *Yöng-sang-gang* river to *Sö-chhang*<sup>3)</sup>. Thence onwards to the last hill-pass to *Koang-jyu*, we found greenish porphyrites of flinty, tufaceous, and massive textures, the last two often alternating, and with an easterly dip. All the rocks irrespective of textures weather into red earth. At the last hill-pass<sup>4)</sup>, *biotite-granite* is found *intrusive*

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1) 無等山      2) 林氏  
3) 西倉      4) 老人峠



in the porphyrite-tuff, from which fact we can estimate the young age of the granite.

### Koang-jyu <sup>1)</sup>

*Koang-jyu* (60 m), the magisterial town of *South Chyöl-la-Do*, is located in the basal granitic hollow and on the talus slope of the overlying porphyrite-sheet of *Mu-teung-san* already mentioned (Pl. XI. *fig.* 3). On the north and south, the town is closed in by offshoots of the green effusive <sup>2)</sup> of *Mu-teung-san* which overhangs the *cumnäi* on the east (Pl. XII. *fig.* 2), and sends streams trickling down to the low open valley of the *Yöng-san-gang* river (Pl. XII. *fig.* 1).

From the *cumnäi* we took the northern route to *Tam-yang* <sup>3)</sup>, KOANG-JYU and on the way we crossed two east-west hill necks of biotite-granite capped with green porphyrite. After walking 10 km, we reached the small flat of granitic sand of *Steui-tari* <sup>4)</sup> when the road divides, one branch leading eastwards along a dry valley to *Nam-phyöng* where the sheet of porphyrite of *Mu-teung-san* seems to come to an end. We, however, rode straight-forwards towards the north on the granite terrane which was soon replaced by small whitish eye-gneiss. The latter continues to

1) 光州—全羅南道監察使所在地

2) This rock is greenish and aphyritic with black spots. Under the microscope it is seen to consist of lath-shaped plagioclase elongated along the a-axis and simply twinned after the albite law, and of short prismatic, light-green diopsidic augite with tolerably high interference-colors and twin structure. The augite shows one axial pole on the base. It alters, as enstatite does, into a greenish fibrous substance. Chloritic substance fills up the interstices of the feldspars and causes the rock to appear macroscopically green. Clumps of ilmenite are abundant altering into leucoxene. The rock is *augite-porphyrile*.

3) 潭陽

4) 芥橋

appear as far as *Tam-yang* which is located on the whitish compact masanite whose fine porphyritic components are biotite, quartz, and epidotized feldspars. *Tam-yang* (90 m) is at the north head (Pl. XII. *fig.* 1) of the *Na-jyu* plain, skirted by a sharp ridge with the south-west trend of the *Upper Kyöng-sang formation*.

TAM-YANG From the *cummäi* of *Tam-yang* we turned eastwards along the boundary line of the eye-gneiss and the compact masanite<sup>1)</sup>, the latter capping the gneiss with a northwesterly dip. We gradually ascended the flat-topped hill of *Pang-chhyuk-chhi* (140 m)<sup>2)</sup>, viewing on the east the isolated rocky point of *Ami-san* which is built up of fine eye-gneiss. This flat-topped elevation is the water-parting that divides the waters of the Yellow Sea from those of the South Sea.

SUN-CHHYANG We then descended and followed a river in the eye-gneiss terrane down to *Sun-chhyang* where our route joined that of Messrs. YABÉ and IXOUYÉ<sup>3)</sup>. The *cummäi* lies in a denudation-hollow in granitic rock, which, like many other Korean basins, was formed by simple erosion and beveling. The environs present the bare "bad lands" scenery. To the north one sees a group of isolated tops, like *Ami-san* already mentioned, of eye-gneiss, which borders on the diagonally-running ridge of the porphyritic hinterland of the *No-ryöng system*. To the south lies the wall-like ridge of muscovite-schist<sup>4)</sup> of *Ok-koa* beyond hillocks of eye-gneiss.

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1) This white eruptive forms the hill surrounding the well-known ancient castle of *Chhyu-uöl-san* (秋月山).

2) 防築峠

3) See page 69. 4) See *ante*, page 69.

We now took the route to *Nam-uön* passing over hills of gneissoid granite of white porphyritic structure, fast falling into debris and decomposing into bare red earth, and after two hours we were at the ferry of *Chyök-söng-jin* (115 m).

The cliff (Pl. XII. fig. 3) on the other side readily attracts the attention of a geologist, for it rarely happens that one sees to full advantage the back of a schistose plane of coarse lamellar biotite-orthogneiss in its horizontal, regular extension. The road led through a gully of this rock where we had an exceptionally good opportunity to observe the various stages of schistosity and the contact with the overlying muscovite-schist. The underlying rock is an intensely mylonitized orthogneiss rich in biotite, and is of the habit of the one found at the *Kammachhi* in my first traverse<sup>1)</sup>. The complex has variable directions of stretching; but generally speaking, it is N. 20 E., and dips 50° S.E. The ridge runs in the same direction soon ending on the south at about 2 km distance; northwards also it extends only 4 km, gradually becoming lower as one proceeds.

The orthogneiss is conformably overlaid by the psammitic muscovite-schist of the *Kang-jin* type, together with black and green phyllites. It was of great interest to me to observe the contact. The parallel-planed muscovite-schist, which was originally fine sand, is impregnated and veined with granitic material at the plane of junction, indicative of the igneous origin and later age of the orthogneiss. The complex of the gneiss and schist belongs to the same geological unit as those of *Kang-jin*<sup>2)</sup>, *Ok-koa*<sup>3)</sup>, and *Neung-jyu*<sup>4)</sup>. If the patches be connected on a

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1) See page 51, footnote 6.

2) See page 54.

3) See page 69, the *Thong-myöng-san* rock.

4) See footnote 3, page 50.

geologic map, they will unequivocally mark out the western margin of the Chiri-san sphenoid.

Proceeding eastwards we saw a gold placer being worked in gravel of muscovite-schist, and the rock was soon replaced by *crushed porphyritic* biotite-granite which is clearly visible on the ascent to the *Pi-hong-chhi*<sup>1)</sup> pass (215 m). Since leaving *Mok-pho*, this was the first ridge passed that deserved the name. It distinctly delineates the westernmost range of the Chiri-san sphenoid, and runs parallel to the belt of the muscovite-schist already cited; it can be geologically traced from the *Kammam-chhi* mentioned in the first traverse<sup>2)</sup>. After the descent on the other side we had further to climb up and down three low undulating hills of *sheared* granite, sometimes intruded by dykes of grayish bostonite with chloritized biotite, which is fast dis-aggregating and weathering into reddish sandy earth. Finally, we went over from *Sai-sul-mak*<sup>3)</sup> along the forested foot of the old castle *Kyo-ryong-san*<sup>4)</sup> to *Nam-uön*.

## NAM-UÖN

*Nam-uön* is an important *cumnäi* located in the centre of an intermontane in-filled basin, only 50 m above sea-level (Pl. XIII. fig. 3). It is on the high road of *Chyöl-la-Do*, which starts from *Suw-chyön* on the south coast, being located at the cross-road leading west and east via *Un-bong*<sup>5)</sup>. It was a not unimportant inland post for Japanese landing either at *Suw-chyön*<sup>6)</sup>, or at the mouth of the *Söm-jin-gang*<sup>7)</sup> on their way to the now forlorn capital of the defunct kingdom of *Päik-chyöi*, on the plain of *Kun-san*. Its destruction in 1597, during TAIKO's expedition, left an indelible resentment in the hearts of the people.

The basin is enclosed by mountains, opening only towards

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1) 飛鴻峙 2) See *ante*, page 51. 3) 新酒店 4) 蛟龍山 5) 雲峰  
6) See *ante*, page 46. 7) See *ante*, page 41.

the southwest to *Kok-söng*, in which direction a stream of clear water drains down a wide and shallow sandy bed. Korean mountains are, generally speaking, not very high; but they are so sharply delineated and characterized by such regularity of trend that travellers receive a strong impression of their great altitude. We had a good example here. To the west, we saw the ridge *Pi-hong-chhi*<sup>1)</sup> which we had crossed the day before (Pl. XIII. *fig.* 2). To the south, the barrier-like (Pl. XIII. *fig.* 1) South *Pam-chhi* (Chestnut-tree pass, 200 *m*) with its regular ridge and trend separated us from the flat of *Ku-ryöi*, already mentioned<sup>2)</sup>. It runs N. 70°E. to *San-chhyöng*, obliquely cutting down the CHIRI-SAN MASSIVE. It is the most pronounced of the topographic elements of the equatorial HAN-SAN system. To the north is the hilly land of *No-ryöng*, and on the east side is the INNER CHIRI-SAN RIDGE which I had presently to cross.

From the *cumnäi* to the *Yö-uön-chhi*<sup>3)</sup> (435 *m*), the road follows a stream of clear water with a bed of arkose gravel up to the pass where the rock is a slightly compressed biotite-granite (Pl. XIV. *fig.* 1). The slope is thinly covered with pine forest on a clean, half-decomposed granitic ground (see *fig.* 1). The scenery is fine from the Korean point of view. One finds on the natural rock-surface by the road side two inscriptions which General LIU<sup>4)</sup>, the Commander-in-Chief of the Chinese army, had engraved in ostentatious commemoration of his passing here, in 1593 and 1594, on his way to drive away TAIKO's army from the peninsula in which, of course, he did not succeed. The custom of engraving large Chinese characters on natural exposures is still in vogue in Korea, and one finds many such

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1) See page 78.    2) See page 44.    3) 征倭都督劉綎    4) 女院峙

inscriptions in *Keum-gang-san*<sup>1)</sup> or the "Diamond Mountains."

The rather coarse granite (with epidote) on the top of the *Yö-uön-chhi* was slightly sheared in the direction of N. 20° E. towards the *Yuk-sim-nyöng* pass<sup>2)</sup>, which is visible from here towards the north and forms the prolongation of the ridge. The *Pi-hong-chi* ridge was seen running with regular trend on the western horizon (Pl. XIV. *fig.* 1). We were now on the rim of the high *Un-bong* flat (370 *m*), from which the axial ridge of the *Chiri-san* ridge was seen towards the east raising its submerged but regular crest (1239 *m*) with wall-like sharpness (Pl. XIV. *fig.* 2), and coming suddenly to an end towards the north-east in consequence of its having been cut down obliquely by the *Pam-chhi* fault. The channel of drainage of the flat and our road went through the wind-gap thus produced.

At the entrance of the said wind-gap, 4 *km* northeast of UN-BONG the *cumnäi* of *Un-bong*<sup>3)</sup>, is *Pi-djön*<sup>4)</sup>, literally the village of the temple of the stone monument. This was an unfortunate battle ground for the Japanese; for even the disorderly tumultuous Korean soldiers here had the good luck to win two victories over their superior opponents. There are three shrines (Pl. XIV. *fig.* 3) overshadowed by a group of *Celtis sinensis*. One contains an inscription commemorating the victory over the Japanese in 1594; it is engraved on the natural granite exposure half enclosed in the shrine. The second is a fine shrine with a tablet bearing an inscription commemorating the victory of General I-SÖNG-KYÖI<sup>5)</sup> in defeating an enterprising band of pirates from southern Japan. Afterwards this general rose in power, dethroned the last king of *Ko-ryöi* and became the first sovereign of the present

1) 金剛山 2) 六十嶺 3) 雲峯 4) 碑殿 (Pl. XV. *fig.* 1). 5) 李成桂

dynasty. The third shrine is the largest, but I could not make out the character of its contents.

Leaving this strategic point (Pl. XV. *fig.* 1) and the real entrance of *Chyöl-la-Do* from *Kyöng-sang-Do*, we passed through a narrow tract of gneissoid hornblende granite<sup>1)</sup>, schistose adamellite, porphyritic normal granite-gneiss, genuine orthogneiss, and the like,—various modifications of a granitic magma, with the schistose axis N. 80° E., corresponding to the direction of the *Pam-chhi* ridge. This direction was constantly observed all along the road and river-cliffs, intruded by numerous dykes of reddish aplite which closely follows the schistose direction as if it were interbanded muscovite-gneiss; only a few cross it transversely.

From *In-nöl* (Pl. XV. *fig.* 2), the road rises imperceptibly to the *Phal-hyöng-chhi*<sup>2)</sup>. This is 430 m high (see *fig.* 2), being nearly as high as *Yö-uön-chhi* already mentioned<sup>3)</sup>, and forms the eastern edge of the *Un-bong* flat and the rim of the axial ridge of the *Chiri-san* range. From the pass a panoramic view (Pl. XV. *fig.* 3) opens disclosing the low, dark conlisse ridges of *Kyöng-sang-Do* and the *Kyöng-sang* formation, in contrast to the highly sculptured and naked hilly granite land of *Ham-yang* directly below.

The slope of the *Phal-hyöng-chhi* is, as before stated, built up of granitic gneiss which, being tinged somewhat bluish, is traversed abundantly by aplite which also has become schistose.

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1) It may be pointed out as a special feature of this rock that the hornblende contains round grains of albite in poikilitic fashion, and the plagioclase encloses xenomorphic quartz whose contour is said to correspond to pinacoids and a dome. To me the rock seems to have consolidated under special circumstances between hypabyssal and plutonic conditions. B. Popoff, "Ueber Rapakiwi aus Süd-Russland." *Travaux de la Société Impériale des Naturalistes de St. Pétersbourg* vol. 1, 31.

2) 八兄峠      3) See *ante*, page 79.

sometimes changing into eye-gneiss. It is worth while to remark here that all the dykes run, and also are sheared N. 80° E. in the *Pam-chhi* direction.

HAM-YANG<sup>1)</sup>

We passed by the *eummäi* (Pl. XVI. *fig.* 1) of *Ham-yang*<sup>2)</sup> and followed a torrential stream down to *Sa-keum*<sup>3)</sup>, on the fine white eye-gneiss terrane, where it is joined by a tributary from the north. The *eummäi* of *An-eui*<sup>3)</sup> is only 11 km from here, and I shall touch the place in my next traverse. When at *Pi-djön* (March 11th, 1901) on the high plain (370 m) amid the snow-covered peaks of the *Chiri-san*, I met with frost and frozen streams; but at *Sa-keum* we found the warm spring mists. The contrast in climate between *Kjöng-sang-Do* and *Chyöl-la-Do* is very marked. *Sa-keum* is at the divide of the roads from *Chin-jyu* to *Nam-uön* on the one hand, and from *Chyön-jyu* via the *Yuk-sim-nyöng* pass on the other. From here we followed YABÉ's route as far as *San-chhyöng*, whence he went directly south to *Chin-jyu*<sup>4)</sup>.

The first rock met with is a brownish, fine-grained two-mica orthogneiss which under the microscope is seen to consist mainly of xenomorphic microcline and cataclastic quartz. The brownish colour is due to the slight decomposition of plagioclase which contains poikilitic grains of quartz. The schistose strike runs N. 60° E. The rock is replaced just before *Neul-bot-jyang*<sup>5)</sup> by a compact aplitic rock which is intruded by melanocrate dykes of a dioritic composition.

The aplitic leucocrate is a granitic-granular aggregate of plagioclase and quartz. A little orthoclase is also present. The micropegmatitic structure is wanting. The melanocrate is fine-

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1) 咸安 2) 沙斤 3) 安威 4) See footnote 5, page 35. 5) 於外場



granular consisting of hornblende, biotite, plagioclase, and titanite, with the habit of the components common in crystalline schists. Both are sheared in the direction N. 30 E. inclining southwards. They seem to me to be composite dykes of great magnitude.

Throughout the tract between *Nam-uön* and *Han-yang*, multifarious modifications of a granitic magma are all sheared in the direction N. 70 E., *i. e.*, in the *Pam-chhi* ridge direction conforming to the Han-san system which characterizes the dislocation of southern Korea. Taking into consideration firstly, the abundance of later intrusions in the form of dykes in the same orientation, especially on the stretch from *Sa-keun* to *San-chhyöng*, and secondly, the geographical situation of the dykes, corresponding to the cross section of the axis of the *Pam-chhi*,—we are convinced of the fact that the tectonic disturbance expressed in the dislodgement of the crust in the equatorial *Pam-chhi* orientation has a deep significance, obliquely cutting as it does the prevailing tectonic direction of *Chyöl-la-Do*. How far this deformation influenced the other parts of *Kyöng-sang-Do*, and in what age the disturbance occurred are all important questions which will be discussed in later pages.

THE HAN-SAN  
ORIENTATION

At the hill-neck between *Säing-nim-jyang*<sup>1)</sup> and *Chæü-gori*<sup>2)</sup>, we came suddenly upon a new rock, which resembles a coarse marble in its external appearance, structure, and colour. Macroscopically, some specimens show, however, faint indications of schistosity in the linear arrangement of the chloritized hornblende. Under the microscope, it was found to consist of a hypidiomorphic-granular aggregate of highly polysynthetic plagioclase. Hornblende and muscovite, both chloritized, are found in

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1) 生林場岱 2) 眠牛里

some specimens. The cataclastic structure, so universally observed in the rocks of the present region, is not present owing perhaps to the relieving of the strain in consequence of the development of twinning, just as marble behaves under similar circumstances. It was not possible for me to decide in my rapid journey whether the leucocrate occurs in the form of a dyke, or whether it represents a magmatic differentiation of a granitic rock, though the latter view seems to be the more plausible explanation. It is not labradorfels nor anorthosite as there are no such rocks as gabbros nor norites with which it could have been brought into connection. At present I simply call it **PLAGIOCLASITE**. The schistose direction is already N. 20 E. Its eluvial soil is grayish-blue and clayey, and the debris ash-colored.

SAN-CHHYÖNG

After covering five kilometers of bad rocky road on the plagioclase, we reached *San-chhyöng* (80 m)<sup>1)</sup>, located on an erosion-hill (Pl. XVI, fig. 2) of ortho-hornblende-gneiss<sup>2)</sup>.

Turning aside from the course of the rapid *Nam-gang*, we climbed eastwards up a talus slope of dark hornblende-gneiss to the pass of *Chhyöng-möri-chhi*<sup>3)</sup> (360 m) which is already on the light-colored normal orthogneiss. The sudden change of the hornblende to the biotite rock forces me to believe that the former is intrusive in the latter; but it is remarkable for the persistence of the hornblende rock which makes a **DISTINCT BELT** all along the eastern or inner margin of the Chiri-san sphenoid from here through *Tun-söng*<sup>4)</sup>, and the *Koang-tai-chhi*<sup>5)</sup> as far as the south coast, west of *Kön-gang*. It is an open field for investigation by future observers.

THE EASTERN  
BELT

1) 山 瀟 Scenic situation on the east bank of the Nam-gang. 2) See footnote 5, page 35.  
3) 尺 旨 峠 4) See footnote 5, page 35. 5) See footnote 3, page 38.

From the pass a view can be had of the inner *Chivi-san* on the southwest (Pl. XVI. *fig.* 3). We discovered at least two parallel ridges of the *Pam-chhi* type instead of a single ridge, all coming suddenly to an end at the west bank of the *Nam-gang*. To the east (Pl. XVII. *fig.* 1) we looked down upon the hilly<sup>1)</sup> lowland (70 m) of the *Nak-tong-gang* backed by high ridges of the green eruptive formation of *Kyöng-sang-Do* beyond the river.

The relief of the meridional *Nak-tong* lowland extending 60 km is coulisse-like (Pl. XVII. *fig.* 1); the uplifted edges of the sedimentary beds, running parallel to one another in the direction of the axis of the basin, are basseted westwards with model-like regularity (see figure 1). I have already touched upon the physiography of this basin in the first traverse<sup>2)</sup>.

The eastern side of the *Chhyöng-möri-chhi* is precipitous (Pl. XVII. *fig.* 2). The rock exposed is fine eye-gneiss dipping westwards contrary to our expectation. At the foot is a stream, the east bank of which, I was surprised to find, is a cliff composed of the *Nak-tong series* slowly slanting to the east.

CHYÖNG-  
MÖRI-CHHI  
PASS

From the place called *Chap-chhi*<sup>3)</sup> on the river-side we had to travel 10 km to *Sam-ga*<sup>4)</sup>, after crossing two low but steep hill bassets<sup>5)</sup> with an average height of 70 m (Pl. XVII. *fig.* 3). These consist of tabular, gray muscovite-sandstone intercalated with a few beds of green micaceous marl with an uneven sedimentation-plane (the strike N. 20 E., the dip S.E.).

After spending so many days on the granite terrane, it was a great relief to leave it and to greet again the heavy-colored *Kyöng-sang formation* with which I had become acquainted on my first traverse (pp. 11-37).

1) All the hills run meridionally. 2) See *ante*, page 33. 3) 鍾峙 4) 三嘉  
5) The Chyung-chii (中峙), and the Ko-dök-chhi (古德峙).

The hills on our way were now covered with grass and a few pines. Patches of rice-paddy were found between the hills, but no houses. It is a lonely tract (Pl. XVIII, *fig.* 1). Rocks weather into gray soil, sometimes tinged a deep violet, showing the presence of much iron in it. It is limy.

The complex gradually changes in petrographical character becoming sandy with massive beds in the higher horizon. We had already met with the same complex between *Chin-jiyu* and *Pong-gyôï* on the first traverse, where it forms the basal series of the Lower *Kyôny-sang* formation to which Mr. YABÉ<sup>1)</sup> gives the special name of the "Nak-tong Series" (Dogger-Malm), and we were here in the same belt.

SAM-GA The *cummâi* of *Sam-ga* (50 m) is a patch of in-filled sandy flat, looking up the wall-like precipitous ridge of the *Chhyöng-möri-chhi* on the west which we had passed in the forenoon, and screened on the east by the basset-edge of the complex of gray Marl and red Tuff sandstone of the Upper *Kyôny-sang* formation.

The *Tai-kok-chhi*<sup>2)</sup> ridge<sup>3)</sup> was reached after riding 8 km in a northeasterly direction on the zone of greenish marly sandstone and green marl which probably corresponds to the plant-bearing bed of *Nak-tong*. It exhibited varying angles of an easterly dip until we arrived at the top. While descending from it to *Söng-am*<sup>4)</sup>, a green porphyrite was observed associated with clayey rock, striking N. 20° E. and dipping 20 S.E. It is overlaid by a strong bed of conglomerate consisting of reddish sandy matrix and the gravels of granite-gneiss and red hornblende-porphyrte, forming the basal bed of the red sandy and

1) This *Journal*, Vol. XX. Article 8. See also *ante*, page 36. 2) 大谷峠

3) See Pl. XVII, *figs.* 2 and 3. A view westwards toward the Chhyög-möri pass from that of the Tai-kok-chhi. 4) 城岩 (Pl. XVIII, *fig.* 2).

marly complex of the *Tai-kok-chhi* ridge. This conglomerate builds up the high pointed cliff of *Kuk-sā-bong*, of which there is a good view<sup>1)</sup> from the pass. It seems to occur constantly in the same horizon and marks the boundary of the non-volcanic Nak-tong series (Lower Kyōng-sang formation) and the volcanic Kyōng-sang formation.

From the *chyumak* ("locality of inns") called *Sōng-am* (85 m) eastwards, our road lay along a streamlet with a well to do population living in small mud-houses in the erosion channel which cuts through the red calcareous tuffite formation (the strike N. 20° E., the dip 5° S.E.). The shallow valley is the centre of a district where paper is manufactured from the mulberry, *Brousonetia papyrifera* Vent. mixed with root-slime. At the end of the valley we reached the thriving *chyu-mak* of *Sin-bon*<sup>2)</sup> (10 m) which is equidistant from the six *cummāis* of the neighborhood which lie within a range of 20 km, and is the crossing point of the inter-*cummāi* roads.

We then rode due north to *Tun-nai-naru*<sup>3)</sup> at the border of the *Nak-tong-gang* through a dreary, purplish hilly tract which becomes marshy near the river. We were still in the "red formation"<sup>4)</sup> consisting of horizontally bedded, gray and green sandstones. The rocks are really a tuffite of aqueo-igneous, clastic origin consisting of the gravel of hornblende-porphyrite, and splinters of quartz, hornblende, plagioclase and groundmass, cemented together with calcareous and ferruginous matter. The soil produced must be ferruginous and limy.

After crossing the *Nak-tong-gang* we proceeded eastwards across the inundation flat interspersed with brownish pools of

1) Pl. XVIII, fig. 2. 2) 新本 3) 苧川津 4) Pl. XXXV, BC ml.

stagnant water in the shadows of low hills of the red formation. To the east the view was closed by the wall of the green porphyrite mountain of *Chhyang-nyöng*, intruded by masanite at the base. It is the edge of the eruptive sheet and the green breccia which occupy a large area in the southeast corner of *Kyöng-gang-Do*.

The red formation soon disappeared being replaced by a blackish shale and greenish flinty tuffite which are worked for the gold in their quartz veins, exactly like that near *Ma-san-pho*<sup>1)</sup>. The strike is changed here to N. 10 W., with the dip N.E.

MAL-LI  
JUNCTION

At *Mal-li*<sup>2)</sup> on the north of *Chhyang-nyöng* we crossed the high road which I took on my third traverse of the peninsula, and followed up the gravelly valley northeastwards to the *Pang-gol-chhi*<sup>3)</sup>, reaching *Chhyöng-do*<sup>4)</sup> the next day. We here left the "black series" corresponding to that of *Chin-hai*<sup>5)</sup>, and entered upon the green eruptive terrane. Descending a gravelly dale, and turning off from the road to *Mil-gang*<sup>6)</sup>, we went on northwards up to the second pass (285 m), and descended to a rather open country (125 m). We observed that the road crossed an equatorial ridge which, according to my view, can be traced as far as the east coast plunging into the Sea of Japan north of *Ul-san*. After we entered upon the terrane of green porphyritic rocks, the country became barren and desolate, with gravel and talus everywhere. Sometimes red porphyry with white spots was seen in sheets.

From *Phung-gak-jyang*<sup>7)</sup>, we took the east route to *Chhyöng-do* for a distance of 14 km over a flat of arkose and wacke

1) See footnote, page 25. The Yong-dam gold-fields. 2) 萬里 3) 芳洞峙  
4) 清道 5) See ante, page 37, and Pl. XXXIV. AB No. 2, sh. Pl. XXXV BC sh.  
6) 密陽 7) 風角場

sands, having in view on the south a cliff of the green eruptive which slopes at first slightly eastwards, but in the opposite direction near the *emnāi* of *Chhyöng-do* (at *Hoa-san*<sup>1)</sup>) forming a slight trough.

At last we reached *Chhyöng-do*<sup>2)</sup>. It lies on the high road CHHYÖNG-DO between Fusan and Seoul, the most frequented of the public roads in South Korea.

From the little plain of *Chhyöng-do* (90 *m*), I took the high road to *Tai-ku*<sup>3)</sup>, first passing over the *Phal-cho-ryöng*<sup>4)</sup> (419 *m*) down to a narrow valley of porphyrite and breccia gravels, the latter being sometimes colored red. At *O-dong*<sup>5)</sup>, the ground is strewn with masanite gravel brought down by floods from the west where the granitic rock is intruded into the green eruptive, probably in a laccolithic form. Here the valley becomes narrow and the stream torrential, owing to an equatorial ridge passing here with the fault scarp to the north. The slopes of the surrounding hills are covered with a well-managed plantation of pines,—a rare thing in the deforested peninsula.

### Tai-ku<sup>3)</sup>

The sandy and gravelly plain of *Tai-ku* is the largest in the heart of the hilly *Kjöng-sang-Do*. The *emnāi* is located at the

1) 華山

2) 清道 After leaving Mok-pho, I saw none of my countrymen for eighteen nights, passed in inns infested with bed-bugs (*püvli*), so that I appreciated a bath at a Japanese gendarmerie station where a single police at arms was engaged in searching for the bandits who a few days before had menaced an American missionary at the hill south of the *emnāi* and robbed him of his luggage. The next day I saw a foreigner travelling in a palanquin with a long musket in his hand. He eyed me in my Korean costume suspiciously. Now five years later the *emnāi* is a station of the Fusan-Seoul railway. The country is changing rapidly.

3) 大邱 4) 入助嶺 5) 梧洞

east foot of a low hill of red marl with the strike N. 80° E. and the dip to the southeast at low angles. The red formation had been in sight ever since I had seen it cropping out from under the green breccia at the north of the wind-gap of *O-dong*. In my judgment the soil is not very productive. Communication is now greatly facilitated by the railway; but in former times transportation was chiefly by boats on the *Nak-tong-gang*, the landing being at *Sa-mun*<sup>1)</sup>.

*Tai-ku* is a magisterial town of the first rank and the most populous one in South Korea (Pl. XIX. *figs.* 1 and 2).

A panoramic view of the surrounding country is very instructive. On the western horizon beyond the rolling hills of the red formation is seen the well-known *Ka-ya-san*<sup>2)</sup> (1184 m) of *Ko-ryŏng*, which sweeps northwards to the green aphanitic *Keum-o-san*<sup>3)</sup> (812 m) of *Sŏn-san*<sup>4)</sup>. It is a continuation of the *Chhyŏng-mŏri-chhi*<sup>5)</sup> and the eastern rim of the granitic Chiri-san sphenoid. The south is closed by the fault scarp (Pl. XIX. *fig.* 2) which our party had crossed at *O-dong*. To the northeast the sharp, oblique ridge of *Phal-kong-san* (1138 m) screens the *Tai-ku* plain from the north wind (Pl. XIX. *fig.* 1). One notices there that the lower two-thirds appear buff-colored (masanite) interspersed with pines, while the upper third is capped with the complex of the black shale and the red tuffite series.

I continued my journey to *Yŏng-il* on the east coast via *Ha-yang*<sup>6)</sup> and *Yŏng-chhyŏn*<sup>7)</sup>. We went first through hills of red and green marly tuffites. Their prevailing strike is N. 70 E., the dip 5° S.E. On the south the fault-scarp sweeps in the

1) 沙門 2) 伽那山 3) 金烏山 4) 善山

5) See page 85, and Pl. XVII. *figs.* 2 and 3.

6) 河陽 7) 永川



east-west direction (Pl. XIX. *fig.* 2), and on the east (Pl. XX. *fig.* 1) a meridional ridge of the greenish flinty tuffite runs along the distant horizon. We then crossed the *Keum-ho-gang*<sup>1)</sup> to *Pan-ya-uöl*<sup>2)</sup> where the granitic masanite blocks from *Phal-kong-san* are seen scattered through the village. Next comes the terrane of blackish shale, sometimes marly, and at *Pong-suchyön*<sup>3)</sup>, the front *eummäi* of *Ha-yang*, a light-colored, medium-grained biotite-granite was observed on a cliff intruding a short distance into "the black series". It is undoubtedly an offshoot of the *Phal-kong-san* masanite, and this exposure gave us the key for determining the young age of this intrusive as compared with the rocks of the Upper *Kyöng-sang* formation.

Proceeding, we rode due east on a rather sandy flat for 6 km, with *Hoa-san* (806 m)<sup>4)</sup> and *Pong-nim-san*<sup>5)</sup> in full view on the north at a distance of 18 km, forming an east-west ridge and making the south rim<sup>6)</sup> of the extensive flat (300 m) of *Andöl*<sup>7)</sup> on the red formation. Four kilometres further on, our route left the river and turning to the northwest brought us to the foot of a low hill-pass. The terrane was in the black shale which was being worked for gold in placer. The auriferous quartz reef in the marly shale is of the same type as those of *Chhyang-nyöng*<sup>8)</sup> and *Yöng-dam*<sup>9)</sup>. This is the type of ore-deposits which is called marl gold<sup>10)</sup>.

On the north side of the hill on the river-bank is situated

YÖNG-  
CHHYÖN

1) 琴湖江 2) 半夜月 3) 烽燧店 4) 華山 5) 鳳林山

6) This ridge is produced by the flanking bed of the *black* series which slopes southwards leaning upon the horizontally bedded *red* formation on the north. 7) 安德

8) See page 88. 9) See footnote, page 25. 10) See *ante*, page 32.

the *eumnäi* of *Yöng-chhyön*<sup>1)</sup> in a depression of the Shale terrane with the strike N.S. and the dip 20° E. The same series, occasionally interstratified with sandstone layers was observed from the thriving *eumnäi* for a distance of 12 km becoming almost horizontal as we went up eastwards along a fork of the river to the village of *Chhyöng-gyöng*<sup>2)</sup> and the pass of the same name (150 m).

Here a greenish, banded flinty tuffite made its appearance, and its gravel, brought down from *Ok-san*, was being worked for gold. This also is the marl gold.

A greenish hornstone-like rock occurs constantly on the upper horizon of the black Marl or Shale belt from *Chin-häi*<sup>3)</sup> via *Chhyang-nyöng*<sup>4)</sup> hither, and we shall see it extensively developed in the environs of *Kyöng-jyu*. The east foot of the pass is on the hornblende-biotite-granite which appears for only a short distance intruding into flinty rock as if producing a contact effect on the latter. The *Chhyöng-gyöng* pass, though not very high, is one of the most important topographic elements of the *Tai-päik-san range*<sup>5)</sup> and is the second (inner) coastal ridge of *Kyöng-sang-Do* along the Sea of Japan.

From the *Nö-sil chyumak* at the foot of the pass to *An-gang*<sup>6)</sup> (90 m) we went over a barren gravel flat (Pl. XX. *jig.* 3, and Pl. XXI. *jig.* 1) of flinty rock, seeing on the north a cliff of the same rock with a westerly inclination. Beyond the hills at a distance of 16 km in the same direction runs the high untrodden ridge of *To-eum-san*, which is probably a prolongation of *Hoa-san*<sup>7)</sup>

1) 永川 From here Mr. Yabé took the direct route to the south-east toward the old capital *Kyöng-jyu*, finding on the way the black marl-sandstone series, and at *Sam-kori* a granitic rock, and further on the banded flinty tuffite as far as *Kyöng-jyu* where, however, a hill of aplitic masanite was seen on the west of the *eumnäi*. Pl. XX. *jig.* 2.

2) 清景 3) See page 27. 4) See page 88.

5) See Geotectonic Map in 'Orographic Sketch of Korea.' This *Journal*, Vol. XIX. Art. I. 6) 安康 7) See page 71.

already referred to, terminating at the south of *Chyöng-ha*<sup>1)</sup> on the coast. On the south is the open gravel waste of *Kyöng-jyu*, from which direction flows the *Hyöng-san-pho*<sup>2)</sup> in its wild river bed.

Thence our road passed through the gorge of *Hyöng-san-pho* and out on the Tertiary flat of *Yöng-il* (Pl. XXI, fig. 2) at the head of the shallow bay of the same name (Unkofsky Bay). The *cumnäi* itself is located on an unprotected sandy plain, while *Pho-lang*<sup>3)</sup> is a port at the mouth of the river, and the most frequented harbour on the coast. The gorge cuts through the coastal ridge of greenish breccia<sup>4)</sup> of the uppermost *Kyöng-sang* formation which occurs here in a thick bed (the strike N. 20 E., the dip 10° N.W.). It weathers into light-yellow earth, looking very much like disintegrating granite.

*The trip along the coast and then to Kyöng-jyu*

Having ended my second traverse across the peninsula from *Mok-pho* to *Yöng-il* on the east, I turned southwards along the shore towards *Chyang-gi*<sup>5)</sup>; and in doing so I passed the hill-neck of the *Ho-dong-chhi*<sup>6)</sup>, about 4 km from the *cumnäi*, where a light, soft, cream-colored tuffite, bedded horizontally, was exposed in distinct stratification. This was the first time that I had met with the typical Tertiary in the peninsula. The stratification-plane is full of plant-impressions, besides fish bones, *Cassis*, and *Lucina*. The plant-remains are *Acer pictum* Thunberg, *Zelkova*

1) 清河 2) 浦項 3) 兄山浦

4) Green-flecked fusiin-breccia of felsophyre. The main mass consists of microfelsitic substance showing fluidal structure with insets of crystals of hornblende, corroded quartz, and feldspars; the last is also remarkably corroded like the porphyritic quartz. It seems to me to represent the green breccia of the Upper *Kyöng-sang* formation.

5) 長鬚 6) 好洞峙

*leaki* Siebold, *Fagus ferruginea* Ait., *Styrax*, and many other forms of *Quercus* and *Salix*. Mr. YABÉ who made the preliminary determination of the above, is inclined to consider the bed to be of the Pliocene age. YABÉ and INOUYÉ later revisited the same locality and made a collection of the petrifications. Later Mr. INOUYÉ found another locality of the fossils of the same horizon near *Pho-lang* at the head of *Yöng-il* Bay already referred to.

The hill-pass *Ho-dong-chhi* commands a view, as far as the eye can reach, over the bay and the precipitous coastal ridge of breccia with Tertiary foothills (Pl. XXI. fig. 3) of the *Heung-häi*<sup>1)</sup> coast. From it we came down to a streamlet and ascended again to a water-shed of Tertiary tuffite covered with dwarf pine trees. The divide of the *Söng-uön-chhi*<sup>2)</sup> is 120 m high, and this seems to be the average height of the headland of *Yöng-il*, which is built up of the same cream-colored tuffite of the Pliocene Tertiary. In following down the stream southeastwards, we found the stratified tuffite underlaid by massive brown tuffite intermingled with débris and the half water-worn gravel bed of a massive rock<sup>3)</sup>, which rests, in turn, upon masanitic porphyry<sup>4)</sup>. The last rock extends northeastwards in the axial direction of the headland of *Yöng-il*, raising its crest above the surrounding Tertiary hills, and terminating at Cape *Tong-eul-päi-kot*<sup>5)</sup> (C. Clonard).

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1) 興海 2) 城院峠

3) This volcanic gravel has a dark to light-brown groundmass enclosing porphyritic feldspars and quartz. Under the microscope it was seen to consist of typically corroded feldspars and quartz as porphyritic components, besides a few brownish hornblende crystals, which likewise had suffered magmatic resorption. The groundmass is microfelsitic with flowage-structure, sometimes showing bands of felsitic substance. It is the hornblende-quartz-feldspar-felsophyre.

4) By masanitic porphyry I mean that light-brown porphyry having the appearance of the oft-mentioned masanite (p. 21). Porphyritic minerals are idiomorphic feldspars and quartz. Both the plagioclase and orthoclase are flesh-colored due to slight decomposition. The groundmass consists of a microgranitic aggregate of quartz and feldspar. It is a kind of laccolithic *graniteporphyry*. 5) 冬乙背串

The porphyry forming the basement of this region, is overlaid by an unstratified dark-gray mud and sand mixed with coarse angular fragments of felsophyre. It has the aspect of a modern mud flow and agglomerate from a volcano. We then passed over a slight elevation (*No-sil*) where the said rock is again covered by the cream colored unstratified tuffite which above passes insensibly into the stratified tuffite corresponding to the plant-bed. Between this place and the *eumnäi* of *Chyang-gi*, which is scarcely 2 km distant, the rock is overlaid discordantly by a coarse sand bed which contains a poor, thin lignite seam<sup>1)</sup> (the strike N. 70° E., the dip 40° N.W.). This is superimposed by a gray sandy tuffite which is in turn covered by a black lava<sup>2)</sup> (?) sheet.

On a butte-like erosion hill or mesa of the basalt-lava is located the wretched *eumnäi* (90 m) encircled with a stone-wall (Pl. XXII. *fig.* 2) designed in former times to guard against the incursions of Japanese from the coast.

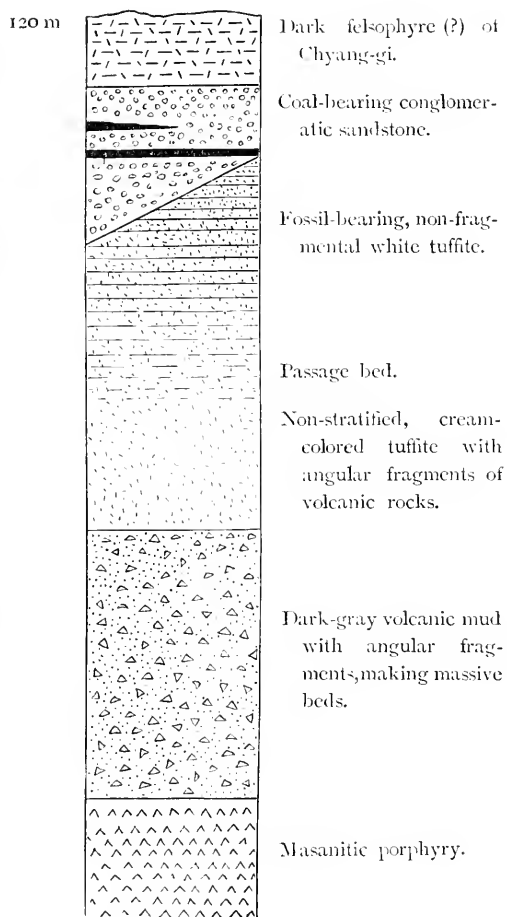
The sectional column annexed (the next page) is that observed from *Yöng-il* to *Chyang-gi*. As will be seen from the section, the masanite-porphyry forms the foundation of the region superimposed by a series of gravel beds of the dark-colored felsophyre and the cream-colored tuffite, both stratified and unstratified, the former containing the Pliocene plant-remains. The series is discordantly covered by a lignite bed, and the whole is capped by the basalt (?) flow of *Chyang-gi*. The entire thickness of the clastic portion may be roughly estimated at 120 m.

The general conclusions drawn from my observation of this region are firstly, that the basalt flow took place at the end of

1) The writer was the first foreigner who had seen this poor seam of earthy lamellar lignite. Since then, the locality has been several times visited by travellers.

2) The locality is called Myöng-dong (明洞). See Pl. XXII. *fig.* 1.

the Tertiary, and it may be assumed that the same was the case with the basalt flows of the petrographic province of Eastern Asia including the western half of Hon-shû in Japan<sup>1</sup>. Secondly, that the land connection of Japan with the continent was severed at the end of the Tertiary, or at the beginning of the Diluvium. Thirdly, that a great epirogenic movement occurred in Eastern Asia accompanied by an outpouring of basalt, thereby casting a modern aspect over the land in the region concerned. Fourthly, that a part of the Upper *Kyōng-sang* formation is probably of the Tertiary age.



Tertiary pyroclastic series of Chyang-gi.

CHYANG-GI

From the *cumñai* of *Chyang-gi* on the coast, we went to *Kyōng-jyu* via the *Ka-na-chhi* (370 m), first going southwards over a hilly tract with two passes (the *Mōn-chhi* and the *Kam-chhi*, 361 m) for 8 km on the stratified tuffite (the strike N. 20 E., and the dip 30 N.W.) with the typical basalt blocks projecting from the cream-

1) The basalt of this petrographical province or comagmatic region frequently contains hypersthene and quartz, and genetically, as it seems to me, is closely related to the sanukite of Shikoku, first described by Professor Weinschenk. *N. J. Beilageband VII S. 148.*

2) 長鬚

colored tuffite earth which is underlaid by a nevaditic-looking whitish crystal-porphry<sup>1)</sup>. It was probably this eruptive which supplied the material for the cream-colored tuffite. I took some powder of the latter, boiled it with HCl, and decanted the decoction. The insoluble part was examined, and seen to consist of particles of a half-decomposed felsitic groundmass of felsophyre. It is therefore not mud nor clay but silt that builds up the tuffite. It is also not one of those pumiceous tuffs which we, living in a volcanic country, are accustomed to see, and for which it might readily be mistaken. The Korean rocks as compared with ours must produce rich soils, when decomposed.

From *Yöng-il* southwards along the coast, the country is thinly populated, and especially from *Chyang-gi* on it is by no means easy to find an inn for a night's lodging. The naked hilly coastal tract of whitish felsophyre and masanite, and yellowish tuffite, is fast falling into disintegration, shallow valleys being filled up and changed into sandy wastes; and highly sculptured talus slopes are constantly sending down masses of débris from all sides like miniature glaciers. The country presents truly the "bad lands" scenery (Pl. XXII. *fig.* 3).

The west side is a ridge of hard rocks, to which I first turned my steps (see *fig.* 3) to reach *Kjöng-ju* viâ the *Kana-chhi* (375 m) from the poor village of *Oa-eup*<sup>2)</sup> (20 m). Near the

1) The rock from the Kam-chhi (The Persimmon pass) is a light-gray, slightly violet rock varying in structure from felsophyric to nevaditic. The porphyritic components are embayed quartz and idiomorphic feldspars, both twinned and untwinned. The nevaditic variety contains some light-brownish green hornblende, and *rectangular* aggregates of biotite as if it were a pseudomorph after the former mineral. The groundmass varies from the microfelsitic with fluctuation-structure (felsophyre) to the implication-structure of quartz and orthoclase (nevaditic masanite). Apatite is present abundantly as an accessory.

2) 臥邑 The dry river bed, which we followed hither, here turns eastward, and is said to end at Ku-gil (九吉) on coast. The monastery of Chirim-sä (祇林寺) is 2 km west from here.

mountain-foot I unexpectedly met with a biotite-hornblende-ande-site<sup>1)</sup> of a trachytic appearance and structure with a glassy hyalopilitic groundmass. At the mouth of a gorge in the mountain with a *chyu-mak* on a meandering streamlet, one again finds the green quartz-hornblende-porphyrite of the Upper Kyöng-sang formation. The ascent over the same rock to the *Ka-na-chhi* (375 m) is rather steep, but the descent to *Seup-kol* is gradual on white spotted porphyrite intercalated with breccia, producing contact-metamorphism on the flinty tuffite of the "black shale series."

From *Seup-kol* our route took a northwest by west course through a gorge in the banded flinty rock (the strike N. 20° E., the dip 50° N.W.) The wind-gap traverses the highest part of the coastal ridge in its deepest core which is penetrated by a biotite-granite at its base. At the west outlet (*Sai-sul-mak*, 110 m) of the gorge, an erosion and gravel terrace two-kilometers in extent was seen flanking the west foot of the mountains. This type of land feature rarely occurs in Korea, and indicates that the east coast is gradually emerging from the sea. The topography opens to the west, but the rock-character (the strike N. 20° E., the dip 5—10° N.W.) remains the same as far as *Kyöng-ju*, well exposed along the *Söng-chhyön*<sup>2)</sup> river (Pl. XXIII. fig. 1).

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1) This young effusive is at one extreme of a series leading through various modifications of felsophyres and masanites to granite. These occur close together in South Korea, probably representing the products of one magma, differing only in structure conditioned by the depth at which they had consolidated. The green diopside—and hornblende-porphyrates, sometimes quartz-bearing, occurring so characteristically in the uppermost Kyöng-sang formation, seem to be the basic facies of the same magma. A field is open here for the petrologist to trace out the details and relationship of the members of this interesting and geologically important series of rocks.

2) 星川



## Kyöng-jyu

Pl. XXXV. Profile EF

*Kyöng-jyu* (75 m) (Pl. XXIII. *fig.* 1) was the old capital of *Sin-han*<sup>1)</sup>, one of the *Three Hans* in South Korea which came into existence at about 209 B.C. Later it was the metropolis of *Sil-la*, one of the "Three Kingdoms," from 57 B.C. to 936 A.D. The Japanese attacks during the regency of JINGÔ KÔGÛ in the years 209, 233, and 249 A.D. had *Kyöng-jyu* as their objective.

In the eyes of our people in ancient times *Kyöng-jyu* was the sole metropolis of the peninsula. During the Tang dyanasty (618-907 A.D.), *Sil-la* maintained close relations with China, and its capital was the true centre of *Silla-Korean* civilization and Buddhism. Our contact, both in war and in peace, with the *Silla-Koreans* had a reactionary influence upon our religion, art, and science which, according to T. SEKINO<sup>2)</sup>, was reflected in our art of the Nei-raku period.

During this Augustan age of *Sil-la* (about 655 A.D.), *Kyöng-jyu* had an urban population of 900,000. Her high culture and civilization have long since passed away leaving only a forlorn town of mud hovels (Pl. XXIII. *fig.* 1). A few relics of former grandeur are still to be seen. One is a nine-storey pagoda of the stone-masonry of *Pun-hoang-sã*<sup>3)</sup> of which only three examples remain now. The second is the largest Korean bell (2.25 m in diameter) of extraordinarily fine workmanship, cast in the year 771 A.D. The third is a ruined astronomical observatory of granite masonry, of a cylindrical shape, 29 feet high and 17 feet in

1) 辰韓

2) "Report on Korean Architecture" (in Japanese). *Bull. Coll. Engin. Imp. Univ.*, Tokyo 1905.

3) 芬臺寺.

diameter at the base. These constitute all the remains of the ancient city now to be seen.

Incidentally I may mention that *Kyöng-ju* is noted for the manufacture of the high-priced spectacles worn by the Koreans, not to remedy some defect in their visual organs but simply to enhance their elegant appearance. The sole benefit, in their opinion, to be derived from the use of spectacles is the cooling effect<sup>1)</sup> upon the eye. The material of which the lenses are made is the rock crystal<sup>2)</sup> from the granitic *Nam-san* ("South Mountain") which is in full view from here at a distance of 5 km, lying elevated where the road divides, one road leading to *Ön-gang*, the other to *Ul-san*. Rough lenses are chipped from the crystal at right-angles to the longest axis. This requires skill and necessitates much waste of material. The use of a simple modern cutting machine would do away with this difficulty. The reason why the Korean spectacle-makers prefer that special section rather than another is not known. They simply say that by cutting in that special direction defects *e. g.*, clefts, foreign inclosures, and the like, are minimized. Optically speaking, the section at right-angles to the principal axis of the uniaxial crystal is also the plane of equal elasticity, while in other sections such is not the case. I shall leave this question to the ophthalmologist. The polishing of the chipped lens is done on whetstones of progressive degrees of fineness,

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1) This is perhaps due to the action upon the eye of the ultra-violet rays whose injurious effects are at present much discussed by scientists.

2) *Nam-san*, like *Ko-söng* in *Kang-nön-Do*, has from early times been noted for the occurrence of rock-crystals. The crystals are solely used for the manufacture of spectacles. Lately a Japanese at *Fu-san* discovered in this spot beautiful crystals of amethyst and also of aventurine-quartz; the latter are one and a half feet or more in length, and the largest and the finest ones that I have ever seen. They were exhibited at the Ueno Exhibition in 1906, and are now deposited in the Mitsubishi Museum.

mostly of a sandstone-nature, with ground quartz.

The rectangular-mural *Kyöng-jyu* (Pl. XXIII. *fig.* 1) is located on a flinty gravel flat thinly covered with sand between the forks of a river. The thing that struck me most was the artificial relief on the flat, caused by a group of rather high mounds about twenty in number, which resemble miniature volcanoes (Pl. XXIII. *fig.* 2). These mark the sites where the remains of the kings of *Sil-la* were interred, but some mounds were raised simply as lookout stations.

The plain of *Kyöng-jyu* lies between the ridges (Pl. XXIII. *fig.* 2) of the *Tai-päik-san range*, the western being that of the *Chhyöng-gyöng-chhi* already referred to<sup>1)</sup>, the eastern, that of *Thoham-san*<sup>2)</sup>, which was the one we had just crossed. A Korean geographer a century ago pointed out of the true topographical situation of the plain and I have only to corroborate his view. It is only 5 km broad skirted on both sides by ridges of green flinty tuffite of the "black series," the western being rather the higher of the two; but the flat extends in the north-south direction, and I took the south route over it to *Ul-san*.

We marched by the ruined astronomical tower already mentioned, and then a crescent-shaped gravel-hill (Diluvium?) underlaid by the green flinty tuffite, opening to the west. It is the old site of the *Sil-la* city of *Uöl-söng*<sup>3)</sup>, so named from its shape. Our road lay on an arkose sandy plain on the left side of the masanite<sup>4)</sup>

1) See *ante*, page 92.

2) 吐舍山 A monastery of high antiquity is in this mountain, which is a part of the Tong-tai-san ridge. 3) 月城

4) In structure the masanite stands between medium-grained granite and coarse aplite. Colored mineral is present only in a small quantity and so is biotite. Such is the case with the plagioclase. The entire rock is simply an eutectic aggregate of quartz and orthoclase in microscopically coarse intergrowth, an implication-structure of the most irregular shape (see *ante*, page 21).

edge of *Nam-san*<sup>1)</sup>. The granitic rock sinks under the flinty tuffite, reappearing near *Sai-sul-mak*. The *chyu-mak* lies on a high sand flat (Pl. XXIII. *fig.* 3) which forms the water-shed, and which we followed down-stream southwards in the *Ul-san* direction. The coast side is likewise granitic masanite (see *fig.* 3) covered with a flinty tuffite and marl series, both together forming the ridge of *Thong-tai-san*<sup>2)</sup> which separated us from the east shore. According to Mr. IXOUYÉ, a Tertiary bed is said to occur on the coast in patches pierced through by a basalt which under the microscope is seen to be a typical one.

About 4 *km* before *Ul-san*, we crossed a plank-bridge (Pl. XXIV. *fig.* 1), which is supported by piers made of piles of bags of sand and gravel. This is the usual style of bridge-construction in Korea. The sandy river, *Nam-chhyön*, empties at the head of the cove of *Ul-san*. Near the mouth of the river is *Yöm-pho*<sup>3)</sup>, a Japanese settlement before the time of HIDEYOSHI's invasion. The indentation is closed in on the east by the headland of *Yöm-pho* which extends southwards to Cape Tikhmenef. It is the end of the coastal ridge of the *Tai-päik-san* range which bounds the entire shore with its mural precipice southwards from *Gen-san*.

The plank-bridge is at the foot of a flat-topped hill on which is located a spacious, walled village, "The Left Garrison," once an important fortress. This hill is built up of the "red formation", a part of the extensive inlier around *Ul-san*, which crops out from beneath the "black series". It is the same series as that mentioned in the First Traverse occurring on the east of *Chin-jyu*<sup>4)</sup>, and in the Second Traverse as being found in the basin of

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1) It is called *Ok-san*, or gem mountain on account, of the occurrence of the rock-crystals already mentioned (page 100, footnote 2).

2) 通大山 3) 鹽浦 4) See page 33.

the *Nak-tong-gang*<sup>1)</sup>. On a flat-topped, isolated butte-like hill (Pl. XXIV. *fig.* 1; the strike N. 20° E., the dip S.E.) between the bridge and the *cumnäi*, overlooking the surrounding Alluvium is the ancient fortress of *Cheung-söng*<sup>2)</sup> where the struggle centred in the closing phase of HIDEYOSHI's invasion. It was into this fortress that the Japanese army was driven by the combined forces of the Chinese and Koreans. When the garrison was reduced to the extreme of famine, a reënforcement under KATÖ arrived just in time and defeating the besiegers on February 9th, 1598, relieved the Japanese. This final success on our part brought the great war to an end.

The hill of "The Left Garrison" and *Cheung-söng*, the flat elevation around *Ul-san* and the inlet as well as the flat of *Kyöng-ju*, and the stepped terrace of *Sö-chung* to be mentioned later—all show signs of once having been subjected to extensive erosion and subsequently to the upheaval of the east coast.

Proceeding southwards through the *cumnäi* of *Ul-san*, and UL-SAN round a hill-edge of the same "red formation," we met with a river in a transverse valley coming from the direction of *Ön-yang*<sup>3)</sup>. We pushed along the bank of the *Tai-hoa-chhyön*<sup>4)</sup> river for 2 km, seeing in front of us the *inner Tai-päik-san* ridge running regularly in the north-south direction and cut deeply by the valley of the *Un-mun-chhi*<sup>5)</sup> pass of *Chä-in*. We, however, turned southwards to *Fusan* crossing the river at *Sam-pho-dari* where the red formation (the strike N.W.—S.E., and the dip slow to N.E.) is intruded by a buff-colored aplitic masanite, another evidence of the young age of masanite.

1) See page 87 *et seq.* 2) 甌城 or 鶴城 (Hak-söng).

3) 彦陽 4) 大和川 5) 雲門峙

After about 4 *km*, we reached *Chi-thong* (40 *m*) where the granitic masanite mountain protrudes into the *red* formation, the latter being soon replaced by the overlying green-tuffite (the strike N.E.—S.W., the dip S.E.) which continues to appear on the gravelly flat opening eastwards to *Nam-chhang* and the coast.

Following the stream up to *Sö-chhang* (16 *km* from the river), we saw on our left (Pl. XXIV. *fig.* 2) the massive *Tai-hoa-san*<sup>1)</sup> consisting of green breccia and sheet of porphyrite. This is the uppermost *Kyöng-sang* formation and the one which the stratigraphical succession hitherto traced had led me to expect. Magnetite is reported to occur in the mountain. It is said that it is also found at *Ung-gol*<sup>2)</sup>, lying a few kilometers to the northwest of *Sö-chhang*, where the ore-body seems to occur in the green breccia near the masanite basement. It may be of the same type as that of *Fusan*<sup>3)</sup>. To the right (Pl. XXIV. *fig.* 2) runs a porphyrite ridge which begins at *Kyöng-jju* and ends at the port of *Fusan*. It is the inner *Tai-päik-san* ridge.

The road ascends two successive terraces (Pl. XXIV. *fig.* 2) of porphyrite gravel. This was the second time that I had seen this type of land-feature in *Kyöng-sang-Do*; the first instance I have already mentioned as occurring east of *Kyöng-jju*<sup>4)</sup>. Both are indications of the gradual upheaval of the east coast. Thence the path descends southwards over masanite which crops out from beneath the sheet of porphyrite. The edge of the *Hoang-dari* declivity is in another respect significant, for it is the 'fault-scarp'<sup>5)</sup> that runs equatorially from the north of *Masan-pho* viâ the *Mul-geun* gorge of the *Nak-tong-gang* to the east coast. On the south of the fault, the mountains

1) 大和山            2) 熊洞

3) See *ante*, page 11.    4) See *ante*, page 98.

5) See pages 16 and 131.

on both sides become detached and lower. The one on the west is masanite, that on the east, porphyrite.

At *Song-chyöng*<sup>1)</sup> a road from *Keui-jyang* to *Yang-san* crossed our route. The open south is masanite terrane skirted on the west by *Keum-jyöng-san*, the northwest slope of which is capped with an outlier of porphyrite and in this recess is seen the monastery of *Pöm-ö-sä*<sup>2)</sup>. At the southeast foot of *Keum-jyöng-san*<sup>3)</sup> is located the hot spring (Pl. XXIV. *jüg.* 3) of *Tong-näi*<sup>4)</sup>, only 2 km from the *cumnäi*. Its balneal history is not exactly known, but it has been a bath-resort since 1691. The mineral water bubbles up from granitic sand (see *jüg.* 3) near the bank of a dry rivulet, and is collected and led to the bath. I bottled some of the water in 1901 and brought it home, and Prof. K. TAMBA, of The Imperial University of Tokyo, kindly made an analysis of it which gave the following results. It was the first Korean mineral water to be scientifically analysed.

	Gramme per Litre
Sodium, Na.....	.2776
Potassium, K.....	.01015
Calcium, Ca.....	.0667
Magnesium, Mg.....	trace
Chlorine, Cl.....	.4570
Sulphuric Acid, SO <sub>3</sub> .....	.06775
Silica, Si O <sub>2</sub> .....	.1216
Alumina, Al <sub>2</sub> O <sub>3</sub> .....	.0012
Sesquioxide of Iron, Fe <sub>2</sub> O <sub>3</sub> .....	.0020
Solid matter.....	1.00869

The water is colorless, transparent, odorless; taste slightly saline; reaction alkaline; temperature 76 C.

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1) 松亭. 2) 梵魚峙 See *ante*, page 15. It is popularly called *Po-ma-sä*.  
 3) See page 15. 4) It is proper to call it the hot spring of Keum-san-dong.

I hastily passed *Tong-năi* (Pl. XXV. *fig.* 1) and *Fusan-chin* (Pl. XXV. *fig.* 2) in the masanite terrane and was again on porphyrite ground in the Japanese settlement at *Fusan* on March 19th, 1901, after having spent nearly two months on the traverse (see page 11).

YABÉ'S  
DETOURS

Mr. YABÉ took the high-road from *Ul-san* to *Tong-năi* viâ *Keui-jyang*<sup>1)</sup> on the shore, supplementing my observations made on the country-road that runs west of his route. Having started from *Ul-san*, he went due south on a dissected erosion flat of the "red formation," and near *Nam-chhang* he came across the overlying green tuffite corresponding to my flinty tuffite. At the *Hoa-thonyöng*<sup>2)</sup> elevation on the south of *Nam-chhang*, a green eruptive was seen; it is an offshoot of the *Tai-hoa-san*<sup>3)</sup> mass, consisting of breccia and sheets of green porphyrite here decomposed into red rock. Then, as far as *Keui-jyang* he journeyed over a hilly tract of tuffite, sandstone with coaly flecks, and shale with carbonaceous layers.

I saw no such complex on my journey, and Mr. YABÉ is not able to decide whether the said bed is of young Tertiary or of the Lower *Kyöng-sang* formation. On account of its stratigraphic position I shall at present include it in the *black* series (Pl. XXXV. Profile AB, No. 2) of the Upper *Kyöng-sang* formation. At *Keui-jyang*, porphyrite was seen occurring in isolated outliers on the masanite base down to *Tong-năi*.

Mr. YABÉ also made a trip from *Tong-năi* to *Kyöng-jyu* viâ *Yang-san*<sup>4)</sup> and *On-yang*<sup>5)</sup> on the route running parallel to, and west

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1) 機張 2) 火吐嶺 3) 大和山 See *ante*, page 104  
4) 梁山 5) See *ante*, page 103.



of mine. All the way up to *Ön-yang*, his path ran on the masanite terrane except at two points, one near *Yang-san* where porphyrite occurs in a patch, and the other midway between the two *eummäis* near the monastery of *Thong-do-sā*<sup>1)</sup> the porphyrite always capping granitic (masanitic) rocks. North of *Ön-yang*, the "red series" of *Ul-san* reappears along the road, being replaced on the north by the outcrop of masanite at *Nam-san*, already referred to as the locality for quartz<sup>2)</sup>.

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(1) 通度寺

3) See footnote, page 100.

## CHAPTER III.

## THE THIRD TRAVERSE

*Plates XXVI.—XXXIII.*

My third traverse crossed the space between *Fusan*, frequently mentioned above, and *Kun-san* by the *Yuk-sim-nyöng*<sup>1)</sup> pass at the *Do* boundary. I shall however commence my itinerary of observation at *Kun-san* for the simple reason that I so made the journey.

*Kun-san* (Pl. XXVI. *fig.* 2 and 3), like *Mok-pho*, is a free treaty port opened in 1898. Rice and beans are the chief staples of the country. The town is located at the mouth (Pl. XXVI. *fig.* 1) of the *Kenm-gang*.<sup>2)</sup> This river drains the area between the *Chhya-ryöng* and the *No-ryöng* ranges<sup>3)</sup>, and waters the largest plain in South Korea,—the rice-producing flat of *Chyön-jyu*, hollowed out in a granitic terrane. The port itself is on the south bank sheltered (*fig.* 3) by hillocks from the west winds.

The lowest bed is composed of (1) a *phyllitic sericite-schist* (Pl. XXXIV. FG, Ph) with the strike N. 30° E., and the dip vertical or slightly west. This is overlaid, as is clearly seen at the landing place, by (2) a bluish, compact rock of the appearance of amphibole schist, or cornubianite with a slight tinge of violet. Seen under the microscope it consists of grains of quartz, and lobes and irregular lamellæ of chocolate-brown biotite, aggregated in such a manner as to produce the hornfels structure. Slides

1) 六十嶺 2) 錦江

3) 車嶺及蘆嶺 This *Journal*, Vol. XIX. Art. 1, pp. 14-16.

also show ottrelite and pyrites. The rock is therefore *ottrelite-biotite-schist*. It represents an altered product of the sandy portion of a sedimentary, as the sericitic member does of the arkose and clayey portions. Next in ascending order comes (3) a coarse colorless quartzite which may be a dyke or a normal member, but I cannot decide which. This is again overlaid by (4) a *Garbenschiefer* with stripe-flecks, 2 cm long, making gradual transitions to (5) normal greenish silky *phyllite*. These flecks are spots where coaly particles accumulated in the colorless, homogeneous crystalline ground of unknown nature, probably plagioclase. Weathering gives to the last two rocks the rusty brown color which characterizes the surrounding hills.

The age of these highly metamorphosed sedimentaries cannot be stated with certainty, but I include them at present in the Metamorphic Mesozoic for lack of facts which necessitate a change to another time division in geological chronology. Rocks akin to the present sediment-metamorphics have already been noticed<sup>1)</sup> as occurring at *Tong-pok* and *Mu-an*<sup>2)</sup>. These however, differ in that the rocks were originally partly pyroclastics, partly massive-eruptives, and only a few were true sedimentaries such as graphitic-anthracite bed and limestone-conglomerate. Moreover, the *Tong-pok* rocks are highly cataclastic and deeply metamorphosed, and bear the stamp of katogene, while the *Kum-san* schists show anogene metamorphism.

From a hill top one can see to the west during ebb-tides an extensive mud flat due to the tidal difference of 15½ feet on this coast. When the tide returns the *Keum-gang* becomes 1-2 fathoms deep for 3.5 km up-stream as far as *Kang-gyöng*<sup>3)</sup> which

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1) See *ante*, pages 66 and 68.    2) See *ante*, page 72.

3) 江景

is therefore practically the port to the interior. In the remote north the *Chhja-ryöng range* runs obliquely across the land, terminating at the northwest coast of *Nam-pho*<sup>1)</sup>. It is the gneiss ridge; and the hilly land on this side is the Mesozoic (?) terrane of strong conglomerate consisting of gravels of slate, fine granite, and psammitic quartz-schist<sup>2)</sup>. As will be seen on my geologic map, the problematic Mesozoic occupies a tongue-shaped patch with broad base along the coast.

On the south, beyond the plain and the shallow cove, the high headland of *Pyön-san*<sup>3)</sup> projects out to sea in a southwesterly direction. It is rugged and mountainous, rising to a height of 524 m. Here is the forest reserve of the Korean court, though its value is lessened by never-ceasing deforestation. The late notorious *Tai-uön-gun*, the father of the ex-sovereign, had recourse to this mountain for timber to build during his regency an extravagant palace, now deserted, in *Seoul*, as the Koreans say, almost to the ruin of the nation. This outstanding forested headland presents a unique aspect in the otherwise naked flat coast of the Yellow Sea. Mr. F. KOBAYASHI, who made a trip thither, reminds me of the occurrence of mylonitized granite which I presume from the direction of the shear-cleavage is a continuation of the same rock of *Im-phi*<sup>4)</sup>, lying to the east of *Kun-san*, to which I shall presently refer again.

To the southeast, beyond the plain of *Chyön-jyu*, the metamorphic ridge of *Mo-ak-san*<sup>5)</sup> of *Chyön-jyu* in coulisse form is seen beyond *Pyön-san*.

1) 藍浦

2) My knowledge of this part of the peninsula is deficient, as I had no opportunity of making journeys there. I saw, however, a few rock-specimens collected by Mr. F. Kobayashi who also informed me of the general distribution of the rocks.

3) 邊山 4) 臨陂 5) 母岳山

Before leaving *Kun-san*, I must not forget to mention a belt of conglomerate, sandstone, and shale along the southwest shore of the harbour overlying the above-mentioned metamorphics. Mr. IXOUYÉ saw the rock, and to me it seems to be a continuation of the problematic Mesozoic of *Nam-pho*, already referred to.

To the east within a few kilometers one can see the hillocks to which we now turn our attention.

Our pathway to *Chyön-jyu* led across rice fields, and became slippery during the rain making the journey extremely unpleasant, the reason being that the land is simply a part of the mud flat of the low coast of the Yellow Sea. People go out wearing clumsy wooden clogs and carrying bamboo sticks. Their houses are sheltered by bamboo groves making the scenery resemble that of farming district, at home. During my long wanderings in Korea, I rarely met with clayey soil of such wide extent as here. The soils in the peninsula for the greater part consist of arkose sand if not of gravel. Valleys are generally speaking mere accumulations and heaps of gravel, Alluvial and Diluvial terraces being almost entirely wanting. This is the characteristic land (and also geologic) feature of the peninsula. The agronomist wants more clays for his purpose, though the soils are richer in lime and alkalies than those of Japan.

BUN-SAN  
TO  
CHYÖN-JYU

After an hour's walk we entered the hills of *Im-phi*. The rocks are all eruptive gneisses of various structures. (a) One variety is coarse-schistose with distended eyes of quartz-feldspar mass in black micaceous bands. (b) The other is *Lagengneiss* rich in biotite with spots of microcline or anorthoclase. Micas are of two kinds, the biotite being of the chocolate-brown color and lash-shape. The quartz is crushed to grains, showing undula-

IM-PHI

tory extinction. The above two are typically schistose-made orthogneisses. (3) The third is a whitish, thin schistose rock of parallel-planed structure with spots of garnet. Microscopic examination shows it to be composed of orthoclase and plagioclase, quartz and a little green biotite, besides zircon and garnet, showing, except in the case of the zircon, highly cataclastic structure. The common garnet is crushed being traversed by parallel cracks and filled with chlorite. It is a leucocratic dyke now made schistose together with intruded granite. It is a granulite in its present form. The whole complex strikes N. 20° E, with pseudo-cleavage plane dipping westwards. Therefore it underlies the Metamorphic Mesozoic (Algonkian?) schists of *Kun-san*<sup>1)</sup>. If the strike direction were prolonged, the complex would extend to the forested headland of *Pyön-san*, already referred to<sup>2)</sup>. The general physiognomy is that of an abraded hill of 10—20 m now greatly dissected and filled with a gravel terrace as at the *cummäi* of *Ham-yöl*<sup>3)</sup>. The abraded hill extends to *Kang-gyöng* and even farther northwards. Sometimes the crest of the steeply inclining rock runs like a sand dune with great regularity on the south of the town last-named.

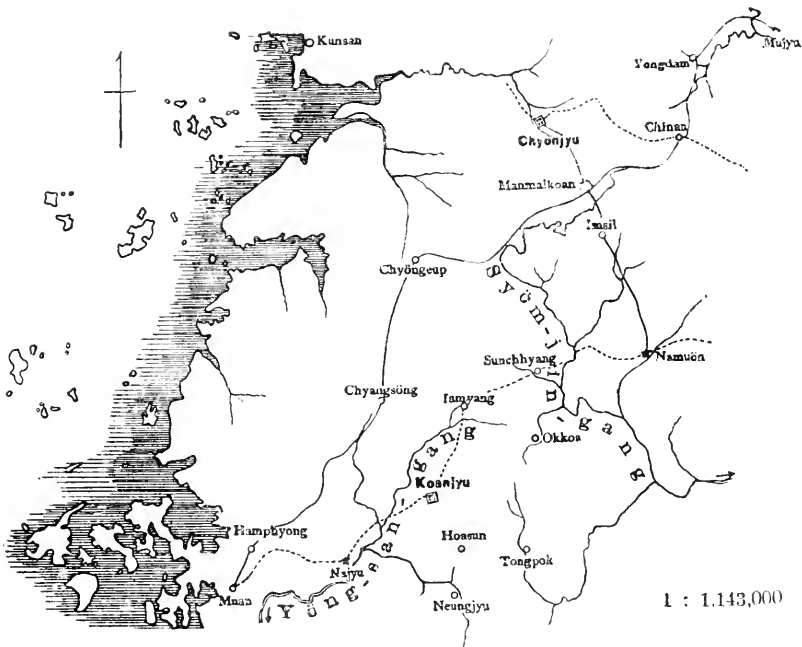
Having crossed a stream<sup>4)</sup>, we saw toward the north an isolated, rather high granitic hill, jutting out from an eastern mountain with the east-west trend, and commanding the whole view. On the flattened top is an old castle, and at its south foot is the *cummäi* of *Ik-san*<sup>5)</sup>, the site of one of the ancient capitals of the kingdom of *Päik-chyöi*<sup>6)</sup> or "One hundred Families."

Our road then led across a plain and finally over a hill of granite (Pl. XXVII. fig. 1) to the provincial capital, *Chyön-jyu*.

1) See *ante*, page 109. 2) See *ante*, page 110.

3) 威悅 4) Sä-mul (泗水) at Tai-jyang (太場). 5) 益山 6) 百濟

As low conical granitic mounds are seen scattered here and there on the plain, while the mylonitized granite (orthogneiss), which is only a pathological variety of the same, forms the moat-like crest, it may be safely assumed that the granular granite yields more easily to weathering and abrasion than the sheared and pressed granite. The plain we passed through is therefore formed by differential degradation and worn away in the granitic terrane. Such granitic basins are frequently met with, and constitute one of the characteristic land-features of this country, indicating at the same time that the peninsula has been in the continental period for a long geological æon, at least since the beginning of the Tertiary.



Sketch map showing Mr. Yabé's route in the "Spatulate Mesozoic area," the dotted lines being the writer's routes.

I. The Profile between **CHYÖN-JYU** and **NAM-UÖN**

The geology of the environs of *Chyön-jyu* (Pl. XXVII. *f*<sub>1</sub> 2 and 3) is rather complicated and interesting.

I shall first of all take up the section between the towns of *Chyön-jyu* and *Nam-uön* across what I call the *No-ryöng ridge*<sup>1)</sup> on the highway of south-west Korea through the *Man-mal-koan*<sup>2)</sup> pass. It was Mr. YABÉ who made the trip here, and I follow him giving brief remarks on the rocks from a suite in his collection. (See the annexed sketch map.)

I have already spoken of the granite of *Nam-uön* in my second traverse<sup>3)</sup>. It is a light-colored, slightly pinkish (ortho clase) coarse biotite-granite, showing slight indications of schistosity and porphyritic structure. It is pierced through by a dyke of wet-gray compact rock which, under the microscope, is seen to consist of microphenocrysts of feldspar and biotite in sericitic groundmass with speckled polarization. The phenocrysts are all decomposed, and what is remarkable is that the feldspar is entirely replaced by calcite. Farther north, the rock is changed into "Augengneiss" with titanite, the white lenticular feldspar which makes "eyes" being 2 *cm* in size. It is not known whether or not the granites are parts of the same rock. The "Augengneiss" is variously traversed by dykes of tourmaline rocks.

Im-sil

From *Im-sil*<sup>1)</sup> we entered the Mesozoic terrane, and the first rock met with was a conglomerate consisting of gravels of gray schistose rock and quartz, cemented with arkose matter. It is

1) "An Orographic Sketch of Korea." This *Journal*, Vol. XIX. Article I. page 14.

2) 萬馬關 3) See *ante*, pages 78 and 79.

1) 佐賀



underlaid by a complex of green marl and white tuffite, making an anticlinal near the well-known *Man-mal-koan* pass with its stone gate (the strike N. 30° E., the dip N.W. or S.E.).

The northern flank is again built up of orthogneiss, though 'eyes' are wanting here. It is a coarse but hard reddish granite. The microscope discloses that the idiomorphic oligoclase, which is altered into sericite, is enclosed by orthoclase and microcline. The orthoclase likewise shows signs of muscovitization, while the microcline is fresh with a reticulated structure. Biotite is altered into epidote and chlorite, and dragged into tissue-like bands. Crystals of rather large apatite and small zircon are present. Quartz is reduced to cataclastic grains. It is an alkaline orthogneiss.

Near the provincial capital, *Chyön-ju*, the rock is overlaid by a complex of Mesozoic sericite schists.

MESOZOIC  
SCHISTS

One member is a foliaceous *para-biotite-schist*, consisting of fine biotite scales alternating with quartzose bands.

The second is a grayish *graphite-schist* with silky lustre on the plane of cleavage. The main bulk consists of quartz with a little plagioclase, showing hornfels-structure. The rest is made up of sericite membrane with coaly particles. The granulated surface of cleavage is due to quartz grains.

The third is a fine granular schist of nephrite-like appearance. Microscopically it consists of quartz and reedy tremolite with poikilitic grains of quartz. Feldspars are wanting, but drop-like titanite is present. This is *tremolite-schist*. Mr. K. IXOUYÉ found a schist of similar appearance in the gold region of *Keum-gu*<sup>1)</sup>, not far from here. The rock, however, contains malacolite instead of tremolite. Both rocks seem to have been altered from an impure limestone.

1) 金溝

The fourth is a psammitic *quartz-schist* slightly tinged with yellow.

The last is a phyllitic foliaceous *sericite-schist*, and is a modification of the second. The flecks are produced by the accumulation of graphite. The general mass is made up of quartz grains of honey-comb structure. A few tourmaline rods are present as an accessory.

These schists make multifarious alternations with the strike N. 60° E., and the dip 70° N.W., well exposed at the old castle.

At the west of the town, members of the same schistose series, but of different petrographical characters, are exposed, keeping the same strike and dip. The prevalent rock is a white, sericitic "Lagengneiss", consisting of quartz-orthoclase aggregate with hornfels-structure. A rather large microcline contains quartz grains in the poikilitic fashion. Sericite occurs in thin laminae. The strike is N. 60° E., and the dip 80° N.W.

Intercalated with the above, there occurs *epidote-hornblende-gneiss* having a microtexture of the so-called *Lagen* and woody forms, both combined. Individual grains are aggregated so as to produce the hornfels-structure. Components are grains of quartz and a few feldspars in small quantities, besides needles and lashes of grass-green hornblende. Drop-like titanite and epidote grains are also present. The rock is the injected apophyses sheared subsequently to the present form.

The complex is warped up at the north end with the contrary dip, thus producing a syncline on the base of a biotite-granite.

II. The Basin of the Upper KYÖNG-SANG Formation,  
or the NO-RYÖNG Ridge Area

a) From Mu-an to Chyöng-eup

(See sketch-map, p. 113.)

In the preceding descriptive profile from *Chyön-jyu* to *Nam-uön*, we crossed the *No-ryöng ridge* between *Im-sil* and *Sö-uön* at the *Man-mal-koan* pass. That part of the section consists of conglomerate, black marl, and light-colored tuffite, corresponding to the "Marl Series" of the Upper *Kyöng-sang* Formation, and runs across the spade-shaped basin of the said formation now rising as a distinct ridge through differential erosion in south-west Korea.

In order to arrive at some definite idea as to the extent, the tectonic condition, and the reciprocal relation of the said complex to the surrounding formations, I shall start from the south-west end of this spatulate area. I myself have not been in this region, and what I give in the following is a composite picture drawn after inspection of the field sketches and rock-specimens placed at my disposal by Mr. YABÉ.

In my second traverse from the treaty port of *Mok-pho* to *Mu-an*, I have already spoken of a foliaceous graphite-sericite-schist<sup>1)</sup> with the strike N.E.—S.W., and the dip S.E. at the latter locality. The Mesozoic metamorphic schist is underlaid conformably by a sericite-quartz-schist at *Ham-phyöng*<sup>2)</sup>. Mr. NIYAMA went due north to *Yöng-goang*<sup>3)</sup>, finding on the way a tongue of green breccia of felsophyre on the gneiss-granite; but Mr. YABÉ took a northeasterly route from *Ham-phyöng* to *Chyang-söng*<sup>4)</sup>

1) See page 70. 2) 咸平 3) 靈光 4) 長城

along the strike of the Mesozoic metamorphies, first meeting with the same breccia formation with the strike N.N.W. and the dip N.E.—a part of the breccia region, described somewhat in detail<sup>1)</sup> in the Second Traverse. Further onwards he found a gray, banded, non-fossiliferous, crystalline limestone, white quartzite, reddish sericite-quartz-schist with parallel-planed cleavage (the metamorphic Mesozoic), and red felsophyre at *Oi-chhi*<sup>2)</sup> where a reddish gneiss-granite again made its appearance. The limestone contains microscopic patches of sericite and grains of quartz. About 7 km this side of *Chyang-söng* on the east side of the flat, Prof. C. GÖTTSCHE<sup>3)</sup> found another limestone (*Ssari-chhi*<sup>4)</sup>) with garnet and vesuvianite. It is undoubtedly one of the Mesozoic members.

CHYANG  
SÖNG  
MESOZOIC

*Chyang-söng* has been known to geologists since the journey made thither by GÖTTSCHE in 1883. According to him<sup>5)</sup> there occur at *U-dong*<sup>6)</sup> between gneiss and porphyry-tuff the following beds :

1. Fine-granular sandstone, 10 m ;
2. Dark marly-slate with gastropoda, ostracoda and plant-remains, 3 m ;
3. Medium-granular conglomerate, 20 m.

As the strike of the complex corresponds with those of *Nak-long*, *Ul-san*, and *Ko-söng* (*Kyöng-sang-Do*), it is provisorily included by him in the Paleozoic.

In Mr. YABÉ'S collection, the district from the north of *Chyang-söng* to *Chhyöng-am*<sup>7)</sup> is represented by the following rocks : (1) Light-reddish *felsophyre*, and (2) fine *masanite*. From the latter

1) See page 72. 2) 外峙

3) "Geologische Skizze von Korea." Sitzungsber. d. Akad. d. Wiss. zu Berlin, XXX. 1886, S. 861.

4) 扭峙 5) *Loc. cit.* S. 868.

6) 牛洞 7) 靑岩 A few kilometers north of *Chyang-söng*.

place northwards are found, (3) greenish amygdaloidal rock, (4) compact dark-gray *diabase-aphanite* with phenocrysts of hornblende surrounded by a resorption-border and light-brown augite (the groundmass has interstitial colorless glass), (5) thick grayish, non-calcareous *shale* with plant-remains, and (6) greenish, finely-granular, aphanitic *diopside-porphyrite*. Further northwards we meet with (7) a brownish *fusion-breccia*, (8) coarse, sheared *granite*, (9) a fine modification of the same, and lastly, (10) a two-mica-bearing *ortho-gneiss* which is scaly and imperfectly schistose, with apatite and tourmaline. At the well-known *No-ryöng*<sup>1)</sup> pass there occurs a grayish porphyritic rock with rectangular plagioclase, 7 mm in size, having quartz grains in the microgranitic groundmass with approximately rectangular orthoclase. It is a *porphyritic masanite*. Numbers 1-7 should be included in the *Kyöng-sang* bed.

The country suddenly opens northwards from the *No-ryöng* pass toward *Chyöng-eup* and the plain of *Chyön-ju* through foothills of orthogneiss. The gradual ascent through the *Kyöng-sang* terrane and the sudden descent beyond on the orthogneiss region are the characteristic features of the "spatulate area" of the *No-ryöng* ridge.

Not much light has been thrown on the local geology since GOTTSCHE's visit. From its lithological characters I am disposed to think the bed of *Chyang-söng* to be the equivalent of the "black series" of the Upper *Kyöng-sang* formation, *i.e.*, post-Jurassic. As to the relation of the complex developed here and that of the green breccia of *Komang-gol*<sup>2)</sup>, lying a little further south, I consider them contemporaneous in a broad sense, representing

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1) 蘆嶺 2) See page 72.

only different facies, and so have colored my map with separate tints.

β) From Chyöng-eup to Chin-an

(See sketch map, p. 113.)

In order to ascertain the extent of the "spatulate area" in my unpublished map, Mr. YABÉ made a trip in the east-west direction from *Chyöng-eup*<sup>1)</sup> to *Chin-an*<sup>2)</sup> via *Man-mal-koan*<sup>3)</sup>, already referred to.

CHYÖNG-  
EUP

Having started eastwards from the first-mentioned *eumnäi* on the southern edge of the *Chyöng-jyu* plain, he travelled on the granitic terrane. It is a grayish, coarse, sheared granite with rectangular feldspar (orthoclase or microcline,  $1\frac{1}{2}$ –2 cm long). YABÉ crossed the *Sunchhyang-Chyöngjyu* highroad (meridional) at *Yöm-am*<sup>4)</sup> where the orthogneiss comes in contact with several of the basal members of the Upper *Kyöng-sang* formation. One rock is (1) a dark-gray, calcareous diabase-aphanite, containing microphenocrysts of chloritized diopside, associated with red, calcareous marl<sup>5)</sup>. At *Yöm-am*, a stream is full of (2) orthogneiss gravel, but a pass toward *Chin-an* is already of the young formation built up of (3) white, silicified spherulite-rock, (4) dull-white, devitrified perlite, (5) dark, flinty diabase-aphanite, microscopically similar to No. 1., and (6) ash-gray, amygdaloidal diabase. These various effusives dip W.N.W., and are overlaid or underlaid as far as *Man-mal-koan*<sup>6)</sup> by a complex of dark marl<sup>7)</sup> and sandstone, the former having imperfect plant impressions, and the strike N. 30° E., with the dip at first to the N.W.,

1) 井邑 2) 鎮安 3) See page 114.

4) 鹽岩 5) At Söng-hoang-dong (城隍堂). 6) See Yabé's trip, page 114.

7) Not far from this locality gold is washed from the soil directly overlying the marl.

but afterwards to the S.E. The complex makes a slow anticline, and stratigraphically it corresponds to the *Chyang-söng* bed first discovered by C. GOTTSCHÉ<sup>1)</sup>.

From *Man-mal-koan* on the high-road<sup>2)</sup>, YABÉ marched eastwards on a country road over the same marly and green tufaceous rocks with the same strike, but dipping in a south-easterly direction, overlaid by a strong bed of the Mesozoic conglomerate near *Chin-an*, and presenting a remarkable erosion form looking, when seen from a distance, like a pair of erect pony's ears (Pl. XXVIII. *fig.* 2, and Pl. XXIX. *fig.* 1); hence the name *Mal-i-san*<sup>3)</sup>. It is regarded as a sacred double peak and is well known among the natives, like the Tertiary conglomerate of Kalabaka in Thessalia.

I shall touch the *cumñäi*, *Chin-an*, in my next trip (page 125).

Comparing Mr. YABÉ's specimens with mine from other regions, I am forced to the conclusion that the principal members — (1) the red tuffite, (2) the black marl and green tuffite, and (3) the sheet of porphyrite (Pl. XXXIV. Profile AB, Nos. 1, 2, 3) of the Upper *Kyöng-sang* formation are all represented in this spatulate area, though it is impossible for me to give cartographical expression to this opinion.

After this short digression, we shall now quit the provincial capital *Chyöng-juu* (Pl. XXVII. *figs.* 1 and 2), and continue the diary of our journey toward *Chin-an*. Our road led eastwards through spurs of hills of the sericite-*Lagen*gneiss and the epidote-injection-gneiss (the strike N. 60 E., the dip N.W.), already referred to as occurring on the west of the town. They are variously faulted at right-angles to the strike (N.W.-S.E.). We

MAN-MAL-  
KOAN PASS

CHYÖNG-JYU  
TO  
CHIN-AN

1) See page 118. 2) See page 115. 3) 馬耳山

followed them for 10 *km* as far as *Ku-jin-ni*<sup>1)</sup> where porphyritic masanite made its appearance. This carries the phenocrysts of orthoclase and plagioclase in a microcrystalline groundmass. It is a part of a large mass that stretches northwards to *Ko-san*<sup>2)</sup>. Red tuffite occurs abundantly as river-gravel coming from the northeast, but its origin is unknown. Feldspar-conglomerate is also found as blocks on the flat. Both bespeak the proximity of the Upper *Kyöng-sang* formation.

The road next turns southeastwards (Pl. XXVIII. *fig.* 1) to the ascent of the *Chyöng-nai-chhi*<sup>3)</sup>, 450 *m* high, on the eruptive terrane of masanite, coarse tourmaline-pegmatite, limestone (?), and sheared aplite with pseudocleavage oriented N. 60° E., dipping S.E. The top is of the *Chyöng-jyu* gneiss, pierced through by muscovite-pegmatite.

At *Söi-dong*<sup>4)</sup> on the high plain (320 *m*), we again entered the terrane of the spatulate area of the Mesozoic, the rocks being represented by greenish flinty tuffite and black marl, the latter containing pistachio-green epidote-concretions (2 *cm* in diameter) with fimbriate fissure-border. This peculiar but characteristic concretion or rather induration is met with in the marl in contact with granite at *Phyöng-häi*<sup>5)</sup> on the east coast, and also in the Mesozoic marl in contact with porphyrite in the province of Nagato, Japan, where it goes by the name of "grape-stone" (*budö-seki*). From analogy with other occurrences, I take it as having resulted from a contact metamorphism either with granite or diabase-porphyrite; but I have not seen the actual contact. Another contact hornfels of reddish tint from marl and sandstone is in Mr. YABÉ's collection. The third contact rock is

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1) 九津里    2) 高山邑  
3) 笛川峠    4) 細洞    5) 平海



somewhat remarkable. It is a dark, coarse-lamellar mica-schist, full of andalusite-crystals ( $1\frac{1}{2}$  cm long). Under the microscope one finds both the pinitized and fresh andalusite with enclosed biotite, besides large orthoclase enclosing poikilitic quartz. The quartz of the general mass presents the typical hornfels-structure. Chocolate-brown, irregular lamellae of biotite and muscovite are found together with the felted sillimanite. The geological relation of the last two contact rocks is unknown to me.

The marl series is overlaid by a red conglomerate which consists of orthogneiss, reddish porphyrite, and marl, striking northeastwards with the southeast dip. The sedimentaries make low mountains on the high flat (300 m), above which the popular *Mal-i-san*<sup>1)</sup> rises precipitously on the south. The transgressing conglomerate peak rests directly upon a gneiss-granite. The *eumñi* of *Chin-an* itself is on this sheared eye-gneiss.

Side-excursion from CHIN-AN to YONG-DAM<sup>2)</sup> and MU-JYU<sup>3)</sup>

(See sketch map, p. 113.)

In order to ascertain the eastern extent of the "spatulate area" of the Upper *Kyöng-sang* formation, it was thought well to make a short digression northwards.

Following the stream down northwards for 4 km on the sheared eye-gneiss terrane, Mr. YABÉ met with the above-mentioned formation, represented by thick conglomerate of orthogneiss, quartzite, and sandstone, and thin bands of red marl, dipping S.S.E., which conforms to the general orientation

1) See page 121, and Pls. XXVIII. fig. 2, and XXIX. fig. 1.

2) 龍潭 3) 茂朱

of the complex. A stream with a deep channel runs along the strike in the conglomerate.

Near *Yong-dam*, however, sheared eye-gneiss again makes its appearance, and is followed by coarse-lamellar ortho-biotite-gneiss, associated with a little calcareous, chloritic sericite-plagioclase-schist, the latter being a mylonitized basic dyke rock. The sedimentary complex has here a breadth of only six kilometers. The stretch between *Yong-dam* and *Keum-san*<sup>1)</sup> which lies to the north is mainly occupied by a gneiss-granite, but 4 km before reaching the latter place an iron-glaucophane-mica-schist of the appearance of a certain glaucophane-schist was seen (Pl. XXVIII. fig. 3). It consists of sheared quartz with sillimanite fibers, besides opaque iron-glaucophane and silvery sericite. The mode of occurrence of this para-mica-schist is unknown. The *eummäi*, *Keum-san*, itself lies on a porphyritic masanite.

Leaving details to my Fourth Traverse, I shall now follow Mr. YABÉ's route eastwards to *Mu-jyu*, encountering first the gneiss-granite and then a coarse-lamellar biotite-gneiss as far as the *eummäi*. In Mr. YABÉ's collection there is found from the last locality an adinole-like rock consisting of chlorite and sericite in microcrystalline mass. Its geological relation is not clear. At *Mu-jyu*, a porphyritic masanite is found capped with red, calcareous tuffite and red felsophyre, together with sandstone and conglomerate, and having the slow south-west dip. The ancient citadel of the *eummäi* is on the upper flat surrounded by steep cliffs, thus suggesting the red skirt of a dress (Pl. XXVIII. fig. 4); hence the name *Chyökh-sang-san*<sup>2)</sup>, or "Mt Red Skirt." It looks like the butte of the western United States.

1) 錦山

2) 赤裳山

It is the eastern termination of the "spatulate area" which we have traced from *Chyang-söng*<sup>1)</sup>.

On the way from *Mu-ju* to *Chi-ryöi* in *Kyöng-sang-Do* over the well-known *Tai-tök-san* pass, there occur a number of abnormal eruptives represented in YABÉ's collection. One rock is a talcose quartz-schist which probably resulted by pressure-granulation from aplite. The other is an orthogneiss showing crystallization-schistosity: the quartz and orthoclase of the rock are so aggregated as to produce a granular implication-structure. The third is a fusion-breccia of the character of quartz-porphry, containing abundant fragments of quartz in the cryptocrystalline ground-mass of fluxion-structure.

All these rocks bear the stamp of a marginal facies of granitic magma, and though interesting from the standpoint of petrology, simple inspection of rock-specimens is of no help in ascertaining their geological relations. One thing, however, is certain, viz., that the sericite-schist which closely resembles that of the typical Taunus schists, has resulted from one of the two last-mentioned by a katamorphic shearing of the crust. The typical sericite-schist is found at the province-boundary along the railway cutting at the well-known *Chhyu-phun-nyöng* pass<sup>2)</sup>. This so-called *Metamorphic Mesozoic* (Algonkian?) has already been referred to as occurring at *Tong-pok*<sup>3)</sup>.

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After this short digression, I now resume my itinerary from *Chin-an*. The *cummäi* is at the water-shed (about 300 m), the streams on one side flowing to the southern archipelago, on the

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1) See *ante*, pp. 117-123.

2) 秋風嶺

3) See page 68

other to the Yellow Sea. Our road cut through a hill-neck of coarse-lamellar biotite-orthogneiss which is at first undulating, but finally dips to the northeast with the strike N. 20° W. The little flat of *Mul-kö-sil*<sup>1)</sup> was next reached, and there unexpectedly we met with a hornblende-porphyrite in a broad dyke carrying on its east shoulder a gray zigzag-lamellar mica-schist with white spots (the strike N. 20° W., the dip 80° N.E.), being overlaid on the east by a sheared reddish orthogneiss with pseudo-cleavage N. 40° W., the dip N.E. It is traversed by a coarse microcline-pegmatite with muscovite and large tourmaline crystals. The dyke trends N.E.–S.W., making hills for a considerable distance southwards. The contact-metamorphosed mica-schist is of a sedimentary origin, being built up of psammitic quartz-grains alternating with coarse zigzag bands of brown biotite and white brittle muscovite, with helicitic structure. This coming together of the porphyrite, contact schist, and reddish gneissoid granite is to me paradoxical. It is possible that we here have to do with a pinched relic of thrust-blocks (Pl. XXXIV. FG, ph).

The way up to the *Pha-kogäi* (490 m) is built of pressed orthogneiss with injected veinlets, metagneiss, and crushed pegmatite with microcline and perthite; the pegmatite being therefore of the alkaline variety. The descent to *Söng-dam* (350 m) is also a sheared granite with a distinct pseudo-cleavage dipping southwards. The *Pha-kogäi*, just passed over, is an important topographic element. It is a sharp ridge which, coming northwards from the *Pi-hoang-chhi*<sup>2)</sup>, passes here northwards to the *Chhyu-phung-uyöng* pass (p. 125), where it joins with other converging ridges. Separated from it by a meridional valley of the "Red

1) 物巨谷

2) See *ante*, pp. 78-79.

River," there arises on the eastern horizon the still mightier ridge of the snow-covered *Yuk-sim-nyöng* on the boundary of the province. This ridge I climbed the next day, January 10th, 1901, and stood on one of the highest points in the high interior of *Chyöl-la-Do*.

The "Red River" was next crossed, on its way from the open south to its closed gorge on the north. The *Phan-kogäi*<sup>1)</sup> was then crossed on granite-gneiss with the shear plane likewise dipping easterly, and we entered the little intermontane flat of *Chyang-gyöi-jyang*<sup>2)</sup> (Pl. XXIX. *fig.* 3). The rock is a rather fine-granular hornblende-gneiss-granite, composed of plagioclase, orthoclase, irregular scales of deep-brown biotite and also irregular plates of deep brownish-green hornblende with poikilitically inclosed crystalloids of quartz. It is a dioritic orthogneiss with crystallization-schistosity showing scarcely any signs of the mechanical shearing which is the commonest phenomena observed in the Korean granites.

We rode up a gradual slope (see the view cited above) of porphyritic gneiss-granite pierced through by a dark diorite, and finally reached the steep pass (690 *m*) of the *Yuk-sim-nyöng*, (Pl. XXX. *fig.* 1). The name, which means "sixty", refers to the fact that in early days during an interval of a few months some sixty travellers were here waylaid and robbed by bandits. This was the highest point of the present traverse, and is on the boundary between the provinces of *Kyöng-sang* and *Chyöl-la*. The rock on the top is a coarse whitish granite, made slightly schistose by shearing, with the schistose plane inclining northwestwards; it contains large microcline crystals,  $3\frac{1}{2}$  *cm* long. On our left stood the bald

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1) 板規 2) 長溪場

granite prominence of *Töj-yu-san*<sup>1)</sup> which is frequently mentioned in works on the geography of the peninsula.

*Töj-yu-san* (Pl. XXX, fig. 2) and its neck, the *Yuk-sim-nyöng* pass, are direct prolongations of the pass of *Yö-nön-chhi*<sup>2)</sup> trending here northeastwards to the well-known *Tai-tök-san*<sup>3)</sup> between *Mu-ju* and *Chi-ryöi*. The southern flank of *Töj-yu-san* descends precipitously into a gulch from which a deep valley starts southwards. The road descends to the very bottom (360 m) of the valley. As the coarse porphyritic gneiss-granite has the shear-plane dipping west, the ascent is gradual from the side on the pseudo-cleavage face, but the descent to the east is steep, the road zigzagging down a basset of schistose rocks, about 330 m in thickness. A similar *cul-de-sac* of its south neighbor with the same orientation was seen far up the *Han-yang* valley, and both are so closely related that they seem to have a common geotectonic structure.

Our valley turned at first southeast, then northeast, traversing the core of the axis of another ridge, here called *Hoang-sök-san*. The ridge, which has some prominent features and a monastery, comes from the *Phal-hyöng-chhi*, mentioned in the Second Traverse<sup>4)</sup>, and ends at *Tai-tök-san* on the north. The rocks are of the *Yuk-sim-nyöng* type, but a little finer with large microcline crystals. About 5 km this side of *An-cui*<sup>5)</sup> (*Koan-beuk*), they become gneiss-granite and *Augen-Lagengneiss* with the vertical plane of schistosity trending N.50° E. Here the clear stream runs down a tortuous channel with a deeply eroded bed broken by low cataracts. I saw a fine summer-house (Pl. XXX, fig. 2) in the shadow of the forest on the river bank,—a choice spot for

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1) 德裕山 2) See *ante*, page 80. 3) See *ante*, page 125.

4) See *ante*, page 81. 5) 安威

lovers of scenery. The place is called *Nophem-chyöng* or the "High Summer-house." It is 140 *m* lower than the foot of the *Yuk-sim-nyöng* pass, and is the outlet to the hilly land of the *Nak-tong* basin. We were then in the *eumnäi* of *An-cui* (150 *m*), our nearest approach to *Sa-keun* on the route of the First Traverse<sup>1)</sup> which was only 11 *km* distant.

Leaving the *eumnäi* we climbed a pass northwards on a slightly schistose gneiss-granite with vertical shearing plane, trending N. 40° E. The rock is fast disintegrating into arkose sand. We did not take the somewhat roundabout way to *Kö-chhyang*<sup>2)</sup>, but proceeded due east coming down to a shallow valley, which brought us to *Sin-gol* located at the entrance of an equatorial gorge. Looking back at the mountain just crossed, we saw that it was a rather high ridge, trending in the same direction as the gneiss itself, *i. e.*, N.30 E.; but toward the northwest in the direction of *Kö-chhyang* and farther northwards, the land is open, and the oft-mentioned *Tai-tök-san*<sup>3)</sup> of the hinterland was seen culminating in a snow-capped crest.

It was somewhat surprising to find ourselves in a low and open region of granite hills in this intermontane area. The low, hilly tract extends from *Ham-yang* at the foot of the *Chiri-san* to *Keum-san*<sup>4)</sup> viä *An-cui*, *Kö-chhyang*, *Chi-ryöi*, and farther north-eastwards, all along the eastern foot of the boundary-ridge. We cannot attribute this formation simply to subaërial erosion and a loose underground structure; for the rocks of the ridge and the hills are exactly alike. We must therefore look for another cause in accounting for the present low relief. The writer thinks it probable that the uplifting of the boundary-ridge, the *So-päik-*

1) See *ante*, page 82. 2) 居昌

3) See *ante*, pp. 125 and 128. 4) 金山 A station of the Seoul-Fusan Railway.

*san* range, caused the sinking of the inner, east side which corresponds to the down-warped region under question.

We then proceeded from *Sin-gol* eastwards through the gorge in which the scenery was fine. Though it was dusk and we were hastening on along the course of the torrent of the *Nam-chhyön*, we still noticed gneiss-granite. At about the middle of the gorge, a dark sheared hornblende-granite resembling "Flasergabbro" appeared followed soon by fine orthogneiss as far as *Koan-bin*<sup>1)</sup>. From the lithological character of the rock and the direction of the shearing plane in it, I thought I was passing the easternmost ridge of the *So-päik-san* range in defile, corresponding to *Chhyöng-möri-chhi* in the Second Traverse<sup>2)</sup>.

Having left the mountain-depression in which the village of *Koan-bin* is situated, we went eastward up the water-shed<sup>3)</sup> (170 m) from which the land gradually sloped away toward the *Nak-long-gang*. The rock was still gneiss-granite stretching N. 60 E., with the dip N.W., instead of being vertical. This was the prevailing orientation of the rock of this region. On the east side of the pass gravel of an apparently contact rock, banded blue and gray, was found in abundance. I saw it also in the distance crowning the orthogneiss at the top of *O-to-san*<sup>4)</sup>. If it proves to be really a contact rock, the metamorphosing rock will be the gneiss-granite. The whole state of things here is to me entirely paradoxical.

All the way the same gneiss-granite was exposed except at *Ha-yang* where a gneiss-granite was seen for a short distance with red porphyritic feldspar. It is probably a later intrusive.

About 9 km from *Koan-bin*, a stream makes a sharp curve

1) 勸資 2) See ante, page 85.

3) Chü-ri-chhi 思里峙 4) 五島山



below a bluff of the same rock overlaid by thick grayish sandstone. The sandstone becomes conglomeratic at its base, containing gravel of granitic rocks, intercalated with gray marl, clearly seen on the buttress-shaped *Man-tai-san*<sup>1)</sup>. The place is called *Nopheun-chyöng* (55 *m*). Not far from here Mr. IXOUYÉ found a fossil bed containing the flora described by Mr. YABÉ at the village of *Nak-tong*<sup>2)</sup>. It is the "Nak-tong Series." From this hamlet eastwards the country opens in a broad valley with low cliffs, exposing a well-stratified Mesozoic complex of gray sandstone and red marl with the strike N.N.E., and the dip 10° S.E. It is the "red series" of the *Upper Kyöng-sang formation* (Pl. XXXIV. Profile FG [sdm and ml]). Turning left at *Mäi-gol*<sup>3)</sup>, we finally arrived at the *eumnäi* of *Kö-ryöng*<sup>4)</sup> (35 *m*).

The province of *Kyöng-sang-Do* lies on the genial south side of the *So-päik-san* range, and is the ultramontane region of the north Koreans, who call the province *Nyöng-nam*<sup>5)</sup> or the "Mountain-south." The *Nak-tong-gang* drains the whole province, and approximately divides it into two halves. In early days the east half was subject to the *Sil-la* kings<sup>6)</sup>, while the west half was subdivided into the six petty kingdoms of *Ka-ya*<sup>7)</sup>.

The *eumnäi* of *Kö-ryöng* was the chief town of The *Great Ka-ya*<sup>KO-RYÖNG<sup>1)</sup></sup> which was finally absorbed by *Sil-la*. It is now a miserable town or rather village lying on the east slope of *Chyu-san*<sup>8)</sup>, the "Vermilion Mountain," built up of "red marl" (the strike N. 30° E., the dip 20° S.E.). On the east front is the junction of two streams, the northern confluent, *Ka-chhyön*, comes from the northwest rising in the well-known *Ka-ya-san*<sup>9)</sup> (1184 *m*) in a

1) 萬代山 2) See *ante*, page 36. 3) 梅洞 4) 高靈 5) 嶺南  
6) See *ante*, page 99. 7) 伽耶 8) 朱山 9) 伽耶山 See *ante*, p. 90.

recess of which is located an old and noted monastery with a few relics of the *Sil-la* civilization. The high *Ka-ya-san* is built up of gneiss-granite, and is the northeastern outpost of the easternmost ridge of the *Chiri-san sphenoid*. The ridge suddenly lowers on the north to a hilly tract through which the Seoul-Fusan railway traverses the peninsula. It is the land-feature that separates the granitic region from the sedimentary terrane, and commands a view of the entire southeastern *Kyōng-sang-Do*.

Our road then led eastwards along the river where we found exposed thick beds of red marl (Wellenschiefer) alternating with massive strata of a gray muscovite-bearing sandstone, striking N. 30 E. and dipping slowly 20 S.E. The complex was still the *Red Marl series*. At last we found ourselves once more<sup>1)</sup> on the bank (Pl. XXX, *fig.* 3) of the *Nak-tong-gang* at *Kue'-pho*<sup>2)</sup> (20 m). A splendid exposure of the "red series" on the *Nak-tong-gang* consists of an alternation of three rocks,—a strongly effervescent red marl and a reddish sandy tuffite, the latter consisting of splinters of plagioclase, orthoclase, quartz, and fragments of red porphyrite, cemented with sesquioxide of iron, while the third is a light-green arkose sandstone or rather tuffite consisting likewise of splinters of quartz, orthoclase, plagioclase, and flakes of biotite and muscovite, cemented with calcareous and chloritic substances.

After having crossed the river at the ferry (Pl. XXXI, *fig.* 1) of *Hol-gāi*<sup>3)</sup>, we found ourselves in the *cummāi* of *Hyōn-phung*<sup>4)</sup> which is still in the "red series." Looking back towards the west, the rugged, serrated ridge of *Ka-ya-san* was seen with foothills of the red formation, while in the east we looked up

HYŌN-  
PHUNG.

1) See pages 16 and 87. 2) 闊浦 3) 忽浦 4) 玄風 Pl. XXXI. *fig.* 2.

Mt *Pi-soul-san*<sup>1)</sup> rising direct and steeply (Pl. XXX. *fig.* 3) from the *cumnaïi*. The latter is partly composed of the "black shale series" intruded by a coarse buff-colored masanite of an aplitic habit. The sedimentaries stand with their backs to the west.

As I had already touched *Tai-ku*<sup>2)</sup> in the Second Traverse, I then turned southwards to reach *Fusan*. The new geological terrane is built up of perfectly fissile black shale or rather slate alternating with flinty green tuffite (the strike N.W.—S.E. (!), and the dip N.E.). We made 32 *km* through *Chhyang-nyöng* (Pl. XXXII. *fig.* 1) and *Yöng-san* along the strike of the complex, intersecting on the way the route of the Second Traverse<sup>3)</sup> near the former, and touching the laccolite of aplitic masanite near the latter. The people of this district were not friendly. From here we had an excellent opportunity to survey the physiography<sup>4)</sup> of the trench-like hilly land (Pl. XVIII. *fig.* 3) on the right side of the *Nak-tong-gang*, composed of the lower half of the *Kyöng-sang formation*. The *Nak-tong-gang* following an equatorial tectonic line makes a sudden turn eastward after receiving an affluent from *Chin-jyu*. The change of the river-course is undoubtedly due to a tectonic structure caused by the uplifting of the equatorial *Han-san* range on the south side of the stream.

The road leads directly to *Ma-san-pho* across the ferry of *Song-jin*<sup>5)</sup> which is the upper tide limit in the *Nak-tong-gang*. We, however, marched to *Sam-nang-jin*<sup>6)</sup>, now a railway junction, through an equatorial tectonic valley which runs parallel to the transverse course of the river. This transverse valley (Pl. XXXII. *fig.* 2) is an instructive example of a tectonic structure, being

1) 琵琶山 It is the same granitic mountain that was seen from *Tai-ku* toward the southwest. See *ante*, page 90. It is the western continuation of the fault-scarp which we had crossed at O-dong.      2) See *ante*, page 89.      3) See *ante*, page 88, Mal-li junction.

4) See *ante*, page 32 on the mature topography.      5) 松津      6) 三浪津

walled on our left (north) by a sheer precipice of many hundred feet, exposing thick bands of red breccia which dip slowly eastwards; while the right or depressed side was a series of discontinuous hills. The road follows the axis of the V-shaped valley bottom.

Not far from *Yöng-san* we observed a change in the nature of the rock from sedimentary to igneous. The latter is the eruptive (Upper) *Kjöng-sang formation*. The best exposures were seen at *Chi-tari*<sup>1)</sup> where the fusion-breccia, consisting of fragments of greenish and reddish volcanics, becomes almost massive. It is an ancient lava-flow. In appearance it resembles an augite-andesite<sup>2)</sup>, though geologically it is inseparable from the diopside-porphyrite which has been frequently mentioned. The greenish porphyrite is characterized by the presence of chlorite and epidote, and the reddish variety by iron-glance. At *Ku-pak*<sup>3)</sup> at the south foot of *Chyong-nam-san*<sup>4)</sup>, I saw gold-washing being actively carried on in the sand, the excavations being carried to a depth of 40 feet in the gravel of the breccia. This is a new type of the occurrence of gold, but the original home of the precious metal is not definitely known.

SAM-NANG-  
JIN  
JUNCTION

At *Sam-nang-jin*, now a railway junction, we were still in the region of porphyrite much weathered and colored green by chlorite and epidote. After having made 4 km on a sandy flat, we turned southeast where the *Nak-tong-gang* river takes a southeasterly course through the gorge of the *Kkachhi-uön*<sup>5)</sup> gate. The narrows are built up of reddish, brecciated felsophyre with the phenocrysts

1) 芝橋

2) This is probably the same rock as that found near *Mil-yang*, and described by T.H. Holland under the name of andesite. "Notes on Rock-specimens from Korea." *Q.J.G.S.* 1891, p. 181.

3) 九朴 4) 從南山

5) 鶴院關 Pl. XXXII, fig. 3. See *ante*, page 16.

of plagioclase and quartz in a fluidal glassy groundmass, now greatly devitrified. The mass has gentle easterly dips. We have here a good example of the coming together<sup>1)</sup> of porphyrite and felsophyre,—a condition frequently met with in the southeastern corner of the peninsula.

Leaving the gorge at *Mul-geun*, we were again on the open flat of the *Nak-tong-gang*<sup>2)</sup>, and finally reached *Fusan* on January 19th, 1901, after having spent seventeen days in the Third Traverse.

### Mǎi-ka<sup>3)</sup>, or Makau

(*One of the Great Heuk-san Islands*)

*Na-jyu Group*.—There are a great many islands, large and small, off the free port of *Mok-pho*, called by the Koreans collectively the *Na-jyu Group*, because they were formerly subject to the district office of *Na-jyu*. West of this *Inner Na-jyu Group* and separated from it by the *Na-jyu Canal* (“the Single Canal” of European charts), there lies another which may conveniently be called the *Outer Na-jyu Group*. It comprises two subgroups, which are, counting from the north, the Great Heuk-san-tô, and the Hydrographer islands, besides an isolated island Heuk-san-tô<sup>4)</sup>, or the “Black mountain Island.” The last lies farthest from the mainland and was in early days the last port of call for native junks bound for South China.

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1) The same occurs in West Borneo. Easton says that diabases and quartz-porphyrines always appear in association. Both are probably to be considered as extreme members of the differentiation-products of a magma. N.W. Easton: “Geologie eines Theiles von West Borneo.” *Jaarboek van het Mijwresen in Nederlandsch Oost-Indië*, Batavia, 1904.

2) See page 16.

3) 梅加島 4) 黑山島. This is better known among the Koreans as Ka-ka-to (可佳島), and as Ross Island by Europeans.

The geology of the Outer and Inner Groups has been entirely unknown, not to mention that of other groups of the Korean Archipelago with the single exception of a short remark by H. B. Guppy<sup>1)</sup> who, during a brief visit of the "Hornet" to the Korean Archipelago in 1878, found quartzite and quartzose rock on the island *Mahan* (*Māi-ka*), one of the Great Heuk-san subgroup. "Underneath the quartzite occurred a highly micaceous rock and a gneiss traversed by veins of quartz, which occasionally separated the contiguous rock. The dip was 15 N.E."

### Quelpart

If Korea is the "Italy of the East," then Quelpart or *Chyöi-jyu*<sup>2)</sup> is its Sicily. The island lies some fifty miles off the southern coast of *Chyöl-la-Do*; and in reaching it from *Ö-ran-pho*<sup>3)</sup> of *Hāi-nam*, Korean boats usually call at the smaller island, *Chhyo-jā-do*<sup>4)</sup> or "Weather-waiting Island", which lies south of 34° N. Quelpart is the largest island in the South Korean Archipelago, and also in the Korean domain, extending east-west 72 km by 31 km north-south. It is a volcanic island, the volcano being only active one in all Korea. It rises steeply about 6750 feet from the sea-bottom which lies 50-60 fathoms deep; and geologically it is not directly connected with the backbone of the *Tai-pāik-san range* in the peninsula, as has been repeatedly asserted, for although the island is of course related to the peninsula in an indirect way, there is nothing to show that it emerged

1) "Note on the Geology of the Korean Archipelago," *Nature*, Vol. XXIII, 1881, p. 417.

2) 濟州島 See page 54. Formerly (from the Silla epoch) the island was called *Tum-la* or *Tam-na* (耽羅 or 耽毛羅), but the name was changed to the present one in 1235 A.D.

3) 於蘭浦 (蘭梁 *Nan-ryang?*).

4) 椒子島) or 侯風島, one of the *Chho-ran-to* Group.

from the sea after once having sunk beneath the waters off its southern coast.

The island resembles in outline a sea-slug on which Mount *Hul-la-san*<sup>1)</sup> elevates itself to the height of 1,950 *m* as determined with an aneroid barometer by GENTHE<sup>2)</sup> (also 6,390 ft. by GENTHE, 6,550 ft. on Japanese charts, 995 *m* on French charts). The entire island is formed by the sloping side of this peak—“The Peak which reaches toward the Milky Way,” sometimes called *Uön-san*<sup>3)</sup> or conical mountain. The shore is dotted with villages and the people raise millet, upland rice, sorghum, beans, barley, wheat, potatoes, tobacco, buckwheat, yams, turnips and cabbages. Oranges, pomeloes, and peaches are grown. Cultivation ceases at the height of about 500 metres. Up to 1,200 *m* the piano is covered with a thick growth of oak and pine, which is replaced above by the zone of shrubs which disappear on the cold peak. It is snow-clad till the fifth month of the lunar calendar. There are no tigers, leopards, bears, wolves, foxes, hares, nor crows<sup>4)</sup>. In short, there are no obnoxious animals nor birds.

The population numbers about forty thousand. The history of the inhabitants has not yet been studied and made clear, though it seems it is of importance ethnologically as forming a link in the chain which connects the Japanese and the Koreans. Tradition<sup>5)</sup> says that in the dawn of history three men, YANG<sup>6)</sup>,

1) 漢孛山 The Hul-la-san or Han-na-san is Mt. Auckland of the English chart.

2) Genthe, “Korea,” Published by G. Wegner, 1905, Berlin.

3) 圓山又名圓嶠山

4) Cited in ‘Tam-la-si’ 耽羅志

5) The well-known Hulbert gives as faithful a translation of the geography of the island as one can ever learn from a reading of native geographical works, and leaves me nothing to add from the standard work “Tong-kuk-yö-chi-seung-ran.” “The Island of Quelpart.” *Bullet. Am. Geogr. Soc.* 37, 1905.

6) 梁, 高, 夫.

Ko, and Pt, emerged from a lava tunnel<sup>1)</sup> on the north slope, where GENTHE<sup>2)</sup> passed a night, at an altitude of 1070 *m*, and 40 *km* from the *eumnaï*. Each married a mysterious maiden who came from Japan, and the three families settled and divided the island. After fourteen generations had passed away, three brothers of the Ko family landed at *Tam-jin* (now *Kang-jin*<sup>3)</sup>), and visited the capital *Kyöng-jyu*<sup>4)</sup> of the kingdom of *Sil-la*. This happened at an early period of the kingdom and the king named the island *Tam-na*<sup>5)</sup>, as the three men landed at *Tam-jin*. Since then, *Tam-na* has also been paying tribute to *Päik-chyöi*, Japan, and *Ko-ryöi*. In the year 1295, a king of *Ko-ryöi* altered the name to the present *Chyöi-jyu*. The Mongols invaded *Ko-ryöi* in 1231, and immediately became the masters of the situation. They established on the island a horse-breeding station, and the descendants of the half-savage Mongol horsemen seem to constitute a portion of the present population, for we see still wild horses in the crater on the top, of which GENTHE<sup>6)</sup> gave a vivid description. The people speak a sharp, strongly accented language instead of the monotonously smooth Korean.

The usual landing point is *Myöng-uöl*<sup>7)</sup>, 23 *km* west of the insular capital *Chyöi-jyu*, or one may, though with some risk, go ashore directly from the roadstead<sup>8)</sup> and land near the *eumnaï* on the abraded basalt. The dark rock constitutes the entire island, consequently presenting a dark land-feature. Every thing is dark here. Gravel, stone fences, houses, the people and their clothes (like the Manchus), the pigs and horses as well, vividly contrasting with the things and the people of the mainland

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1) Mo-heung (毛興). 2) Loc. cit. 3) See page 54 (耽津). 4) See page 99.  
 5) 耽羅 In of ancient Korean words the syllables *na*, *ra* (羅), *ya* 耶 means "kingdom."  
 6) Loc. cit. 7) 明月 opposite to Yang-do (楊島). 8) San ji-pho (山底浦).



who with their lighter complexion and white clothing dwell on the cream-colored granitic terrane.

As I have already said, the island is entirely occupied by the slope of *Hal-la-san*, and appears at first sight to have been formed as it were by a single volcanic convulsion; but this is by no means the case. GENTHE counted from the *cumnäi* at a single glance about 30 cones just like the adventives around Fuji-san. I myself did not visit the island, and so am not able to give the details of its earth history and structure, yet I am sure of the existence of a great number of cones with or without a top-crater. I mention here only the cones with the crater-lake on top, cited in the native geography<sup>1)</sup>.

VOLCANIC  
CONES

a) **Chyöi-jyu**<sup>2)</sup> district (northern slope).

1. *Hal-la-san*, with a lake usually hidden in mist, 30 *li*<sup>3)</sup> south of the *cumnäi*.
2. *Chyang-eul-san* (長兀山), with 4 tops, one having a bottomless 'dragon' crater-lake, 36 *li* south.
3. *Ün-dang-ak* (元堂岳), with a crater-lake in which are found aquatic plants and turtles, 17 *li* south.
4. *Ip-san-ak* (笠山岳), with a crater-lake and lotus plants in it.
5. *Ö-seung-säing-ak* (御乘生岳), with a top-crater.
6. *So-tong-ak* (小秃岳), with a crater.

b) **Chyöng-eui**<sup>4)</sup> district (southeastern slope).

1. *Su-ak* (水岳 or 水頂岳), with a top-crater, 40 *li* west of the *cumnäi*.

1) 東國輿地勝覽 ("Tong-kuk-yü-chi-seung-ran").

2) 濟州 3) *Li*=about  $\frac{1}{2}$  km. 4) 靜義

2. *San-mai-yang-ak* (三每陽岳), with a large-lake, 30 *li* north.
3. *Su-söng-ak* (水城岳). Castle-like with a large lake, 32 *li* north.
4. *Su-yöng-ak* (水盈岳), with a crater-lake.

c) **Tai-chyöng**<sup>1)</sup> district (southwestern slope).

1. *Kul-san* (屈山), with 99 caves, 25 *li* east of the *cummäi*.
2. *Song-ak* (松岳), with a steep-walled crater-lake, 15 *li* south.
3. *Ho-keun-san* (狐根山), with a crater 17 *li* in circumference and unfathomable 'reaching underworld', 50 *li* east on the *Chyöng-eui* boundary.

The whole island is dominated by the central peak, *Hal-la-san*, or Mt Auckland, 1950 *m* high, deeply forested especially on the north side, and on its sweeping slope ride the above-mentioned, posthumous parasitic cones — not to mention others which still remain undescribed. Besides, there may occur ancestral dwarf cones hidden under the giant, cropping out from beneath the edge in the form of spurs as at the southwestern and northeastern corners where the sea-bottom is comparatively shallow.

The remarkable feature of this gigantic volcanic island is the long crescent-shaped edge *Chyang-uöl-ak*, or "Long Point Peak", which opens southwards with a perpendicular precipice of 330 *m* overhanging the south coast with its back to the north. Herr GENTIE saw two grand lava streams on the steep side, and others may be discovered on the opposite side. From the topography I surmise that *Hal-la-san* represents only a part of the *northern crater-wall* of a once gigantic cone which was disrupted and

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1) 大靜

thrown into the southern sea, the shattered blocks strewn along the coast being now known as islets and rocks. The unfortunate Dr. GENTHE whom I saw typewriting at the monastery of *Sög-oang-sā* near *Gensan* in Korea, and later killed by savages in Marocco, found on the very top of the crest a perfect crater-lake<sup>1)</sup>, 400 *m* in diameter and 70 *m* deep, with cold blue water whose shore is the breeding place for the hardy Quelpartian ponies.

The island of *Chyöi-jyu* is the only active volcano that I know of in all Korea; but the active crater is not on the top, as one would expect, but on an islet at the southwest corner of the island near *Tai-chyöng*.

ACTIVE  
CRATER

I shall give here the exact translation by HULBERT<sup>2)</sup> of a Korean book on this active crater called *Sö-san*<sup>3)</sup>. “In 1003 A.D., a mountain suddenly rose from the water. There were four holes, and from them poured out a ‘flood of red water’ which soon turned into stone. Five years later another wonder of the same kind occurred, and the king of *Ko-ryöi* sent a learned scholar to examine it. The people reported to him that when the mountain came up there was a dense cloud and fog, accompanied with earthquakes and thunderings. After seven days it was all over; but there stood the new mountain over three hundred metres high and forty kilometres around. There was no wood nor grass on it. It was constantly covered with a pall of smoke, but when the wind blew the smoke away from a portion of the mountain it was seen to be of a dirty yellow sulphur”. The above is a specimen of Korean report and the only one that we have on volcanic disasters. I am not able to locate the exact position of the

1) It is called Päk-nak-dam (白鹿潭) or the “Deep Water Frequented by White Deer.”

2) *Loc. cit.*, p. 137. 3) 瑞山

new crater-cone on the maps at my disposal. But no one can fail to recognize in this report a record of a distinct volcanic action.

BASALT  
ROCKS

The island is built up solely of basalt of which there are in my possession only a few specimens of gravel collected near the island capital by a member of the staff of the *Mok-pho* Consulate, and one chip from the south coast given me by Mr. KOBAYASHI.

My handspecimens are either slaggy, even vesicular, or compact, and all are of a grayish color.

- a) Macroscopically visible phenocrysts are plagioclase. The structure presents various degrees of coarseness, some portions having the phenocryst of plagioclase 8 *mm* in length. Prevailing rocks have compact structure. Microscopically, the coarse variety consists of lath-shaped bytownite (equal extinction-angle being 30°) with the usual albite-twinning, and crystals and grains of olivine rich in iron, both being abundantly present. The rest of the mass is made up of brownish-yellow grains and brownish globulite in a colorless base. With weak powers the groundmass appears entirely black.
- b) The compact variety appears bluish-black with no phenocrysts. Microscopically, only plagioclase crystals are seen in the dark globulitic granular groundmass. Olivine and augite are not found.

So far as I can judge from examination of my handspecimens, the prevailing rocks of the island are rich in plagioclase and olivine with no augite-phenocrysts in the blackish groundmass of the globulitic base mixed with grains of augite. It is the *Korean type of the plagioclase-basalt* which is extensively developed in North Korea, forming basalt-mesas.

As to climate<sup>1)</sup>, the island has the same latitude as that CLIMATE of northern Kyûshû, and is consequently warmer than the south coast of the mainland. Its flora<sup>2)</sup> bears the stamp of a southern climate. Being situated at the divide of three waters, the Yellow Sea, the China Sea, and the sea of the southern archipelago, the island is exposed to a branch current of the *kuroshio* which again divides, one arm reaching along the west coast of Korea, the other toward the Strait of Tsushima. The surrounding sea is stormy and the air moist, the current swift (2 knots), and the tidal difference great. The top of *Hu'-la-san* is usually covered with a veil of cloud, and unless it lifts people dare not go off shore for fear of the mountain spirit becoming angry; the legends of the island folk are therefore more or less connected with this spirit. Especially during June and July the island is often swept by great storms of wind and rain. The islets of *U-do*<sup>3)</sup> on the east and *Chyuk'-do*<sup>4)</sup> on the opposite side afford poor shelter; in early days the latter was mostly frequented by Japanese freebooters. The former or "Ox Island" is the grazing ground for this class of domestic animals. In former times people went there in winter and returned in summer owing to the frequent heavy storms.

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1) It is stated ('Tam-lasi') that the people of the island enjoy longevity due to the congenially warm climate and the north side is more healthy than the south, owing to the cool northerly wind.

2) A small collection of plants numbering about a hundred species was brought home by a Japanese assistant of Mr. Anderson, an American zoologist, who lately visited the island; and Messrs. Takeda and Nakai undertook the specific determination of the plants of that collection in which mosses and lichens are not included. The result of enumeration shows that the Quelpartian flora resembles more closely that of Japan than that of Korea; 92% of the species occur in Japan and only 58% in Korea and China. Twenty-seven or 43% of the collection are new to the flora of Korea of which 25 species are known in Japan. Farther researches will throw much light on the interesting relation between the floras of Japan and Korea. "Plantæ ex insula Tschedschu." Bot. Mag., Tokyo, XXIII. No. 263, 1900.

3) 牛島 4) 竹島 "Bamboo Island".

## CHAPTER IV.

## SUMMARY

Having thus given my diary of the three Traverses, in which I have stated what I had observed as to the geology and physiography of the region travelled through, I shall now give a brief summary, deferring a general account of the result to later occasions.

The region reconnoitered during the traverses comprises that part of the peninsula, lying south of 36° N., embracing the whole of *Chyöl-la-Do* and the south half of *Kyöng-san-Do*. In my first traverse (pp. 11–63) I left *Fusan*, the port nearest to Japan, on January 24th, 1901, taking the route along the south coast of the rias type, which abounds in indentations and is fringed with the countless islands of the South Korean Archipelago, and arrived at *Mok-pho* on the shore of the Yellow Sea on February 16th, the distance being not less than 400 *km*.

Starting from the last-named place on February 20th, the second traverse (pp. 70–106) beat its path through the *Chirisan* range at *Un-bong*, over the *Nak-long-gang* river at *Chhyang-nyöng*, and touched *Tai-ku*, ending at *Yöng-il* Bay on the east coast. Thence turning south, at first along the coast and then in the interior, I reached *Fu-san*, the starting point of the first traverse, on March 19th, the distance travelled being 530 *km*.

The third traverse (pp. 108–135) was made from *Kun-san* at the mouth of the *Keum-gang*, from which place I set out on January 3rd, 1901. My route led through the *So-päik-san* range at the *Yük-sim-nyöng* pass, crossing the *Nak-long-gang* this time at *Hyön-phung*, and finally to *Fusan* on January, 19th, 1901, the distance

being about 220 *km*. The first traverse was made during the coldest part of the year when hailstorms and heavy snows were experienced. The second was performed during early spring, while the third was during early winter.

#### A. CLIMATE

As a systematic statement of the climate is deferred to a sequel, I shall here simply give the impressions it made upon me during my journeys.

Tall bamboo forests begin to appear near *Kun-san* on the west coast at about 36° N. This useful plant, of which of course there are many species, plays an important rôle in the household economy of all Koreans, but it is raised only in the south where, due to its presence, the land-physiognomy differs markedly from the north. I saw it again on the east coast at *Ul-chin* at about 37° N., thus showing the difference of one degree; and this fact unequivocally proves the warmer climate of the Japan Sea coast as compared with that of the Yellow Sea. The mean annual air temperature of *Pu-san* is 14° C, and that of *Mok-pho* 13° C. The isotherms run obliquely through the peninsula, just as the orographic elements do. I saw the *Camelia japonica* only on the south coast.

The *So-päik-san* range, starting from *Ul-chin* just mentioned, runs obliquely across the peninsula, and this mountain-barrier is the important factor that differentiates the climate. The sunny side of the range is *Kyöng-sang-Do*, the land of the defunct *Sil-la* kingdom<sup>1)</sup>. The region here is clean, and the streams clear. Everywhere there are mountains which are not very high and

KYÖNG-  
SANG-Do  
Coast

1) See *ante*, page 99 *et seq.*

plains which are not very wide, so that it is a topographic labyrinth. There are no volcanoes nor severe earthquakes. The people lead a quiet, peaceful life, knowing nothing of the busy struggle of the outer world. The province enjoys the most genial climate of the peninsula, resembling that of the opposite coast of the Japan Sea on the mainland of Japan (the mean annual temperature of *Fusan* being 14 C., Hamada 14.5°, and Matsuyé 14.2°). The province approaches my ideal of paradise. The only thing unseemly is the scarcity of forests, and even this bare physiognomy of the land is not due to the fault of Nature, but to the careless hands of the inhabitants.

SOUTH  
COAST

The south coast is washed by the warm Tsushima current, while the east is swept by the cool back current of the Japan Sea. The fish fauna of the latter is said not to differ much from that of the Vladivostock region. The former coast is subject to a considerable tidal difference of 10–13 feet, while in the latter, being a part of so to say a large lake, the tide is scarcely observable<sup>1)</sup>. The months of June and July are the rainy seasons. During the rest of the year the sky is serene, and the land is alternately bathed in warm, misty spring, and dry, clear autumn weather.

Turning now to the interior, the granitic *So-päik-san* or boundary range with east escarpment raises its rugged crests which are covered with snow from early autumn to late spring, contrasting in this respect with the coastal *Kjöng-sang-Do* where the snow scarcely lasts a day. The highest point is in the *Chiri-san* massive with an altitude of 1942 *m*. Beyond the range to the west the land gradually lowers to *Chyö!-la-Do*.

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1) B. K. "An Orographic Sketch of Korea." This *Journal* Vol. XIX. Article 1. p. 27.



The coast of *Chyöl-la-Do* is notorious for its thick fog, especially in June. Being fringed with countless islands, usually known by the name of the Korean Archipelago, in conjunction with swift currents (2–5 knots), great tidal difference (14–29 $\frac{3}{4}$  feet), shallows, and thick fogs, it usually gives coasting steamers hard work to get through. The fog<sup>1)</sup> of the *Chyöl-la-Do* coast and the South Yellow Sea have become proverbial, being comparable to that of the south coast of Hokkaidō, the New Foundland of the Pacific. The fog is generated either simply or as a precursor of rain, both kinds appearing concomitantly with low pressure. We may classify it according to the time of its occurrence into morning, afternoon, evening, and midnight fog. The last is frequent in April, the second in May, and the first in June. The fog is blown landwards by the sea-wind, sometimes changing into drizzle which scatters within at most a quarter of an hour. Ordinary fog in which objects are visible at the distance of 10 *m*, continues on an average for 11 hours in April, 5 in May, and 9 in July, though in exceptional cases it has been known to last 50–60 hours. At the time of the generation of fog, the wind turns from the east to the north-west or the reverse, and both cases happen when a centre of low pressure passes over the south or the north of the peninsula.

As I have already said, the fog of the *Chyöl-la-Do* coast is blown landwards by the sea-breeze, being accompanied by a lowering of pressure; and during foggy weather the air pressure approaches the monthly mean within the variation of  $\pm 3-4$  *mm*, and this is probably the condition essential to the generation of the fog. The air temperature is above the monthly mean in

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1) T. Noda: "Fogs on the Southern Yellow Sea." (in Japanese.) *Jour. Meteor. Soc. Japan.* No. 7, Tokyo, 1905, p. 248.

April and May, and below in July. Temperature seems to have no great influence on the “ sea ” fog, though with the “ inland ” fog as in Hokkaidô (Japan), the difference in air temperature near the ground seems to be the factor essential to its generation ; the lower temperature of the air in direct contact with the cool ground causes in the air weak currents which facilitate condensation in the immediately overlying stratum. In short, the *Chyöl-la-Do fog* makes its appearance when the wind changes in direction under a slightly low pressure.

CHYÖL-LA-  
DO  
COAST

THE FOG

MOK-PHO  
METEOR.  
OBS.

In connection with these remarks on the climate of *Chyöl-la-Do*, let me give the following general results<sup>1)</sup> of a year's observations taken at *Mok-pho* where a meteorological station was established in 1904.

1) THE ANNUAL MEAN TEMPERATURE OF THE AIR<sup>2)</sup> is 13.1° C, which is equal to that of our Noto peninsula, though *Chyöl-la-Do* is in the same latitude as Kobé (12.6° C). The mean temperature of the three summer months is 22.7°, which is lower than that of Noto, but that of the three winter months (4.3°) is higher than that of Tokyo. In short, *Mok-pho* enjoys a comparatively uniform and mild climate.

2) PRESSURE AND WIND.— The air pressure during the winter months (767 *mm* on the average) is high as compared with Japan, but during the summer the mean is 756 *mm*, which is considerably lower, being nearly equal to that of the Riû-kiû islands ; the reason being that during the cold months the province is near the high pressure centre of the continent, while in summer it lies near the low pressure centre of the Pacific. North winds therefore prevail from September to March, and south-

1) T. Noda : “ The Climate of the South-west Coast of Korea.” *Jour. Meteor. Soc Japan*, Tokyo, No. 4, 1905, p. 78.

easters during July and August. The rest of the year, April—June, has variable winds until the southeaster gradually overcomes the northeaster. The wind during the winter is stiff, its average velocity being a meter a second, comparable only with the strength of that which prevails in the Formosan channel and along the northwest coast of Hokkaidô.

3) RELATIVE HUMIDITY.—The annual average of humidity is 81%, comparable with that of the west coast (Akita) of North Japan. The month of maximum humidity is July (90%), the minimum being in February (68%); but it is subject to great variations from September to March. Generally speaking, the air is damp, and especially so if we compare the humidity with that of Kobé on the Inland Sea (Japan).

4) RAIN-FALL.—The annual total of precipitation is 935 *mm*, being nearly equal to that of the Okhotsk coast of Hokkaidô, and 39% less than that of Kobé; and even this small amount is concentrated in the above mentioned period of variable winds. Consequently the remaining two-thirds of the year are droughty. There are, however, important exceptions, for during the summer a cloud-burst often accompanies a gale, and in winter the prevailing north wind sends hailstorms and drifting snow of which the writer had the bitterest experience during his journey.

Generally speaking, the maximum rainfall occurs in summer; the next comes in spring; and the minimum, which is less than one-third of the summer rainfall, occurs in winter.

5) RAINY DAYS.—These number 132, being equal to those of the Island Sea; and, with the exception of the west coast of Formosa, there is no region in Japan, which bears comparison, in number of fine days, with *Mok-pho*. The monthly duration of sunshine is therefore not less than 40%, excepting the rainy periods

of April-May and July. The first frost appears at the end of November, and the last in April; snowfalls occur from the middle of December to the beginning of March.

6) **STORMY SEASONS.**—In spring low pressure habitually comes from the Yang-tse-Kiang basin, being accompanied with rain and strong winds; but gales frequently sweep up from Formosa in July and August. The high but not the low pressure during late autumn and winter often causes heavy precipitation attended with stiff north winds.

7) **FOGGY SEASON.**—The fogs begin in March and clear away in August. They are accompanied with rather low pressure, and occur mostly at night. The following short table may be of interest :

	Wind.	Mean relative humidity.	Days.	
			cloudy	foggy
March .....	N.	73	12	1
April.....	N.W.	83	16	6
May ....	N.N.W.	82	10	5
June .....	<b>N.W.</b>	88	12	<b>11</b>
July .....	S.E.	90	9	6
August....	N.W.	87	3	2

### B. OROGRAPHY

My first outline of the orography of the Korean peninsula was published in 1903<sup>1)</sup>. Since then, my paper imperfect though it was has been repeatedly referred to both at home and abroad by writers on Korean works. During and after the Russo-Japanese war, a Commission consisting of geologists and mining engineers was appointed to investigate the mineral resources of

1) This *Journal*, Vol. XIX. Art. 1.

Korea, and the Commissioners in their reports<sup>2)</sup>, which have just now been made public, in the main adopt my view concerning the Korean mountain systems.

Korea is, geologically speaking, a land of diagonal "Horst". The fundamental geologic and topographic lineaments traverse the peninsula diagonally from the southwest to the north-east as prolongations of the mountains of South China, and of a later date dislocations of the earth's crust have given to the peninsula its present shape which in its outline resembles that of Italy at the other end of Eurasia. The character of the diagonal "Horst" is typically developed in South Korea, while the northern half has a frame-work of a somewhat different orientation.

The region now under discussion, which comprises nearly a quarter of the peninsular area, lies between 33 and 36 N., and includes within it the island of *Chyöi-jyu* far off the southwest coast. The east half is the province of *Kyöng-sang-Do*, and the west half *Chyöl-la-Do*. The diagonal *So-päik-san* range with its one-sided, feather-like, minor ridges traverses the latter, and the meridional

2) *a.* Fukuchi, "On the Coal-fields of Phyöng-yang, Sam-deung, and Sari-nön, Phyöng-an-Do." (in Japanese.) Department of War, Tokyo, 1905, pp. 24, with sketch maps.

*b.* ——— "The Gold-field of Syun-an, Phyöng-an-Do." (in Japanese.) Department of War, Tokyo, 1905, pp. 4, with sketch maps.

*c.* Iki and Suzuki, "Report on the Mineral Resources of Hoang-hai-Do, Kyöng-geui-Do, South Chhyung-chhyöng-Do, and the Southern Part of South Phyöng-an-Do." (in Japanese.) Mining Bureau, Tokyo, 1906.

*d.* Inonyé, "The Mining Industry in Korea." (in Japanese.) Mining Bureau, Tokyo 1906.

*e.* ———, "Geology and Mineral Resources of Korea." *Mem. Imp. Geol. Surv.*, Tokyo 1907.

*f.* Inonyé and Niiyama, "Report on the Mineral Resources of Chyöl-la-Do, and Kyöng-sang-Do." (in Japanese.) Mining Bureau, Tokyo, 1906.

*g.* Kanehara and Nakagawa, "Report on the Mineral Resources of Ham-gyöng-Do." (in Japanese.) Mining Bureau, Tokyo, 1906.

*h.* Matsuda and Sasao, "Report on the Mineral Resources in Phyöng-an-Do." (in Japanese.) Mining Bureau, Tokyo, 1906.

*i.* Okada and Nishio, "Report on the Mineral Resources of Kang-nön-Do." (in Japanese.) Mining Bureau, Tokyo 1906.

*Tai-pāik-san* range runs through the former. The tilted *So-pāik-san*, culminating in the *Chiri-san* massive, with an east escarpment lies at the boundary of the two provinces, forming at the same time the water-parting of the two regions. The rocks of *Chyöl-lu-Do* are diagonally overthrown and folded, while those of *Kyöng-sanj-Do* are abruptly thrown down in the vertical and also in the meridional direction. In the former the land gradually lowers toward the northwest, *i. e.*, toward the free port of *Kun-san*; and in the latter, the land also rises on the east, but slopes imperceptibly westwards toward the *Nak-tong-gang* river.

HYDRO-  
GRAPHY

The hydrography is naturally dependent on the relief of the land, and the rivers run either parallel to, or across, the topographic lineaments. There are four streams of some importance, *viz.*, the *Nak-tong-gang*, the *Söm-jin-gang*, the *Yöng-san-gang*, and the *Keum-gang*. The drainage of the region is topographically adjusted excepting the western affluents of the *Nak-tong-gang*. These western tributaries flow down in clear torrents from the high, granitic boundary range which was recently elevated into precipitous ridges.

I should not forget to mention the *Han-san* range of the south coast,—a series of ridges running almost equatorially<sup>1)</sup>, due to parallel dislocations by which the ground was successively thrown down southwards, thus limiting the southward extension of the peninsula. The sudden turn of the *Nak-tong-gang* and the *Söm-jin-gang* to the east is due solely to the damming up of their courses by the above-mentioned *Han-san* range. The rivers would naturally take the short and direct course to the south coast were it not for the existence of this unique range. One can scarcely fail to notice this peculiarity even on ordinary

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1) See Geotectonic map. This *Journal*, Vol. XIX, Art. 1.

maps. A southwest branch (the *Am-nok-jin*<sup>1)</sup>) of the *Söm-jin-gang* and the corresponding tributary (the *Nam-gang* of *Chin-ju*) of the *Nak-tong-gang* rise near the south coast, but instead of flowing directly to the sea they take north-easterly courses and make roundabout ways to their debouchures. This I consider to be the unique feature of the drainage and topography of South Korea.

**C. RECAPITULATION OF THE GEOLOGICAL FORMATIONS**

Having thus described my Three Traverses across regions with extremely favorable exposures of rock series, I shall now give a general survey of the geological formations according to their successive ages beginning with the oldest in the following order:—

- |      |                        |    |   |
|------|------------------------|----|---|
| I.   | Basal gneiss.....      | {  | a. The Pong-göi gneiss.                               |
|      |                        | b. | The Tong-ehyang gneiss.                               |
| II.  | Kang-jin mica-schist   | {  | a. The Kang-jin mica-schist.                          |
|      |                        | b. | The Mul-kö-sil mica-schist.                           |
| III. | Phyllite schist.....   | {  | a. The Tong-pok complex.                              |
|      | (Metamorphic Mesozoic) | b. | The Mu-an complex.                                    |
|      |                        | c. | The Chyön-ju complex.                                 |
|      |                        | d. | The Küm-san complex.                                  |
| IV.  | Great granitoid series | {  | a. Paleogramite.                                      |
|      |                        | b. | Melanocrate.  |
|      |                        | c. | Leucocrate.   |
| V.   | Kyöng-sang formation   | {  | a. The Lower.   |
|      | (Mesozoic)             | b. | The Upper.  |
|      |                        | c. | The Kyöng-sang formation and its Japanese equivalent. |

1) 鴨綠津

- VI. Felsophyre and its allies  $\left. \begin{array}{l} a. \text{ Felsophyre.} \\ b. \text{ Masanite.} \\ c. \text{ Grano-masanite.} \end{array} \right\} \text{Neogranite.}$
- VII. Tertiary formation.
- VIII. Diluvium and younger effusives.
- IX. Alluvium.

### I. *The Basal Gneiss*

I. a. The oldest known rock of the region is the sedi-gneiss found exposed at a point about 4 km from *Pong-göi*<sup>1)</sup> at the east foot of the *Hoeng-tai-chhi* pass, west of *Chin-jju*<sup>2)</sup>. It underlies the basal muscovite sandstone of the Lower Kyöng-sang Formation. The *Pong-göi gneiss*<sup>3)</sup> occurs, so far as I have seen, in a small strip (the strike N.—S., the dip E.) along the east margin of the great granitic embossment of the *Chiri-san massif*. The gneiss must have had in some remote æon an extent of continental magnitude, stretching eastwards even to Japan; but it was depressed and shattered, and is underlaid by the Mesozoic Kyöng-sang Formation, or otherwise assimilated by a hot bath of magma in the zone of rock-flowage, and now it reappears as small laccoliths in the form of granite through the Mesozoic, as may be seen on the geologic map of south-east Kyöng-sang-Do.

The *Pong-göi gneiss* is a light-brown, psammitic-looking rock, consisting of quartz, orthoclase, plagioclase, and biotite with the honey-comb texture characteristic of sedi-gneiss. It is variously injected and interleaved, broken and healed by coarse veinlets of granodioritic material consisting of hornblende, plagioclase, ortho-

1) 鳳溪 or Pong-gyöi. 2) 普州 See *ante*, page 33. 3) See footnote, page 37.



clase and quartz, the last but one in the form of plates in which rounded quartz is enclosed in the poikilitic fashion. The rock is, therefore properly speaking, a *metagneiss* or *injection-gneiss*.

The Pong-göi<sup>1)</sup> gneiss resembles to all appearances the Lower Takanuki gneiss<sup>2)</sup> of North Japan, a part of the "Kashio gneiss" of the Japanese Geological Survey. Like its Japanese equivalent, this gneiss, though not in the normal condition, represents the basement sedi-gneiss of the peninsula, pressed up and intruded by the granodioritic differentiation-magma of the granitic batholith of the *Chiri-san massif*.

I. b. The second occurrence of the true sedi-gneiss of the character of the TAKANUKI series is that of the west side of the *Chiri-san massif*, lying between *Na-ju* and *Yöng-am*<sup>3)</sup>, near the gold placer of *Tong-chhang*. The *Tong-chhang gneiss* is exposed in a narrow band extending from the northeast to the southwest. This small Archean patch lies on the edge of the schistose granite terrane, as if it were swimming on the granitic batholith, and on the south it is intruded and covered by the quartz-tsingtauite with a few plagioclase phenocrysts. The sediment-gneiss is a light-yellowish, fine-psammitic biotite-gneiss with parallel-planed structure.

## II. *The Kang-jin Mica-schist*

II. a. Next in the ascending stratigraphic order, though never occurring in direct contact with the preceding, comes the para-mica-schist. It is a white, tabular, blastopsammitic, fine-saccharoidal schist consisting of angular and partly interdigi-

1) 鳳溪

2) 'The Archean Formation of the Abukuma Plateau,' p. 243. This *Journal*, Vol. V. Pl. III. 3) See page 65.

tating grains (0.1–0.34 *mm*) of clear quartz with a few lamellae of light-brownish sericite which imparts an imperfect schistosity to the rock. Through the scarcity of micaceous mineral, the rock actually graduates into a quartz-schist. In general appearance it is like the well-known itacolumite. Ours, however, is not elastic. It is a sericite-quartz-schist of sedimentary origin. The bed occurs in a regular belt 40 *km* long, extending in a northeasterly direction from the *Tai-dun*<sup>1)</sup> headland at the southwest corner of the peninsula through *Kang-jin*<sup>2)</sup> as far as *Neung-jyu*<sup>3)</sup> (p. 50) and forming a steep syncline.

Southeast of *Neung-jyu*, the belt is directly overlaid by a gray metamorphic tuff-sandstone, which in turn is covered by a brownish felsophyre (p. 50 [3]). This find was of uncommon interest, for from their position I was enabled to judge their relative age. Between this series and the preceding para-gneiss, there must have been a time gap, as they, so far as my experience goes, never occur in association. The series, next above, the metamorphic Mesozoic, consisting of various metamorphics of tuffs and effusives of the character of sericite-schist, approximately corresponds to IXORÉ's *Kun-san Formation*<sup>4)</sup>. It is worthy of note that the *Kang-jin schist* and the one next to it, though not usually occurring in association, have a geological position which makes it appear as if they had been pinched between the mylonitized and compressed eruptive gneiss.

In its northward course the belt of the *Kang-jin schist* disappearing under the Phyllite Formation emerges farther northwards both on the south and the north of *Oh-koa*, and extends

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1) 大屯半島 2) 康津 3) 綾州

4) *Mem. Geol. Surv. Japan*, Vol. I., No. 1, page 20, 1907, Tokyo

as far as the ferry of *Chyök-söng*<sup>1)</sup> between *Sun-chlyang*<sup>2)</sup> and *Nam-nön*<sup>3)</sup>, where a splendid profile is exposed for the detailed study of this series (the strike N. 20° E., the dip 50° S.E.). Near-by is the gold placer of *Chho-gyöi-san*<sup>4)</sup>, where Mr. IXOUYÉ found black and green phyllites as members of this series.

II. *b.* About 56 km northeast of the locality of *Chyök-söng* last mentioned, there occurs at *Mul-kö-sil* lying to the east of *Chin-an* (p. 126) a patch of gray zigzag-lamellar mica-schist of sedimentary origin with white spots in the equant, interdigitate or honey-comb aggregate. The spots (1-2 cm) are a pinitoid substance, probably altered from andalusite, cordierite, or orthoclase. It is probably a prolongation of the preceding mica-schist of *Kang-jin*. This contact schist has the strike N. 40° E. and the dip N.W., and occurs between hornblende-porphyrite and biotite-orthogneiss. The relation of the three rocks is not at all clear to me. Perhaps the schist is the pinched relie of thrust-blocks.

### III. The Phyllite Series

Under this head are included the a) *Kun-san* and b) Phyllite formations, the divisions proposed by Mr. IXOUYÉ<sup>5)</sup>. The former is exclusively developed near the free part of *Kun-san* and is characterized by highly metamorphosed schists; the latter is the designation given to similar rocks of the peninsula though less metamorphosed as compared with the former, and according to IXOUYÉ seems to represent a certain horizon of the late Baron v. RICHTHOFEN'S *Taku-shan* formation. From the close resemblance

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1) 赤城 or 積城 See *ant.*, page 77.    2) 淳昌    3) 南原  
4) 草溪山    5) *Loc. cit.* p. 20.

of the two formations I am, however, disposed to include them in a single series.

The present Phyllite series occurs in four parallel bands on the west side of the *Chiri-san massif*; their trends correspond to the margin of the mass, extending from the southwest to the northeast exactly in the same course as the belt of the *Kang-jin* schists; and the bands are distributed so as to appear like relics of beds deposited in parallel troughs of crust waves originating from the massive *Chiri-san*. I shall begin with the innermost.

III. *a.* The Tong-pok<sup>1)</sup> Complex.—This occupies a bilobate area between *Ncum-jyu*, *Tong-pok*, and *Ok-ka*, directly overlying the *Kang-jin* muscovite-schist (pp. 54–55). According to Messrs. INONYÉ and YABÉ (p. 66), a biotite-orthogneiss appears east of *Hoasum*, being covered eastward by a wonderful complex of phyllite, sandstone, schalstein, and the like, which my microscopic study showed to be metamorphosed and mylonitized eruptives and sedimentaries. They are (1) a flagstone of fine-sandy appearance, which is really a banded spherulitefels of either rhyolite or quartz-porphyry; (2) a brownish-red ferruginous tuff of the appearance of an altered flaxseed iron ore; (3) a grayish, highly-lamellar muscovite-schist with spots of quartz,—a kataporphyritic schist which has resulted from the crushing and dragging of quartz-porphyry; (4) a mashed carbonaceous slabstone with bluish dots of quartz,—a kataclastic coaly sediment; (5) a katamorphosed and anamorphosed, blackish grit of either igneous or sedimentary origin; (6) lenticular masses of graphitoid some 30 feet in thickness imbedded in No. 5. The analysis of a specimen of graphitoid from *Kui-an*<sup>2)</sup> gave the following result<sup>3)</sup>:—

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1) 同福 2) 龜岩 See *ante*, page 68. 3) Inonyé and Niyama: "The Mineral Resources of Chyöl-la Do, and Kyöng sung-Do." (in Japanese.) Tokyo, 1906, p. 86.

H <sub>2</sub> O	Volatile matter.	Coke.	Ash.	S.
9.78	8.29	58.02	29.91	0.38

The semicrystalline or epi-crystalline series dips S.E., and makes up the terrane as far as *Tong-pok*, capped by green porphyrite.

Near *Pong-nai-jyang*<sup>1)</sup>, and midway between *Tong-pok* and *Po-söng*, Mr. IXOUÉ found a rock similar in appearance to graphite-schist (p. 49 [5]). It is of the type No. 3, and its black color is due to the presence of magnetite in chloritic film. It is a mylonite from either quartz-porphyrity or quartz-dioriteporphyrite. The original home of the placer gold found near-by is not known.

From *Tong-pok* northward to *Ok-koa* (p. 68), a typically green *ottrelite*-schist and hematite-*ottrelite*-schist occur in association with mashed quartzose rock containing tourmaline and zircon (igneous origin), and at one place covered with crystalline-limestone *conglomerate*. The complex is probably the northern prolongation of the graphitoid bed of *Kui-am* already referred to<sup>2)</sup>. Farther on northwards to *Ok-koa*, the psammitic muscovite-schist of the *Kang-jin* series emerges from below this Phyllite series.

III. b. The Mu-an<sup>3)</sup> Complex.— In the environs of *Mu-an*, 24 km north of the port of *Mok-pho*, a graphite-sericite-schist of the type No. 3 makes its appearance, being greatly decomposed into red earthy, thinly-split shingles, striking N. 45° E., with the dip S.E. The slide shows the rock to be of the same sort as those of *Tong-pok* and *Pong-nai-jyang* already mentioned, with corroded quartz enveloped in phyllitic membranes, thus showing blastoporphyrity texture. It is a katamorphic product of a porphyritic igneous rock. The schist is covered by red

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1) 福内場 2) See page 68. 3) 務安 See page 71.

felsophyre on the east and underlain by orthogneiss on the north-west.

The belt of the *Mu-an* schist trends southwest with the uplifted edge on the gneiss terrane, and some of the island groups off *Mok-pho* may be inferred with great probability to be prolongations of this belt. Its northeastward extension was reconnoitered by Mr. NIYAMA (p. 117), who found a hard sericite-quartzite underlying the schist at *Ham-phjöng*. Mr. YABÉ<sup>1)</sup> followed the belt as far as *Chyang-söng* along the strike of the complex, finding on the way white quartzite and reddish sericite-quartz-schist, and, as on the south of *Ok-koa*, a crystalline limestone.

III. *c.* The Chyön-jyu<sup>2)</sup> Complex. This is a syncline belt whose axis trends from the northeast to the southwest. The basement of the southeast wing is an alkaline orthogneiss overlaid by (1) a biotite-schist of clastic origin with parallel-plane structure, and (2) a grayish, lustrous graphite-schist with fine dots of quartz grains, and (3) a nephrite-tremolite-schist. Mr. IXOURÉ<sup>3)</sup> found at the gold mine in *Keum-gu*, not far from here, a similar rock which, however, contains malacolite instead of tremolite. Both the tremolite and malacolite rocks seem to have been altered from an impure limestone. Then comes (4) a yellowish, psammitic quartz-schist. Lastly, the uppermost bed (5) is a phyllitic sericite-schist with spots of graphite. These multifarious schists are well exposed, with the strike N. 60° E., and the dip 75 N.W., at the old citadel, *Nam-ko San-söng*, of *Chyön-jyu*.

On the west of the town, members of the same complex, but of different characters, are exposed keeping the same strike

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1) See sketch map, pages 113 and 117. 2) 全州 See page 115. 3) See p. 115.

and dip, though finally dipping in the contrary direction at the contact with the orthogneiss base of the northwest wing of the syncline. The prevalent rocks are the white sericitic leaf-gneiss (Lagengneiss), and epidote-hornblende-gneiss with stretched structure. The latter was originally an injected apophysis sheared subsequently to its present form. According to the laccolith theory, both rocks would be the products of the marginal consolidation of a certain magma.

III. *d.* The Kun-san Complex. The small area on the southwest of the port of *Kun-san* is the fourth and the outermost belt of the Phyllite Series<sup>1)</sup>. Mr. IXONÉ<sup>2)</sup> includes the series of rocks both on the west and also on the east of *Kun-san* in one group under the name of the "Kun-san Formation." I leave the series of rocks which occurs from the east of *Kun-san* to *Ham-yöl* at present to treat it on another occasion along with the eruptive formation of granite.

The small group of the Phyllite Series near the roadstead of *Kun-san* has in its lowest bed (1) a phyllitic sericite-schist with the strike N. 30 E., and the dip slightly west or vertical, well exposed at the landing place. Next in ascending order comes (2) a bluish, compact ottrelite-biotite-schist<sup>3)</sup> with the appearance of an amphibole-schist. It is an altered product of a clayey sandstone. Then (3) a coarse, colorless quartzite which is a dyke or normal member, overlaid by (4) a Garbenschiefer with stripe-flecks, which gradually passes into (5) the greenish-silky normal phyllite. The present series is similar in rocks to that already mentioned under III. *a*, *b*, *c*, with the difference

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1) See page 108.

2) *Mem. Imp. Geol. Surv. Japan.* Vol. I. No. 1. 1907, Tokyo, p. 20.

3) Another occurrence of ottrelite rock is at Tong-pok, p. 69.

that here the members are entirely of sedimentary origin, but wanting in limestone.

The above-mentioned four belts of sericitic and phyllitic rocks, usually included in the epi-zone of crystalline schists, have their petrographical features so much alike that handspecimens cannot be distinguished from one another, and on this ground I may be justified in giving them the common designation of the Phyllite Series. As to the age of the series nothing definite can be said. In the present state of my knowledge, I shall assign it provisionally to a metamorphic Mesozoic, although it is not intended thereby to exclude the idea of its being of the Proterozoic (Algonkian), or even of the Palæozoic formation.

#### *IV. The Great Granitoid Series*

Korea is a land of granite and gneiss. In GOTTSCHÉ'S geologic map of 1886, the whole area was colored in one tint representing granitic rocks with only a few patches of later igneous and sedimentary formations. The map of Messrs. NISHIWADA and ISHII became slightly polychromatic, and in my manuscript map of 1902, some more legends were added. Even in recent maps more than half of the peninsula is colored to show granitoid rocks.

At the close of the preceding Phyllite period, Korea underwent a complete change. A grand intrusion of granite took place throughout the peninsula, shattering the crust into diverse patches and metamorphosing the sediments and ancient lava-flows and dykes into schistose and foliated rocks. The intrusion and



pressing up of granitic magma seem to me to have taken place on such a grand scale that the preëxisting sheet crust was torn asunder and buoyed up to an Alpine altitude. Then the land was subjected to degradation which laid bare the hidden batholith, leaving now the preceding three series in detached patches not unlike pieces of orange peel.

The masses of granite and orthogneiss that commonly appear as embossments protruding through schists over a great area are usually regarded as the oldest known rocks and styled "Primitive" or "Fundamental." The granites are still regarded as the original crust, the associated gneiss as highly metamorphosed sedimentaries, and are known as the Laurentian formation<sup>1)</sup>. Writers on Korean geology including myself have also fallen into this habit of regarding the Granitoid series as the Primitive. It is now known in many instances especially in the United States, Saxony, and the Alps, that some granites and gneisses are intrusions into schist series, and the gneisses are in the main regarded as katamorphic granite, or according to WEINSCHEK, piezocrystallized granite.

IV. *a.* Palæogranite.—As granites in Korea are of different ages, the group now under consideration may be better designated as palæogranites<sup>2)</sup> by way of distinction from younger ones<sup>3)</sup>.

The dominant type of the palæogranite of the region is the coarse magnophyric biotite-granite which has a special tendency to become porphyritic and at the same time schistose in texture,

1) Chamberlin-Salisbury, "Geology," 1906, Vol. II, p. 113.

2) Gehl. Oberberggrath Credner has recently given the name *palæogranite* to the well-known granulite (Jaccolith) of the Saxon Mittelgebirge, and I have found it very convenient to follow his good example. Remunitionsprogramm: 'Die Genesis des sächsischen Granulitgebirges,' 1906. See page 185.

and is often penetrated by dykes of granodiorite, tourmaline-microcline-micropertthite, and porphyrite (pp. 125–126). Though the palaeogranite is highly diversified in structural development, yet it has all the common traits by which other kinds, especially the younger ones, can be easily discriminated. I shall, therefore, now give a general description of it; but before doing so, let me say a few words as to where the palaeogranite occurs in the region under question.

The high *So-paik-san*<sup>1)</sup> range of which the *Chiri-san massif* forms a part, lies obliquely across the boundary of the two provinces of *Kyōu-j-sang-Do* and *Chyō-la-Do*, and is entirely constituted of the palaeogranite; moreover, the greater part of the area of *Chyō-la-Do* is an extension of the same, while that of *Kyōng-sang-Do* is occupied by the Mesozoic formation.

The palaeogranite is a grayish, coarse magnophyric plutonic, becoming slightly red on the weathered surface due to the partial decomposition of feldspars into pinitoid particles mixed with iron oxides. Essential components are quartz, orthoclase, microcline, oligoclase, biotite and sometimes muscovite. Accessories are allanite, garnet, titanite, zircon, apatite, cordierite, sillimanite and tourmaline. The characteristic macrotexture is its schistosity which varies within wide latitudes according to the condition on which it is brought to bear and the quantity of micas which take part in its mineralogical composition. We have therefore all stages from almost normal granite to gneiss through various phases of gneissoid granite, granite-gneiss, orthogneiss and granulite. The second characteristic is its porphyry-like texture, and accordingly we have eye-gneiss equivalents of the

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1) 小白山脈

modifications above cited. The color of the rock is also greatly influenced by the quantity of its micaceous components. On account of its coarse texture, the rock easily falls into disintegration creating the waste land which characterizes the scenery of Korea. Corresponding to the macroscopic appearance, the microtexture presents great diversities, and one never fails to see cataclastic texture, and constrained undulatory extinction in quartz and feldspar, in all the rocks of this group.

Microcline and quartz are the two predominant components of the rock. The latter occurs in the form of granite-quartz which always shows internally constrained, undulatory extinction, and has suffered granulation and smashing from external pressure. The former is most characteristic of our rocks. The microcline<sup>1)</sup> occurs in two forms, viz., automorphic megaphenocryst and plate. The (*a*) phenocryst has a light grayish-blue color and prismatic habit elongated toward the *a*-axis, and attains the extraordinarily large size of 8 *cm*<sup>2</sup>. It is often twinned after the Carlsbad law. It cannot be distinguished from orthoclase either in its macroscopic or microscopic aspect excepting by its reticulated structure, pellucidity and optic orientation. A cleavage piece of (001) shows the extinction of  $5\frac{1}{2}^\circ$  with P/M. As the moiré structure is frequently observed, so we have here microcline-micropertthite. The reticulated and perthitic structures are seen in the same plate though the presence of one precludes that of the other in different parts of the crystal. A modification of the micropertthite — a parallel growth of albite and microcline with the *b*-axis in common, is seen in the Hadong specimen, in which the polysynthetic lamellar albite has a rectangular outline flattened toward the *b*-axis.

The (*β*) xenomorphic plate of microcline shows also the reticulated structure by which character alone it can be distinguished

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1) The Yuk-sim-nyōng specimen (六十嶺), p. 127.

2) In the Ha-dong (河東) specimen, p. 40.

from the xenomorphic orthoclase, which has a rounded outline, is often altered into muscovite, and occurs in the poikilitic fashion. The orthoclase crystallized earlier than the microcline, and is poorly represented in the rocks of our area. The xenomorphic microcline often encloses smooth polygonal and sometimes *drop*-shaped quartz of the same orientation. This is a sort of intergrowth akin to graphic granite. When the microcline and interstitial quartz come in direct contact, the suture is that of irregular juxtaposition due to their simultaneous crystallization.

Oligoclase of the dioritic habit is always idiomorphic and zonally structured with the pinitified nucleus, and twinned after three laws. The polysynthetic lamellation is fine, continuous and equidistant. As it is not possible to get cleavage-pieces the determination of the plagioclase is of only approximate value. The symmetrical maximum angle of extinction was measured at about 5°. The Becke method gave the following result:

$$\begin{array}{ll} \omega > \alpha' & \omega < \beta' \\ \varepsilon > \beta' & \end{array}$$

The feldspar is therefore a basic oligoclase with the composition  $ab_1, an_1 - ab_2, an_2$ . The size is usually small, and it is often surrounded by a myrmekitic border. Accessories are common epidote, allanite, muscovite, titanite, garnet, sillimanite, zircon and apatite. Primary iron ores are scanty.

IV. *b*. Melanocrate.— One of the striking features in the gneissoid terrane is the occurrence of a long but apparently interrupted belt of adamellite along the east margin of the *So-päik-san* range from the southwest coast through the *Hoang-tai-chhi* pass (p. 39), *Tang-söng* (footnote p. 35), *San-chhyöng* (p. 84) as far as to *Sang-jyu* at the northwest corner of *Kjöng-sang-Do*. It is undoubtedly a basic marginal facies of the light-colored, acidic granitoid of the *So-päik-san* laccolith through which it had intruded before the complete solidification of the main mass. I

have, however, once seen it at *Un-bong*<sup>1)</sup> which is located nearly at the centre of the massive; and further researches will probably disclose many other occurrences outside the marginal belt. The adamellite has also the granitic and gneissoid phases accompanied by cataclastic structures.

It is composed of microcline, biotite, greenish hornblende and granitic quartz, with the characteristic accessory of titanite besides apatite. Microscopically it closely resembles the batholithic granitoid, being composed in greater part of microcline with the idiomorphic, zonal oligoclase (the extinction with P/M on (010) is +9 to +14), and simple orthoclase. The last is not easy to distinguish from the un-twinned microcline nor from the brachypinacoidal section of oligoclase. The brown biotite is abundant as compared with the greenish-blue hornblende, the former fringing the latter as if it were a typomorphic mineral from amphibole. The hornblende often encloses pegmatitically round grains of orthoclase and quartz of the same orientation, and the microcline or orthoclase, or both, contain globular quartz in a similar manner. The latter may fitly be termed microcline (orthoclase) poikilite. Long experience leads me to regard poikilitic and myrmekitic structures as characteristic of the deep-seated intrusives. The richness of microcline in the adamellite proves unequivocally the close "consanguinity" of this rock to the granitoids.

IV. *c.* Leucocrates. — Complementary to the preceding, the products of the opposite pole of the magmatic differentiation are the anorthosite and the tourmaline dyke-rock. The former is strictly speaking the labradorite-rock, the latter the tourmaline-microcline-perthite. The former represents a phase of an intrusive of considerable dimensions, the latter a typical dyke-rock. Both are true intrusives pressed up as an after-effect before the complete consolidation of the granitoids, just as the adamellite is

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1) See *ante*, page 81, footnote 1.

the counterpart on the other extreme. There is, however, a marked difference between the two leucocrates; the anorthosite has a marble structure with slight signs, if any, of the protoclastic, while the tourmaline rock is highly quartziferous, and is made schistose by the mashing of the quartz, presenting thereby a typical cataclastic structure.

a) The anorthosite, like ADAM'S Norian of Canada, is a grayish-white, marble-like rock, being composed almost entirely of labradorite with a small quantity of muscovite and quartz. A basal plate of a cleavage-piece of the labradorite extinguishes light at  $-17^\circ$ , and the M face at  $28^\circ$  in the acute angle,— facts which imply the presence of a labradorite of the composition  $ab_{23} an_{77}$ . The anorthosite is seen under the microscope to be built up of equiform (2—13  $mm$ ), equant grains of coarse but distinctly polysynthetic plagioclase twinned after both the albite and the pericline laws. Characteristic black rods and brown tablets of ilmenite are seen but rarely as enclosures. The rock occurs, so far as I have seen, at two localities, viz., one near *San-chhyöng*<sup>1)</sup> at the east foot of the *Chiri-san*, and the other near the water-shed of the *Chhyu-phung-myöng* pass along the Seoul-Fusan railway. One cannot fail to notice firstly, its peculiar relation to the adamellite since it occurs close-by and to the east of the exposures of the adamellite; and secondly, that anorthosite crops out along the proto-axis of the granitoid belt of South Korea.

Like the classical anorthosite of the Laurentian formation of Canada, our rock is also the product of the magmatic differentiation of a gabbro magma. Near the *Chhyu-phung-myöng* already cited, Mr YABÉ took specimens of a typical hornblende-biotite-norite. This is the only specimen of this rock ever seen by the writer in Korea. Near *San-chhyöng*, the anorthosite contains greenish, fibrillated hornblende, which seems to have been derived from either hypersthene or augite. In other words, it is a metagabbro.

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1) See *note*, page 84. Here it is called *plagioclasicite*.

β) The tourmaline-microcline-perthite. This is a very coarse mashed rock consisting of perthite, quartz, schorl and muscovite. The latter two are idiomorphic, while the other two are xenomorphic though the perthite is idiomorphic with reference to the quartz. A plate of the microcline cut in the direction of the (001) cleavage piece shows it to be made up of parallel bands of irregular lamellæ with their axis nearly at right-angles to the P/M edge (a specimen from *Chyo-söng*, 12 km east of *Po-söng*<sup>1)</sup>. The untwinned lamellæ have the extinction-direction  $\pm 17^\circ$  with P/M; while the twinned have  $5^\circ$  with P/M in the same sense. The (010) cleavage-face has  $6^\circ$  in the simple, and  $17\frac{1}{2}^\circ$  in the twinned with P/M in the obtuse angle in both cases. Here we have therefore the microcline-perthite with microcline base alternating with albite bands. Apparently simple xenomorphic plates of feldspar in other tourmaline dyke-rocks are likewise probably microcline though I have no ground for denying the presence of orthoclase in association with it. The quartz is granulated and highly charged with liquid inclosures. In short, the present rock is the mylonitized tourmaline-microcline-micropertthite. This sheared dyke-rock occurs at places too numerous to mention. During my journey I saw extensive occurrences of it between *Chin-an* and *Song-dam*<sup>2)</sup> at the west of the *Yuk-sim-nyöng* pass. Generally speaking, it appears along the proto-axis and west of the granitoid belt in contrast to the melanocrate which being represented by adamellite<sup>3)</sup> as already referred to, is chiefly confined to the east margin of the belt.

#### V. The *Kyöng-sang* Formation

On the first geologic map ever made of the peninsula (1886) by GOTTSCHÉ, nearly the whole of the *Kyöng-sang* province was embraced in the Carboniferous. During my reconnaissance jour-

1) 寶城(鳥城之西) See *ante*, page 50. 2) See *ante*, page 126.

3) Ortho-hornblende-gneiss. See *ante*, page 81.

ney in 1901, I saw there sandstones and marls covered by strong beds of green breccia and sheets of green porphyrite—a complex which is inseparable and apparently forms a geological unit. Being influenced by the writings on China by the late vox RICHTHOFEN, who without much discussion of the subject judged the geology of that country from European standards, I provisionally assigned that complex to the Permo-Carboniferous<sup>1)</sup> under the name of the “Kyöng-sang Formation”. Later, Mr. YABÉ made a happy find of Jurassic plants in its lower horizon and called the bed the Nak-tong series<sup>2)</sup>. Mr. INOUYÉ has suggested another classification<sup>3)</sup>. At the present juncture it becomes necessary for me to recast the meaning of my *Kyöng-sang* Formation and to give a somewhat definite shape to it. It is best to divide the formation into the lower and the upper; the lower, clastic members should embrace YABÉ’s *Nak-tong* series, allotting the red and green eruptive members to the Upper *Kyöng-sang* Formation. This two fold division is well sustained lithologically, and stratigraphically as well as palæontologically. The lower, sedimentary *Kyöng-sang* formation (the *Nak-tong* series) makes a curved belt on the north, northwest and west of the *Kyöng-sang* province flanking the east foot of the granitic *So-päik-san* range; the rocks composing it are gray sandstones, and red, green and black marls: the upper, igneous *Kyöng-sang* formation constitutes a large area in the southeastern quarter of the province; the rocks are invariably eruptives occurring either in the form of tuff, breccia, or sheet.

In the annexed synopsis I give an approximate correlation

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1) ‘Orographic Sketch’, pp. 15 and 24. See *ante*, p. 55.

2) “Mesozoic Plants from Korea.” *Jour. Sci. Coll.*, Vol. XX, Art. 8, p. 5. Also see pp. 36 and 86.

3) “Geology and Mineral Resources of Korea.” *Mem. Imp. Geol. Surv. Japan*. Tokyo, 1907, Vol. I, No. 1.



GOTTSCHE, 1886.	KOTŌ, 1902.	YABÉ, 1905.	ISOUE 1907.	KOTŌ, 1907.	Upper Kyōng-sung Formation. Eruptive. Pyroclastic.	
		1. Porphyrite sheet and green breccia bed.		No. 1. Greenish eruptive formation consisting of green breccia and green porphyrite, accompanied by felsophyre.		
1. Thick banded sandstone, conglomeratic near the base. Thickness 40 m.		2. Red coloured tufts partly brecciated, together with greenish slaty rocks.	1. Clayslate formation. 2. Upper schalstein formation.	No. 2. A series of <i>blackish</i> shale and green-banded, indurated, pelitic tuffite of a flinty appearance.		
	The Kyōng-sung Formation.	3. Hard sandstone, often conglomeratic, and overlaid by shale, red tuff and amygdaloidal sheet.	3. Upper sandstone and clayslate formation.	No. 3. Alternation of reddish and greenish marls, the latter being sandy. It is the <i>Red Formation</i> , and of tufaceous origin.		
2. Marl of various shades of colour between violet and chocolate-brown, with frequent intercalations of compact limestones. Thickness 70 m.		4. Thick shale, green or black in colour, and often sandy, containing few plant remains.	1. Lower schalstein formation.	No. 4. Manifold alternations of wet-gray marl and gray sandstone; the former sometimes contains marly nodules with imperfect organic remains. In its upper portion the complex becomes conglomeratic.		
3. Conglomerate, arkose near the base with numerous, very compact layers of the same. Thickness 450 m.						Lower Kyōng-sung Formation. (The Nak-tong Series) Elastic.
4. Bituminous clay, partially discoloured, with small coaly flecks and obscure vegetable impressions. Thickness 15 m.		5. Thick conglomerate gradually passing below into a sandstone with intercalations of shales which are sometimes coaly.— <i>The Nak-tong Series</i> .	5. Lower sandstone and clayslate formation.	No. 5. Thick complex of reddish and grayish muscovite-sandstones alternating with gray muscovite-bearing marls with a few traces of unknown plant-remains (p. 36). The whole rests directly upon the para-gneiss. <i>The Nak-tong Series</i> (YABÉ).		
5. Dark marly shale alternating with a fine-grained, fragile sandstone. Thickness 25 m.						



of the classifications advanced by several writers in the Kyöng-sang formation (see the table).

First of all it should be noted that there is a discrepancy regarding the uppermost member (No. 1 of the last column). Messrs. GORTSCHE and IXOUYÉ look at the green porphyrite and its derivative fusion-breccia simply as products of later volcanic eruptions, while Mr. YABÉ and myself like the rest take it as forming a geological unit. More extended researches will decide the question. It is, however, to be remarked that Nos. 2 and 3 are built up of volcanic materials sorted and deposited under shallow water, and are intimately related to No. 1—the eruptive sheet. These eruptive formations lie everywhere conformably upon the normal elastics, Nos. 4 and 5, though a conglomeratic bed is sometimes inserted between Nos. 3 and 4. Consequently the whole forms an uninterrupted series of rocks corresponding to a long range of Mesozoic time. Green porphyrite and its breccia occur always in association with the Mesozoic in southern Korea.

*To speak more in detail* of the beds in the above scheme, the lowest, No. 5, is mainly built up of muscovite-sandstone with intercalation of micaceous marl. The region composed of the beds consists of rolling hills with “hogbacks” whose trend corresponds to the tilted edge of slowly inclining, reddish-weathering strata. The general features of the land and rocks remind one of the “Red Basin of Ssi-chuan” of the Upper Yang-tse-kiang, if they are not of the same geological age. In this horizon, Mr. YABÉ<sup>1)</sup> found the plant-bearing bed at *Pultang-kokäi* in North *Kyöng-sang-Do* (p. 36). I give in the following the constitution of this small flora.

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1) *Loc. cit.* p. 170.

<i>Dictyozamites falcatus</i> (Morris)	common.
<i>Nilssonia orientalis</i> Hr.	abundant.
<i>N.</i> sp.	rare.
<i>Dioonites</i> (?) sp.	„
<i>Ctenophyllum</i> (?) sp.	„
<i>Podozamites Reinii</i> Geyler	„
<i>P. lanceolatus</i> (Lindle. and Hutton)	„
<i>Pinus</i> sp.	common.
<i>Pinus</i> sp.	„
<i>Onychiopsis elongata</i> (Geyler)	abundant.
<i>Coniopteris Heerianus</i> (Yokoyama)	common.
<i>C. hymenophylloides</i> (Brongn.) (?)	rare.
<i>Cladophlebis</i> <i>cf.</i> <i>denticulata</i> (Brongn.)	„
<i>C. koraiensis</i> sp. nov.	abundant.
<i>C.</i> <i>cf.</i> <i>Dunkeri</i> (Schimper)	rare.
<i>C.</i> sp.	„
<i>Sphenopteris uaklongensis</i> sp. nov.	common.
<i>S.</i> sp.	rare.
<i>Adiantites Sewardi</i> sp. nov.	abundant.
<i>Sagenopteris bilobata</i> sp. nov.	rare.
<i>Equisetum ushimarensis</i> Yok.	common.

Of the above, only five species, viz., *Adiantites Sewardi*, *Coniopteris Heerianus*, *Dictyozamites falcatus*, *Nilssonia orientalis* and *Podozamites Reinii* are available for determining the age of the strata. The fossil flora is of the type of the Tetori Series and according to YABÉ, represents the Malm-Dogger epoch in Korea. Later, Ixouyé<sup>1)</sup> made a find of *Onychiopsis elongata* (Geyler) at the *Ka-chhi* pass on the north of *Hjöp-chhyön*.

No. 4, the bed next above is rather thin as compared with the preceding, and consists of an alternation of thin regular beds

1) See *ant.*, page 130.

of wet-gray marl and gray, compact, calciferous sandstone, turning red on weathering. As it is more closely related in its rock nature and stratigraphy to the preceding than to the one next succeeding, I am rather disposed to include it in the Lower Kyöng-sang formation, and to consider it as a part of the Nak-tong series.

No. 3.—The ‘Red Formation’, is composed of variously-coloured beds of marls which through weathering become chocolate-brown, purple, red, carmine-red, and orpiment-yellow, thus giving an unearthly aspect to the landscape. At its base the rock is sometimes conglomeratic consisting of granitic gravels and porphyrite blocks cemented with a sandy matrix. The conglomeratic bed marks the beginning of the “red formation”, and sometimes shows a slight discordancy with the underlying elastic complex, No. 4 (pp. 28 (footnote), 87). The originally reddish or greenish marls, which are sometimes sandy, are of tufaceous origin consisting of detritus of porphyrite, splinters of quartz, hornblende and plagioclase, cemented by calcareous and ferruginous matters (p. 87). They invariably effervesce with acid, and they differ from the reddish-brown, slaty schalstein of Japan, which they greatly resemble and for which they are mistaken.

The red colour of the marl is, as I have already stated, in part due to simple weathering, but that of the fresh marl remains yet to be explained. According to Dr. HORNUNG (p. 31), saline brine from the evaporation of sea-water brings about the halurgometamorphosis in rocks by inducing the oxidation and precipitation of red, anhydrous oxide of iron from eruptive rocks rich in iron. The red colour in the present case may be due to this cause. The richness of soil in soda, and the presence of the so-called marl gold may be attributable to the same cause.

No. 2.—The complex of *black* and sometimes reddish-brown marly shale and *greenish* flinty tuffite is, like the preceding, of pyroclastic origin, and both are conformable in stratigraphy. Search was made in vain for fossils in the black marly shale. If there be any, they would be of great service in determining the age of the Upper Kyōng-sang beds.

A characteristic of this horizon is the appearance of banded, green and yellow, indurated tuffite. It is a compact, flinty, hornstone-like rock the origin of which is not wholly clear to me. Seen under the microscope it consists of coaly particles and biotite in the quartz-feldspar ground, the yellow bands being extremely rich in epidote granules. Its flinty texture may be in part due to the contact-metamorphic influence of the overlying green porphyrite, No. 1. But the constant occurrence of this greenish, flinty, indurated tuffite in the definite horizon needs some other explanation which I am not able to offer in the present state of my knowledge of the complicated geology of the region. Perhaps induration and silicification of tuffite under seawater in connection with submarine eruption of porphyrite had much to do in bringing about the hornstone-like texture of the rock. In short, the rock has undergone a diagenetic process.

It is also one of the characteristics of this complex that auriferous quartz veins are of frequent occurrence in it, and I give to this gold the name of the 'black shale gold' in contrast to the 'marl gold' already referred to.

No. 1, the green eruptive, is the uppermost member of the whole Kyōng-sang formation. The mode of its occurrence is so peculiar and characteristic as not easily to be explained. Porphyrites occur in an extensive sheet underlaid by thick beds of fusion-breccia of the same. They often cover the laccolithic and

euctophytic variety of granite, which I have named masanite. It is not entirely without reason that GOTTSCHE and IXOUÉ, as I have already stated, wholly exclude this formation from the Mesozoic group<sup>1)</sup>; but I have also already pointed out that the porphyrite and the Mesozoic complex appear closely associated in southern Korea. Moreover, if any one follows the profile of the Mesozoic beds from the east coast of the *Kyōng-sang province*, he can scarcely fail to see this green eruptive formation occupying the highest position in the series of the Mesozoic.

The rocks composing this *eruptive green formation* are of several types<sup>2)</sup> though they all belong to the same magma.

(a) The main sheet rock is dark-gray and aphanitic with few flecks of feldspar which can only be recognized by reflected light. Despite its fresh appearance, the rock under the microscope is seen to be very much altered. The original, macro- or micro-phenocrystic ferro-magnesian mineral, either diopside or hornblende, is usually altered into chlorite and epidote. The structure is pilotaxitic; the lath-shaped, twinned plagioclase makes up the groundmass together with interstitial, amorphous substances rich in chlorite. In it are imbedded the phenocrysts of tabular plagioclase. Clumps of ilmenite are abundant altering into leucoxene. The rock effervesces with acid. Besides the common (diabasic) porphyrite, there are some which contain corroded quartz, the former representing augite-andesite, the latter dacite of a later period. Magnetite is observed as at Fusan in the form of bedded veins accompanied with skarn (p. 14).

(b) A greenish-blue, compact and flinty rock with conchoidal

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1) See *ante*, page 171.    2) See *ante*, page 12.

fracture. Microscopically, it is composed of fragments of plagioclase and round chalcedonic patches, leucoxene-like substance and minute glittering flecks intermixed with amorphous dust. It is "jasperoid" and probably an indurated porphyrite-tuff which is scarcely distinguishable from the indurated tuffite of zone No. 2.

(c) A grayish-green, compact rock with angular flecks. Microscopically it is seen to be composed of angular crystals of plagioclase imbedded in the matrix which is made up of polarizing particles together with crystals of magnetite and fine grains of epidote. The plagioclase is also epidotized forming clusters with regenerated plagioclase. It is a compact porphyrite-tuff.

(d) The oft-mentioned green breccia is a fusion-breccia, and not a normal aqueous or æolian tuff. It is usually massive, but sometimes cleaves into the pot-sherd-like flakes characteristic of tufaceous rocks. Microscopically the green splinter is seen to be of pilotaxitic structure with the phenocryst of plagioclase sometimes epidotized, and also the phenocryst of the chloritized ferro-magnesian mineral. The dark splinter is the same volcanic in which magnetite-crystals are abundantly present. The grayish general mass consists of minute grains displaying aggregate-polarization colours. An unexpected guest is the deeply corroded quartz.

#### *A) The Kyōny-sang Formation in Chyöl-la-Do*

Thus far I have spoken of the Kyōng-sang formation exclusively as occurring in the province of the same name; but there are still other patches of the same formation in the present area



on the other side of the *So-päik-san* range. The *spatulate basin*<sup>1)</sup> in the *Chyöl-la* province is the Mesozoic of the same type as in the *Trans-So-päik-san* region. We find there exactly the same rocks, viz., diabase-porphyrityrite and its breccia, and red and green marls. Prof. GOTTSCHIE found near *Chyang-söng* a dark marl with gastropoda, ostracoda and plant-remains (p. 118). Comparing Mr. YABÉ's rocks of that region with mine of other areas, the complex developed there seems to represent the red marl (No. 3), the black marl and green tuffite (No. 2) and the sheet of porphyrite (No. 1). So far as the facts presented warrant a generalization, I am inclined to believe that the 'spatulate basin' is represented by a complete series (Nos. 1-3) of the Upper, and perhaps also the number 4 horizon of the Lower Kyöng-sang formation<sup>2)</sup>, though it is impossible for me to give cartographical expression to this opinion.

Uniform strikes and dips prevail here. The common strike coincides with the main axis of the basin with southeasterly dips. The conglomerate bed on the south margin consists of the gravels of granite and porphyrite, representing the same bed as that at the base of the No. 3 horizon (pp. 28 and 87).

One more patch lies a little farther north in the environs of *Yöng-dong*<sup>3)</sup>, and I correlate this Mesozoic with No. 4 of the Kyöng-sang formation.

### *B) The Kyöng-sang formation and its Japanese equivalent*

Before passing to another subject, let me say a few words about the Kyöng-sang formation on the opposite side of the Sea

1) See *ante*, pages 114-121 and 123-125.    2) See table, page 170.

3) 永同 It lies outside the present area.

of Japan. On the geologic map of Japan, one finds a belt of the Mesozoic bed<sup>1)</sup> in the region at the entrance of the Inland Sea (Seto-uchi), extending from the northeast corner of Kyû-shû to the west coast of the main island for a distance of about 120 km, with the axis from the northeast to the southwest; and nearly at the centre lies the port of Shimonoseki.

The Mesozoic complex here developed is likewise divisible into two series corresponding to the peninsular area.

a) The lower consists of sandstone, shale and a conglomerate of Palæozoic gravels. Its basal horizon harbours some Rætic plants, and the higher the Liassic Ammonites. The lower horizon is characterized by the absence of schalsteins and the presence of anthracite, the oldest coal found in Japan.

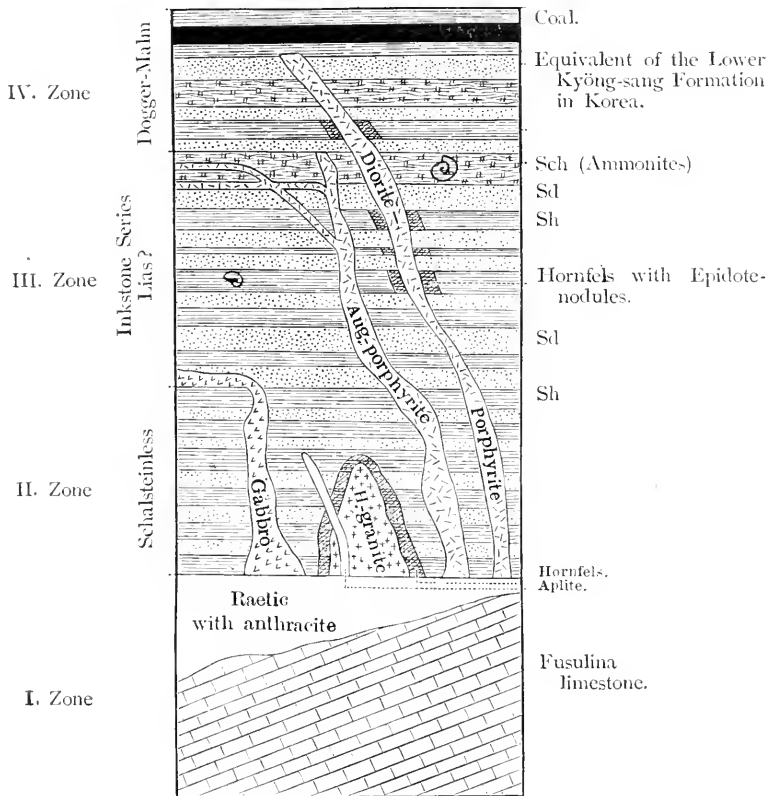
β) The upper series is built up of the so-called schalstein, conglomerate and breccia sometimes intercalating the beds of limestone. All is of pyroclastic origin excepting the calcareous beds. This series accompanies sheets of green porphyrite and beds of breccia; the latter is the green fusion-breccia of porphyrite, being scarcely distinguishable from the oft-mentioned Korean equivalent. The most characteristic feature of the upper series

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1) Preliminary works on the geology of the Mesozoic bed of this region were carried out by Messrs. Okada, Inoué, Suzuki, and Kochibé. On the palæontological side we have the papers by Prof. Yokoyama.

- a) T. Suzuki, "Explanatory Text to the Geological Map, Section Fukuoka" (in Japanese), 1894.
- b) K. Inoué, "Notes on the Geology of Nagato" (MS.), 1896.
- c) H. Okada, "Geology of The Toyora District" (MS.), 1900.
- d) T. Kochibé, "Explanatory Text to the Geological Map, Section Tsunoshima" (in Japanese), 1903.
- e) T. Suzuki, "Explanatory Text to the Geological Map, Section Yamaguchi" (in Japanese), 1907.
- f) M. Yokoyama, "On some Fossil Plants from the Coal-bearing Series of Nagato" *Jour. Coll. Sci.* Vol. IV. Pl. II. 1894.
- g) M. Yokoyama, "Jurassic Ammonites from Echizen and Nagato" *Ibid.*, Vol. XIX. Art. 20, 1904.
- h) M. Yokoyama, "Mesozoic Plants from Nagato and Bitchu," *Ibid.*, Vol. XX. Art. 5, 1906.

is the predominance of the so-called red and green schalsteins, which are in reality nothing but shales or marls exactly like the Korean rocks. The red marl contains pentagonal segments ("the plum-blossom stone") of stems of a crinoid (Palaeozoic?) and the black shale many obscure casts of a shell. As the red marl affords good material for inkstone (the stone on which the hard india "sumi" is rubbed up with water) the entire upper series is popularly called by Japanese geologists the "Inkstone Series".



Profile of the Mesozoic in Nagato Prov., schematized after the late Okada. Sch schalstein, Sd sandstone, Sh shale.

The annexed is a sectional column reconstructed, schematized, and also classified mainly from the descriptive profile of the Mesozoic beds of Nagato Province, mentioned in the late Okada's dissertation, "On the Geology of the Toyora District, Nagato" (MS.).

The basement bed is the *Fusulina* limestone of the Anthracolithic age.

I. Zone.—The above is overlaid discordantly by the Rætic plant bed of Yamanoi<sup>1)</sup>. It contains anthracite layers. The species which Prof. YOKOYAMA is able to determine are the following:

- |      |                                |                   |
|------|--------------------------------|-------------------|
| * 1. | <i>Cladophlebis nebbensis</i>  | (Brgnt.)          |
| 2.   | <i>C. yamanoiensis</i>         | Yok.              |
| * 3. | <i>Dictyophyllum Nathorsti</i> | Zeil.             |
| 4.   | <i>D. japonicum</i>            | Yok.              |
| 5.   | <i>D. Kochibei</i>             | Yok.              |
| 6.   | <i>Podozamites lanceolatus</i> | (Lindl. et Hutt.) |
| 7.   | <i>Nilssonia Inouyei</i>       | Yok.              |
| * 8. | <i>Baiera paucipartia</i>      | Nath.             |

The species of the florula Nos. 4, 5, and 7 are found only in Japan; but No. 6 is a form of wide occurrence in the Jurassic. The important species Nos. 1, 3, and 8 are of great moment in assigning the age of the bed to the Rætic epoch, as they are found only in that formation.

II. Zone.—This zone is the so-called schalsteinless, being built up essentially of shale and sandstone which are barren of fossils.

1) Yokoyama: "Mesozoic Plants from Nagato and Bitchu." This *Journal*, Vol. XX, Art. 5.

III. Zone.—This is the “Inkstone Series” proper, consisting of shale, sandstone, conglomerate, with schalstein beds in its upper horizon and harboring a marine fauna in sandstone and shale. The species of Ammonites<sup>1)</sup> hitherto found at *Nishi-Nakayama* and *Ishimachi* are as follows :

1. *Hildoceras chrysanthemum* Yok.
2. *H. densicostatum* Yok.
3. *H. Inouyei* Yok.
4. *Grammoceras* (?) *Okadai* Yok.
5. *Harpoceras* sp.
6. *H.* sp.
7. *Caloceras subfibulatum* Yok.
8. *Dactyloceras helianthoides* Yok.

In general aspect the fauna shows a great resemblance to that of the Upper Lias of England. There seem to be two or more horizons in the Ammonite-bearing layers in the zone.

IV. Zone.—This also is composed of an alternation of shale, sandstone and schalstein, the whole being capped with another complex of shales and a coal seam. The higher, coal-bearing complex contains at *Nanami* an impression of *Onichyopsis elongata* Gey.—a fact which betrays the presence of the upper Jurassic beds, probably representing the Dogger-Malm horizons. The writer is rather disposed to consider this zone correlated to Nos. 4 and 5 of the Kyōngsang Formation of the peninsular area<sup>2)</sup>.

1) Yokohama: “Jurassic Ammonites from Echizen and Nagato.” This *Journal*, Vol. XIX. Art. 20.

2) See table, page 170.

If I am justified in my opinion, the Korean Jura is but imperfectly represented in its lower horizons. The other side of the Strait of Tsushima passed that time in a continental, erosion period, while this side was under the sea, harboring the Ammonite fauna.

I have here purposely inserted the above few lines in order to call the attention of readers to the similar and dissimilar aspects of the Mesozoic development, especially of the Jurassic, on the two sides of the strait.

From what has been said before, one cannot help thinking that the Mesozoic beds on both sides of the Strait of Tsushima are lithologically one and the same formation—the sandstone and marl in the lower, the red tuff-marl and green eruptives in the higher horizon, if we set aside the consideration of fossils. The Korean Jura is mainly represented by brackish water deposits of the Malm-Dogger age; while our Jura, by the Liassic marine deposits.

If any one journeys over the *Kjōng-sang* province and the environs of Shimonoseki, he is sure to receive the impression that he is meeting with the same succession of strata and the same kinds of rocks.

If we approach the question from the geographical point of view, interesting light will be shed on the Mesozoic on both sides of the Strait of Tsushima as well as of the intervening space, which for brevity will be hereafter called the “Tsushima basin.” The Mesozoic belt on the Japanese side trends from northeast to southwest, and that of the Korean also in the same direction. If we outline the supposed extent of the “Tsushima basin” area, a wide belt of the Mesozoic terrane will embrace

the entire tract of the Strait of Tsushima including the coastal regions on both sides, with the axis trending northeast and southwest corresponding to that of the strait. It is obvious that the Mesozoic mountains, situated between the Alpine ranges of the *So-paik-san* and *Chû-goku*, once connected the insular empire with the continent. Since then, the intervening tract has been cut off by the subsidence of the Mesozoic ground, and the isolated islands of Tsushima bear witness to the great geographical revolution that made Japan an island group. As to when the last diastrophic changes took place, I can only say that it was probably at the end of the Tertiary, as may be surmised from the Tertiary deposits which flank the coastal slope of the already uplifted Mesozoic mountains. The Mesozoic basin of the Tsushima area seems to have been *shallow* on the Korean and *deep* on the Japanese side.

Much light will be thrown on this subject if, as GOTTSHE has already attempted to do, the geology of Tsushima<sup>1)</sup> is worked out in detail. The Tsushimâ area in my opinion forms a geological unit, and the whole range of the Mesozoic group will be embraced in the *Kyông-sang* formation in the broad sense of the term.

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1) Mr. Nasa visited the islands of Tsushima in 1891, and found an extensive development of a complex of shale, slate and sandstone, which vividly impressed him with its close resemblance petrographically to those of the Mesozoic terrane of Kaga province. (*Bulletin Imp. Geol. Surv.* [in Japanese], No. 1., 1891.)

Lately, Mr. Satô reconnoitred the islands and found also the shale and sandstone, the latter calciferous and muscovitiferous. He divided the complex into two groups: the lower sometimes becomes conglomeratic and has poor seams of anthracite (18-20 *cm* thick) with *Ostrea*; the upper is intercalated with sheets of quartzporphyry and porphyrite. The whole complex is thrown into folds with the anticlinal axis trending from northeast to southwest with the prevailing dip to the southeast, though the contrary was frequently observed. Satô likewise assigns the age of the complex to the Mesozoic (Lias). (*Explanatory Text to the Geologic Map of Kamiyagata, Tsushimâ Is.* [in Japanese], 1908). To the writer, the Tsushima Mesozoic seems to have a closer affinity to that of the Japanese side than to that of the Korean.

*VI. The Felsophyre and its Allies*

We now come to deal with one of the many obscure problems in Korean geology — the problem with which we have also been confronted in Japan, though no one has ever attempted to solve it. It is the question of felsophyre, which is not only represented by multifarious modifications, but also occurs in close association with green porphyrite which has apparently no genetical relation with the felsophyre. I have already mentioned the quartziferous<sup>1)</sup> fusion-breccia in connection with porphyrite, and also that the green breccia cannot be easily distinguished from the breccia derived from felsophyre<sup>2)</sup>. At any rate the rather basic porphyrite and the highly acidic felsophyre, though seemingly diametrically opposed, occur in close connection, and the latter, so far as my observation goes, always underlies the former; but in time relation they are not far from one another. To explain the genesis of the two effusives, petrologists are in the habit of invoking the aid of magmatic differentiation which is, however, not easy to conceive in the wide distribution in Korea of the complementary rocks in a comagmatic region. The writer apprehends that the same difficulty about the porphyrite will confront geologists outside the peninsular area, especially in Japan and North China, and even in Borneo<sup>3)</sup>.

Another question presents itself to my mind, and this is that the effusive felsophyre, according to my observations in the field<sup>4)</sup>, imperceptibly merges into normal quartzporphyry which in turn grades into rhyolitic and nevaditic varieties, and then into

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1) See *ante*, footnote, page 44.    2) See *ante*, footnote, page 19, and footnote, page 98.

3) Easton: 'Geologie eines Theiles von West Borneo.' *Jaarboek van het Mijnwesen in Nederlandsch Oost-indië*, Batavia, 1904.

4) See *ante*, footnote, page 98.



eutectophyre, graniteporphyry and finally, into aplitic granite. If the facts stand as I have here outlined them in regard to the relative position of the two, the granitic rocks must have been pressed out before the porphyrite; but many field relations show that the granitic rock must be laccolithic intrusions capped with the sheet of porphyrite, as is well seen in the environs of Fu-san<sup>1)</sup>. This and many other contradictory facts lead the writer into a labyrinth of doubts. The facts will be presented while speaking of laccolithic intrusions of neogranites.

As I have already given brief descriptions<sup>2)</sup> of porphyrites, I shall now enumerate the essential features of felsophyres and their allies.

In order to make clear the relations that exist between the rock varieties of the neogranite family, I give in the following a short table with brief remarks :

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1) See *ante*, pp. 15 and 105.

2) See *ante*, page 175.

## NEOGRANITES

	Marginal Facies of Laccolith	Effusive Forms
Porphyritic	<p>1. Quartz-porphyry (quartz-tsingtauite).—Phenocrysts of quartz, bipyramidal or corroded, and of orthoclase, are set in the microgranitic, sometimes micropegmatitic groundmass.</p> <p>2. Tsingtauite.—Orthoclase is the only phenocryst which is imbedded in a microgranitic groundmass (Rinne). This rock has thus far not been observed by the writer in Korea.</p> <p>3. Masanite<sup>1)</sup> (graniteporphyry).—Phenocrysts of plagioclase, usually zonal-structured, and often myrmekitic on periphery; those of quartz, bipyramidal or corroded,—both are set in a fine granitic or micropegmatitic groundmass. If the phenocrysts of quartz occur in addition to those of plagioclase, the rock may fitly be called the <i>quartz-masanite</i>.</p>	<p>1. Orthoclase-quartz-felsophyre. — Groundmass is pinkish, microfelsitic, showing flowage structure. It is sometimes micropegmatitic. The phenocrysts of quartz and orthoclase are imbedded in the matrix. The quantity of quartz is variable, and the rock is often found in transition to the next variety.</p> <p>2. Orthoclase-felsophyre. — Phenocrysts of orthoclase are set in matrices of the same kinds as in the preceding.</p> <p>3. Plagioclase-quartz-felsophyre (crystal-porphyry).—The matrix is the same as in the two preceding.</p>
Granular	<p>4. Grano-masanite (Aplite-granite).</p>	<p>4. Eutectofelsite.</p>

1) So named because it is typically exposed in the Ku-ryong Copper Mine near the port of Ma-san-pho (See *ante*, page 22).

1. To begin with the *effusives* of the neogranites, the first is a fine felsite-like pelitic rock (tuffite) of a fine-banded texture, weathering into red earth. This light-coloured rock is exposed on the west of *Kim-hăi* (p. 18), overlaid by green porphyrite-breccia. Microscopically, it consists of minute polarizing splinters of feldspar and amorphous dust.

2 *a*. A pinkish, compact, brecciated felsophyre of *Hăi-nam* (p. 57, footnote), exhibiting a beautiful fluidal texture. Microscopically the rock consists of angular fragments cemented with a felsitic matrix. Each fragment shows fluidal texture and is built up of pinkish felsitic bands admixed with granules of sesquioxide of iron. Porphyritic crystals are corroded and kaolinized orthoclase. The cementing substance is a confused aggregate of polarizing grains with fragments of orthoclase. When altered it becomes clay-stone-porphry.

2 *b*<sup>1)</sup>. This modification of the brecciated felsophyre has the appearance of a sheared, bedded tuffite, with angular fragments, green chloritic patches, and kaolinized crystals of feldspar in a light-green matrix. When decomposed the rock colours the soils red and green. The appearance of the rock is exactly like that of the green fusion-breccia of porphyrite (p. 176). Its distribution is wide as it makes up the headland of *U-su-yŏng* with the northern part of the island of *Chin-do* (pp. 57 and 61). It is well exposed on both sides of the narrows of the celebrated whirlpool of *Myŏng-yang-jin*, the world-famed Charybdis of Korea. Here the green-flecked, ash-gray brecciated felsophyre has abundant pyramids and corroded crystals of quartz which project out like needle-heads on the wave-beaten surface at the water's edge, presenting a rough scraggy appearance (p. 59).

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1) This as well as No. 2 *d* should better be included in No. 1.

2 c. Close by the Korean Charybdis is the small hill, *Ok-măi-san* by name, noted for the material used in making the fine cigarette boxes which we frequently find in shops in *Seoul*. It is an unctuous, white claystone—the “ok-mai stone”<sup>1)</sup>. It consists of pure, amorphous clayey matter impregnated with granules of hematite making carmine-red flecks in the rock. It is probably a local sedimentation of decomposed felsophyre, later subjected to post-volcanic action which produced the granules of hematite. The rock resembles lithologically as well as geologically the “mitsu-ish stone” of Bizen, Japan, where the rock is now being extensively quarried for refractory bricks (p. 59).

2 d. A spherulite-porphry occurring near the *cummăi* of *Hăi-nam*. It is a light-brown rock with abundant grains of quartz set in the spherulitic groundmass. Altered orthoclase and biotite are also present.

3. The crystal-porphry typically exposed at *Yū-dal-san* near the free port of *Mok-pho*, not to mention many others. It is a grayish, coarse, nevaditic rock containing a few crystals of biotite and flesh-coloured microcline, but a large quantity of corroded grains and bipyramids of quartz. The groundmass is a granulo-crystalline felsitic matrix. The microcline easily weathers off leaving hollows behind it, giving it the rough aspect of rhyolite for which it was formerly mistaken.

A remarkable, nevaditic, rapakiwi-like<sup>2)</sup> crystal-porphry was brought home by Mr. INOUÉ from the mouth of the *Yōng-san-gang* near *Mok-pho*. It is built up of crystals of oligoclase and quartz with an interstitial groundmass of microgranitic aggregate with bluish-green needles of hornblende and crystals of titanite. The white plagioclase (1–2½ cm) is enclosed in a shell of flesh-

1) 玉埋石 or 玉華石 = “precious flower-stone.” 2) See ante, page 64.

coloured orthoclase—the reverse of that of the Finnish rapakiwi —, and the quartz (1 cm) is round, sometimes bipyramidal. These two components make up the greater bulk. It is a modification of masanite and may fitly be called “masanophyre”, and it may be used for decorative purposes. This excellent rock was kindly analysed by Mr. S. SHIMIZU, of the Geological Survey, with the following result:—

		Molecular ratio.	Molecular ratio in percentage.
SiO <sub>2</sub>	75.68%	1.2613	82.64%
Al <sub>2</sub> O <sub>3</sub>	14.74	.1445	9.47
Fe <sub>2</sub> O <sub>3</sub>	0.57	.0036	.23
FeO	0.95	.0132	.86
MnO	0.13	.0018	.12
MgO	tr.		
CaO	0.15	.0027	.18
Na <sub>2</sub> O	3.13	.0505	3.31
K <sub>2</sub> O	4.58	<u>.0487</u>	<u>3.19</u>
H <sub>2</sub> O	<u>1.00</u>	1.5263	100.00
	100.93		

According to the system of LÆWINSON-LESSING, we have

	1.169	$\bar{R}O$	1.481	R <sub>2</sub> O <sub>3</sub>	12.613	SiO <sub>2</sub>	
		$\bar{R}O$	1.266	R <sub>2</sub> O <sub>3</sub>	10.789	SiO <sub>2</sub>	R <sub>2</sub> O : RO
Crystal-porphry	$\bar{R}O$	1.3	R <sub>2</sub> O <sub>3</sub>	10.8	SiO <sub>2</sub>	a4.49	5.6 : 1
Type Quartzporphry	$\bar{R}_2O_3$		R <sub>2</sub> O <sub>3</sub>	9	SiO <sub>2</sub>	a4.55	2.5 : 1

As compared with typical quartz-porphry our rock is slightly lower in SiO<sub>2</sub>, but much higher in alkalis. I have tried to apply OsANN's formula to the analytical numbers, but without satisfactory results, as the alumina is too high.

4. Eutectofelsite (eutectophyre) is the name given by the

writer to a whitish, earthy tuff-like rock cleaving into imperfect tablets. The locality is the hill-neck *Pam-chhi*<sup>1)</sup>, south of *Masan-pho*. Microscopically it is made up of interlocking aggregates of quartz and orthoclase of equidimensional grains and of the same orientation, forming the so-called implication-structure.

5. Common quartz-porphry with a few phenocrysts of quartz and orthoclase in a microgranitic groundmass is rare in Korea, and was noticed by the writer only on the west of *Chin-häi*. With this and the two following are the *marginal facies* of neogranites.

6. Masanite.— This is a buff-coloured, inequigranular rock of the aspect of a fine granite on one side and of a quartz-porphry on the other. Unlike aplite it easily falls to weathering due to the loose aggregation of the quartz and orthoclase, producing thereby an appearance of pumice both in colour and texture. Besides, the phenocrysts of plagioclase weather away leaving hollows behind them; but the patches of quartz resist atmospheric decomposition.

The main bulk of masanite is built up of quartz and orthoclase which are equant, polyhedral and equiform, and the structure is interlocked or implicated. The quartz, however, shows optical continuity extending to several grains so that the mineral must be considered as plate in which orthoclase is imbedded. The rock therefore has, so to speak, the antipegmatitic and not the pegmatitic structure, for in the latter orthoclase serves as the base.

Another peculiar feature is the exclusively plagioclastic nature of the zonal-structured feldspar-phenocryst with indefinite

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1) See *ante*, page 26.

outline, gradually merging into a general mass; myrmekitic intergrowth with quartz is frequently observed on its periphery. The quartz occurring in patches also gradually merges into a general mass. These and many other peculiarities entitle it, as I believe, to receive a new name, and I call it masanite. It is, mineralogically speaking, a porphyritic plagioclase-greisen. It is probably the marginal facies of the laccolith.

The masanite habitually appears at the base of the sheet of porphyrite though both are defined by a sharp line of demarcation and easily distinguished by contrast in colours (p. 22).

The following is the result of an analysis carefully made for the writer by Mr. G. TSUKAMOTO, of the Geological Survey :—

		Molecular ratio.	Molecular ratio in percentage.
SiO <sub>2</sub>	72.38%	1.2063	78.93
Al <sub>2</sub> O <sub>3</sub>	14.77	.1448	9.47
Fe <sub>2</sub> O <sub>3</sub>	1.98	.0124	.81
FeO	0.70	.0097	.63
MnO	0.26	.0037	.24
MgO	1.13	.0282	1.85
CaO	1.38	.0246	1.61
Na <sub>2</sub> O	3.50	.0565	3.70
K <sub>2</sub> O	3.95	.0421	<u>2.76</u>
H <sub>2</sub> O	1.54	<u>.0856</u>	100.00
TiO <sub>2</sub>	trace	1.6139	
P <sub>2</sub> O <sub>5</sub>	<u>„</u>		
	101.59		

According to the system of LEWINSON-LESSING, we have the following :—

	1.648	$\bar{R}O$	1.572	$R_2O_3$	12.063	$SiO_2$		$R_2O : RO$
Masanite	1.05	$\bar{R}O$		$R_2O_3$	7.67	$SiO_2$	$a$ 3.69	1.48 : 1 $\beta$ 26.3
Type Granite	1		1		7.7		3.91	1.7 : 1

In comparison with average granite the masanite is slightly *lower* in acidity coefficient and alkalies. This is due to the oligoclase phenocryst which characterizes our rock<sup>1)</sup>.

From OSANN'S formula we have the following :—

S	78.93	A	6.46	C	3.01	F	2.72	n	5.7
s	78.93	a	10.598	c	4.938	f	4.462		
s	78.93	a	11	c	5	f	4	n	5.7 $\beta$

Our rock closely resembles the granite of Woodstock<sup>2)</sup>, from which, however, it slightly differs in the value of n, *i.e.*  $Na_2O : K_2O$ . The value of n in masanite is high in  $Na_2O$ , the number being 5.7 ( $=\beta$ ), that of Woodstock 4.9 ( $=\gamma$ ). This is due to the presence of plagioclase.

7. Grano-masanite.— This is essentially the same as the preceding in its mode of (laccolithic) occurrence and composition. Large masses of Korean neogranite belong to this category, and occur extensively also in Chû-goku in Japan, in association with crystal-porphry. It is a *buff-coloured*, coarse aplitic granite easily crumbling into debris and sand. It is poor in coloured minerals and accessories, being mainly composed of equiform and equant quartz and orthoclase. The components of this monotonous leucocrate have the appearance of simultaneous crystallizations rudely intergrowing one another pegmatitically, though lacking the regularity of the texture of graphic granite. The rock

1) The specimen analysed was brought from the Ku-ryong copper mine, north of Masan-pho. See *ante*, page 22.

2) Osann : "Versuch einer chemischen Classification der Eruptivgesteine. I. Die Tiefengesteine." *Tschermaks, M. P. M.* Bd. XIX. Heft 5/6, S. 464.



is a mere interlocking of xenomorphic components. Granophyric texture is of iversal unoccurrence. Porphyritic development is frequent and it is the oligoclase which takes the form of the phenocryst enclosed in a shell of flesh-colored orthoclase as in the crystal-porphyry already mentioned; and this characterizes the rock in contrast to common granite; and this also brings it in close relation with the masanite. The typical rock is that found near *Fusan* (p. 15).

The grano-masanite occurs always in the intrusive laccolithic form erupted after the porphyrite as is proved by its intrusion into the porphyrite-tuff near *Koang-jyu* (Chyöl-la-Do)<sup>1)</sup>, and in series No. 2 at *Ha-yang*<sup>2)</sup> near *Tai-ku* (Kyöng-sang-Do). The grano-masanite irrupted at the end of the Kyöng-sang period.

### VII. *The Tertiary Formation*

At about the close of the Mesozoic era, or in our case the Kyöng-sang period, a great diastrosphic movement occurred in the peninsula, especially in south Korea, accompanied or ushered in by the eruption of neogranite or masanite. The land was dislocated and uplifted, depressed and remodelled, and the general outline of the peninsula was then complete. Since then, as in the case of China, the land of Korea has remained long in the continental period, and has been degraded from Alpine altitudes to hilly tracts, the materials from the ruined mountains forming in the meantime the Tertiary deposits near the sea-shore, which

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1) See pages 74-75.    2) See page 91.

we now see in our present area only along the bay of *Yöng-il* on the east coast or coast. (See p. 93).

The basement of the Tertiary is felsophyre and crystal-porphyre which are superimposed by a series of gravel beds of dark-coloured felsophyre and the cream-coloured tuffite, the latter both stratified and unstratified. The stratified bed entombs plant remains. The series is discordantly covered by sandy beds containing poor lignite, which is in turn covered by black sheets of basalt<sup>1)</sup> on which stands the *cumnäi* of *Chyang-gi*. From the fossil bones, bivalves and plant-impressions in the stratified fossil bed, Mr. YABÉ considers the complex to be of the Pliocene age<sup>2)</sup>.

In passing, I should mention the fact that at the south of *Chyang-gi*, the fragments of typical basalt are found in unstratified tuffite which consists of a half-decomposed felsitic groundmass of felsophyre. From the occurrence of basalt blocks in the Tertiary it is safe to infer that the eruption of the basic effusive had already begun during Tertiary period, and I wish to lay stress on this point, as our Japanese colleagues usually shift the time of its outpouring to a later period.

### VIII. *The Diluvium*

Korea is a land of granite, but on the other hand it is characterized by the absence of typical Diluvium either marine or subaerial. In this respect it differs from eastern Japan, but resembles the northern part of China. The peninsula together with a part of China has remained in the continental period

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1) I thought it was basalt; but from the specimen brought back by Inouyé, I now see it is a black felsophyre. It requires, however, further proof. See *ante*, pages 95 and 96.

2) See *ante*, page 94.

since the great diastrophic revolution which happened at the end of the Mesozoic era. The Tertiary is meagerly represented and only on the east coast. The æolian loess of China is the deposit at one phase of that continental period. According to the late von RICHTHOFEN, the Diluvial loess<sup>1)</sup> is confined to North China and its neighbourhood within the mountain barrier which once described a curve from Tehin-lin-shan through the Huai mountains to the peninsula of Korea. I searched in vain for the loess not only in the peninsula, but also in eastern Manchuria. The limit of the loess seems to me to run through western Shan-tung and the eastern margin of the Liao valley in Manchuria.

Through the long interval of a later geologic period the peninsula has been subjected to intense subaerial degradation, and the waste has been carried down to the sea as fast as it has been formed; consequently we expect the Diluvium only in the present sea bottom. The Diluvium is therefore a lost period in the record of the deposits on the peninsula. Wave-built terraces, so common in Japan, are not found at any place on the coast nor inland. Only a few terraces, either alluviated or planated, are observed near *Kap-san* on the east *Kai-ma*<sup>2)</sup> plateau forming cusps above the river-bed; but even in the case of these we have no positive proof that they are of the Diluvial age.

What we should take for the representative of the Diluvial rock, is the immense sheet of basalt flows which we find in North Korea. This moreover is rare in the present area, and

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1) Fluvial and lacustrine loesses may according to my view belong in part to the Alluvium. Prof. B. Willis is of opinion that a part of the loess is of late Tertiary age ("Research in China").

2) Popularly called the *Koan-peuk Plateau* (關北臺地). See "An Orographic Sketch of Korea". This *Journal*, Vol. XIX. Art. 1, page 31.

to be seen only on the east coast where it occurs in association with the Tertiary already mentioned. The basalt had already begun its effusion during the Tertiary; but the period of main outpouring seems to have been the Diluvial period. This is also in accord with the view held by ANERT and CHOLNOCKY.

The only large extent of the occurrence of common basalt<sup>1)</sup> in the south is the island of Quelpart, which is also the only active volcano in south Korea.

#### THE YOUNGER EFFUSIVES

*a)* Basalt. — The iron-black basalt occurs at a few points in association with the Tertiary of *Yōng-il*<sup>2)</sup> on the east coast. It is the Stielbasalt — a typical dolerite of coarse texture. Microscopically it has a gabbro-like, typically ophitic texture with violet titan-augite plate enclosing lath-shaped plagioclase and idiomorphic olivine. Such a typically ophitic texture is rare in my experience.

*β)* The basalt<sup>3)</sup> of Quelpart Island is somewhat different and belongs to the type of Mt. Fuji. It is either slaggy or compact, and all of a bluish-gray colour. It is rich in plagioclase and olivine with no augite phenocrysts in the blackish ground-mass of the globulitic base which is admixed with grains of common augite. It is the flow-basalt which is also widely distributed in North Korea, forming volcanic mesas.

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1) The rocks of Quelpart were formerly considered to be all of the basalt family; in later works granite was created to make foundation. Mr. Inouyé (*loc. cit.*) altered to pyroxene-andesite. From the hand specimens at my disposal I cannot but reinstate the main rocks of the island either as being basalt of the Fuji type or a variety of olivine-andesite, although the occurrence of other rocks in small patches is not thereby absolutely denied (see page 141).

2) See *ante*, page 96. The same rock occurs at Tai-chho (大草), on the coast northeast of Chyang-gi, and also at Ho-am (虎岩) on the coast northeast of Ul-san.

3) See *ante*, page 141.

The whole island of Quelpart or *Chyöi-jyu* is volcanic, and from Korean works I have noted down ten or more old cones or craters scattered about in the island. The island is the only active volcano that I know of in all Korea; the active crater is, however, not on the top of *Hal-la-san*, but on an islet by the name of *Sö-san*<sup>1)</sup> off the southwest corner near *Tai-chyöng*. We have a record of an eruption in 1003 A.D. (See page 141).

γ) Hornblende-andesite. — At *Chyang-heung* on the south coast, a purplish-brown, brecciated hornblende-andesite<sup>2)</sup> was seen which evidently makes up the high, rugged *Sui-in-san* with its perpendicular cliffs of picturesque aspect. It is a devitrified glassy base with granules of iron, in which corroded grass-green hornblende is found porphyritically imbedded. A little colourless augite and much apatite are present.

δ) On the south of *Chyang-gi* on the east coast, we find a biotite-hornblende-andesite of a trachytic aspect and structure with colourless hyalopilitic groundmass; its mode of occurrence was not ascertained in my hasty journey (p. 98).

### IX. *The Alluvium*

Korea is a semi-desert created in part by Nature, but chiefly by the careless hands of its inhabitants. Mantle rocks or regoliths are not commonly met with in this country. The ground is naked and desolate; but Providence has provided it with a high percentage of alkalies, lime and magnesia which somewhat offset its sterility. Moreover, clays are rare things in the peninsula except on the low coast of the Yellow Sea. The lowlands are sandy; and as we

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1) 瑞山 2) See *ante*, page 53.

approach the piedmont hills, thick debris covers the foot, and the valleys are choked with coarse cobbles through which slender streams make their difficult way to the sea. The cobbles and shingles are of such a large size that only glaciers could have carried them. I can only suppose that there was at the end of the Diluvium a great meteorological change from dry climate to the wet<sup>1)</sup>, which inaugurated the beginning of the Recent period. Abundant precipitation and floods caused energetic erosion, degrading mountains and widening valleys, spreading loads and burying bottoms, while the fine silt and sand were carried down to sea. What we now see as the Alluvial deposit in the interior is the coarse load left behind by the sorting and *subtracting* action of running water. This climatic amelioration then prepared the way for the wandering of the prehistoric man who entered the peninsula from the north. The dolmens and stone mounds with side entrances<sup>2)</sup> which I saw may be remains of the primitive inhabitants.

In short, this is the general aspect of the Alluvium. Alluviated ground is scarce on the east coast, and a few patches occur on the south along the bays, indentations and debouchures of rivers; but along the Yellow Sea, on the contrary, extensive low flats are alternately exposed and hidden by the unique tidal difference of more than thirty-four feet.

The flats are thinly covered with sand. On one occasion I examined them at *Che-mul-pho*, and found to my surprise that the sand cover was only a few inches thick. The underground was loose original rocks disintegrating by a selective decomposition of their components. The flats therefore had resulted from

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1) In non-glaciated regions, such as Africa, the Drift period was represented by the *Pluvial period*.

2) Near the village of Nak-tong on the bank of the Nak-tong gang.

marine abrasion. They imperceptibly grade into the dry sandy plain which skirts the west coast.

Shallow basins in the labyrinthic interior are also sand-buried, and in the rainy season from July to September swollen streams spread mercilessly over the ever changing shallow river-bed. At a few points, *e. g.*, between *Ul-san* and *Fusan* (p. 104), and at *Chyang-heung* on the south coast (p. 53), gravel terraces could be seen which may belong to the Old Alluvium or the post-Diluvium. Such gravel terraces were observed by the writer at *Kyöng-jyu* (p. 98), and by Mr. INOUYÉ at the *Keum-gu* gold field west of *Chyön-jyu*.

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P.S.—In the present paper I have purposely omitted the section on the orogenic history of the part of the peninsula under question for various reasons; firstly, that a general sketch has already been given in my former paper: “An Orographic Sketch of Korea,” (This Jour. Vol. XIX. Art. 1); secondly, that my view was criticised by some (pp. 2-4) so that to ventilate the question requires detailed analyses of the orography of the peninsula—a problem not only of Korea, but of the whole of eastern Asia; thirdly, that the present paper deals with only a quarter of the peninsular area, and therefore is not fitted to give expression to the broad problem of the whole peninsula though my view may be gathered from scattered notes in the diary of the “Three Traverses” already given. For these and many other reasons it would be better to postpone the statements on the orogenesis of the present region to a future occasion when the whole peninsula could be treated in a more general way.

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