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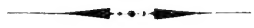
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Prof. **J. Sakurai**, *L.L. D., Rigakuhakushi*, Director of the College, (*ex officio*).

Prof. **I. Ijima**, *Ph. D., Rigakuhakushi*.

Prof. **F. Ōmori**, *Rigakuhakushi*.

Prof. **S. Watasé**, *Ph. D., Rigakuhakushi*.



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By A. IZUKA.—Publ. May 31st, 1912.

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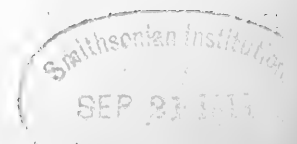
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JOURNAL
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COLLEGE OF SCIENCE,
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B. Hayata.

Materials for a Flora of Formosa.



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All communications relating to this Journal should be addressed
to the Director of the College of Science.

MATERIALS FOR A FLORA OF FORMOSA

Supplementary Notes to the Enumeratio
Plantarum Formosandarum and
Flora Montana Formosæ.

By

B. Hayata, *Rigakuhakushi.*

Materials for a Flora of Formosa

Supplementary notes to the *Enumeratio Plantarum Formosana-
narum* and *Flora Montana Formosæ*, based on a Study
of the Collections of the Botanical Survey of
the Government of Formosa, principally
made at the Herbarium of the Royal
Botanic Gardens, Kew.

By

B. Hayata, *Rigakuhakushi*

*Lecturer on Botany, Botanical Institute, College of Science,
Imperial University of Tōkyō.*

Introduction.

Since the publication of the *Enumeratio Plantarum Formosana-
narum*¹⁾ and *Flora Montana Formosæ*,²⁾ a large number of
collections has been sent to me for determination, by the Go-
vernment of Formosa. The collections are in greater part from
the mountainous regions of the island and contain a considerable
number of novelties. As the flora of Formosa has a close
affinity to the floras of Japan and China, it is very important,
in order to work up the materials, to make an exhaustive com-
parison of the collections with specimens from the two countries.

1) MATSUMURA, J., and HAYATA, B.—*Enumeratio Plantarum Formosana-
narum*, in *Journ. Coll. Sci. Imp. Univ. Tōkyō*, XXII., 702 pages, with 18 plates, 1906.

2) HAYATA, B.—*Flora Montana Formosæ*, in *Journ. Coll. Sci. Imp. Univ. Tōkyō*, XXV.
Art.—19, 260 pages, with 41 plates, 1908.

At the same time, as the flora of the island contains a considerable number of elements from India, including the Himalayas and the Malay peninsula and archipelago, it is equally desirable for my work that the same should be done with the specimens of the regions above mentioned. For a comparison with Japanese specimens, the Herbarium at Tōkyō will answer fairly well, as it includes nearly all Japanese plants, though not exhaustively. Chinese plants, however, are here only very poorly represented. I, therefore, found it very unsatisfactory to work up so big a collection only in the Herbarium at Tōkyō. Moreover, as a considerable number of Chinese plants are represented in the Herbarium at Kew, and also in that at Dahlem, and the type specimens of FRANCHET are especially preserved in the Herbarium at Paris, and those of MAXIMOWICZ, in that at St. Petersburg. I thought it very necessary for my work to see all the plants represented in the principal herbaria of the West. It was my great good fortune that I was given an opportunity of visiting these different herbaria in order to make an exhaustive comparison of my materials with the collections preserved in them. With this intention I first went to Kew taking all my materials with me. There I pursued my work with specimens of the floras to which our flora is more or less related. The comparison made, in most cases, was confined to the flora of Asiatic regions, especially, to China, Korea, India, the Himalayas, and the Malay peninsula and archipelago; but, sometimes, it was extended, when necessary, to Australia, the Arctic and Antarctic regions, Europe, Africa, America and even to Polynesia. I found that many of the species of my collections are represented in the Chinese herbarium at Kew, and also among the specimens from other regions. At the same time, I found also that the greater part

of my materials is not yet represented at Kew, and that, in great probability, they are species not yet described. After finishing my work at Kew,¹⁾ I went to the Herbarium at Paris, in order to see the type specimens of Chinese plants mainly described by FRANCHET. Then, my work was pursued in the Herbarium at Dahlem where are preserved a good many collections of Asiatic flora. My purpose in going to Dahlem was to see especially the specimens mentioned in Prof. DIELS' "Die Flora von Central China."²⁾ In Dahlem, as in Paris, I devoted myself to making notes of the specimens preserved there, as I had not brought my materials with me. I especially devoted myself to making sketches, on tracing paper, of the specimens which are represented only in Dahlem and nowhere else, so that I could make a close comparison with these sketches on my return to Tōkyō. After finishing my work, I went, with the same purpose, to the Herbarium at St. Petersburg, in order to see the type specimens of MAXIMOWICZ. During my work on the continent, I was successful in placing some species which I had not been able to determine at Kew. Still, many of the plants in my collections which remain as yet undetermined, are not represented in any of the herbaria on the continent. It is, therefore, highly probable that they are species not yet described.

The plants mentioned in the present work are mostly of species newly described and, if not, they are new to the flora of Formosa, though there are a very few which were previously

1) DIELS, L.—Die Flora von Central China, in ENGL. Bot. Jahrb. XXIX, pp. 169–657.

2) During my stay at Kew, I was away from my work, for a little more than a week, when I went to Brussels to take part in the International Botanical Congress, then being held there, at which I presented a paper entitled "Botanical Survey of the Government of Formosa, with short Sketches on the Vegetation and Flora of the Island." The paper is now in press at Brussels.

recorded from that island. The references here made under each species are extremely limited, as there is no space for full accounts. Critical views regarding species already described by myself or by others, are here given. In the present work, it is my desire to mention all the species recorded from Formosa, which have appeared in different publications, since the issue of the *Enumeratio Plantarum Formosandarum* and *Flora Montana Formosæ*. So that, practically speaking, the present work is an exhaustive supplement bringing our former publications up to date.

To mention the number of species of the flora* of the island, known to us up to the present time, there are, in the *Enumeratio*, 1999 species belonging to 701 genera and 153 families. In my *Flora Montana*, 392 species are mentioned belonging to 266 genera and 70 families; in the present work, I have mentioned 735 species belonging to 343 genera and 109 families, thus adding to our present knowledge of Formosan flora, 567 species, 72 genera and 2 families. Excluding all those species which appear for a second or third time, in the above three papers, the total number of the plants of the island is 2660 species belonging to 836 genera and 156 families. The following list shows genera added to those mentioned in our former publications. Most of them are new to the flora of the island.

<i>Isopyrum.</i>	<i>Canarium.</i>	<i>Prinsepia.</i>
<i>Braenia.</i>	<i>Allophylus.</i>	<i>Callitriche.</i>
<i>Uvaria.</i>	<i>Pometia.</i>	<i>Tashiroa.</i>
<i>Cochlearia.</i>	<i>Albizzia.</i>	<i>Bupleurum.</i>
<i>Thespisia.</i>	<i>Pirus.</i>	<i>Pimpinella.</i>
<i>Suriana.</i>	<i>Cotoniaster.</i>	<i>Phellopterus.</i>

* The term flora used in this work includes flowering plants, ferns and their allies.

<i>Oreomyrrhis.</i>	<i>Hemigraphis.</i>	<i>Saccolabium.</i>
<i>Osmorhiza.</i>	<i>Acrocephalus.</i>	<i>Cleisostoma.</i>
<i>Angelica.</i>	<i>Lycopus.</i>	<i>Apendicula.</i>
<i>Abelia.</i>	<i>Melissa.</i>	<i>Aphyllorchis.</i>
<i>Nauclea.</i>	<i>Cryptocarya.</i>	<i>Galera.</i>
<i>Guettarda.</i>	<i>Illigera.</i>	<i>Herminium.</i>
<i>Coprosma.</i>	<i>Chamabaina.</i>	<i>Hemipilia.</i>
<i>Triplostegia.</i>	<i>Juglans.</i>	<i>Floscopa.</i>
<i>Lagenophora.</i>	<i>Platycarya.</i>	<i>Pinellia.</i>
<i>Cotula.</i>	<i>Castanea.</i>	<i>Zannichellia.</i>
<i>Codonopsis.</i>	<i>Halophila.</i>	<i>Remirea.</i>
<i>Embelia.</i>	<i>Oleronia.</i>	<i>Cladium.</i>
<i>Maba.</i>	<i>Cirrhopetalum.</i>	<i>Thuarea.</i>
<i>Melodinus.</i>	<i>Chrysoglossum.</i>	<i>Eremochloa.</i>
<i>Heterostemma.</i>	<i>Collabium.</i>	<i>Acrophorus.</i>
<i>Paulownia.</i>	<i>Spathoglottis.</i>	<i>Oleandra.</i>
<i>Hemiphragma.</i>	<i>Bletia.</i>	<i>Monachosorum.</i>
<i>Titanotrichum.</i>	<i>Pleione.</i>	
<i>Oreocharis.</i>	<i>Sarcochilus.</i>	

In the present work, a few species are mentioned under families different from those to which they are referred in the former publications. As the alteration of families is a matter of importance, I shall here try to comment briefly on this point. There are three species which are properly transferred from one family to another. One is a plant which was called *Rehmannia Oldhami* HEMSL, formerly referred to Scrophularineæ, but now to Gesneraceæ. The reference to the species is given under the heading of the genus. The plant was first referred to *Rehmannia*¹⁾ by W. B. HEMSLEY who afterwards thought it better to regard it as representing a distinct genus from *Rehmannia*. He then established a new genus, *Matsumuria*,²⁾ for the plant, and referred it to Gesneraceæ on account of its perfectly one-called

1) HEMSLEY, W. B. in Ann. Bot. IX. p. 154.

2) HEMSLEY, W. B. in Kew Bull. Dec. (1909), p. 360.

ovary with two parietal placentæ. Almost at the same time, this plant attracted the attention of SOLEREDER who saw the very same specimen at Kew, and established a new genus called *Titanotrichum*¹⁾ which was published in September, 1909, when the description of HEMSLEY was in press. The priority has at last been given to the genus of SOLEREDER. In the present work, the plant is mentioned as *Titanotrichum Oldhami* SOLERED. and is referred to Gesneraceæ. Another plant is *Logania dentata*²⁾ formerly described by myself, which should be transferred from Loganiaceæ to Scrophularineæ. In 1906, when I published the plant in my Flora Montana Formosæ, I was informed by Mr. E. D. MERRILL that he thought that the Philippine plant *Nertera dentata* ELMER³⁾ (with which my plant is identical) should be referred to *Hemiphragma heterophylla* WALL. of the Himalayas. I also alluded to this matter in the foot notes to my paper in which I expressed the opinion that it was still questionable whether my plant should be referred to *Hemiphragma* or not. At Kew, I compared it with the type of the latter species and found that they were very similar excepting slight differences in the number of the corolla-lobes and in the attachment of the stamens to the corolla-tube. So far as I can ascertain from the description of *Hemiphragma* given in BENTHAM and HOOKER, f. "Genera Plantarum II. p. 959," the genus has a five-lobed corolla and four stamens, affixed to the base of the tube. But, in my plant, the corolla is four-lobed and the stamens are also four, but, affixed to the middle of the tube. It may be questioned, however, if the flowers of my plant may not be imperfect ones, as it was

1) SOLEREDER, in Bericht. Deutsch. Bot. Gesellsch. V.—27, p. 400 (Sept. 1909).

2) HAYATA, B.—Fl. Mont. Formos. p. 163.

3) ELMER, in Leaflet. Philipp. Bot. I—1, p. 15.

collected when the flowering season was nearly over. I examined a considerable number of the specimens, but I could not find more than one or two flowers upon which the description and figures in my paper could be based. It may be well conjectured that my plant in the normal state of its flowers may have a five-lobed corolla with four stamens. I therefore think it better to transfer my plant from Loganiaceæ to Scrophularineæ, referring it to *Hemiphragma heterophylla* WALL. Another plant which I may here mention, is *Ellisiophyllum pinnatum* MAKINO, which was referred to Hydrophyllaceæ, but, in the present work, is transferred to Scrophularineæ. In 1871, MAXIMOWICZ established the same genus upon a Japanese plant in "Mél. Biol. Vol. XIII. p. 18", then named by him as *E. reptans*. It is very probably to be referred to Polemoniaceæ, because of its seeds which produce a considerable amount of mucilage in the moist condition,— a character which is all but peculiar to the same family. The plant has also a close relation with Hydrophyllaceæ, so far as the leaves and flowers are concerned. It seemed, therefore, rather questionable to MAXIMOWICZ himself, to what family the present genus should be referred. In 1876, the same genus was referred to Hydrophyllaceæ by BENTHAM and HOOKER. f. in their "Genera Plantarum" II. p. 829. A little later, in 1890, it was referred to Scrophularineæ by BAILLON in "Bull. Soc. Linn. Paris, No. 103." Here, he expressed his opinion that the doubtful genus belongs neither to Polemoniaceæ nor to Hydrophyllaceæ, but to Scrophularineæ. Moreover, he stated that its nearest of kin is *Litorella* of the same family. In 1892, it was again referred to Hydrophyllaceæ by PETER in "ENGL. u. PRANTL. Nat. Pfl.-fam. IV. 3-a, p. 63." As to the nomenclature of the plant, there had been no difficulty, until Mr. T. MAKINO (1906) called his attention

to the similarity of the figures of *Moseleya pinnata* HEMSL. in HOOKER'S Ic. Pl. XXVI. t. 2592, (1892), and his drawings of *Ellisiophyllum reptans* MAXIM. which he had just made. The same plant is an extremely troublesome one, as to its genus and species as well as its family. Previous to the establishment of *Ellisiophyllum* by MAXIMOWICZ, the same plant was found in Nepal and is described as *Mazus pinnatus* WALL. The plant was afterwards referred to *Ourisia* (1835), then to *Hornemannia* (1846), then to *Sibthorpia* (1876) and finally to *Moseleya* (1893). The last genus was established by W. B. HEMSLEY, as there was, as he thought, being quite unaware of *Ellisiophyllum* of MAXIMOWICZ, no proper genus for the plant. As is clearly seen in the comparison of the drawings of *Moseleya* and *Ellisiophyllum*, above mentioned, they are two different genera established for one and the same plant. Accordingly, it is clear that the former should be reduced to a synonym of the latter. The present plant should, therefore, be referred to *Ellisiophyllum* with the specific name of *pinnatum*, as is stated by Mr. T. MAKINO.¹⁾ Now I may return to the question as to what family the plant should properly be referred? In my paper "Flora Montana Formosæ," I mentioned the plant under Hydrophyllaceæ. In 1909, Herr Professor A. BRAND wrote me that he had some doubt about this plant's belonging to Hydrophyllaceæ and expressed his desire to study it, asking me to send him the materials. This being done, he soon published his paper on *Ellisiophyllum*²⁾ in which he expressed the opinion that BAILLON'S statement, to which I have referred above, was correct. According to his opinion, all the Hydrophyllaceous plants have, without

1) MAKINO, T. in Tôkyô Bot. Mag. XX. p. 92. t. V.

2) BRAND, A.—*Ellisiophyllum*, in "Zwei Kritischen Pflanzen Gattungen," p. 5.

exception, two parietal placentæ, which connate themselves in the innerside of the capsules. But, it is quite otherwise with the present plant, which bears only a placenta rising by itself to midway from the base of the ovary, i.e. a central placenta, as is the case with Scrophulariaceous plant. The genus is, therefore, not to be referred to Hydrophyllaceæ, but should be referred to Scrophularineæ. There is a little difference between his statement and Mr. MAKINO's drawings, regarding the placenta. So far as I can judge from the latter figures, the ovary is perfectly two-celled, with axial placentæ. But, in the figures given in HOOKER's *Icones Plantarum*, the ovary is nearly, but not perfectly, two-celled, as the placentæ are free at the apex. Although these differences exist, they are, in my opinion, to be regarded as results of individual mutability, to which all plants are more or less subject. Taking all these things into consideration I think the plant should be referred to Scrophularineæ, as was stated formerly by BAILLON and quite recently by Prof. BRAND. Finally, I may mention one more plant which is also extremely difficult as to its reference. It is *Triplostegia glandulifera* WALL. The genus was first established by WALLICH on a Himalayan plant in his manuscript and also in DC. Mem. VII. t. 4, referring it to Valerianeæ, as we see in "DC. Prodr. IV. p. 642." The genus is, however, transferred to Dipsaceæ by BENTHAM and HOOKER, f. in their *Genera Plantarum* II. p. 158, with the remark "Genus hucusque ad Valerianeas quibus inflorescentia accedit adscriptum, sed involucellum, semen albuminosum, folia et indumentum omnino Dipsacearum et odore Valerianearum caret," and also on p. 1230, with another remark, "Stamina perfecta sæpe 3 tantum ut in Valeriana affinibusque, et genus omnino medium tenere videtur inter Valerianeas et Dipsaceas,

etsi characteres essentielles posteriorum.” The genus is also referred to Dipsacæ by HEMSLEY in FORBES and HEMSLEY’S Index Flora Sinensis, I. p. 399, and also by F. HÆCK in ENG. u. PRANT. Pfl.-fam. IV.—4 p. 187. When I examined the plant in the Herbarium at Tōkyō, where we have very few Chinese specimens for comparison, I thought that it must be a plant belonging to Valerianæ, and I saw that the plant was quite referable to the genus *Hæckia*, then newly established by Professors ENGLER and GRÆBNER in DIELS’, “Die Flora von Central China.”¹⁾ I saw also that the description of *H. Aschersoniana* ENGL. and GRÆBN. accorded fairly well with my plant, though there are some minute points in which they do not exactly agree. As the plants of this family are usually subject to some mutability in the magnitude of flowers and leaves, I thought the present plant to be identical with *H. Aschersoniana*. During my work in the Herbarium at Dahlem, I examined the type of the *Hæckia* and also the specimens of the *Triplostegia* of the Himalayas, and found that they are exactly the same as those with which my plant also is identical. The present plant is, therefore, mentioned, in this work, under the name of *Triplostegia glandulifera* WALL. As to the position of the present genus, it is, in my opinion, much more desirable to refer it to Valerianæ, than to place it in Dipsacæ.

I may here mention another remarkable case given in this work. Of all the plants contained in the flora, perhaps the most striking genus is *Oreomyrrhis*, which is all but peculiar to the Australian flora, belonging to Umbelliferæ. The genus is, not only new to the flora of the island, but also new to that of the

1) DIELS, L.—Die Flora von Central China, in ENG. Bot. Jahrb. XXIX p. 598.

northern hemisphere. Another case of novelty is the addition of two families to the present flora. They are Hernandiaceæ and Myristiceæ.

The materials upon which this work is based are, in greater part, the collections made by the Governmental Botanical Survey, supervised by Mr. T. KAWAKAMI, during 1906-1909. I have also referred to a small set of specimens of Loo-chooan plants, collected by Mr. G. NAKAHARA, a few dubious specimens from the Loo-choo and Bonin islands, preserved in the Herbarium at Tōkyō, and small collections of Formosan plants sent by Mr. S. NAGASAWA and the late N. KONISHI.

The present work was, in great part, carried out by myself in the Herbarium at Kew. A few families were examined by the staff of the same laboratory. Of the staff, I may mention Dr. O. STAFF for doubtful families, Mr. E. N. BROWN for Asclepiadeæ and Aroideæ, Mr. R. A. ROLFE for Umbelliferæ and some Orchids.

In conclusion, I must tender my hearty thanks to Prof. J. MATSUMURA for his encouragement during the present work. I also wish to express my sincere gratitude to Mr. K. OSHIMA, Ex-Chief of Civil Government of Formosa, by whose graciousness extended towards myself, I was able to visit the principal herbaria of the West. To Lieut. Col. D. PRAIN, Director of the Royal Botanic Gardens, Kew; to Monsieur le Prof. Dr. H. LECOMTE, Directeur de la Galerie de Botanique du Muséum à Paris; to Herrn Prof. Dr. A. ENGLER, Direktor des Kgl. Botanischen Gartens und Museums zu Dahlem, and to Monsieur le Prof. Dr. A. A. FISCHER von WALDHEIM, Directeur du Jardin Impérial de Botanique à St. Pétersbourg, I am also greatly indebted for permission to work in their herbaria. My very cordial thanks are also due to Dr.

O. STAFF, keeper of the Herbarium at Kew, for his constant kindness during my stay at Kew, to Mr. C. H. WRIGHT for his assistance in determining plants, especially, Palmæ; to Mr. N. E. BROWN for Asclepiadeæ, and Aroideæ; to Mr. R. A. ROLFE for Umbelliferæ, and Orchideæ, to Mr. S. A. SKAN for his advice in the library; to Mr. T. A. SPRAGUE for Celastrineæ; to Messrs. W. B. HEMSLEY and J. G. BAKER for their valuable advice; to Dr. A. HENRY for his kindness in helping me to see LINDLEY'S Herbarium in Cambridge; to Mr. S. T. DUNN for *Carices*, to Monsieur F. GAGNEPAIN for his assistance in my work in the Herbarium at Paris; to Herrn Dr. R. PILGER, and Herrn Dr. R. SCHLECHTER for their cordiality during my stay at Dahlem; and to Monsieur W. L. KOMAROW, for a seat given to me in the Herbarium at St. Petersburg. Finally, I sincerely desire to express my cordial gratitude to Monsieur J. PALIBIN, Conservateur du Jardin Impérial de Botanique à St. Pétersbourg, for his kindness in entertaining me at his house, during my stay in the capital and in placing at my disposal all facilities for my work. To Mr. T. KAWAKAMI who has put all the Governmental collections at my disposal, to Messrs. Y. SHIMADA, U. MORI, S. SASAKI and all other collectors, I wish to tender my sincere thanks.

B. HAYATA.

Tōkyō, 13, February, 1911.

Materials for a Flora of Formosa.**Dicotyledones.****Polypetalæ.****Ranunculaceæ.*****Clematis* LINN.**

Clematis akoensis HAYATA sp. nov. Caulis glaber, foliis 15 cm. a se remotis. Folia trifoliolata crassiuscula, petiolata, petiolis 5 cm. longis, foliolis cordato-ovatis, 3 cm. longis, sæpe præter costas plicatis, apice acutis reflexis glabris, petiolulatis, petiolulis 1.5 cm. longis. Flores axillares, solitarii vel paniculati, paniculis paucifloratis, longe pedunculatis, pedunculis 7 cm. longis, apice incrassatis prope basin 2-bracteatis, interdum ebracteatis, bracteis minutis spathulatis obtusis 1 cm. longis. Flores apertientes 4.5 cm. in diametro. Sepala 6, extus dense et brevissime velutina, margine conduplicato-reflexa, intus glabra, crassiuscula, oblonga, 23 mm. long, 8 mm. lata, apice obtusa. Stamina ∞ , in longitudine sepalura $\frac{1}{2}$ -plo æquantia, antheris apice connectivis obtusis productis. Achænia barbata, barbis albis.

HAB. Akō; Miharashi-tōge, leg. J. KAWAKAMI et U. MORI, Aprili 1907, (Fl.)

The present plant is very like, or perhaps the same plant as, HENRY'S specimen No. 1320 labelled *C. parviloba*. The type of *C. parviloba* is quite different from our plant and also from HENRY'S specimen, in having hirsute sepals, much thinner and less glabrous leaves.

Clematis boninensis HAYATA sp. nov. Caulis glaber vel paucissime pubescens, striatus, foliis a se 11-12 cm. remotis, ramis divaricatis, tenuibus. Folia longe pedunculata, elongato-oblonga, vel ovata, obtusa vel obscure acuta, crassiuscula, basi rotundata, tum subito angustata, ad petiolum abeuntia, 7-4 cm. longa, 3-2 cm. lata, 5-nervia, integra. Flores laxe corymbosi, corymbis paucifloratis vel interdum in florem unicum reductis. Flores 4 cm. in diametro. Sepala spathulata 2.5 cm. longa 8 mm. lata, apice obtusa, basi angustata, ad marginem brevissime tomentosa. Stamina ∞ , antheris apice truncatis filamentis filiformibus. Achænia sub maturitate oblique ovata, acuta complanata pubescentia, obscure rostrata, 8 mm. longa, 4 mm. lata, caudis reflexis, 3 cm. longis, longe barbatis, barbibus albis transverse patentibus, 5 mm. longis.

HAB. Bonin : Chichijima, leg. OKADA, Nov. (Fr. et fl.)

Mostly like *C. paniculata*, but differs from it by the larger flowers and longer leaves. The flowers are twice as large than those of *C. panisulata*. The plant is not represented at Kew. The leaves have five-nerves at the base; three of them are very conspicuous, while the other two are very slender.

Clematis chinensis RETZ. ; DC. Prodr. I. p. 3 ; FORBES in Journ. Bot. (1884) pp. 262 et 265 ; FORBES et HEMSL. Ind. Fl. Sin. I. p. 3 ; DIELS Fl. Centr. Chin. in ENGL. Bot. Jahrb. XXIX. p. 332 ; MATSUM. et HAYATA Enumeratio Plantarum Formosanarum, p. 4 ; FINET et GAGNEPAIN, Contrib. Fl. Asi. Orient. p. 20.

Clematis minor DC. ; LOUR. Fl. Cochinch. ed-WILLD. p. 422 ; FORBES, in Journ. Bot. (1884) p. 263.

Clematis Benthamiana HEMSL. in FORBES et HEMSL. Ind. Fl. Sin. I. p. 2.

HAB. Taitō : Taiharō, leg. T. KAWAKAMI et G. NAKAHARA, Jan. 1906, (No. 680).

DISTRIB. Southern and Central China.

OBSERV. Plant slender, pubescent; internodes 8 cm. long; leaves trifoliolate, about 10 cm. long, petioles 4 cm. long, twining, petiolules almost equal 8 mm. long, leaflets cuspidato-lanceolate the terminal one 6 cm. long, 1 cm. broad much larger than the lateral ones, margin entire, with three distinct and two obscure nerves, veins impressed on the surface, prominent beneath scarcely hairy, turned black when dried; achenes flattened in a dry specimen, with two ridges, ovate, 2 mm. broad, hairy, tails 2 cm. long with soft hairs; somewhat resembles *C. formosana* O. KUNTZE.

Clematis crassifolia BENTH. Fl. Hongk. p. 7; KUNTZE, Monog. Clemat. p. 152; FORBES et HEMSL. Ind. Fl. Sin. I. p. 3; FINET et GAGNEPAIN, Contrib. Fl. Asi. Orient. p. 16.

HAB. Sbintiku, Goshōrin, leg. T. KAWAKAMI, Dec. 1905, (No. 1245).

DISTRIB. Central and Southern China. New to the Formosan flora.

OBSERV. Rather stout, glabrous, climbing plant; leaves fleshy, trifoliolate, leaflets elliptical, obtuse or acute, narrowed at the base, nerves very obscure, reddish brown when dried; sepals angustate with white hairs on the margin, 18 mm. long; stamens 1 cm. long, with brownish undulated filaments; anthers oblong, not mucronate, five times shorter than the filaments; achenes long hairy, with hairy tails; remarkable for its undulate filaments.

Clematis Leschenaultiana DC. "Syst. I. p. 451;" KUNTZE, Monog. Clemat. p. 167, (*C. acuminata* δ .); FINET et GAGNEPAIN Contrib. Fl. Asi. Orient. p. 27.

Clematis Wightiana? HAYATA Fl. Mont. Formos. p. 43.

HAB. Kachinro, leg. C. OWATARI, Mart. 1898; Taitō, Iriyokukaku, leg. T. KAWAKAMI et U. MORI, Dec. 1905 (No. 2149); Niki et Suichōriu, leg. C. OWATARI, Jan. 1898.

DISTRIB. China and Indo-China.

OBSERV. Covered by yellowish soft hairs; leaves trifoliolate, petioles 5 cm. long, leaflets ovate acute 8 cm. long, $3\frac{1}{2}$ cm. broad, obscurely dentate or nearly entire, lateral leaflets oblique at the base; panicles few-flowered, peduncles 4–5 cm. long; sepals 4, ovate, nearly acute, with yellowish soft hairs on the outside, glabrous inside; stamens many, 12 mm. long, filaments hairy on the margin and outside, quite glabrous on the inside, anthers narrow, glabrous; achenes hairy, fusiform with two distinct ridges, tails with long hairs.

In my Flora Montana Formosæ, I doubtingly referred this plant to *C. Wightiana*. After examining more carefully, I have found that the specimen is the same as the Philippine form of *C. Leschenaultiana* DC. The present plant differs from *C. Wightiana* in having fusiformed achenes and thread-like filaments. *C. Leschenaultiana* described in KUNTZE'S "Monog. Clemat. p. 167," has lanceolate leaves, while the Formosan plant has ovate ones.

Clematis Leschenaultiana DC. var. **angustifolia** HAYATA n. v.
Caulis striatus atro-purpureus tomentosus vel pubescens. Folia trifoliolata, parce tomentosa, foliolo terminali oblongo-lanceolato acuminato basi acuto vel rotundato 7–8 cm. longo, $2\frac{1}{2}$ cm. lato, remote serrato ad acumen integro, petiolulo 1 cm. longo, foliolis lateralibus oblongo-ovatis acutis basi oblique rotundatis, petiolis foliorum 6 cm. longis. Flores sæpe solitarii, vel paniculati, paniculis 2-3-floratis, pedunculis flavo-tomentosis. Achænia fusiformia rostrata, caudis

longis barbatis, barbis transverse patentibus, flavescentibus.

HAB. Shinkō : Rahao, leg. T. KAWAKAMI 1908.

Differs from the type in having much narrower leaves.

Clematis longisepala HAYATA Fl. Mont. Formos. p. 41.

HAB. Bankingsing : Dr. A. HENRY, No. 846, (herb. Kew.)

Clematis Owatarii HAYATA sp. nov. Caulis gracilis striatus, glaber, internodiis 14 cm. longis. Folia pinnata, foliolis 3-5, rotundato-ovatis vel triangulari-ovatis, apice rotundatis vel emarginatis basi truncato-rotundatis, ad extremitatem subito acutis 4 cm. longis, $3\frac{1}{2}$ cm. latis, glabris, integerrimis, petiolis 6 cm. longis, petiolulis $1\frac{1}{2}$ cm. longis. Flores axillares solitarii, longe pedunculati, pedunculis 7 cm. longis apice incrassatis, basi 2-4-bracteatis, bracteis minutis, spathulatis, vel ovatis. Achænia complanata, barbata, caudis 5 cm. longis, barbatis, barbis transverse patentibus, 4 mm. longis, albis.

HAB Formosa, leg. C. OWATARI.

The present plant differs from *C. recta* and also from *C. paniculata* in having longer tailed fruit and much more rounded leaves. The leaves have generally three leaflets, or sometimes five-leaflets, then the distance from the first pair to the second pair is nearly as long as the petioles.

Clematis taiwaniana HAYATA sp. nov. Pubescens, caulibus striatis. Folia tripartita vel bi-trifoliolata, triangularia, 20 cm. longa, totiusque lata, petiolis 12 cm. longis, pinnulis ovato-cordatis cuspidatis grosse-dentatis, utraque pagine pubescentibus. Paniculæ axillares, 15 cm. longæ, 7 cm. latæ, pubescentes v. tomentosæ. Flores minores circ. 1 cm. in diametro, 8 mm. longi; sepalis 4, ovatis v. spathulatis obtusis, extus pubescentibus intus glabris, staminibus 2-3-seriatis, filamentis dilatatis, antheris

oblongis; achænia pubescentia, stylis longe barbatis, barbis albis.

HAB. Taichūcho; Daibōho, leg. T. KAWAKAMI et U. MORI, Aug. 1904, (No. 229); Biōritsu: Taiko, leg. T. KAWAKAMI et U. MORI, Aug. 1908 (No. 73); Taihoku: Shizangan, leg. T. KAWAKAMI et S. SASAKI, Juni. 1908.

The commonest species of *Clematis* in Formosa; the leaves of the plant are extremely variable. It comes near *C. triloba* Hook; but differs from it in having leaves grossly dentate or incisely lobed. Also it is very like *C. Vitalba* LINN. var. *javanica* O. KZE., from which it is distinguishable by its more rounded fruit.

***Clematis paniculata* THUNB.**

HAB. Garanbi: Koshūn, leg. T. KAWAKAMI, Juli. 1906, (No. 1620).

DISTRIB. Japan, China and Korea.

Exactly the same as Chinese specimens at Kew, labelled *C. paniculata* but a little different from Japanese specimens preserved in the Tōkyō Herbarium.

***Clematis uncinata* CHAMP.** in "Kew Journ. Bot. III. p. 255"; BENTH. Fl. Hongk. p. 6; MAXIM. Mém. Biol. IX. p. 597; FORBES et HEMSL. Ind. Fl. Sin. I. p. 7; FINET et GAGNEPAIN, Contrib. Fl. Asi. Orient. p. 8.

Cl. leiocarpa OLIV. in Hook. Ic. Pl. t. 1533.

Var. **floribunda** HAYATA n. v. Glabra, subnigricans in exsiccato, internodiis 12 cm. longis. Folia 5-foliolata subcoriacea circ. 20 cm. longa, foliolis ovato-lanceolatis acuminatis, basi rotundatis 11 cm. longis, 3½ cm. latis, 3-nerviis supra subtusque prominentibus. Paniculæ axillares 30 cm. longæ, 15 cm. latæ, ramosissimæ, bracteis subulatis. Flores minores 1½ cm. in diametro æquantes; sepalis

4, lanceolatis aristatis, 1 cm. longis $2\frac{1}{2}$ mm. latis, margine albo-lamellatis, extus intusque glabratis; staminibus 2-3-seriatis intimis longioribus 6 mm. longis, filamentis nigricantibus, antheris angustis connectivis latoribus productis achenia subglabrata ovata, stylis longe barbatis, barbibus rubris.

HAB. Taiko, leg. T. KAWAKAMI, Aug. 1908, (No. 58).

The present variety differs from the type in having much smaller flowers, ovate-lanceolate leaves, and not leafy inflorescence. It resembles the type in stamens and achenes, and especially in glabrous sepals turning black when dried. The type has usually larger flowers, with sepals twice as longer as that of the variety, and longer, looser, and less flowered inflorescence, with longer peduncles. The present variety is represented at Kew by a specimen from Hongkong, which is labelled *C. uncinata*, but is different from the type of the species mentioned.

Ranunculus LINN.

Ranunculus Kawakamii HAYATA sp. nov. Herba perennis, tenuis, 7 cm. alta, hirsuta, pauci-ramosa. Folia radicalia fasciculata, longe petiolata, petiolis 4-5 cm. longis, hirsutis vel subglabris, basi dilatatis stipulam squamosam formantibus, laminis semi-orbicularibus, vel rhomboidalibus, apice rotundatis vel obtusis brevissime 5-lobatis, (lobis obtusis), inferiore integris basi acutis, truncatis, interdum reniformibus vel cordatis, prope marginem hirsutis, 10 mm. longis, 12 mm. latis. Folia caulina minora, hirsuta, petiolis basi dilatatis amplexicaulibus. Flores ad apicem ramorum solitarii, vel axillares, pedunculis 1 cm. longis hirsutis; flores apertientes 5 mm. in diametro. Sepala 4-5, rotundata, valde concava apice bifida vel rotundata, 2 mm. longa extus pilosa. Petala 3-5, alba,

oblonga apicē rotundata, 4 mm. longa. Stamina circ. 10, $1\frac{1}{2}$ mm. longa, antheris oblongis apicē rotundatis, filamentis complanatis basi plus minus brevissime hirtellatis. Carpella circ. 10. Syncarpium globosum.

HAB. Kagi: Arizan, ad 7000 ped. alt., leg. T. KAWAKAMI et U. MORI, (No. 3646).

The present plant appears very near to *R. Cymbalaria* PURSH and also to *R. flaccidus*; but differs from the former in the shape of the flowers and especially in having very few carpels, and from the latter in the hairy form of the plant.

Ranunculus taisanensis HAYATA sp. nov. Perennis; caulis ascendens, hirsutus, pauci-ramosus, 14 cm. longus. Folia radicalia, longe petiolata, hirsuta, petiolis 4 cm. longis basi dilatatis caulem amplectantibus, laminis late orbicularibus, 3-lobatis, lobis rotundato-rhomboidalibus, leviter lobulatis vel irregulariter serratis basi truncato-cordatis, apice subrotundatis. Folia caulina iis radicalibus conformia, petiolis basi dilatatis, caulem amplectantibus. Folia superiora trilobata, lobis acutis. Paniculae pauci-floratae vel ad florem unicum reductae, bracteis minutis, lanceolatis, 2 mm. longis, pedunculis $1\frac{1}{2}$ cm. longis, floribus apertientibus. 7-8 mm. in diametro. Sepala 5, oblongo-elongata, apice obtusa, vel rotundata, $3\frac{1}{2}$ mm. longa, 1 mm. lata, dorso hirsuta. Petala 5-10, obovata, cuneata apice rotundata, basi cuneata, 4 mm. longa, 2 mm. lata basi distincte glandulifera. Stamina circ. 20, 2 mm. longa, antheris rotundatis apice emarginatis, filamentis plus minus complanatis; carpophorium oblongo-cylindraceum. Carpella numerosa. Achænia oblique rotundata, $1\frac{1}{3}$ mm. longa, rostrata, rostris brevissimis, facie minute punctata.

HAB. Biōritsu: Rokujiō-taisan, ad 8000 ped. alt., leg. T. KAWAKAMI et U. MORI.

Near *R. philippinensis* MERR. et ROLFE; but differs from it by the much smaller flowers and more rounded leaves.

Ranunculus sp.

HAB. in Monte Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI et U. MORI, 1906, Oct.

OBSERV. Apparently perennial with long fibrous roots. Stem slender hirsute, branchless, with a solitary flower. Radical leaves long petiolate, petioles 6 cm. long, slender, nearly glabrous or thinly hairy, blades rounded in outline, 3-5-lobed towards the apex, somewhat thick nearly glabrous or hirsute. Cauline leaves 1 at the middle portion of the stem, subsessile, deeply 3-lobed, lobes lanceolate, obtuse or acute, hirsute. No flowers; indeterminable. There is something like this at Kew, labelled *Ranunculus philippinensis* MERR. et ROLFE. Without examining its flowers, it is difficult to say whether our plant is identical with the Philippine plant or not.

Isopyrum LINN.

Isopyrum adiantifolium Hook. et THOMS. var. **arisanensis** HAYATA n. v. Rhizoma repens, caulis erectus, tenuis, gracilis 1 mm. in diametro, striatus, subglaber, inferiore aphyllus cramosus, superiore furcatus, vel bi-furcatus, pauci-foliatus. Folia radicalia fasciculata, cum petiolis 4-5 cm. longa, petiolis 3-4 cm. longis, tenuibus, basi stipulatis, stipulis semi-orbicularibus 4 mm. longis cum petiolis connatis, squamosis, laminis bi-tri-pinnatis, pinna terminali semper simplici, cum petiolulo 12 mm. longa, flabelliformi-semiorbiculari, leviter lobulata, basi truncato-acuta,

integra, 7 mm. longa, 8 mm. lata, tenui, pinnis lateralibus sæpe pinnatis cum petiolulis 12 mm. longis, pinnulis lateralibus pinnatis, pinnula terminali simplici pinna terminali conformi. Folia caulina ad ramificationem 2, opposita, minora ternate vel bi-ternate pinnata. Flores dichotome-cymosi, pedicellis 8 mm. longis. Sepala 5, oblongo-ovata, 4 mm. longa, apice obtusa. Petala 5, brevissima nectariformia stipitata, cum stipitibus 1 mm. longa, laminis rotundatis $\frac{1}{2}$ mm. longis, obtuse mucronatis, intus ad basin laminæ glanduliferis. Stamina 5, filamentis $2\frac{1}{2}$ mm. longis complanatis, antheris oblongo-orbicularibus sæpe incurvis. Carpella 2, libera, sessilia, lunaria, 3 mm. longa, $\frac{1}{2}$ mm. lata, stylo brevissimo, $\frac{1}{3}$ mm. longo, stigmatate truncato. Folliculi divaricati elongati, 9 mm. longi, $2\frac{1}{2}$ mm. lati, basi connati, apice truncati dorso virides, facie flavescentes. Semina circ. 10, globosa, $\frac{3}{4}$ mm. in diametro dorso leviter carinata, fusco-flavescentia, glabra.

HAB. Arizan, leg. T. KAWAKAMI, et U. MORI, Mart. 1908.

Near *I. adiantifolium* HOOK. f. et THOMS.; but differs from the type in having much smaller flowers and shorter leaves.

Magnoliaceæ.

Illicium LINN.

Illicium sp. HAYATA Fl. Mont. Formos. p. 45.

HAB. in montibus centralibus, ad 8000 ped. alt., leg. U. MORI Nov. 1906, (No. 1918).

Very like *Illicium Griffithii*; no flowers, indeterminable.

Anonaceæ.

Uvaria LINN.

Uvaria sp. Scandens; folia angusta v. obovato-angusta,

apice abrupte acuta basi acuta, 20 cm. longa, 6 cm. lata, subtus glauca, costis et venis prominentibus.

HAB. Mt. Chōran, leg. G. NAKAHARA, Aug. 1905, (No. 270).

OBSERV. A large twining plant; near *U. clusiflora* MERRILL, of the Philippines.

Menispermaceæ.

Stephania LOUR.

Stephania tetrandra MOORE; MATSUM. et HAYATA Enum. Pl. Formos. p. 16.

HAB. Tamsui, leg. B. HAYATA, 1908.

DISTRIB. East China.

OBSERV. Caulis lignosus volubilis striatus, glaber. Folia reniformia, irregulariter repundata, vel integra, apice subito acuta, ad summum obtusa, et mucronata, basi reniforme-cordata, peltata, (sinibus rotundatis) glabra, subtus glauca, chartaceo-membranacea, 7 cm. longa, 8 cm. lata, petiolis gracilibus striatis 6 cm. longis, prope basin laminarum insertis. Paniculæ superaxillares petiolum in longitudine æquant, pubescentes; flores ad apicem ramorum panicularum capitatum et umbellatum dispositi, pedicellis brevioribus, 4 mm. longis. Drupæ compresso-globosæ, 5 mm. in diametro, glabræ.

Near *Stephania dahurica* DC. and also *S. hernandifolia*; but differs from the former in having nearly rounded, but not lobed, leaves, and from the latter in roundly sinuated base of the leaves. In *S. hernandifolia*, the sinus at the base of the leaves is acute but not rounded.

Sp. Suffrutex, scandens, tomentosus. Folia alterna, ovata vel elliptica, obtuse acuminata, breve petiolata, 7 cm. longa, 4 cm.

lata, supra glabra, subtus hispido-tomentosa, costis venisque prominentibus, margine integra. Racemi pauci-florati, axillares.

OBSERV. Very interesting plant. This is the only shrubby plant belonging to this family from Formosa.

Berberideæ.

Berberis LINN.

Berberis Kawakamii HAYATA sp. nov. *Berberis* sp. HAYATA Fl. Mont. Formos. p. 48. Frutex erectus ramosissimus, ramulis angulatis sulcatis, spinis ternatis 2-3 cm. longis. Folia fasciculata coriacea obovata oblanceolata vel lanceolata acuta basi cuneata subsessilia remote spinuloso-dentata 5-3 cm. longa, 2-1 cm. lata, venis supra impressis subtus prominulis, venulis utraque pagine prominentibus, subtus pallidiora. Flores 10-15 fasciculati basi fasciculorum perulati, perulis 2-3-seriatis, squamosis, late triangularibus brevissime aristatis, pedicellis inclinatis, 1 cm. longis. Sepala 5-6, inæqualia, lanceolata acuminata vel subulata, petalum superantia, extimis minimis. Petala 5-6, oblongo-rotundata, $4\frac{1}{2}$ mm. longa, obtusa vel rotundata, basi intus 2-glandulifera. Stamina 5-6, $2\frac{1}{4}$ mm. longa, filamentis $1\frac{1}{4}$ mm. longis incrassatis, antheris 1 mm. longis oblongis, connectivis leviter productis truncatis. Carpellum breve cylindraceum 3 mm. longum, stigmatibus sessilibus peltatis. Baccæ 5-10-fasciculatæ, nigricantes, oblongo-ovoideæ, 7 mm. longæ, utrinque obtusæ, 2-3-spermæ, seminibus lunaribus, curvis, 5 mm. longis, minute rugulosis fuscentibus, pedunculis 1 cm. longis.

HAB. in monte Morrison, ad 9000 ped. alt., leg. T. KAWAKAMI Oct. 1906, (No. 1941).

The present plant comes very near *B. barandana* VIDAL; but differs from it in having much shorter peduncles and especially in

the number of ovules contained in ovaries. *B. barandana* has one ovule while our plant has always two or sometimes three ovules. It also bears some resemblance to *B. xanthoxylon* HASK. and *B. Wallichiana*, but differs from both in having more sparsely serrated leaves, and especially from the latter by its much more rounded fruit.

***Berberis morrisonensis* HAYATA sp. nov.**

Berberis sp. HAYATA Fl. Mont. Formos. p. 47.

Frutex erectus ramosissimus, ramulis spinis ternatis, Folia fasciculata coriacea, ovata spathulatave, apice rotundata aristato-mucronata vel obtusa margine remote spinuloso-dentata, basi cuneata sessilia vel breve petiolata, 15 mm. longa, 7. mm. lata. Baccæ 3-fasciculatæ, globoso-ellipsoidales, utrinque obtusæ, rubræ, 9 mm. longæ, 3-spermæ, stigmatibus parvis sessilibus, seminibus lunaribus, 4 mm. longis, lævibus rubro-puniceis, pedunculis 1½ cm. longis.

HAB. in monte MORRISON, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (Nos. 2289 et 2297).

Near *B. dictyophylla* FRANCH.; but differs from it in having 3-fasciculate fruits which are much more round than that of FRANCHET'S species.

Nymphæaceæ.

***Brasenia* SCHREB.**

***Brasenia purpurea* CASP.**; "in JORN. Sc. Acad. Lisb. IV. p. 312."

Hydropeltis purpurea RICHARD; DC. Prod. I. p. 112.

Brasenia peltata PURSH.; HOOK. f. et THOMS. in HOOK. f. Fl. Brit. Ind. I. p. 113; FRANCH. et SAV. Enum. Pl. Jap. I. p. 25.

HAB. Giran: Kentōzan, leg. T. KAWAKAMI et U. MORI, Juni. 1906, (No. 1341).

DISTRIB. New to the flora of Formosa ; commonly found in Japan, distributed in eastern North America and eastern Australia. Not yet known from China.

OBSERV. Flowers solitary, sessile, or pedunculate ; leaves pettate, elliptical, 10 cm. long, 6.5 cm. broad.

Papaveraceæ.

Corydalis DC.

Corydalis formosana HAYATA sp. nov. Herba majuscula, 40-50 cm. alta, ramosissima, glaberrima, caulibus sulcatis flexuosis. Folia caulina cum petiolis 15 cm. longa, 7 cm. lata bipinnata, petiolis 4 cm. longis, pinnis remotis, ovatis 5 cm. longis 3 cm. latis, petiolulis 2 cm. longis, pinnulis subsessilibus, obovatis, trilobatis vel irregulariter lobulatis apice rotundatis, lobulis obscure mucronatis. Racemi 13 cm. longi, pedunculis 4 cm. longis, bracteis ovatis acutis 4 mm. longis, pedicellis 4 mm. longis. Sepala minutissima oblique rotundata, obtusa, $1\frac{1}{2}$ mm. longa, basi rotundata. Petala exteriora dissimilia, altero cum calcaribus 17 mm. longo, 4 mm. lato, apice patente emarginato leviter mucronato, dorso prope apicem alato, (ala 2 mm. longa $1\frac{1}{2}$ mm. lata), basi calcarato, calcaribus 4 mm. longo 2 mm. lato, prope apicem abrupte recurvato, apice rotundato ; altero angustato 12 mm. longo, 2 mm. lato, versus apicem dilatato, rotundato, leviter emarginato dorso prope marginem alato, alis triangularibus 1 mm. latis ; interiora angustissima 12 mm. longa unguolata, unguibus $5\frac{1}{2}$ mm. longis, $\frac{1}{2}$ mm. latis, laminis oblique quadrangularibus 6 mm. longis $2\frac{1}{2}$ mm. latis, apice rotundatis emarginatis, mucronatis, prope apicem dorso alatis, alis leviter productis 1 mm. latis. Stamina 12 mm. longa, filamentis complanatis, $1\frac{1}{2}$ mm. latis, sursum gradatim

angustatis. Capsulæ lineares cum rostris $2\frac{1}{2}$ cm. longis 4 mm. latis, apice rostratæ, rostris 6 mm. longis. Semina orbicularia compressa, minute et eleganter circum centrum punctata, $1\frac{1}{2}$ mm. in diametro, arillis suborbicularibus $1\frac{1}{2}$ mm. longis.

HAB. Taitō; Taruko, leg. G. NAKAHARA, 1906, Juni. (No. 710).

Very near *C. Balansæ* PRAIN; but differs from it in having larger flowers and very much smaller bracts.

Corydalis kelungensis HAYATA sp. nov. Herba tenuissima 30 cm. alta, ascendens, glaberrima. Folia radicalia longe petiolata, multiplo-ternata, cum petiolis 30 cm. longa, petiolis gracilibus 15 cm. longis, longe petiolulata, pinnulis obovatis 2 cm. longis 1 cm. latis apice rotundatis vel 2-3 lobatis basi gradatim angustatis ad petiolulum abeuntibus, subtus pallidioribus. Racemi 10 cm. longi, laxe-florati, bracteis ovatis 5 mm. longis, pedicellis 1 cm. longis. Flores circ. 18 mm. longi. Sepala 2, caducissima, non visa. Petala 4, inæqualia, horizontaliter conniventia, exteriora altero majore naviculari cum calcare 18 mm. longo, basi calcarato, (calcare 9 mm. longo, 3 mm. lato recto apice obtuso recto vel leviter curvo); altero plano 13 mm. longo basi longe unguiculato, lamina rotundata 7 mm. lata apice emarginata vel sinuato, basi gradatim angustata ad unguem abeunti; interiora cohærentia, angusta dorso apice valde carinata, 13 mm. longa. Genitales non visæ.

HAB. Kelung; Arikō, leg. T. KAWAKAMI et Y. SHIMADA, 1908 Mart. (No. 4298).

The flowers are somewhat like those of *C. decumbens* PERS., but the leaves are quite different.

Corydalis taitōensis HAYATA, sp. nov. Herba humilis perennis 8 cm. alta, radicibus fibroso-crassiusculis. Folia radicalia bi-

pinnata, cum petiolis 8 cm. longa, glabra, in circumscriptione ovata, petiolis 4 cm. longis basi gradatim dilatatis, plus minus incrassatis, pinnis remotis cum petiolulis 2 cm. longis, 1 cm. latis, pinnulis obovatis, 3-lobatis vel-lobulatis, sessilibus, lobulis obscure mucronatis. Folia caulina iis radicalibus conformia. Racemi 5-8 cm. longi, bracteati, densiuscule florati, bracteis obovatis obtusis 5 mm. longis $2\frac{1}{2}$ mm. latis, pedicellis 6 mm. longis. Sepala 2, minuta, caducissima, oblique rotundata $1\frac{1}{2}$ mm. in diametro, erregulariter dentata, basi rotundata, peltatim vel cordatim affixa. Petala 4, exteriora altero basi calcarato, cum calcare 18 mm. longo 5 mm. lato erecto vel leviter recurvato apice truncato brevissime calloso-mucronato marginato, prope apicem leviter concavo-excavato, altero angustato 13 mm. longo, 3 mm. lato, apice truncato et carnosio mucronato prope apicem giboso, interiora angusta longe unguiculata, cum unguibus $13'$ mm. longa, unguibus 7 mm. longis, laminis angustatis obliquis basi leviter auriculatis 7 mm. longis, $2\frac{1}{2}$ mm. latis, apice truncatis carnosio-mucronatis, dorso carinatis, carinis apice leviter productis, $1\frac{1}{2}$ mm. latis. Filamenta 12 mm. longa 2 mm. lata, complanata versus apicem angustata.

HAB. Taitō : Daironkōsha, leg. T. KAWAKAMI, et U. MORI.

Argemone LINN.

Argemone mexicana LINN.; ROXB. "Fl. Ind. II. p. 571;" HOOK. f. et THOMS. in HOOK. f. Fl. Brit. Ind. I. p. 117.

HAB. Taitō : Hinaro, leg. T. KAWAKAMI et Z. KOBAYASHI, Juni. 1906, (No. 1558).

DISTRIB. An American plant; naturalized in Formosa.

OBSERV. An armed plant; leaves sessile, oblong, 10 cm. long, 5 cm. broad, dentately incised, aristate on the margin, costs,

and nerves; capsule oblong 5 cm. long, with very many spines on it.

Cruciferæ.

Arabis LINN.

Arabis morrisonensis HAYATA sp. nov.

Arabis taraxacifolia HAYATA Fl. Mont. Formos. p. 49. (non ANDERS.)

Herba lignescens, perennis, hirsuta, pilis simplicibus vel ramosis $\frac{1}{2}$ mm.—1 mm. longis, stolonifera, decumbens, caulibus 20 cm. longis, ramosis foliosis. Folia radicalia fasciculata, depresso-radiatim disposita, lyrata, longe petiolata, cum petiolis 3 cm. longa, 6 mm. lata stellato-hirsuta, (pilis furcatis vel simplicibus) spathulata in circumscriptione, petiolis $1\frac{1}{2}$ cm. longis laminam in longitudine æquantibus, laminis longe ovatis lyratis, lobis utraque latere 4-5, lobo terminali obovato-obtusum. Folia caulina simplicia oblanceolata, $3\frac{1}{2}$ cm. longa, 4 mm. lata apice obtusa deorsum gradatim attenuata margine parce remote serrata vel subintegra. Racemi terminales vel axillares 5-6 cm. longi, pedicellis 1-2 cm. longis, bracteis 0. Sepala oblongo-angustata, $2\frac{1}{2}$ mm. longa 1 mm. lata apice rotundata mucronata, dorso paucissime hirsuta. Petala oblongo-obovata unguolata, 6 mm. longa, apice rotundata, vel truncata. Stamina 2 mm. longa. Siliquæ rectæ vel leviter curvæ, lineares 3-4 cm. longæ, 1 mm. latæ, utrinque obtusæ, apice stylis persistentibus, pedicellis $1\frac{1}{2}$ cm. longis. Semina elongato-oblonga $1\frac{1}{2}$ mm. longa $\frac{2}{3}$ mm. lata, utrinque rotundata, complanata minute scabriuscula.

HAB. in monte Morrison, ad 13004 ped. alt., leg. S. NAGASAWA, Nov. 1905, (No. 680).

In my paper above cited, I mention that the present plant agrees quite well with the description of *Arabis taraxacifolia* ANDERS. given in HOOK. f. Fl. Brit. Ind. I. p. 136, and also very like the European *A. arenosa* Scop. Although I did not, at that time, see ANDERSON'S specimen, I thought that the plant might be identical with *A. taraxacifolia*. While studying here at Kew, I have compared it with the type of the some species and have found that they are quite different. The Formosan plant is distinguishable from the Indian in having nearly erect and stouter pods, larger seeds, and smaller leaves and also in bearing very long stolons. The Indian plant appears to be of more tender habit, with curved pods, narrower, smaller seeds, and larger, thinner leaves. Moreover, the present plant differs from *A. arenosa* Scop. in having longer pods, smaller flowers, and leaves with more rounded lobes. The description given above is drawn up from a specimen numbered 680, which is of a rather elongate form and prostrate habit.

Cardamine LINN.

Cardamine hirsuta LINN. var. **formosana** HAYATA n. v. Caulis glaber, ramosus, ascendens, 15 cm. altus, foliosus. Folia pinnatisecta, obovata in circumscriptione, cum petiolis 5 cm. longa, 2½ cm. lata, petiolis 2 cm. longis complanatis vel alatis, segmentis lateralibus obovatis apice rotundatis, 3-5 lobulatis, basi subito attenuatis 2½ cm. longis. Racemi 4 cm. longi, pedicellis 1 mm. longis, bracteis obtusis ⅔ mm. longis. Sepala 4, oblonga 1½ mm. longa ⅔ mm. lata. Petala 4, obovata, spathulata 1½ mm. longa, apice rotundata vel emarginata, basi angustata. Stamina 1½ mm. longa, filamentis complanatis. Ovarium cylindraceum 1½ mm. longum. Siliquæ lineares rectæ, 17 mm. longæ 1 mm. latæ,

utrinque obtusæ. Semina oblonga $\frac{2}{3}$ mm. longa minute scabrida.

HAB. Taitō: Hakuhakusha, leg. T. KAWAKAMI, et Z. KOBAYASHI, 1906, Mai. (No. 1485).

There is a specimen very much like this in the Kew Herbarium. It is labelled *C. hirsuta* LINN. but quite different from the type. As the present plant is quite easily distinguishable from the type of *C. hirsuta* LINN., it is advisable, in my opinion, to regard it as representing a variety of the type, rather than to regard it as a form of it.

Cardamine hirsuta LINN. var. **rotundiloba** HAYATA n. v. Herba glabra, caulibus simplicibus 15 cm. longis pauci-foliatis. Folia radicalia pinnata, spathulata in circumscriptione, cum petiolis 6 cm. longa 1 cm. lata, pinnis utraque latere 4-5, remotis subsessilibus rotundatis sæpe obliquis obscure lobatis vel integris, 5-10 mm. longis, petiolis 3 cm. longis complanatis basi leviter dilatatis. Racemi 10 cm. longi, remote florati. Siliquæ lineares rectæ, 22 mm. longæ, 1 mm. latæ, apice obtuso-truncatæ. Semina minute scabrida, oblonga, utrinque rotundata, 1 mm. longa.

HAB. Shintiku: Goshizan, leg. T. KAWAKAMI, (No. 1306).

The present variety is easily distinguishable from the type in having much more rounded lobes of leaflets. There is a specimen very much like this variety at Kew which is labelled *Cardamine hirsuta* LINN. with question mark.

Cardamine reniformis HAYATA Fl. Mont. Formos. p. 50.

In my paper above cited, I mention that the plant is somewhat near *C. asarifolia* LINN. from which it is distinguishable by the reniformed or cordate leaves. While studying here at Kew, I have found that the plant is also near *C. violæfolia* O. S. SCHUTZ. from

which it is separable in having rather angulate leaves and very much smaller flowers. Flowers of my plant are 3 mm. long, while those of the Chinese *C. violæfolia* are 8 mm. long, or even more. Those of *C. asarifolia* LINN. are also much larger.

Senebiera POIR.

Senebiera integrifolia DC.; MATSUM. et HAYATA Enum. Pl. Formos. p. 25.

HAB. Kashiōto, leg. T. KAWAKAMI et G. NAKAHARA, Feb. 1906, (No. 1000); Pratas island, leg. T. KAWAKAMI, Juni. 1908, (No. 11).

DISTRIB. Madagascar, southern Africa, western Australia, Loo-choo islands.

OBSERV. Herb, rather hardy, procumbens, creeping on the basal part, many branched, about 20 cm. high; leaves alternate, spatulate or linear, entire, a little dentate on the upper portion of the margin, 3 cm. long, 4 mm. broad, incurved; racemes terminal, many-flowered, flowers very small; silique didymous laterally compressed, rugosely reticulate; seeds solitary in each cell.

Cochlearia LINN.

Cochlearia formosana HAYATA sp. nov. Herba gracilis tenuis, glabra, 8-10 cm. alta, pauci-ramosa, radicans. Folia simplicia v. trifoliolata, petiolata, foliolis cordatis $2\frac{1}{2}$ cm. longis apice rotundatis emarginatis vel mucronatis, basi reniformibus, margine integris vel remote crenulatis, ad sinus crenarum mucronatis, membranaceis. Racemi subaxillares longe pedunculati pauci-florati. Flores albi minores, 2 mm. longi; sepalis $1\frac{1}{2}$ mm. longis spatulatis; petalis $2\frac{1}{2}$ mm. longis obovatis longe unguiculatis, unguibus $\frac{1}{2}$ mm. longis, staminibus $1\frac{1}{2}$ mm. longis basi glandulis indistinctis; ovarium 2-costatum. Siliquæ sub maturitate horizontaliter divaricatæ, oblongæ

vel elongatæ, 5 mm. longæ subteretes, valvis pubescentibus, concavis, obscure reticulatis. Semina 2-seriata, plurima, oblonga, 1 mm. longa vel longiora, testa rubra, elegante minuteque punctata.

HAB. Shinkō : Remogansha, (No. 1390).

A very pretty herb; the only species belonging to this genus from Formosa. The flowers and fruit of the plant resemble those of *Draba*. But, on account of its being quite glabrous, it should be referred to the present genus.

Capparideæ.

Capparis LINN.

Capparis Henryi MATSUM. in MATSUM. et HAYATA Enum. Pl. Formos. p. 26, t. III.

This is very near *C. micrantha* from which it is distinguishable only in the venation of leaves.

Violaceæ.

Viola LINN.

Viola formosana HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 28.

This is near *V. Sieboldi* MAXIM.; but differs from it in having rounded leaves. The leaves of *V. Sieboldi* are much more oblong, but not quite round at the apex, as is the case with the Formosan plant.

Viola Kawakamii HAYATA Fl. Mont. Formos. p. 52.

This is near *Viola siamensis* from which it differs in having

much longer spurs. The spurs are usually very short in the Siamese plant.

Pittosporeæ.

Pittosporum BANKS.

Pittosporum formosanum HAYATA, in MATSUM. et HAYATA Enum. Pl. Formos. p. 32, t. IV.

Comes near *P. pauciflorum* HOOK. from which it differs in having very much smaller flowers and ascending or spreading, but not pendulous, peduncles. I have seen at Kew a specimen from Hainan, labelled *P. pauciflorum*. The specimen is quite in accord with the present plant.

Pittosporum daphniphyloides HAYATA sp. nov. Folia petiolata oblonga vel oblongo-oblongata apice subito acuta basi abrupte attenuata 15 cm. longa, 4½ cm. lata, margine subintegra vel obscure repandata, coriacea, venis primariis lateralibus utrinque latere 10-15, a costa angulo 60° divaricatis, venulis reticulatis supra impressis subtus leviter elevatis, costis supra impressis, subtus elevatis, petiolis 2½ cm. longis. Racemi ad apicem ramorum fasciculati, paniculati. Capsulæ globosæ, 6 mm. in diametro, apice mucronatæ, 2-valvatim dehiscentes, valvis crassiusculis coriaceis 10-15-spermæ. Semina angulata, compressa, 3 mm. longa, 2½ mm. lata, lævia, rubra.

HAB. Taitō, Dakunsha, leg. T. KAWAKAMI et U. MORI, 1906 Dec. (No. 1839).

This is near *P. floribundum* W. et A.; but differs from it by the fruit and leaves. There is at Kew a specimen exactly like this, labelled *Pittosporum* sp. (China, WILSON, No. 3233).

Pittosporum oligocarpum HAYATA sp. nov. Rami graciles, cinerascens, ternatim ramulosi. Folia ad apicem ramulorum approximate alterna vel verticillata, breve petiolata, oblonga vel oblongo-lanceolata, apice subito acuminata, basi gradatim attenuata, margine integra vel obscure crenulata, costis supra impressis subtus elevatis venis primariis lateralibus circ. 10, utraque pagine obscure elevatis, venulis reticulatis inconspicuis, chartacea, vel chartaceo-coriacea, petiolis 5 mm.—10 mm. longis. Capsulæ ad axillas foliorum apicalium ramulorum solitariae, longe pedunculatae, (pedunculis gracilibus $2\frac{1}{2}$ cm. longis, inclinato-pendulis,) globsæ 7-10 mm. longæ, apice longe mucronatae, basi abrupte attenuatae ad stipitem 1-2 mm. longum abeuntes, 2-3 valvatim dehiscentes, 4-5-spermæ. Semina irregulariter angulata, 4 mm. longa, rubra.

HAB. Taito (No. 5837); Biōritsu, Bunsuikai.

Near *Pittosporum pauciflorum* HOOK. et ARN.; but differs from it in having nearly solitary and axillary fruit.

Caryophyllæ.

Cerastium LINN.

Cerastium arisanense HAYATA sp. nov. Herba humilis prostrata, ad nodos radicans, caulibus tenuibus parce hirsutis. Folia opposita petiolata, minora, late rhomboidea, 5-6 mm. longa, 7 mm. lata, apice obtusa et breve aristata, basi late truncata brevissime attenuata, supra margineque ciliata, subtus præter costas glabra, petiolis 6 mm. longis complanatis. Flores circ. 9 mm. longi ad axillas foliorum solitarii, longe pedunculati, pedunculis circ. 5 cm. longis, hirsutis. Sepala 5, lanceolata, 7 mm. longa, 2 mm. lata, squamosa, trinervia, apice acuminata, dorso basin

paucissime hirsuta. Petala 5, obovato-spathulata 12 mm. longa, $4\frac{1}{2}$ mm. lata, apice 2-lobata, (lobis apice rotundatis $2\frac{1}{2}$ mm. longis, 2 mm. latis, sinibus obtusis), basi attenuato-cuneata, unguiculata. Stamina 10. Ovarium ovoideum 2 mm. longum apice truncatum leviter elevatum. Styli 3, erecto-recurvati, 3 mm. longi.

HAB. ARIZAN. leg T. KAWAKAMI.

Cerastium trigynum VILL. var. **morrisonense** HAYATA, n. n.

Cerastium morrisonense HAYATA Fl. Mont. Formos. p. 57.

This is quite near *C. trigynum* VILL. from which it is distinguishable only in having much narrower petals. It should better be regarded as a variety of the same species.

Stellaria LINN.

Stellaria micrantha HAYATA sp. nov. Herba basi prostrata, ad nodos radicans, internodiis 15 mm. longis, apice ascendens. Folia opposita, sessilia, late ovata, 9 mm. longa, 6 mm. lata, apice aristata, acuta, basi subito attenuata, superiore basi rotundata, plus minus caulem amplexantia. Cymæ terminales vel axillares, 5 cm. longæ 4 cm. latæ, ramis oppositis, bracteis minutis ovatis acutis 1 mm. longis. Sepala 5 oblongo-ovata 2 mm. longa acuta, squamosa. Petala 5, minuta, profunde bifida, lobis lanceolatis 1 mm. longis, sinibus acutis, partibus basilaribus angustatis. Stamina 5. Styli 3, minuti. Capsulæ ovoideæ, ultra medium in valvas 6 integras dehiscentes. Semina compresso-globosa apice brevissime rostrata valde recurvata, facie curvato-reticulata.

HAB. ARIZAN, ad 8000 ped. alt., leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3584).

Near *Stellaria media* LINN. but differs from it in having extremely small flowers.

Stellaria stellato-pilosa HAYATA Fl. Mont. Formos. p. 58, t. II.

This is very near *Stellaria nutans* HEMSL. in Journ. Linn. Soc. XXXIV. p. 434, (Tibet Oriental; Tatsin-Lou); but differs from it by its larger and broader leaves and also in having rough velvety hairs all over the plant. It is also near *S. dichasioides* WILLIAMS in the same volume of the same Journal, p. 436, from which it differs in having more hairy leaves. Besides, it comes very near *S. saxatilis* HAM. from which it is hardly distinguishable. All the plants above mentioned are very similar in every respect, and further study will prove that they are one and the same species, though some of them should be regarded as representing a variety of another.

Portulacæ.

Portulaca LINN.

Portulaca quadrifida LINN. var. ***formosana*** HAYATA v. n. Herba incrassata prostrata, caulibus incrassatis basi 5 mm. in diametro, superiore ramosissimis. Folia alterna crassa, obovata apice rotundata, basi leviter angustata 6-7 mm. longa, 3½ mm. lata, ad axillas fasciculato-pilosa, pilis patentibus 2 mm. longis. Flores ad apicem ramulorum solitarii a foliis verticillatis circ. 5 involucrati. Capsulæ membranaceæ 2½ mm. in diametro. Semina subglobosa ½ mm. in diametro, latere compressa, muriculata.

Portulaca quadrifida HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 39 (non. LINN.)

HAB. Kōtōshō, leg. K. MIYAKE, Nov. 1899.

Very near the type from which it is distinguishable by its far less hairy form.

Hypericineæ.

Hypericum LINN.

Hypericum acutisepalum HAYATA sp. nov. Rami graciles, corticibus rubescentibus, ramulis alternis vel oppositis. Folia opposita, oblonga vel elongato-oblonga, obtuso-mucronata, basi brevissime attenuata, sessilia 3-4 cm. longa, 12 mm. lata, nigro-punctata, subtus pallidiora, venis primariis 5-7, inconspicuis plus minus arcuatis. Flores ad axillas foliorum fasciculati, pedicellati, pedicellis 1 cm. longis, basi perulatis, perulis 2-3-seriatis, subulatis, vel lanceolatis, 1 mm. longis. Sepala 5, inæqualia oblonga acuta 1½ mm. longa. Petala 5, inæqualia oblique obovata, 12 mm. longa, 7 mm. lata, apice truncato-rotundata, basi cuneato-angustata, obliqua. Stamina pentadelpa. Ovarium ovoideum 4 mm. longum apice ad stylum abeuns. Styli ad totam longitudinem connati, 7 mm. longi, apice obscure 5-lobati, stigmatosi.

HAB. Nantō : leg. T. KAWAKAMI, Juli. 1907, (No. 3245).

Near *H. simplicistyla* HAYATA ; but differs from it in having much smaller and acute sepals.

Hypericum Nagasawai HAYATA sp. nov.

Hypericum attenuatum HAYATA Fl. Mont. Formos. p. 59 (pro parte). Caulis gracilis suffrutescens, 7 cm. altus, ⅓-½ mm. in diametro, glaber, tetragonus, angulis acutis. Folia opposita, sessilia, oblonga vel oblongo-elongata, apice rotundata, vel obtusa brevissime mucronata, basi breve attenuata, 1-½ cm. long, 5-6 mm. lata, ad marginem 1-seriatim nigro-punctata, ad paginam pauce pellucido-punctata. Flores ad apicem ramulorum solitarii, pedunculati, pedunculis 6 mm. longis. Sepala 5, elongato-oblonga,

6 mm. longa, 2 mm. lata, apice rotundata vel leviter emarginata margine leviter reflexa ad marginem nigro-punctata, ad paginam pellucido-punctata. Petala 5, oblongo-obovata, obliqua 12 mm. longa, $4\frac{1}{2}$ mm. lata, apice truncato-rotundata, deorsum gradatim angustata, altero latere crassiuscula, altero tenuia. Stamina numerosa, filamentis filiformibus, antheris suborbicularibus $\frac{1}{2}$ mm. longis utrinque emarginatis, dorso apice uni-punctatis, punctis orbicularibus, atro-purpureis. Ovarium oblongo-ovoideum 5 mm. longum $2\frac{1}{2}$ mm. in diametro, 3-sulcatum. Styli 3, distincti, 6 mm. longi.

HAB. Mt. Morrison, ad 13094, ped. alt., 1905, Nov. (No. 754).

In my paper above cited, I mention that the present plant is referable to *Hypericum attenuatum* CHOIS., although there have been some doubts about its being identical with CHOISY's plant. While studying here at Kew, I have compared the plant with the type of the species, and found that they are so very different that it hardly needs pointing out. The Formosan plant comes very near *H. perforatum*; but differs from it in having obtuse or even rounded sepals. *H. perforatum* has usually very acute sepals.

Hypericum randaiense HAYATA sp. nov. Suffrutescens humilis, basi procumbens, sursum ascendens, caulibus gracilibus tetragonis, angulis prominentibus, glabris rubescentibus. Folia opposita sessilia linearia, vel lineari-lanceolata apice truncata brevissime mucronata, 13 mm. longa, $2\frac{1}{2}$ mm. lata, ad marginem pauce nigro-punctata, vel non punctata, ad paginam pellucido-punctata. Cymæ pauci-floratae, 3-5-floratae, vel ad florem unicum reductae, pedicellis 1-2 cm. longis. Sepala 5, lineari-angustata, $5\frac{1}{2}$ mm. longa, $1\frac{1}{4}$ mm. lata, obtusa, ad marginem 2-3-nigro-punctata, ad paginam pauce pellucido-punctata, vel non punctata. Petala 5, valde oblique obovata, apice rotundata, basi oblique cuneato-acuta, 9 mm. longa,

5 mm. lata. Stamina numerosa, filamentis 6-7 mm. longis, antheris late orbicularibus $\frac{1}{2}$ mm. latis, utrinque emarginatis, apice dorso maculatis. Ovarium ovoideum 3-sulcatum $2\frac{1}{2}$ mm. longum, stylis 3, distinctis $5\frac{1}{2}$ mm. longis.

HAB. Randaizan, leg. U. MORI et B. HAYATA, Aug. 1908, (No. 7108).

This is also very near *H. perforatum* but differs from it in having much obtuse sepals.

Hypericum simplicistylum HAYATA sp. nov. Rami graciles, corticibus subsolutis, rubescentibus, ramulis oppositis, gracilibus. Folia opposita chartacea subsessilia, oblongo-lanceolata, circ. 4 cm. longa, 8 mm. lata, apice acuta vel obtusa, calloso-mucronata, basi leviter cuneata, subtus pallidiora, punctata, costis supra impressis, venis primariis basilaribus 2 arcuatis ad apicem foliorum attingentibus, ad hoc venis primariis 5-7, divaricatis inconspicuis. Flores ad axillas solitarii, oppositi, pedunculati, (pedunculis 1 cm. longis), 2-4-bracteati, bracteis oppositis foliis conformibus sed minoribus, 8 mm. longis, ad basin pedunculorum perulati, perulis squamosis, acutis 1-2 mm. longis. Sepala 3 mm. longa, oblonga, apice obtusa vel rotundata. Petala 5, valde inæqualia oblique oblonga, apice rotundata. Stamina pentadelpha quam petalis breviora. Ovarium 4 mm. longum, ovoideum apice obtusum 5-loculare. Styli ad totam longitudinem connati, stigmatibus subglobosis leviter 5-lobatis. Capsulæ elongato-ovoideæ, 8 mm. longæ, $3\frac{1}{2}$ mm. latæ, stylo 5 mm. longo persistente coronatæ. Semina numerosissima, cylindrico-clavata, 1 mm. longa, unilatera-liter alata, alis utrinque leviter productis.

HAB. Nōkōsan, ad 6000 ped. alt., leg. T. KAWAKAMI, et U. MORI, Juni. 1908, (No. 4507).

Near *H. longistylum* OLIV.; but differs from it in the apex of the style and in having smaller flowers, acute and elongate leaves. Also near *H. trinerve* HEMSLE. from which it is distinguishable by ovate capsules and elongately oblong leaves.

***Hypericum subalatum* HAYATA sp. nov.**

Hypericum formosanum HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 41, pro parte, (non MAXIM.)

Rami læves tetragoni, subalati, alis 1 mm. latis. Folia opposita, oblongo-lanceolata, 6 cm. longa, 13 mm. lata apice obtusa, vel brevissime mucronata, gradatim angustata, sessilia, punctata. Flores ad apicem ramulorum axillarium solitarii, pedunculati, bracteati, bracteis sæpe 2-3 cm. longis, cum foliis conformibus sed minoribus, ad basin pedunculorum perulati, perulis squamosis lanceolatis 2 mm. longis. Sepala 5, oblonga, 7 mm. longa, 3 mm. lata, obtuso-acuta. Petala 5, valde obliqua. Ovarium ovoideum 5-sulcatum, stylis ad totam longitudinem connatis.

HAB. Kusshaku, leg. U. FAURIE, 1903.

The present plant differs from *H. formosanum* MAXIM. by much longer leaves. The leaves of the other species are always oblong and shorter than those of this plant.

***Hypericum taisanense* HAYATA sp. nov.** Suffrutex, caulis erecto-ascendens, teres rubescens, simplex, eramosus, 30-40 cm. altus, superiore foliosus basi nudus. Folia opposita, elongato-ovata, sessilia, apice obtusa basi cordata, supra ad paginam marginemque punctata, chartacea, costis et venis primariis supra impressis, subtus elevatis. Cymæ terminales 2-4 cm. longæ, 3-4 cm. latæ, bracteis folio minoribus. Sepala 5, basi connata, ovato-lanceolata, obtusa, vel acuta, 2½ mm. longa, punctata, punctis atro-purpureis.

Petala 5, elongato-obovata, 7 mm. longa, $2\frac{1}{2}$ mm. lata, apice rotundato-truncata, interdum leviter emarginata, basi cuneato-angustata, a medio sursum punctato-maculata, punctis linearibus vel orbicularibus atro-purpureis. Stamina 25-30, basi connata, filamentis filiformibus 4-5 mm. longis, antheris late orbicularibus utrinque emarginatis $\frac{1}{4}$ mm. longis dorso apice maculatis, maculis orbicularibus. Ovarium oblongo-ovoideum 3 mm. longum, $1\frac{1}{3}$ mm. latum, 3-sulcatum. Styli 3, distincti 3 mm. longi. Capsulæ elongato-ovoideæ, 1 cm. longæ, 4 mm. latæ apice stylis persistentibus coronatæ. Semina numerosa, breve cylindrica, $\frac{2}{3}$ mm. longa, $\frac{1}{3}$ mm. lata, utrinque obscure mucronata, sub microscopio elegante muricata.

HAB. Taisan, leg. T. KAWAKAMI.

Near *Hypericum erectum* THUNB. ; but differs from it in having elongately ovate leaves.

Ternstroemiaceæ.

Adinandra JACK.

Adinandra formosana HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 45.

This comes very near *A. Millettii* which has leaves, shining velvety beneath. In the present plant, the leaves are quite glabrous on both sides or slightly pubescent, but never velvety beneath.

Adinandra lasiostyla HAYATA sp. nov. Arborescens? Rami teretes fusco-cineracei, ramulis apicem versus sericeo-tomentosis. Folia oblonga vel lanceolata, 8-10 cm. longa, $2\frac{1}{2}$ cm.—3 cm. lata, breve petiolata, integra vel obscure crenulata, supra glabra,

subtus tomentosa, subcoriacea, petiolis 5 mm. longis. Flores axillares, solitarii, breve pedunculati, pedunculis 8 mm. longis; sepala pilosiuscula, ovata 5 mm. longa; ovarium late ovoideum, stylo piloso.

HAB. Tōzan, in Monte MORRISON, leg. G. NAKAHARA, Oct. 1906; in monte MORRISON, leg. T. KAWAKAMI et U. MORI, Dec. 1906. (No. 1944).

Easily distinguished by the leaves which are tomentose underneath. This differs from *A. Millettii* B. et H. which has lanceolate and sericeously barbate sepals.

Adinandra pedunculata HAYATA sp. nov. Arborescens? Folia alterna, breve petiolata, obovato-elliptica v. oblonga abrupte acuminata ad sumum extremitatem obtusa, 7-8 cm. longa, 3-2½ cm. lata, margine integra secus apicem serrulata, venis utraque pagine leviter prominentibus, subtus pallida. Flores axillares, solitarii, longe pedunculati, glabri, pedunculis 3-4 cm. longis. Sepala 5, valde imbricata, basi cuneata, ovata, acuta, glabra, crassiuscula, margine ciliolata, coriacea, 8 mm. longa, 6 mm. lata. Petala 5, basi cuneata, ovato-angusta, acuminata, crassiuscula, 10 mm. longa, 3-4 mm. lata, glabra; stamina circ. 30, 8 mm. longa, filamentis geniculatis, pilosiusculis, antheris linearibus pilosis filamentis æquilongis, connectivo producto; ovarium 4-loculare late ovoideum pilosiusculum 2½ mm. longum, stylo filiformi glabrato, 8 mm. longo, stigmatibus obscure 4-lobato.

HAB. Shintiku: Goshizan, leg. T. KAWAKAMI et U. MORI, Juli. 1906, (No. 1353).

Near *A. acuminata*; but differs from it in having glabrous styles and stigmata which are obscurely 4-lobed; also comes near *A. formosana* HAYATA; but quite distinguishable by the

larger flowers, numerous (nearly 30) stamens, 4-celled ovary ; from *A. Millettii*, by not velvety leaves which are toothed towards the apex ; also very much like *A. integerrima*, but differs in having much smaller sepals.

Actinidia LINDL.

Actinidia Championi BENTH. ; MATSUM. et HAYATA l.c. p. 47.

HAB. Nantō : Mokuriran, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1184).

OBSERV. Leaves large ovate, cordate at the base, glabrous on the surface, densely tomentose underneath, nearly entire or obscurely serrulate ; flowers in cyme, cymes axillary, solitary, peduncles 8 cm. long, with many (nearly 30) flowers ; sepals and ovary tomentose, reddish brown.

Thea LINN.

Thea biflora HAYATA sp. nov. Rami fusco-cinerascentes, vel sursum rubescentes. Folia alterna ad ramulos superiores remote disposita, oblonga, 5 cm. longa, $2\frac{1}{3}$ cm. lata, apice acuta ad summum extremitatem retusa, basi rotundato-obtusa, margine a medio sursum serrulata, deorsum subintegra utrinque exsiccato pallido-flavescentia, supra costis venis venulisque elevatis, subtus venis et venulis planis inconspicuis, supra ad costas petiolosque breve hirsuta, infra glabra, petiolis 4 mm. longis. Flores ad apicem ramorum geminatim oppositi, sessiles. Alabastrum floris oblongum, sericeo-tomentosum. Sepala 5-8, valde inæqualia, valde imbricata, caducissima, 4-seriatim ad torum 5 mm. longum tomento-hirsutum disposita, late orbicularia dorso medio apiceque dense longaque sericeo-tomentosa, medio coriacea, utrinque tenuia, intus

glabra, extimis minoribus, interioribus majoribus 15 mm. longis 2 cm. latis. Petala 5, inæqualia, exteriora majora obovato-rotundata, apice truncato-rotundata, 2 cm. longa, $1\frac{1}{2}$ cm. lata, extus basi hirsuta, cæterum glabra, interiora angustiora. Stamina numerosa, petalum $\frac{1}{2}$ -plo in longitudine æquantia, filamentis ad medium connatis, antheris ovatis, circ. 2 mm. longis, $1\frac{1}{3}$ mm. latis, utrinque emarginatis, connectivis plus minus dilatatis. Ovarium ovoideum dense longeque tomentosum, pilis 2 mm. longis erecto-patentibus, stylis 4, ad medium vel ad totam longitudinem leviter connatis, erectis, stigmatibus ad apicem stylorum exteriore sitis oblique truncatis (sulcatis?).

HAB. Kagi: Kodenshō, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1758).

There is nothing like this at Kew. I think it may be a species not yet described.

Thea gracilis (HEMSL.); MATSUM. et HAYATA l.c. p. 50.

HAB. Kōshūn: Botansha, leg. G. NAKAHARA, Dec. 1906, (Nos. 928. et 925).

OBSERV. Branchlets very slender, pale; leaves narrow lanceolate caudate or acuminate obtuse at the very apex; stamens hairy.

Thea lutchuensis (T. ITŌ), ITŌ et MATSUM. Tent. Fl. Lutch. p. 332.

HAB. Nagodake, leg. G. NAKAHARA, Aprili. 1907.

This comes very near *Camellia euryoides* HANCE, but differs from it by the nearly sessile flowers, more obtuse leaves and 2-lobed stigmata.

Thea shinkōensis HAYATA sp. nov. Rami graciles fuscentes, interdum cinerascetes. Folia versus apicem ramorum disposita, alterna petiolata, oblongo-obovata, 10-12 cm. longa, $3\frac{1}{2}$ cm. lata,

apice subacuta, vel acuminata, ad summum extremitatem obtusa, margine a medio sursum serrata, deorsum integra, basi cuneata, supra venulis reticulatis elevatis, minute elevato-punctata, coriacea, petiolis brevibus 6 mm. longis. Flores ad axillas foliorum apicalium solitarii, breve pedunculati, pedunculis 3-4 mm. longis, pilosiusculis. Alabastrum floris late ovatum. Flores apertientes 3-3½ cm. in diametro. Sepala 5 valde imbricata, caducissima, inæqualia, margine ciliolata, coriaceo-crassiuscula sericeo-pubescentia, extimis minoribus late orbicularibus vel late lunularibus 4 mm. latis, 3 mm. longis, intimis majoribus alabastrum floris involucrentis, latissimis, apice obtuse acutiusculis, medio crassiusculis prope marginem tenuibus, 2 cm. latis. Petala 5-6, inæqualia, basi connata obovato-oblonga, 3-exteriora majora, obovato-oblonga, 1½ cm. longa, 12 mm. lata, apice truncato-emarginata, basi angustata, margine crispata, 2-interiora minorâ angustiora. Stamina numerosa, ad basin connata quam petalis breviora, 8 mm. longa. Ovarium dense breveque sericeo-hirsutum, 3-loculare (placentis incrassatis), cum stylo 7 mm. longum, ovoideum apice gradatim ad stylum abeuns, stylis 3 ad medium connatis, vel ad totam longitudinem connatis, stigmatibus ad apicem ramorum styli 2-lamellatis.

HAB. Shinkō; Remogansha, leg. T. KAWAKAMI et U. MORI 1906, Juni. (No. 1324).

This comes very near *T. reticulata*; but differs from it by the leaves and flowers.

Thea tenuiflora HAYATA sp. nov. Rami graciles cinereo-rubrescentes, superne foliati, ramulis novellis exsiccatis nigricantibus hirsutis basi perulatis, perulis rotundatis ciliolatis, 2-3-seriatim dispositis, cataphyllis spathulatis integris 1 cm. longis. Folia petiolata, coriacea, obovato-oblonga, vel oblonga, 4 cm. longa,

16 mm. lata, apice acuta ad summum extremitatem obtusa, basi cuneato-acuta, margine sursum distincte medio obscure serrulata, deorsum subintegra, utrinque exsiccato glabra, (sed novella ad costam pilosiuscula), utrinque pagine minute punctata, costis venis venulisque distincte elevatis, petiolis 5 mm. longis. Flores sessiles axillares solitarii. Sepala circ. 5, inæqualia, caduca, late rotundata, pauce pilosa, coriacea, 4 mm. lata, margine ciliolata. Petala circ. 5, inæqualia, obovato-oblonga, apice rotundata vel truncato-rotundata, basi cuneata, 18 mm. longa, 10 mm. lata. Stamina numerosa, 8 mm. longa, filamentis basi connatis. Ovarium minutum rotundatum, 1 mm. longum, stylis 3, ad totam longitudinem connatis, 3 mm. longis.

HAB. Wantan, leg. T. KAWAKAMI, Jan. 1904.

Near *T. sasanqua*; but differs from it in having round petals. The petals of the present plant are usually oblong and round at the apex, while those of *T. sasanqua* are generally, if not always, notched at the apex.

Malvaceæ.

Sida LINN.

Sida mysorensis W. et A.; Hook. f. Fl. Brit. Ind. I. p. 322.

HAB. Akō; Chōshūshō, leg. G. NAKAHARA, Sept. 1905, (No. 511).

DISTRIB. India and the Philippines:

OBSERV. Leaves soft tomentose cordate, abruptly acuminate, margin serrulate, 9 cm. long, 7 cm. broad, petioles 5 cm. long; very like *S. humilis* WILLD.

Thespesia CORR.

Thespesia populnea CORR. ; DC. Prodr. I. p. 456 ; WIGHT, Ic. t. 8 ; BEDD. Fl. Sylv. t. 63 ; MIQ. Fl. Ind. Bat. I. pt.-2, p. 150 ; MASTERS, in HOOK. f. Fl. Brit. Ind. I. p. 345 ; MERRILL, in Philip Journ. Sci. IV.—Suppl. pp. 78 et 419.

HAB. Kōshūn : Manshū, leg. G. NAKAHARA, Dec. 1905, (No. 873).

DISTRIB. India, Tropical Asia, the Pacific Islands, and Africa,

OBSERV. Leaves cordate oblong, acute, or abruptly acute. entire, glabrous 13 cm. long, 10 cm. broad, long petiolate, petioles 10 cm. long ; flowers in my specimen subterminal, solitary, pedunculate. New to the Formosan flora.

Gossypium LINN.

Gossypium Nanking MYER. in Herb. Kew.

HAB. Nantō : Nankōkei, leg. T. KAWAKAMI et U. MORI, 1907, Aug. (No. 1169).

DISTRIB.

I am following Sir GEORGE WATT's determination who has most cordially examined the plant at my request.

Sterculiaceæ.

Sterculia LINN.

Sterculia nobilis R. BROWN. in Herb. Kew.

Nom. *indig.* Pin-pon.

HAB. Tainan, leg. T. KAWAKAMI, Aug. 1906, (No. 1440).

DISTRIB. China and Sumatra.

OBSERV. A small tree; leaves large, oblong, 30 cm. long, 15 cm. broad membranaceous, nerves distinct, petioles 6 cm. long. Panicles 15 cm. long, loosely flowered. Flowers polygamous. Calyx campanulate 5-lobed, lobes lanceolate hairy. Fl. ♂: staminal column shorter than the calyx, declining, anthers sessile on the outside of the very short lobes, forming a globular terminal head. Fl. ♀: ovary stalked, 4-lobed, with anthers at its base, style declining, stigma 4-lobed, tomentose. Capsules fleshy, leather-like, thick, ovate, beaked, sessile, 5-6 cm. long, bright scarlet, slightly velvety. The plant is not indigenous to Formosa; but comes from the opposite continent and is in the island found only in cultivation.

The present *Sterculia* is near *S. lanceolata* CAV.; but differs from it in the calyx with lanceolate lobes.

Pterospermum SCHREB.

Pterospermum formosanum MATSUM. in MATSUM. et HAYATA Enum. Pl. Formos. p. 62.

This is very like, or perhaps the same as, a specimen from Borneo, preserved at Kew, labelled *P. fuscum* KUTH.?, which specimen, however, is certainly different from the type of the named species.

Tiliaceæ.

Sloanea LINN.

Sloanea hongkongensis HEMSLE. in HOOK. Ic. Pl. XXVII. (1900) t. 2628.

DISTRIB. Hongkong.

I have seen in Formosa a specimen with a very spinous fruit, which specimen is apparently the same as the present species which I have seen in the Herbarium at Hongkong. The plant is, however, not yet represented in the Tōkyō Herbarium.

Zygophylleæ.

Tribulus LINN.

Tribulus cistoides LINN., HOOK. f. Fl. Brit. Ind. I. p. 423 ;
FORBES et HEMSL. Ind. Fl. Sin I. p. 97.

HAB. Pratas, leg. T. KAWAKAMI, 1907, Juli.

DISTRIB. Throughout the warmer regions of both hemispheres.

Geraniaceæ.

Biophytum DC.

Biophytum sensitivum DC. ; MATSUM. et HAYATA, l.c. p. 69.

HAB. Akō : Bongarisha, leg. G. NAKAHARA, Sept. 1905, (No. 544).

OBSERV. A very graceful herb, about 30 cm. high ; leaves are gathered on the top of the stem, abruptly pinnate, 6-7 cm. long ; pinnæ 20-30, obliquely oblong, 1 cm. long. Flowers many on long peduncles which are projected from the center of congested leaves.

Geranium LINN.

Geranium uniflorum HAYATA Fl. Mont. Formos. p. 65.

Near *G. aconitifolium* and also *G. collinum* A. DC. ; but differs

from the former by not branched peduncles, and from the latter in having much broader stipules.

Rutaceæ.

Fagara LINN.

Fagara integrifoliola MERRILL, Flora of the Lamao Forest Reserve, in Philip. Journ. Sci. I. Suppl. p. 68.

HAB. Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA, Mart. 1906, (No. 1064).

DISTRIB. The Philippines.

The plant is exactly referable to this species, so far as the description is concerned. The tree yields a soft woolly substance which densely covers the radical parts of the plant.

Clausena BURM.

Clausena lunulata HAYATA sp. nov.

Clausena excavata HAYATA in MATSUM. et. HAYATA Enum. Pl. Formos. p. 75, (non Burm.).

Rami fuscentes, cinereo-punctati, pubescentes. Folia pinnata, lanceolata in circumscriptione 25 cm. longa, 8 cm. lata, 31-41-foliolata, foliis mediis maximis lunulatis 4 cm. longis, 12 mm. latis, apice obtusis vel retusis basi valde obliquis latere superiore truncatis latioribus, latere inferiore acuminatis angustissimis margine obscure crenatis vel integris, foliis superioribus et inferioribus minoribus foliolo medio conformibus, glabris vel ad costam pubescentibus, petiolulis 2 mm. longis. Paniculæ terminales 20 cm. longæ 7 cm. latæ, floribus ad apicem ramulorum panicularum ternatim dispositis. Calyces 5-dentati, dentibus truncatis. Petala ignota.

HAB. Kōshūn : Kōkō, leg. T. KAWAKAMI, Juli. 1906, (No. 1655);
Kachiraisha, leg. C. OWATARI, Mart. 1898.

In the Enumeratio Plantarum Formosanarum, I referred this plant to *C. excavata*, thinking that it might be a small form of that species. On examining a set of several specimens collected in different parts of the island, I have, however, found that the plant is always of the same constant form, and is quite different from the type of the named species in many points but especially in its leaves which are in the latter species very much larger, attaining the size of even 3-4 times those of the Formosan plant.

Simarubeæ.

Suriana LINN.

Suriana maritima LINN. ; DC. Prodr. II. p. 91 ; Hook. f. Fl. Brit. Ind. I. p. 522.

HAB. Pratas, leg. T. KAWAKAMI, 1907, Juni.

DISTRIB. On the sea-shores of the Tropics.

Burseraceæ.

Canarium LINN.

Canarium album RÆNSCH. ; DC. Prodr. II. p. 80 ; HANCE, in Journ. Bot. (1871), p. 39 ; ENGL. in DC. Monogr. Phanerog. IV. p. 149 ; FORBES et HEMSL. Ind. Fl. Sin. I. p. 113.

HAB. Toroku : Rinkiho, leg. T. KAWAKAMI, Aug. 1906.

DISTRIB. Cochinchina and South China.

Ilicineæ.

Ilex LINN.

Ilex ardisioides LÆS. in Nov. Act. Nat. Cur. LXXVIII.-I. (1901) p. 359.

HAB. South Cape, Dr. A. HENRY!

I have seen the plant at Kew; it is not yet represented in the Herbarium at Tōkyō.

Ilex bioritsensis HAYATA sp. nov. Rami validi, recti, corticibus cinerascentibus obtecti, ramulis rectis divaricatis, triquetris. Folia alternā breve petiolata, valido-coriacea, margine spinosa, rhomboideo-obovata, $3\frac{1}{2}$ cm. longa, 2 cm. lata, margine utrinque latere 1-2-spinoso-dentata, lobo (vel dente) centrali triangulari apice acuto valde aristato, aristis rectis, lobis (vel dentibus) lateralibus acutis recto-aristatis validis, basi rotundata, vel cordata, supra nitida subtus pallidiora, costis et venis supra leviter impressis, subtus leviter elevatis, petiolis 3 mm. longis nigricantibus. Drupæ axillares, solitariae sessiles, obovoideæ 8 mm. longæ, apice obtusæ, basi sepalis 4 persistentibus triangularibus instructæ facie irregulariter minute punctatæ et leviter obscureque 2-3-cornutæ. Pyrenes 2, a dorso compressæ, dorso convexæ verticaliter circ. 8-sulcatæ, facie planæ, verticaliter circ. 6-sulcatæ, 5 mm. longæ, 4 mm. latæ.

HAB. Biōritsu: Taizan, leg. T. KAWAKAMI et U. MORI, Oct. 1908, (No. 7185).

Very like *Ilex Pernyi* FRANCH. var. *Manipurensis* LÆS.; but differs from it in the shape of the drupe which has always two stones.

Ilex formosana MAXIM. ; MATSUM. et HAYATA l.c. p. 81.

HAB. Uraisha, leg. N. KONISHI, Aprili. 1908, (No. 78).

OBSERV. Branches blackish ; leaves elliptical acute at the base, acuminate or cuspidate at the apex, obtuse at the very tip, 7-8 cm. long, 2-3 cm. broad, margin obscurely crenulate, veins not very distinct on the upper surface, reticulated and dotted on the under surface, somewhat pale beneath, petioles about 1 cm. long. Flowers on a very short raceme which is almost contracted to a cluster.

Ilex goshiensis HAYATA sp. nov. Rami validi, cinerascētes, ramulis fusco-rubescētibz angulatis. Folia alterna petiolata, coriacea, obovato-oblonga, vel oblonga, 26 mm. longa, 16 mm. lata, apice retuso-acuta basi acuta, integerrima, supra opacissima, venis non visis, subtus pallidissima tenuiter venosa, petiolis 4 mm. longis. Drupæ ad axillas foliorum fasciculatæ, pedunculis 5 mm. longis, pedicellis 3 mm. longis, globosæ, 4 mm. in diametro, fusco-rubescētes, basi sepalis 4 persistentibus instructæ.

HAB. Shintiku : Goshizan, leg. T. KAWAKAMI, (No. 1258.)

Near *Ilex Championi* LÆS. ; but differs from it in having shortly cuspidate leaves. The leaves of the other plant are very rounded or even emarginate at the apex. This is also near *Ilex memecylifolia* CHAMP., from which it differs in having leaves which are retused at the apex. There is in the Herbarium at Tōkyō a specimen from the Loo-choo islands which has been identified with *I. Hanceana* MAXIM., by Dr. T. Itō in the Tent. Fl. Lutch p. 367. The specimen is very like, or even the same as, the plant just described, and I have wondered if the Loo-chooan plant be really identical with *I. Hanceana*. I have seen the latter species at Kew and have noticed that it is differ-

ent from the Formosan plant. As is described by MAXIMOWICZ in his Coriar. Ilic. Monoch. p. 33, *I. Hanceana*, has “cymulæ ♂ breve pedunculatæ, 5-6-floræ, petiolum bis vel ter superantes, pedicelli calyce æquilongi, flores 4-meri circ. linam longi. Calyx puberulus, lobis ciliatis ovatis.” But, in the Loo-chooan plant, we find “flores umbellati, umbellis cymose 5-6-fasciculatis, pedunculis umbellarum 5-6 mm. longis petiolum æquantibus, pedicellis florum circ. 3 mm. longis florem 2-plo superantibus.”* In comparing the above descriptions, we see clearly that the Loo-chooan plant is not identical with MAXIMOWICZ's species. As to the identification of the Loo-choo plant with the present one, I am not as yet in a position to decide it. I can only add that they are very similar.

Ilex Kusanoi HAYATA sp. nov. Rami rugosi atro-purpurascentes, ramulis gracilibus, cinerascens, angulatis. Folia petiolata, alterna, chartaceo-membranacea, oblonga vel oblongo-ovata, vel-obovata, leviter obliqua, 5 cm. longa, 3 cm. lata, apice obtuse vel breve acuminata vel leviter cuspidata, vel obtuso-acuta, ad summum extremitatem breve aristata, basi acuta, margine obscure crenulato-serrata, apice serrarum aristata, prope basin subintegra. Flores ad axillas 2-3-4-fasciculati, longe pedunculati, pedunculis gracilibus 18 mm. longis, basi pedunculorum perulati, perulis minutis subulatis. Flores persimiliter hermaphroditi. Sepala 5, rotundata 1 mm. longa, persistentia, margine ciliolata. Corolla 5-lobata, rarius 6-lobata, 3 mm. longa, lobis rotundatis 2 mm. longis, tubo 1 mm. longo. Stamina 5 rarius 6, tubo corollæ affixa, 1 mm. longa, antheris triangularibus cordatis $\frac{1}{2}$ mm. longis apice acutis, filamentis dilatatis. Ovarium globosum cum stylis 2 mm. longum, stylis

* The description above referred to has been drawn up by myself from a specimen from the Loo-choo Archipelago, which is referred to *I. Hanceana* MAXIM. by Dr. T. IRÔ.

brevibus stigmatibus subglobosis 5-lobatis coronatis. Drupæ globosæ 3 mm. in diametro, apice breviter acutæ stigmatibus 5-lobatis coronatæ.

HAB. Taitō, leg. S. KUSANO, Juli. 1908.

The present plant bears some resemblance to the Japanese *Ilex macropoda* MIQ., but the leaves of the Japanese plant are more or less hairy, while those of the Formosan are quite glabrous. Besides, the former has deciduous leaves, while the latter persistent ones. This is also near *I. macrocarpa* OLIV.; but differs from it in having much smaller fruit; from *I. taiwaniana* HAYATA, in having much thinner leaves and much larger flowers.

***Ilex Mertensii* MAXIM. var. *formosæ* LÆS.** in Herb. Kew.

HAB. South Cape, Dr. A. HENRY.

I have seen the plant at Kew. It is not yet represented in the Herbarium at Tōkyō.

***Ilex nokōensis* HAYATA** sp. nov. Rami validi cinerascetes, lenticellis obtecti, pauca pilosi, pilis nigricantibus, ramulosi, ramulis divaricatis, foliosis, cinereo-rubrescentibus brevissime hirsutis. Folia alterna breviter petiolata, viridissima, oblongo-ovata, vel obovata, 2½ cm. longa, 1½ cm. lata, apice rotundato-obtusata, vel obtusata, interdum callosa-mucronata, basi acuta vel cuneato-acuta, margine sursum crenata, crenis apice callosiusculis, deorsum integra, supra costis venis et venulis impressis subtus leviter elevatis, petioli 2 mm. longis.

HAB. Nōkōsan, ad 9000 ped. alt., leg. T. KAWAKAMI et U. MORI, 1908, Jan. (No. 4582)

This is very like *Ilex crenata* THUNB., but differs from it in having impressed veins on the surface of the leaves, which are quite obtusely crenate on the margin. In *I. crenata*, the leaves are shortly aristate at the apex of the teeth on the margin.

Moreover, the lower surface of the leaves of the same species is minutely dotted, while that of the present plant is quite smooth, but never dotted. It bears some resemblances to *I. luzonica* ROLFE and also to *I. Thomsoni*; but differs from the former in having obovate or oblongo-ovate leaves which are crenate towards the apex, and from the latter in having callosobtusely (but not mucronately) crenate leaves. Those of *I. luzonica* ROLFE are usually oblong, more acutely or mucronately crenate from the base to the apex, while these are usually obovate very obtusely crenate only towards the apex.

Ilex parvifolia HAYATA sp. nov. Ramuli graciles ramosi, ferrugineo-tomentosi. Folia approximata, breve petiolata, oblonga, 12 mm. longa, 6 mm. lata, coriacea, utrinque obtusa vel acuta, aristato-serrata, supra ad costas tomentosa, utrinque venis obscuris, petiolis supra tomentosis. Flores axillares, solitarii, pedicellati, sepalis 4, rotundatis, 1 mm. longis. Drupæ rubræ, globosæ, 6 mm. in diametro æquantes, 4-pyrenæ.

HAB. in monte Morrison, ad 8000 ped. alt., leg. T. KAWAKAMI et U. MORI (No. 2036); Arizan, in monte Morrison, leg. G. NAKAHARA, Oct. 1906.

Near *Ilex intricata* Hook. f.; but differs from it by the thinner oblong leaves, which are more or less aristately toothed on the margin. *I. intricata* has nearly obovate leaves, without aristate teeth.

Ilex taisanensis HAYATA sp. nov. Rami cinerascens, longitudinaliter rugulosi rectiusculi, ramulis rectis apice triquetris breve pubescentibus, vel subglabris rubescentibus. Folia alterna, longiuscule petiolata, chartaceo-coriacea, oblonga, vel oblongo-ovata, 37 mm. longa, 15 mm. lata, apice acuta, basi rotundato-obtusa, margine a medio sursum obscure remoteque crenata, venis et

venulis utraque pagine inconspicuis vel tenuissimis, subtus pallidiora, petiolis 1 cm. longis, intus cum costis tenuissime brevissime pubescentibus. Drupæ ad axillas foliorum solitariae, longe pedunculatae, (pedunculis 2 cm. longis ad medium 2-bracteolatis, bracteolis lanceolatis 2 mm. longis), globosæ 5-6 mm. in diametro, albo-punctatae, vel non punctatae, basi calycibus quadrangularibus persistentibus instructæ. Pyrenes 3-5, a dorso compressiusculæ, dorso convexæ apice acutæ, læves 4 mm. longæ.

HAB. Biōritsu : Rokujō-taisan, leg. T. KAWAKAMI et U. MORI, 1908, Oct.

Near *Ilex embelioides* HOOK. f. which differs from the present plant in the leaves, more attenuate or cuspidate towards the apex. The leaves of the new plant are acute at the apex but never attenuate nor cuspidate.

Ilex taiwaniana HAYATA sp. nov. Ramuli cineracei glabri. Folia alterna ovata, obtuse acuta, basi acuta obliqua, mucronato-serrata, utrinque distincte venosa chartaceo-membranacea. Flores ad axillas 3-5-fasciculati, fasciculis pedunculatis, pedicellis 5 mm. longis ; sepalis 5, rotundatis 1 mm. longis ; petalis 5, rotundatis. 2 mm. longis ; staminibus 5 introrsis ; rudimentum ovarii convexum Drupæ globosæ, 4 mm. longæ, longe pedunculatae, (pedunculis 2 cm longis), 10-sulcatae, 5-pyrenæ.

HAB. Kashiōtō, leg. G. NAKAHARA, Feb. 1906, (No. 1025).

Celastrineæ.

Euonymus LINN.

Euonymus Dielsianus LÆSENER, in ENGL. Jahrb. XXIX. (1900) p. 440, t. IV. L.

HAB. Suisha. Shūshūgai, leg. C. OWATARI, Jan. 1898.

DISTRIB. Central China.

OBSEB. Sterilis, ramulis rectis viridiusculis longitudinaliter rugosis. Folia subopposita vel alterna lanceolata vel ovato-lanceolata vel oblonga apice acuminata ad summum obtusa basi attenuata margine sursum remote serrata, deorsum integra, supra exsiccato albescentia subtus pallidiora, 8-10 cm. longa, 3-4 cm. lata, petiolis 8 mm. longis, venis venulisque supra leviter elevatis, subtus inconspicuis.

I have compared the present plant with a Chinese specimen labelled *E. Dielsianus* in the Herbarium at Kew, and found that the Formosan plant is, so far as sterile specimens are concerned, identical with it. In this, Mr. SPRAGUE concurs.

Euonymus Miyakei HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 83, t VII.

Resembles very much *E. javanicus* Bl.; but the leaves of the present plant are always verticillate (ternate in almost all cases), while those of the Javan species are always opposite.

Euonymus Spraguei HAYATA sp. nov.

Euonymus echinatus T. ITŌ, in ITŌ et MATSUM. Tent. Fl. Lutch. p. 371; HAYATA Fl. Mont. Formos. p. 69.

Rami teretes minute papilloso-punctati, striati, fulvo-cinerascentes, ramulis subtetragonis, sulcatis, fulvo-fuscentibus, gracilibus divaricatis. Folia opposita, ovato-oblonga, vel oblonga, 6½ cm. longa, 3 cm. lata, (interdum 4½ cm. longa, 23 mm. lata) chartaceo-coriacea, apice obtuso acuta vel obtuso-acuminata, basi acuta vel rotundata, margine serrulata serrulis obtusis, supra pallida, subtus pallidiora, costis et venis primariis supra leviter elevatis, subtus

costis elevatis, venis inconspicuis, petiolis 8 mm. longis intus sulcatis. Capsulæ cymose dispositæ, (cymis axillaribus, pedunculis gracilibus 3 cm. longis), lato globosæ 6 mm. in diametro, 2-4 lobatæ, 2-4-loculares, apice truncatæ, facie echinata, spinis interdum circ. 30, interdum 5-6, recurvis 1-2, mm. longis, stylis persistentibus. Semina quadrantiformia, rubescentia, 5 mm. longa, lævia, testis coriaceis.

HAB. Loo-choo et Formosa.

When I mentioned the present plant in my "Fl. Mont. Formos.", I was merely comparing it with a Loo-choo plant which had been determined by Dr. T. Itō, and referred to *E. echinatus* WALL. in the Tent. Fl. Lutch. p. 371. As the Formosan plant is exactly identical with Dr. Itō's plant, I used the same name for my plant. While working here at Kew, I have compared with Mr. SPRAGUE the present plant with the type of the named species, and have found that they are clearly not identical. The former is easily distinguishable from the latter by many points but especially by the very much fewer and much more slender prickles on the fruit. In WALLICH's species, the prickles are much more numerous and stronger. Our plant is very near *E. subsessilis* SPRAGUE (= *E. echinatus* LOUR.), but differs from it in having much fewer and more slender prickles. The new species is named in honour of Mr. T. A. SPRAGUE who has cordially assisted me in many ways during my work at Kew.

Celastrus LINN.

Celastrus Kusanoi HAYATA sp. nov. Scandens, ramis fuscetibus, longitudinaliter rugulosis, lenticellis paucè punctatis, ramulis divaricatis. Folia alterna petiolata, late globosa 8 cm. longa 9 cm.

lata, apice rotundata, brevissime cuspidata, (cuspidibus 8 mm. longis, obtusis) basi late truncata vel rotundata cordata, margine remote obscureque serrata, prope basin integra, chartacea, petiolis $2\frac{1}{2}$ cm. longis intus sulcatis. Capsulæ cymose dispositæ, (cymis axillaribus, pedunculis 2 cm. longis brevissime tomentosis) sublobosæ apice stylis persistentibus coronatæ, 3-valvatim loculicide dehiscentes, valvis cæcis flavescensibus orbicularibus apice brevè acutis, extus transverse rugosis, seminibus 2 a quoque loculis. Semina arillis rubescentibus obtecta, oblique cylindræa, leviter recurva, $4\frac{1}{2}$ mm. longa, 2 mm. lata, testis fusco-nigricantibus rugosis minute papillosis coriaceis duriusculis.

HAB. Formosa meridionalis, leg. S. KUSANO, 1909.

The present plant is near *C. articulatus*; but differs from it in having more rounded leaves and transversely wrinkled carpels in a dried specimen. The leaves are nearly rounded, or slightly cordate at the base, shortly acute or nearly rounded at the apex, remotely serrulate on the margin, while those of *C. articulatus* are nearly obovate, acute or rounded, but never cordate, at the base. The carpels of the latter plant are not wrinkled, but rather smooth even when dried.

Rhamnæ.

Rhamnus LINN.

Rhamnus formosana MATSUM. in MATSUM. et HAYATA Edum. Pl. Formos. p. 88, t. VIII.

The plant is very near *R. triquetra* WALL. and perhaps further study will prove them to be identical.

Rhamnus Nakaharai HAYATA n. n.

Rhamnus arguta MAXIM. var. *Nakaharai* HAYATA Fl. Mont. Formos. p. 70.

The present plant is described in my paper above cited as representing a variety of *Rhamnus arguta* MAXIM. At Kew, I have examined the co-type of the latter plant and found that the difference between the type and the variety is so great that I have thought it better to raise the latter to specific rank. The new species differs from the other in having slender flowers with longer styles, and still more in the supra-axillary inflorescence.

Ampelideæ.

Vitis LINN.

Vitis dentata HAYATA sp. nov. Rami fulvo-tomentosi, (pilis patentibus brevibus), vel subglabrati, remote foliati. Folia 3-foliolata, petiolata), stipulata, in ambitu late triangularia membranacea, 10 cm. longa, 13 cm. lata, foliolo terminali oblongo, 9 cm. longo 4½ cm. lato, apice obtuso-acuminato basi rotundato-acuto, remote dentato, (dentibus ascendentibus brevissime aristatis), utrinque glabro, petiolulo 5 mm. longo, foliolis lateralibus oblique oblongo-ovatis apice obtuso-acutis, basi oblique rotundatis latere superiore acutis, inferiore rotundatis, 7½ cm. longis, 4 cm. latis, breve petiolulatis, petiolulis 5 mm. longis; petiolis 3½ cm. longis, stipulis oblongo-rotundatis obtusis 6 mm. longis, medio ad axillas affixis, medio crassiusculis maculatis margine membranaceis basi caulem semi-amplectantibus. Cymæ oppositifoliæ, 4 cm. longæ totiusque latæ, ramulis rectangulare dispositis, pedunculis pedicellisque pubescentibus, pilis patentissimis, bracteis et bracteolis caducissimis. Fl. ♂: calyces complanati, lobis brevissime triangularibus

pilosis, vel circ. obsolete; corollæ patentēs, 2 mm. longæ, lobis 5, valvatis, ovato-triangularibus apice acutis subito acute-reflexis a dorso connatis brevissime cornutis. Ovarium conicum cum stylis 2 mm. longum, basi contractum supra basin 4-5-cornutum, stylis brevissimis apice stigmatibus 4-5-lobatis coronatis.

Vitis umbellata HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 93, (non HEMSL.).

HAB. Shakkō, leg. S. NAGASAWA, Aprili. 1903, (No. 43).

Near *Vitis corniculata* BENTH.; but differs from it in having acutely dentate leaves.

Vitis triphylla HAYATA sp. nov. Ramuli fuscentes, hirsuti, remote foliati. Folia trifoliolata, in ambitu triangularia, hirsuta, foliolo terminali oblongo-lanceolato, foliolis lateralibus longiori 7 cm. longo, 27 mm. lato, apice acuminato basi obtuso-rotundato, margine remote obscureque serrato, (costis et venis utrinque leviter elevatis tenuissimis), subtus pallidiori ad costas fusco tomentoso ad paginam hirsuto, petiolulo 15 mm. longo tomentoso; foliolis lateralibus ovato-oblongis obliquis apice acutis basi oblique rotundatis, latere superiore acutis, latere inferiore rotundatis vel cordatis, 4½ cm. longis, 2 cm. latis, cæterum foliolo terminali conformibus, petiolulis 3 mm. longis; petiolis 3 cm. longis, stipulis ovato-lanceolatis 5 mm. longis. Cymæ oppositifoliæ. Baccæ globosæ, 8 mm. in diametro, 1-spermæ.

Vitis angustifolia HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 90, (non WALL.).

HAB. Shifun, leg. C. OWATABI, 1897, Dec.

Very near *Vitis angustifolia* WALL.; but differs from it in having more hairy, and very obscurely, and remotely serrulate, or nearly entire, leaves.

Sapindaceæ.

Allophylus LINN.

Allophylus Cobbe BLUME “Rumph. III. p. 131;” Hook. f. Fl. Brit. Ind. I. p. 673.

Ornitrophe Cobbe WILLD. Sp. Pl. II. p. 322.

Schmiedelia Cobbe DC. Prodr. I. p. 610; WIGHT Ic. t. 964.

Ornitrophe serrata BENTH. Fl. Austral. I. p. 455.

Schmiedelia villosa WIGHT Ic. t. 401.

Schmiedelia Rheedii WIGHT Ic. t. 964.

HAB. Kōshūn, leg. T. KAWAKAMI, Oct. 1904; Fratas island, leg. T. KAWAKAMI, Juni. 1908, (No. 7).

DISTRIB. North Australia, Indian Archipelago. New to the Formosan flora.

Pometia J. R. et FORST.

Pometia pinnata J. R. et Forst “Char. Gen. p. 110. t. 55.” Hook. f. Fl. Brit. Ind. I. p. 691, (ad nota *P. tomentosa*).

HAB. Taitō: Beirin, leg. T. KAWAKAMI et Z. KOBAYASHI, Mai. 1906, (No. 1522).

DISTRIB. Pacific islands.

Acer LINN.

Acer albo-purpurascens HAYATA sp. nov. Ramuli rubro-purpurascentes, teretes, glabri. Folia elongato-oblonga vel oblongo-lanceolata, 10 cm. longa, 3 cm. lata, apice acuminata, (acuminibus linearibus apice obtusis $1\frac{1}{2}$ cm. longis) basi acuta, margine undulato-integra, vel integra, supra viridia, subtus glauca, albo-purpurascencia, obscure 3-nervia, nervo centrali valido, rubescente, nervis

lateralibus tenuissimis vel rarius obsoletis, venis lateralibus primariis nervi centralis utraque latere 7, subrectis angulo 50° a costa divaricatis, supra nervis venis venulisque leviter elevatis reticulatis, subtus prominentibus reticulatis, petiolis $1\frac{1}{2}$ cm. longis intus sulcatis.

HAB. Giokusan, leg. S. HONDA.

Near *Acer laevigatum* WALL. and still nearer *A. Fargesii* and also very like some form of *A. oblongum* WALL.; but quite easily distinguishable from them by the leaves which are acuminate at the apex and acute at the base.

Acer caudatifolium HAYATA sp. nov.

Acer caudatum MATSUM. in Tōkyō Bot. Mag. XII. p. 63; MATSUM. et HAYATA Enum. Pl. Formos. p. 96, (non WALL.).

Ramuli fusco-cinerascentes, remote foliati. Folia ovato-lanceolata, 8 cm. longa, $3\frac{1}{2}$ cm. lata apice acuminata basi cordata, utraque latere obscure 3-dentato-lobata, crenato-serrata, obscure 5-nervia, nervo centrali nervos laterales 3-plo, nervos basiliares 7-plo superante, venis primariis nervi centralis utraque latere 5, angulo 40° a costa divaricatis, subtus nervis venis venulisque elevatis rubescentibus, subtus pagine pallidiora, petiolis $1\frac{1}{2}$ cm. longis, intus sulcatis.

HAB. Giokusan, leg. S. HONDA.

The present *Acer* is very different from *A. caudatum* WALL., but very near *A. Davidi* FRANCH. The new species is distinguishable from the latter in having much larger serration of the leaves.

Acer duplicato-serratum HAYATA sp. nov.

Acer sp. aff. *A. micrantho* S. et Z.; HAYATA Fl. Mont. Formos. p. 71.

Ramuli glabri. Folia ambitu orbicularia 7 cm. in diametro, palmatim 7-loba, lobis lanceolatis acuminatis, duplicato-serratis, lobo terminali 5 cm. longo $1\frac{1}{2}$ cm. lato, lobis infimis brevioribus $2\frac{1}{2}$ cm. longis, petiolis 2 cm. longis.

HAB. Taitō : Batai-ankei, in monte Lagulan, ad 5000 ped. alt., leg. N. KONISHI, Juni. 1902.

Acer morrisonense HAYATA sp. nov.

Acer sp. aff. *A. crataegifolio*, HAYATA Fl. Mont. Formos. p. 71.

Ramuli glabri, atro-purpurei. Folia ovato-cordata 5-nervia, 8 cm. longa, 5 cm. lata leviter 3-loba, lobis inconspicuis obtusissimis, margine præter apicem duplicato-serrata, apice acuminata vel cuspidata, cuspidibus serrulatis, petiolis circ. 3 cm. longis.

HAB. in Monte Morrison.

Near *Acer Davidi* FRANCH. ; but differs from it in having leaves with three lobes, two of which are very obscure ; also very like *A. laxiflorum*, but quite distinct from it. There is a specimen exactly like this at Kew, labelled “*Acer* aff. *Hookeri*, China, No. 218.” It is very like *A. Hookeri* but quite separable from it.

Acer rubescens HAYATA sp. nov.*

Acer sp. aff. *A. rufinervi* HAYATA Fl. Mont. Formos. p. 72.

Ramuli palliduli exsiccato nigricantes. Folia ambitu cordata octagona leviter 5-loba, lobis brevissimis cuspidatis, cuspidibus terminalibus angustis linearibus, lateralibus latioribus serrulatis, infimis brevissimis, basi cordata, margine præter cuspidem duplicato-serrata, 9-10 cm. longa, 7 cm. lata, coriacea, longe petiolata, petiolis 6-7 cm. longis.

HAB. Taitō, Batai-ankei, ad 7600 ped. alt., leg. N. KONISHI, Juni. 1902, (No. A. 11).

There is a specimen very much like this at Kew. The specimen is labelled “*Acer capillipes* MAXIM. Japonia, Nippon,

* After completing this manuscript, I have found that the plant is very like, or perhaps the same as, *Acer insularis* which has quite recently been described by Mr. T. MAKINO. His specimen is, however, not accessible for us in the Herbarium at Tōkyō.

Prov. Sinano, 1864 leg. TSCHONOSKI." The present plant differs from it in the leaves with larger serration and longer side lobes placed on a little upper portion. Our plant is also very near *A. rufinerve* from which it is distinguishable by the leaves with more round or slightly cordate base; from *A. erosum* PAX, by the quite glabrous leaves.

***Acer oblongum* var. *Itoanum* HAYATA n. v.**

Acer oblongum var. *microcarpum* T. ITŌ in ITŌ et MATSUM. Tent. Fl. Lutch. p. 387. (non HIERN.)

Rami cinereo-rubescens, glabri, ramulis fusco-rubescens, teretibus lenticellis minutis parce dispersis. Folia opposita, longe petiolata, ovata, 7 cm. longa, 33 mm. lata, apice acuminata, (acuminibus circ. 1 cm. longis apice obtusis), margine integra vel leviter undulato-integra, utrinque glabra, concolora, vel subtus glauca, costis venis venisque utraque leviter elevatis reticulatis, basi 3-nervia, nervis basilaribus a nervo centrali angulo 40°-50° divaricatis, venis primariis nervi centralis utraque latere 2, coriacea. Fructus in cymas terminales dispositi. Carpella glabra, cum alis circ. 3 cm. longa, loculis leviter nervosis, a medio leviter elevatis, gradatim ad alas abeuntibus, alis cultriformibus semi-oblongis, 2 cm. longis, 1 cm. latis, latere exteriori rectis, latere interiore rotundatis apice obtuso-rotundatis, sinibus inter alas rotundato-angustatis, alis latere exteriori angulo 40° divaricatis.

HAB. Loo-choo: Kushimajiri, leg. S. TANAKA, Mai. 1891, et Prof. J. MATSUMURA; Nagodake, leg. G. NAKAHARA, Aprili. 1907.

The present plant was erroneously regarded by myself and other botanists as identical with *A. oblongum* WALL. At Kew, I have compared the plant with the type of the named species and found that they do not entirely agree. I have examined several forms of *Acer oblongum* from the Himalayas, China and Formosa,

but I have not found that any of the forms of the same species comes in accord with the Loo-chooan plant in respect of the shape of leaves. Accordingly I have thought it better to regard the latter as representing a new variety of the species. The present variety differs from the type in having ovate leaves, quite rounded at the base, acuminate at the apex, with three distinct nerves, and two distinct lateral veins on both sides of the central nerve. The leaves of the type are oblong, or obovately oblong, or rarely ovate-oblong, much more obtuse at the apex, and nearly acute at the base, pinninerved or obscurely three-nerved, with more than six lateral veins on both sides of the central nerve. The new variety is named in honour of Dr. T. ITŌ who has done so much for the study of the flora of these interesting Archipelago.

Acer Oliverianum PAX var. **Nakaharai** HAYATA n. v.

Ramuli palliduli glabri. Folia ambitu late orbicularia 7 cm. longa, 10 cm. lata palmatim 5-loba, basi cordata, lobis triangularibus cuspidatis 3-3½ cm. longis 2 cm. latis vel latioribus, margine serrulatis, serraturis acutis, venis subtus pilosiusculis demum glabris. Flores cymosi; cymæ ad ramulos 2-foliatos terminales, cum pedunculis 3-5 cm. longæ, glabræ, 3-plo ramosæ, pedicellis terminalibus 6 mm. longis. Flores ♀: sepala 5, rotundato-oblonga, 2 mm. longa, extus intusque versus apicem hirsuta, margine tomentoso-ciliolata. Petala 5, rotundata, 1¼ mm. longa, margine obscure denticulata, vel subintegra basi acuta. Stamina 7, rarius 5, 2 mm. longa, filamentis 1 mm. longis, antheris oblongis 1 mm. longis apice obtusis basi emarginatis. Ovarium late dilatatum ⅔ mm. longum, 2⅓ mm. latum hirsutum, stylis 2 ad totam longitudinem connatis 2 mm. longis, disco extrastaminali, incrassato, 7-5-lobato,

lobis rotundatis. Carpella elliptico-oblonga loculis 4 mm. longis, alis dimidiato-obovatis, divaricatis cum carpello 2- $\frac{1}{2}$ cm. longis, angulo obtuso 120° divaricatis.

HAB. Chōsōkei, leg. G. NAKAHARA, Juli. 1905, (No. 161).

The present variety differs from the type by the carpels which divaricate in an obtuse angle. Those of the type divaricate in 180°.

form. **longistaminum** Flores monœcii: cymæ ad ramulos 2-folios terminales. Fl. ♂. 4 mm. in diametro; sepala 5, rarius 6, oblonga, extus intusque pilosiuscula, 1 $\frac{1}{2}$ mm. longa. Petala 5, obovato-oblonga, 2 mm. longa, apice rotundata, margine obscure denticulata vel subintegra, basi cuneata 2 mm. longa. Stamina circ. 7.4 mm. longa, filamentis filiformibus, apice tenuissimis medio incrassatis 3 mm. longis, antheris cordato-ovatis 1 mm. longis, apice obtusis basi cordatis. Ovarii rudimentum minutum cum stylis 1 mm. longum pilosissimum, disco extra-staminali 7-8-partito, partibus clavatis incrassatis. Fl. ♀: calyx 5-6-partitus, 2 mm. longus, segmentis oblongis apice rotundatis. Petala ut ♂. staminodium 0. Discus extra-staminalis, 7-lobatus. Ovarium late dilatatum pilosiusculum, stylis brevissimis.

HAB. Akō, (No. 3136); Kelung, (No. 4239).

Acer Oliverianum PAX var. **microcarpum** HAYATA. n. n.

Rami et folia ut in typica. Flores ignoti. Carpella glabra, cum alis 2 $\frac{1}{2}$ cm. longa, loculis leviter nervosis, alis oblongis 2-2 $\frac{1}{2}$ cm. longis, apice rotundatis basi angustatis, margine latere exteriori rotundatis curvis, angulo 110°-120° divaricatis.

HAB. Shintiku: Daitōge, leg. T. KAWAKAMI et U. MORI, 1906, Juli. (No. 1426), et leg. S. KUSANO, 1909.

Differs from the type in having extremely small carpels

which are, small as they are, quite in mature state having albumen and embryo. This differs also from the other variety *Nakaharai* in the shape of wings. In the present variety, the wings are usually oblong, while in the other, they are always semi-oblong or cultriformed.

Acer serrulatum HAYATA sp. nov. Rami teretes fusco-rubescen-
tes, glabri, foliati, infra axillas foliorum leviter dilatati. Folia pal-
matim 5-lobata, rotundato-cordata in ambitu, $7\frac{1}{2}$ cm. longa, 9 cm.
lata, duplicato-serrulata, lobis æqualibus, 5-nervia, nervis angulo 60°
a se divaricatis, nervo centrali nervis lateralibus subæquilongo vel
paulo longiori nervos basiliares $2\frac{1}{2}$ -plo superante, lobo terminali lance-
olato $7\frac{1}{2}$ cm. longo, 2 cm. lato, apice acuminato, lobis lateralibus et
basilaribus conformi, petiolis $2\frac{1}{2}$ cm. longis basi leviter dilatatis.

HAB. Shintiku : Taihei, leg. T. KAWAKAMI et Y. SHIMADA, Sept.
1907, (No. 5648).

Near *Acer palmatum* THUNB.; but differs from it in the serra-
tion of the leaves.

Acer Tutcheri DUTHIE var. **Shimadai** HAYATA n. v. Rami
validi, teretes, fusco-nigricantes, lenticellis minutis parce dispersis,
ramulis divaricatis, a latere compressis complanatis, infra axillas
foliorum leviter dilatatis. Folia opposita, petiolata, late rhomboidea,
5 cm. longa, 7 cm. lata, 3-lobata, serrulata, prope basin subintegra,
lobis subsimilibus, (rarius lobis basilaribus minoribus), lobo
terminali late triangulari utraque latere margine recto, $2\frac{1}{2}$ cm.
longo, 3 cm. lato, lobis lateralibus divaricatis latere superiore rectis
horizontalibus, latere inferiore basin rotundatis, distincte 3-nervia,
nervo centrali 5 cm. longo, nervis lateralibus $4\frac{1}{2}$ cm. longis, a
centrali angulo divaricatis, petiolis 4 cm. longis, ad basin in-

crassatis. Cymæ fructiferæ ad apicem ramulorum 2- vel 4-foliorum terminales cum pedunculis 7 cm. longæ, 6 cm. latæ, pedunculis 2-3 cm. longis. Carpella glabra, loculis ovoideis $4\frac{1}{2}$ mm. longis leviter nervosis, alis cultriformibus $1\frac{1}{2}$ cm. longis 6 mm. latis, latere interiore recurvis apice rotundatis, latere exteriori rectis angulo 40° a se divergentibus.

HAB. Shintiku, leg. T. KAWAKAMI et Y. SHIMADA, 1907, Sept. (No. 5657).

Very near the type; but differs from it in having much smaller carpels with much less divaricate wings.

Sabiaceæ.

Meliosma BLUME.

Meliosma squamulata HANCE; MATSUM. et HAYATA Enum. Pl. Formos. p. 99.

HAB. Banchoryō, leg. T. KAWAKAMI et U. MORI, 1907, Nov. (No. 5517); Uraisha, leg. N. KONISHI, Mart. 1908, (No. 58).

DISTRIB. Java, Philippines.

OBSERV. Arbor, ramis ultimis validiusculis cinerascentibus, crebre lenticellatis cæterum glabris. Folia simplicia longe petiolata, coriacea, oblongo-lanceolata, 10-12 cm. longa, $3\frac{1}{2}$ - $4\frac{1}{2}$ cm. lata, apice acuminata vel caudata, basi attenuata, supra glaberrima, nitida, subtus pallidiora, vel glauca, sub microscopio minute lepidota et pubescentia, venis primariis arcuatis ante marginem anastomosantibus, ultimis minute reticulatis, petiolis circ. 7-8 cm. longis. Flores albi racemoso-paniculati. Paniculæ erectæ 15 cm. longæ 5 cm. latæ, ramis gracillimis, 5-6 cm. longis, lateralibus divaricatis, omnibus pilis ferrugineis vestitis, bracteis bracteolisque minutis

squamiformibus. Pedicelli 1-3 mm. longi. Sepala late rotundata circ. 2 mm. lata, margine ciliolata. Petala 5, 3 majora late rotundata $3\frac{1}{2}$ mm. longa, totiusque lata, 2 minora 1 mm. longa angustata apice 2-dentata, staminibus opposita. Stamina 2, filamentis dilatatis 2 mm. longis. Staminodia 3, petalis majoribus opposita, filamentis valde dilatatis. Discus parvus irregulariter dentatus. Ovarium glabrum, globosum, cum stylo sursum attenuatum 2 mm. longum, 2-loculare.

Leguminosæ.

Crotalaria DILL.

Crotalaria acicularis HAM. ; BAKER in HOOK. f. Fl. Brit. Ind. II. p. 68.

HAB. Banchoryō, leg. T. KAWAKAMI et U. MORI, 1907, Nov. (No. 5517).

DISTRIB. Java, Philippines.

Crotalaria elliptica ROXB. ; BENTH. Fl. Hongk. p. 75 ; FORBES et HEMSL. Ind. Fl. Sin. I. p. 151.

Crotalaria Vachelli HOOK. et ARN. Bot. Beech. Voy. p. 180 ; WALP. Rep. I. p. 588.

Crotalaria splendens WALP. Rep. I. p. 590.

HAB. Akō, leg. T. KAWAKAMI, 1906.

DISTRIB. Kwangtung, Hongkong.

OBSERV. Scandens, pubescens, ramosa, flexuosa. Folia trifoliolata, pubescentia, petiolata, petiolis 3 cm. longis, foliolo longioribus, foliolis subsessilibus, terminali lateralibus paulo longiori, oblongo vel obovato, retuso vel minute mucronato 3 cm. longo 2 cm. lato,

lateralibus terminali conformibus. Spicæ ad axillas foliorum ramulorum superiorum, 7-8 cm. longæ pedunculatæ. Flores 6 mm. longi, pedicellati, pedicellis 3 mm. longis. Calyces basi minute 2-bracteati, (bracteis subulatis), campanulati 3 mm. longi, 5-lobati, lobis tubo æquilongis triangularibus acutis, $1\frac{1}{2}$ mm. longis 1 mm. latis, pubescentibus. Vexillum orbiculatum unguiculatum, (lamina 5 mm. longa extus medio leviter carinata, ungue $1\frac{1}{2}$ mm. longo) intus villosum, supra unguem valde reflexum, 2-callosum; alæ obovatæ 6 mm. longæ; carina incurva 7 mm. longa, rostrata. Ovarium stipitatum, (stipite $1\frac{1}{2}$ mm. longo), 2-ovulatum, villosum, stylo medio abrupte inflexo superne intus plus minus longitudinaliter barbato. Stamina omnia in vaginam supra fissam connata. Legumina pedicellata, cernua, adpresse villosa, obovoidea vel globosa 6 mm. longa 4 mm. lata, apice oblique inflata, stylo rostrata 2-sperma.

Near *C. Trifoliastrum* WILLD.; but differs in having much larger obovate leaflets and larger flowers.

Crotalaria Kawakamii HAYATA sp. nov. Ferrugineo-hirsuta vel tomentosa, erecta, ramosa, 40-50 cm. longa. Folia alterna, oblongo-lineararia, ferrugineo-tomentosa, sessilia, 2 cm. longa, 4 mm. lata subtus glandulosa, ad marginem costasque longe hispida. Flores solitarii axillares vel terminales. Calyces campanulati, 1 cm. longi, basi 2-bracteati, (bracteis subulatis 6 mm. longis), 5-fidi, lobis lanceolatis longe flavido-ferrugineo-strigosis. Legumen inflatum oblique oblongum 13 mm. longum, 5 mm. latum, glabrum.

HAB. Taichū, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1208).

Very near *C. ferruginea*; but differs in having smaller, narrower and more strigose leaves and much smaller pod.

Crotalaria similis HEMSL. in Ann. Bot. IX. p. 152; MATSUM. et HAYATA Enum. Pl. Formos. p. 103.

HAB. Kōshūn : Garanbi, leg. T. KAWAKAMI et G. NAKAHARA, Dec. 1906, (No. 850).

OBSERV. A very small herb, procumbent at the base, the erect portion nearly 8 cm. long; leaves secund turning to one side, villous above, silky below, ovate or even round, 8 mm. long, 4-5 mm. broad, very approximate, leafy along the whole length of the stem. Flowers terminal solitary or a very few, sepals lanceolate, pod black nearly globular, 1 cm. long.

Indigofera LINN.

Indigofera glandulifera HAYATA sp. nov. Suffrutices graciles glabri, vel pubescentes, ramosi. Folia trifoliolata, petiolata, petiolis 5 mm. longis, foliolis subsessilibus vel breve petiolulatis, oblongo-ovovatis vel oblanceolatis apice rotundatis vel breve mucronatis basi angustatis, 1 cm. longis 4 mm. latis utraque pagine adpresse pubescentibus, subtus glanduloso-punctatis. Flores parvi 3 mm. longi, ad axillas fasciculati. Calyces pubescentes 2½ mm. longi, 5-fidi, lobis linearibus 2 mm. longis. Petala extus pubescentia. Vexillum obovatum 3 mm. longum, 1½ mm. latum basi angustum; alæ angustatæ, 3 mm. longæ; carina leviter incurva apice rotundata, 3 mm. longa, latere superiore ciliolata. Ovarium cylindraceum 1½ mm. longum. Legumen lineare leviter complanatum, tetragonum in sectione, tetra-pterum, 12 mm. longum, 1½ mm. latum.

HAB. Akō : leg. G. NAKAHARA, Sept. 1905, (No. 538); Taitō : Hinan, leg. T. KAWAKAMI et Z. KOBAYASHI.

Near *I. trifoliata*; but differs in having 4-winged pod and gland-dotted leaves which are more conspicuously dotted on the lower surface.

Indigofera Kotcensis HAYATA sp. nov. Suffrutex, ramis fulvo-cinerascentibus lenticellis dispersis, ramulis rectis subtetragonis vel subteretibus, pauce pubescentibus, vel sub-glabratis, remote foliatis. Folia imparipinnata, ambitu oblongo-lineararia, 18 cm. longa, 8 cm. lata, tenuiter pubescentia, foliolis lateralibus æquilongis utraque latere 5-6, oppositis, foliolo terminali conformibus, oblongis $5\frac{1}{2}$ cm. longis, 2 cm. latis, apice obtusis ad summum breve aristatis, basi obtusis, integerrimis tenuiter chartaceis, vel membranaceis, venis supra tenuiter elevatis, subtus inconspicuis, supra depressopubescentibus, petiolulis 3 mm. longis, petiolis 2 cm. longis, cum rhachis supra canaliculatis, glandulosis, foliolo terminali quam lateralibus majore. Racemi terminales vel axillares 8 cm. longi, dense florati, (pedunculis 1 cm. longis), bracteis ad pulvinos pedicellorum minute ciliato-dentes reductis, ad pedicellis 3 mm. longis. Flores 9 mm. longi, pubescentes. Calyx late campanulatus, valde obliquus, latere superiore $1\frac{1}{2}$ mm. longus, latere inferiore 3 mm. longus, 6-dentatus. Vexillum rotundatum apice rotundatum 11 mm. longum $7\frac{1}{2}$ mm. latum basi late truncato-obtusum. Alæ angustatæ 9 mm. longæ, 2 mm. latæ basi dorso carinatae. Carina late cultriformis, 9 mm. longa, $3\frac{1}{2}$ mm. lata, apice obtusa, basi late truncata. Ovarium glabrum.

HAB. Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA, 1906, Mart. (No. 1063).

Near *Indigofera atropurpurea* ROXB.; but differs from it by slightly curved pod and very short bracts reduced to ciliate teeth. The bracts of *I. atropurpurea* are very long, and exceed flower-buds in length.

Indigofera trifoliata LINN.; HOOK. f. Fl. Brit. Ind. II p. 96; HANCE in Journ. Bot. (1879), p. 105; WIGHT Ic. Pl. Ind. Or. t. 314; FORBES et HEMSL. Ind. Fl. Sin. I. p. 137.

DISTRIB. Through Tropical Asia to North Australia.

HAB. Kōshūn : Garanbi, leg. T. KAWAKAMI et G. NAKAHARA, (No. 864); Kōtōshō, leg. G. NAKAHARA, Mart. 1906, (No. 1059).

Indigofera venulosa CHAMP. ; WALP. Ann. IV. p. 487 ; BENTH. Fl. Hongk. p. 77 ; FORBES et HEMSL. Ind. Fl. Sin. I p. 158.

HAB. Byōritsu : Daitōsei, leg. T. KAWAKAMI et U. MORI, Juli. 1906, (No. 1116); Horisha : Tochikōan, leg. G. NAKAHARA, Aug. 1905, (No. 327).

DISTRIB. China : Kiangsu, Kiangsi, Chekiang, Hongkong; Corean Archipelago.

OBSERV. A small shrub, leaves imparipinnate, 3-4-juged; pinnae remotely opposite, stipellate, ovate, apiculate, 2 cm. long, 1 cm. broad, dark above, whitish below; flowers red, 1 cm. long, racemose; pod linear 5 cm. long, 4 mm. broad, black, nearly straight or slightly incurved.

Smithia AIT.

Smithia Nagasawai HAYATA sp. nov. Suffrutescens, ascendens, ramis rectis gracilibus remote ramulosis, glabris tenuiter striatis, fusco-rubrescentibus, teretibus, ramulis gracillimis remote foliatis. Folia alterna caducissima pari-pinnata, late ovata in ambitu, $1\frac{1}{2}$ cm. longa, apice setis 3 mm. longis terminata, pinnis suboppositis, 5-6-jugis lineari-oblongis 1 cm. longis, $2\frac{1}{4}$ mm. latis, margine remote ciliato-setulosis, apice rotundato-setulosis, (setulis $\frac{2}{3}$ mm. longis), basi valde obliquis, latere superiore acutis, latere inferiore rotundato-cordatis, supra glabris subtus ad costas remote setulosis, (setulis $1\frac{1}{2}$ mm. longis), petiolulis brevissimis $\frac{1}{4}$ mm. longis, pinis superioribus quam inferioribus minoribus, pinnis a se 2 mm. remotis, exstipellatis; petiolis 2-3 mm. longis, cum rhachibus

supra anguste alatis, infra longe setosis, setis 2 mm. longis, stipulis membranaceis acuto-ovatis 5 mm. longis, multinerviis margine ciliato-serrulatis, basi latere interiore longe auriculatis, (auriculis angustatis, 2 mm. longis), apice truncatis. Racemi breves 3-5 mm. longi, recurvi, prope apicem ramulorum axillares, pedunculati, pedunculis 1-2 cm. longis, pedicellis $1\frac{1}{2}$ mm. longis basi 1-bracteatis, (bracteis hyalinis ovato-angustatis 3 mm. longis margine ciliato-setosis obliquis), apice 2-bracteolatis, bracteolis (ovato-acutis, 5 mm. longis, utrinque acutis, margine setosis (setis $1\frac{1}{2}$ mm. longis), extus setulosis, intus glabris). Calyx 2-partitus, segmento superiore late ovato, plicato, 6 mm. longo, 7-8 mm. lato, apice rotundato-emarginato, medio carinato, margine a medio sursum ciliato-setuloso, deorsum integro, multinervio, extus ad carinam setuloso; segmento inferiore obovato, 6 mm. longo, $3\frac{1}{2}$ mm. lato, ciliato-setoso, prope basin integro. Petala non visa. Legumina intra calycem inclusa, 2-plo spiraliter recurva, ad suturam superiorem inter articulos constricta, articulis 7-8 demum secedentibus, oblique late globosis, $1\frac{1}{2}$ mm. latis, minute irregulariter maculato-punctatis, ad suturam inferiorem carinatis, suturis superioribus convexo-rotundatis, suturis inferioribus rectis leviter incurvis. Semina reniformia, latere compressa $1\frac{1}{2}$ mm. lata, $1\frac{1}{4}$ mm. longa.

HAB. Kodenshō, leg. S. NAGASAWA, Oct. 1905, (No. 743).

The present plant bears some resemblance to *Smithia ciliata* ROYLE, from which it is distinguishable by the truncated or rather round apex of the bracts. The bracts of *S. ciliata* are rather acute at the apex.

Desmodium DESV.

Desmodium formosanum HAYATA sp. nov. Rami subrecti,

albicantes, fusco-tomentosi, remote foliati. Folia trifoliolata, ambitu late ovata, cum petiolis 10 cm. longa, 7 cm. lata, foliolo terminali oblongo vel oblongo-obovato, $6\frac{1}{2}$ cm. longo, $3\frac{1}{2}$ cm. lato, apice rotundato, ad summum aristato, (aristis 4 mm. longis) basi obtuso, leviter cuneato, integro, supra adpresso-piloso, subtus brevissime villosus, ad costam et venas fusco-tomentoso, costis et venis primariis supra leviter subtus prominente elevatis, venis primariis utrinque latere 12, leviter curvatis ad marginem attingentibus, venulis inter venas oblique transversis, petiolulo brevissimo 2 mm. longo, rhachis 1 cm. longo, foliolis lateralibus terminali conformibus minoribus, oblongo-ellipticis basi leviter obliquis latere inferiore rotundato-obtusis, latere superiore acutis, 4 cm. longis, 2 cm. latis, petiolulis 2 mm. longis, stipellis lanceolato-subulatis, 4 mm. longis, petiolis $1\frac{1}{2}$ cm. longis, villosus-tomentosis, stipulis subulatis, leviter recurvis basi subito dilatatis, 1 cm. longis, 3 mm. latis, extus villosus-tomentosis intus glabris. Flores paniculato-racemosi, paniculis 2 cm. longis, 15 cm. latis, fusco-tomentosis, pedicellis 3 mm. longis tomentosis, bracteis caducissimis. Calyx 5-lobatus, patens, $5\frac{1}{2}$ mm. longus, lobis æqualibus $4\frac{1}{2}$ mm. longis, 2 mm. latis, caudato-ovatis, apice cuspidato-acuminatis extus patente-tomentosis, intus glabris. Petala 5, circ. æquilonga; vexillum late rotundatum $7\frac{1}{2}$ mm. longum, $6\frac{1}{2}$ mm. latum, apice emarginatum, basi late rotundatum, subito acutum; alæ oblongæ, basi obtusæ latere superiore auriculatæ: carina navicularis apice rotundata, basi angustata latere superiore leviter auriculata; tubus staminalis ruber; stylus reflexus.

HAB. Banchoryō: Juchori, leg. G. NAKAHARA, Oct. 1905, (No. 586).

Near *Desmodium concinnum* DC.; differs from it in having smaller bracts which are rounded at the base, and also in smaller stipules.

Desmodium podocarpum DC., HOOK. f. Fl. Brit. Ind. II. p. 169;
FORBES et HEMSL. Ind. Fl. Sin. I. p. 174.

HAB. Shintiku: Taihei, leg. T. KAWAKAMI, Sept. 1907, (No. 6046).

DISTRIB. North India, Mandshuria, Japan and China.

Desmodium reniforme DC.; HOOK. f. Fl. Brit. Ind. II. p. 173.

HAB. Banchoryō, leg. G. NAKAHARA, Oct. 1905, (No. 602).

DISTRIB. India and Java.

OBSERV. Very slender, scandent herb; leaves broadly reniformed, $1\frac{1}{2}$ cm. long, $2\frac{1}{2}$ cm. broad, glaucous beneath, membranaceous, stipules subulate, scaly, 5 mm. long; flowers on very long and slender racemes, very loosely arranged, very small, nearly 3 mm. long, shortly pedicelled.

Alysicarpus NECK.

Alysicarpus bupleurifolius DC.; BENTH. Fl. Hongk. p. 81; HOOK. f. Fl. Brit. Ind. II. p. 158; FORBES et HEMSL. Ind. Fl. Sin. I. p. 178.

HAB. Akō: Kotanshō, leg. G. NAKAHARA, Sept. 1905, (No. 539).

DISTRIB. Hongkong; Tropical Asia, Mascarene islands, and Polynesia.

OBSERV. A shrubby herb, 40-50 cm. long, decumbent, many-branched; leaves alternate, linear, 5 cm. long, 2-3 mm. broad, shortly petioled, stipules sheath-like, lanceolate, scaly. Calyx 6-7 mm. long, deeply lobed, lobes lanceolate, scaly; pods long, $1\frac{1}{2}$ cm.-2 cm. long, 5-jointed, cut into each joint when ripened.

Lespedeza MICH.

Lespedeza macrocarpa BUNGE; FRANCHET Pl. David. p. 94,
FORBES et HEMSL. Ind. Fl. Sin. I. p. 182.

HAB. Toroku : Tōhozan, leg. T. KAWAKAMI, (No. 1289).

DISTRIB. China : Peking, Hupeh.

OBSERV. Frutex glaber, ramosus. Folia pinnatim trifoliolata, pinnis oblongo-obovatis, apice rotundato-retusis brevissime mucronatis in exsiccato supra fuscis subtus pallido-glaucis reticulato-venosis, terminali $3\frac{1}{2}$ cm. longa, $1\frac{1}{2}$ cm. lata, petiolulo 1 cm. longo, lateralibus terminali conformibus sed minoribus, $2\frac{1}{2}$ cm. longis, petiolulis 2 mm. longis, petiolis 2 cm. longis, stipulis subulatis, scariosis 4 mm. longis, stipellis obsoletis vel minutis. Flores racemoso-paniculati. Calyces campanulati 5 mm. longi pubescentes, 5-fidi, lobis 2-superioribus connatis, 3-inferioribus linearibus vel subulatis 3 mm. longis. Vexillum obovatum 12 mm. longum, 7 mm. latum, apice obtusum basi gradatim angustatum. Alæ lineares 12 mm. longæ, (unguibus tenuibus linearibus 3 mm. longis), supra unguem leviter auriculatæ, laminis 9 mm. longis, 4 mm. latis apice obtusis. Carina angustata incurvata rostrata unguiculata, unguibus 3 mm. longis, laminis circ. 10 mm. longis, 2 mm. latis. Ovarium cylindraceum complanatum 3 mm. longum apice angustatum ad stylum abeuns, 2-ovulatum, pubescens, stylo longo, 10 mm. longo, supra medium incrassato. Legumina complanata, membranacea, reticulato-venosa, uni-sperma.

Lespedeza pubescens HAYATA sp. nov. Suffrutex subglaber. Folia alterna trifoliolata, foliolo terminali oblongo utrinque acuto apice breve mucronato, $2\frac{1}{2}$ cm. longo, $1\frac{1}{2}$ cm. lato, lateralibus terminali conformibus sed paulo minoribus, petiolulis 2 mm. longis pubescentibus, petiolis 3 cm. longis subglabris, foliolis exsiccatis supra nigricantibus glabris, subtus pallido-glaucis adpresse pubescentibus. Paniculæ terminales floribundæ, ramis panicularum 7-8 cm. longis, floribus breve pedicellatis, pedicellis 3 mm. longis.

Calyces 4 mm. longi, adpresse pubescentes 5-lobi, (lobis oblongis 2 mm. longis, 2-superioribus connatis, 3-inferioribus distinctis), basi 2-bracteolati, bracteolis ovatis $\frac{1}{2}$ mm. longis. Vexillum 17 mm. longum, unguiculatum, ungue 2 mm. longo, $2\frac{1}{2}$ mm. lato, lamina obovata 9 mm. longa, $6\frac{1}{2}$ mm. lata, apice rotundata vel emarginata basi leviter auriculata; alæ 10 mm. longæ, carina breviores, unguiculatæ, unguibus 4 mm. longis linearibus, laminis longe obovatis 6 mm. longis apice rotundatis basi latere superiore auriculatis; carina navicularis, unguibus 4 mm. longis, laminis, 8 mm. longis $3\frac{1}{2}$ mm. latis. Legumen ignotum.

HAB. Nanto: Mushazau, ad 6000 ped. alt., leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1136); Byōritsu: Bunsuiga, leg. U. MORI, Juli. 1906, (No. 1104).

Somewhat near *L. Oldhami* MIQ., but distinguished by the shape of flowers and in many other points. Also near *L. Viatorum* CHAMP., but differs in having more obtuse lobes of the calyx.

Vicia LINN.

Vicia Cracca LINN.; FORBES et HEMSL. Ind. Fl. Sin. I. p. 184.

HAB. Taitō: Suibi, leg. T. KAWAKAMI et G. NAKAHARA, Jan. 1906, (No. 776).

DISTRIB. Europe, N. Africa, Asia, and N. America.

OBSERV. Scandens, viridis, glabra, striata. Folia sessilia alterna, 12 cm. longa, 5 cm. lata, pinnata 7-9-juga, apice cirrhata cirrhis 3-fidis, pinnis lanceolato-linearibus $2\frac{1}{2}$ cm. longis, 5 mm. latis utrinque rotundatis apice breve aristatis, petiolulis pubescentibus, rhachis glabris, pinnis infimis reflexis, stipulis lanceolatis pubescentibus 6 mm. longis. Flores spicati, spicis axillaribus, 10 cm. longis a medio sursum floriferis. Flores 13 mm. longi,

pedicellis 2 mm. longis. Calyces tubuliformes basi obliqui, supra gibbosi 5-dentati, tubis 3 mm. longis, totiusque latis, dentibus 2-superioribus brevissimis latissimis, 2-lateralibus cuspidatis $1\frac{1}{2}$ mm. longis, dente infimo lineari 2 mm. longo. Vexillum ovatum 13 mm. longum, 6 mm. latum, basi non unguiculatum apice emarginatum; alæ 14 mm. longæ unguiculatæ, unguibus 6 mm. longis linearibus, laminis angustis, 9 mm. longis, $2\frac{1}{2}$ mm. latis, apice rotundatis basi latere superiore auriculatis; carina alis multo brevior navicularis unguiculata, 6 mm. longa, laminis 4 mm. longis, 2 mm. latis apice truncatis basi latere superiore breve auriculatis. Ovarium longe stipitatum, (stipitibus 3 mm. longis), 6-spermum.

Vigna SAV.

Vigna reflexo-pilosa HAYATA sp. nov. Rami striati, teretes, reflexo-hispidi, pilis fulvis reflexis. Folia trifoliolata, longe petiolata, late triangularia in ambitu, foliolo terminali rhomboideo-ovato, $8\frac{1}{2}$ cm. longo, 5 cm. lato, apice abrupte acuto, basi rotundato-acuto, margine repandato-integro vel integro, costis et venis utrinque leviter elevatis, subtus pallidioribus, utrinque hispidulo, basi trinervio, petiolulo 3 mm. longo, stipellis lanceolatis coriaceis reflexis, 2-4 mm. longis, rhachis 2 cm. longis, foliolis lateralibus terminali conformibus paulo majoribus, oblique ovatis, latere inferiore latioribus, basi truncato-rotundatis, petiolis 7 cm. longis reflexo-pilosis, stipulis oblongis cum auriculis 1 cm. longis, 3 mm. latis, multinerviis acutis, margine pagineque ciliato-pilosis, basi peltato-auriculatis, (auriculis 3 mm. longis, ad extremitatem rotundatis). Racemi axillares 3 cm. longi, longe pedunculati, pedunculis 13 cm. longis, reflexo-pilosis, pedicellis 1 cm. longis, bracteis stipula

conformibus, apice pedicellorum 2-bracteolati, bracteolis lanceolatis $4\frac{1}{2}$ mm. longis, acuminatis, medio carinatis extus brevissime pubescentibus, intus glabris. Calyx late campanulatus 3 mm. longus, breve 2-lobatus, margine denticulato-ciliolatus, lobo superiore latissimo emarginato, lobo inferiore 3-lobulato, lobulis triangularibus acutis. Legumina linearia, scabriuscula.

HAB. Kagi: Kishiri, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (1767).

Near *Vigna Catiang*; differs from it by much more hairy leaves and stem. There is, at Kew, a specimen unnamed which is exactly the same as the present plant.

Vigna sinensis HASSK; WALP. Ann. IV. p. 562; FORBES et HEMSL. Ind. Fl. Sin. I. p. 193.

HAB. Nikusui, leg. T. KAWAKAMI. Juli. 1907, (No. 4244).

DISTRIB. Commonly cultivated in the tropics; perhaps a native in some parts of China, (after HEMSL.).

Vigna stipulata HAYATA sp. nov. Scandens, gracillima, strigosa, pilis reflexis 2 mm. longis, ramis spicarum pilosissime tomentosis, pilis strigosis. Folia alterna trifoliolata hispidula, foliolo terminali rhomboideo trilobato, trinervio, 4 cm. longo, $3\frac{1}{2}$ cm. lato, lateralibus terminali conformibus, petiolulis 5 mm. longis stipellatis, stipellis linearibus 7 mm. longis, stipulata, stipulis auriformibus peltatis medio-fixis radiati-nerviis 1 cm. longis 4 mm. latis, apice acutis basi rotundatis. Flores spicati, spicis terminalibus. Legumen lineare $4\frac{1}{2}$ cm. longum, 5 mm. latum, circ. 13-spermum, nigricans, valvis tortuosis, pilis brevibus strigosis. Semina tetragona, angulata 3 mm. longa.

HAB. Dakusui, leg. G. NAKAHARA, Aug. 1905, (No. 323).

Remarkable for its peltate stipule; leaflets are sometimes entire, sometimes lobed.

Pachyrrhizus RICH.

Pachyrrhizus angulatus RICH.; HOOK. f. Fl. Brit. Ind. II. p. 207; HOOK. et ARN. Bot. Beech. Voy. p. 184; FORBES et HEMSL. Ind. Fl. Sin. I. p. 194.

HAB. Akō: Tōkō, leg. G. NAKAHARA, Sept. 1905, (No. 522).

DISTRIB. South China; Tropics.

OBSERV. Scandent; leaves trifoliolate, terminal leaflet broadly ovate, twice as broad as long, angulate, abruptly and shortly acute, obtuse at the very end, 10 cm. long, 18 cm. broad, trinerved, stipellate, pale beneath, nearly glabrous, lateral leaflets nearly as the same as the terminal one, but very oblique; flowers on terminal raceme; flowers 2 cm. long; calyx silky-pubescent.

Derris LOUR.

Derris elliptica BENTH. in Journ. Linn. Soc. IV. Suppl. p. 111; HOOK. f. Fl. Brit. Ind. II. p. 243.

HAB. Jinkakurin, leg. T. KAWAKAMI et Y. SHIMADA, Aprili. 1908, (No. 3769).

DISTRIB. India, Siam, Malay Archipelago.

Derris oblonga BENTH. in Journ. Linn. Soc. IV. Suppl. p. 112; FORBES et HEMSL. Ind. Fl. Sin. I. p. 199.

HAB. Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA, 1906, Mart. (No. 1058).

DISTRIB. South China.

Sophora LINN.

Sophora tomentosa LINN.; FORBES et HEMSL. Ind. Fl. Sin. I. p. 203.

HAB. Kōtōshō, leg. G. NAKAHARA, Mart. 1906.

DISTRIB. Very widely dispersed on the sea-shores of the tropics.

OBSERV. Shrubby, profusely branched, velvety pubescent all over the plant; leaves pinnate, 7-8 juged, imparipinnate, 15 cm. long, leaflets oblong, round at both ends, 3 cm. long, 2 cm. broad, silky pubescent on both surfaces, at length glabrous on the upper surface, pale yellow in a dry specimen; racemes terminal; flowers $1\frac{1}{2}$ cm. long; calyx campanulate, silky pubescent, nearly truncate or shortly dentate.

Gleditschia LINN.

Gleditschia formosana HAYATA sp. nov. Ramuli graciles, glaucorubrescentes spinosi. Folia alterna pari-pinnata, in ambitu angustata, $5\frac{1}{2}$ cm. longa, 2 cm. lata, 8-juga, pinnis superioribus majoribus oblique rhomboidalibus vel rhomboideo-oblongis, 13 mm. longis, 6 mm. latis, apice truncatis minute mucronatis basi cuneato-acutis, obliquis latere superiore latioribus margine crenulatis, prope basin latere superiore integris, caetrum crenulatis, oppositis, sessilibus vel brevissime petiolulatis, petiolulis brevissime pilosis, rachibus pilosiusculis, supra sulcatis, pinnis inferioribus superiore conformibus sed paulo minoribus, petiolis brevibus 3 mm. longis. Spinæ ramosæ, supra-axillares, 2 cm. longæ, fulvo-rubrescentes. Legumina complanata, lineari-angustata, 21 cm. longa, $2\frac{1}{2}$ cm. lata, fulvo-rubrescentia apice acuta, stylis persistentibus coronata, basi

obtusa, glabra, leviter tortuosa. Semina complanata, 1 cm. longa, 8 mm. lata, glabra, lævia nitidula.

HAB. Tenkachiraisha, leg. C. OWATARI; S. KUSANO, (Fructus!).

The leaves are very much smaller than those of *G. japonica*, and are as small as those of *G. heterophylla* BUNGE. This differs from the latter species by straight, but not curved; pods. There is some doubt about this being a species of *Gleditschia*.

Cassia LINN.

Cassia alata LINN.; HOOK. f. Fl. Brit. Ind. II. p. 264.

HAB. Akō: Sekisan, leg. G. NAKAHARA, Oct. 1905, (No. 615).

The only specimen we have is of a single leaf, which is nearly 50 cm. long, abruptly pinnate, pinnæ being quadrangularly elliptical, with parallel sides, round, minutely mucronate apex, truncate base, 12 cm. long, 5 cm. broad, the superior the larger, base oblique, primary veins nearly 80° to the costa, membranaceous. In the imperfectness of the specimen, the determination is rather conjectural.

Acacia WILLD.

Acacia Intsia WILLD.; HOOK. f. Fl. Brit. Ind. II. p. 297.

HAB. Akō: Bongarisha, leg. G. NAKAHARA, Sept. 1905, (No. 505); Shintiku: Mt. Goshizan, ad 3000 ped. alt., leg. T. KAWAKAMI, Aug. 1906, (No. 1204).

DISTRIB. Tropical Himalayas, India, Ceylon, Philippines.

Very near *A. pinnata* WILLD. As the specimens are all sterile, the determination is rather conjectural.

Albizzia DURAZZ.

Albizzia procera BENTH.; HOOK. f. Fl. Brit. Ind. II. p. 299.

HAB. Biyōritsu : Taiko, leg. T. KAWAKAMI et U. MORI, Juli. 1906, (Nos. 1103 et 7150).

DISTRIB. India, Malay Archipelago, Philippines.

A common *Albizia* in Formosa. The habit is just like the Japanese *A. Juribrissin*. I myself have seen the plant in Formosa, growing in the hilly regions.

Rosaceæ.

Prunus LINN.

Prunus pogonostyla MAXIM. in Mél. Biol. XI. p. 682; FORBES et HEMSL. Ind. Fl. Sin. I. p. 221.

Prunus formosana MATSUM. in Tōkyō Bot. Mag. XV. p. 86; MATSUM. et HAYATA Enum. Pl. Formos p. 118, t. XI.

DISTRIB. Fokien.

I have compared the present plant with the co-type of *Prunus pogonostyla* MAXIM. at Kew, and found that they are quite identical.

Prunus punctata HOOK. f. Fl. Brit. Ind. II. p. 317; FORBES et HEMSL. Ind. Fl. Sin. I. p. 221.

Prunus exerocarpa HEMSL. in Ann. Bot. IX. p. 152.

HAB. Tikushiko, leg. S. NAGASAWA, Mai. 1907, (No. 655).

DISTRIB. Eastern India, China : Kwangtung, Hongkong.

Prunus taiwaniana HAYATA sp. nov. Rami virgati cortice cinereo-fusco glabro vestiti, lenticellati. Folia hysternantha membranacea, tenuiter pubescentia, vel demum glabrata, oblongo-ovata, 6 cm. longa, 23 mm. lata, apice cuspidato-acuminata, basi cuneato-acuta, margine serrulata, supra glabrata, vel tenuiter pubescentia, subtus ad costas venasque dense ad paginam tenuiter

pubescentia, petiolis 6 mm. longis, pubescentibus, stipulis lineari-lanceolatis, minutis. Flores 5-6-fasciculati, perulati, perulis scariosis rotundatis glabris, pedicellis 1 cm. longis, pubescentibus. Calycis tubus pubescens, urceolato-tubuliformis, 4 mm. longus limbus 5-lobatus, lobis patentibus angustatis, 3 mm. longis acuminatis margine glanduloso-serrulatis. Petala 5, oblonga, 8 mm. longa, 4 mm. lata, apice biloba, lobis $1\frac{1}{2}$ mm. longis obtusis basi acutis. Ovarium ovatum, 1 mm. longum glabrum, stylo $7\frac{1}{2}$ mm. longo, deorsum pauce barbellato sursum glabro, stigmate capitellato. Fructus piciformes 6 mm. longi, 5 mm. lati, apiculati, basi cupulis calycis suffulti, longe pedunculati, pedunculis 2 cm. longis.

HAB. Nantō : Musha, leg. G. NAKAHARA, Feb. 1907.

Somewhat like *Prunus pendula* MAXIM., but distinguishable by the smaller flowers with narrower and more deeply emarginate petals.

Spiræa LINN.

Spiræa formosana HAYATA sp. nov. Rami recti, fulvescentes, dense pubescentes. Folia oblonga vel oblongo-ovata, 4 cm. longa, $2\frac{1}{2}$ cm. lata, apice acuta, basi rotundato-acuta, margine duplicato-serrata, serrulis apice callosis, costis et venis primariis supra impressis, subtus elevatis, venis primariis utrinque latere 5, subrectis ascendentibus, ad apicem serrularum attingentibus, utrinque subglabrata subtus pallido-glaucæ, petiolis 2 mm. longis. Cymæ terminales 5 cm. longæ, 8 cm. latæ, ramis et pedicellis pubescentibus, bracteolis subulatis. Calyx late campanulatus $1\frac{1}{2}$ mm. longus, 3 mm. latus, 5-lobatus, lobis patentibus triangularibus extus pubescentibus intus glabris. Petala 5, late rotundata, apice rotundata, vel leviter emarginata, basi obtusa. Stamina 20, longe exserta 4 mm. longa ad faucem calycis inserta.

Disci glandulæ circ. 10, ad faucem calycis insertæ, late angustatæ, $\frac{1}{2}$ mm. longæ. Carpella 5, subfusiformia $2\frac{1}{2}$ mm. longa latere interiore hirsuta, apice stylis persistentibus 1 mm. longis coronata.

HAB. Randaisan, leg. T. KAWAKAMI, et U. MORI, Aug. 1908.

Near *Spiræa japonica* LINN.; but differs from it in having duplicately serrated leaves and less hairy smaller calyx; also near *Spiræa bella*, from which this differs in ovate acuminate or acute leaves.

Var. **brevistyla** HAYATA n. v. Calycis lobi circ. obsoleti, vel obtusissimi. Carpella sub maturitate ovoidea 2 mm. longa, apice brevissime rostrata, vel rostris obsoletis, glabrata, cætrum ut typicæ.

HAB. in Monte Morrison, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1801).

The present variety differs from the type in having much shorter carpels, nearly obsolete styles, and very short calyx lobes.

Spiræa morrisonicola HAYATA, sp. nov.

Spiræa sp. HAYATA Fl. Mont. Formos. p. 79.

Suffrutex nanus, glaber. Folia alterna subsessilia ovata apice obtusa basi acuta vel cuneata $1\frac{1}{2}$ cm. longa medio sursum denticulata basin versus integra, venis supra impressis subtus prominentibus. Fructus in cymas racemosas terminales dispositi. Carpella 2 mm. longa breve rostrata.

HAB. in Monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (Nos. 2233 et 2296).

The present plant is distinguished from other species of the genus by its small and glabrous form.

Rubus LINN.

Rubus conduplicatus DUTHIE in Herb. Kew.

HAB. Shintiku : Taihei, leg. T. KAWAKAMI et U. MORI, Juni. 1906, (No. 1418); Akō : Taigiorinye, leg. T. KAWAKAMI, (No. 2891); Randaisan, Mart. (No. 3526).

Compared with the type of the species at Kew.

Rubus fasciculatus DUTHIE in Herb. Kew.

HAB. Taitō : Koshiron, leg. T. KAWAKAMI et U. MORI, Aprili. 1907, (No. 2842).

Compared with the type at Kew.

Rubus Morii HAYATA sp. nov. Ramuli fusco-purpurascens, teretes, pubescentes, minute aculeolati, aculeis 1 mm. longis. Folia cordato-ovata, 6 cm. longa, $4\frac{1}{2}$ cm. lata, apice cuspidato-acuminata, (cuspidibus $1\frac{1}{2}$ cm. longis), basi rotundata, margine lobulata, lobulis serratis, serris cuspidatis, trinervia, vel pinninervia, supra scabra, minute parce lepidota, subtus pallidiora, petiolis 1 cm. longis, lævibus, stipulis oblique elongato-oblongis 12 mm. longis, 5 mm. latis, apice acutis margine laciniato-dentatis, scabro-lepidotis. Flores racemosi, racemis terminalibus 10 cm. longis, lepidotis, bracteis acuminato-ovatis, laciniatis. Calyx extus dense lepidotus, (fructifer reflexus), cupula valde reflexa, $3\frac{1}{2}$ mm. in radio, intus profunde reticulato-sulcata, lobis acuminato-triangularibus 9 mm. longis, ad basin $4\frac{1}{2}$ mm. latis, extus lepidotis, intus breve pubescentibus. Petala persistentia, obovata, denticulata, deorsum integra, 5 mm. longa, $2\frac{1}{2}$ mm. lata, basi cuneato-angustata. Stamina uniseriata, filamentis complanatis $2\frac{1}{2}$ mm. longis basi rubroglandulosi. Carpophora globosa $1\frac{1}{2}$ mm. in diametro, barbata, stipitata, stipitibus $1\frac{1}{2}$ mm. longis, barbatis. Drupeolæ a latere compressæ $1\frac{1}{2}$ mm. longæ, 1 mm. latæ, reticulato-rugulosæ.

HAB. Taitō : Chakankei, leg. T. KAWAKAMI et U. MORI, 1908, Jan. (No. 4518).

Remarkable for the cupules which are very much reflexed and deeply reticulately furrowed.

Rubus Kawakamii HAYATA sp. nov. Rami fusco-rubescentes, vel fuscentes, graciles, primum tomentis mollissimis obtecti, demum glabrati, rectiusculi, brevissime aculeatis, aculeis 1 mm. longis basi dilatatis. Folia longe petiolata, oblonga, vel oblongo-ovata, vel elliptico-ovata, 12 cm. longa, 5 cm. lata, apice acuminata, basi rotundato-ovata, margine obscure remoteque serrulata vel duplicato-serrulata, valde mutabilia, basi obscure trinervia, costis venisque supra tenuiter impressis, subtus elevatis, venis primariis lateralibus cum nervis basilaribus utrinque latere 7-8, circ. parallelis a costis angulo 30° divergentibus, supra glabra subtus tomentis mollissimis obtecta, demum glabrata, subtus ad costas remote minuteque aculeata, petiolis gracilibus $2\frac{1}{2}$ cm. longis, supra canaliculatis subtus aculeatis, stipulis caducissimis non visis. Cymæ umbellatæ paucifloratæ, floribus 5-6, longe pedicellatis, pedicellis 2 cm. longis, dense pubescentibus, basi bracteatis, bracteis ovatis 5 mm. longis. Calyces campanulati, extus dense breveque villosopubescentes minute aculeati, (aculeis $\frac{1}{4}$ mm. longis apice acutis vel dilatato-truncatis), intus brevissime villosopubescentes, cupulis 9 mm. in diametro, lobis ovatis 9 mm. longis, apice subto acuminatis, margine laciniatis a medio deorsum integris. Petala 5, obovata, utrinque brevissime villosa, lobos calycis $\frac{1}{3}$ -plo in longitudine æquantia. Carpophora dense barbata. Carpella præmatura oblonga 1 mm. longa, recurvata, stylis longiusculis 5 mm. longis basi hirsutis. Drupeolæ sub maturitate obovatæ 3 mm. longæ, $2\frac{1}{2}$ mm. latæ.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7047).

Near *R. malifolius* FOCKE; but differs from it in having more acute or even acuminate and usually trinerved leaves and cymose or even umbellate flowers. In *R. malifolius*, the leaves are pinninerved and the flowers are in racemes. The present *Rubus* is also distinguishable from *R. sepalanthus* FOCKE by tri-nerved leaves and umbellately contracted racemes. This is also near *R. Swinhœi* HANCE, which differs from this plant, in having quite glabrous leaves, and not prickly pedicels and calyx.

Rubus nantcensis HAYATA sp. nov. Rami teretes, fusco-fulvescentes, flexuosi, sursum tomentis mollissimis obteeti, demum subglabrati, aculeis minutis dispersis, remote foliati. Folia longe petiolata, 3-5-lobata, late ovata in ambitu, 8 cm. longa, 6 cm. lata, apice acuta basi truncato-cordata, vel truncato-rotundata, margine irregulariter serrulata, lobo terminali in longitudine folium $\frac{1}{2}$ -plo æquante, apice acuto, basi leviter contracto, subovato 5 cm. longo 3 cm. lato, sinibus inter lobos rotundatis, lobis lateralibus minoribus, lobis basilaribus minimis, basi 5-nervia, supra reticulato-papilloso-rugosissima, costis venis et venulis supra leviter impressis, demum subglabrata, subtus indumentis densis albo-rubescensibus obteeta, costis venis venulisque subtus prominente reticulate elevatis, petiolis $3\frac{1}{2}$ cm. longis, aculeolis minutis remote dispersis, vel lævibus, stipulis angustatis 12 mm. longis obscure denticulatis vel integris. Flores racemosi, racemis axillaribus, brevioribus, $1\frac{1}{2}$ cm. longis, molle tomentosis, pedicellis brevibus 4 mm. longis, stipulis latissimis 3 mm. longis, 4 mm. latis, margine laciniatis, extus tomentosis intus glabris, 2-bracteolatis, bracteolis 2 mm. longis digitato-laciniatis. Calyces campanulati, 5-lobati, extus dense intus tenuiter pubescentes, lobis late angustis, 5 mm. longis, 3 mm. latis, apice subito acuminatis. Carpophora semiglobosa,

barbata, carpellis cum stylo 5 mm. longis, stigmatibus capitatis.

HAB. Nantō: Bikei, leg. T. KAWAKAMI et U. MORI, (No. 3287).

Near *R. rugosus* SM. ; but differs from it by the smaller flowers and more acutely lobed leaves.

Rubus randaiensis HAYATA sp. nov. Ramuli læves, molle tomentosi, teretes, fusco-fulvescentes. Folia longe petiolata, 5-lobata, subcordata in ambitu, apice obtuso-acuta, basi cordata, 10 cm. longa, 8 cm. lata, margine lobulato-serrata, lobulis serratis, lobo terminali ovato, folium $\frac{1}{2}$ -plo æquante, 6 cm. longo, $3\frac{1}{2}$ cm. lato, sinibus inter lobos obtusis, lobis lateralibus minoribus, cum lobis basilaribus minimis mutabilissimis, rotundatis, 5-nervia, supra pubescentia rugosa, subtus dense albo-floccoso-tomentosa, venis venulis reticulato-elevatis, petiolis 4 cm. longis villosito-tomentosis, stipulis majoribus oblongo-ovatis, 18 mm. longis 5 mm. latis, basi latioribus caulem semi-amplectantibus. Racemi breves pauci-florati, axillares vel terminales, floribus bracteatis, bracteis magnis alabastrium floris involventibus, caducissimis, rotundatis, $1\frac{1}{2}$ cm. longis totiusque latis, apice brevissime pauce dentato-laciniatis, extus hirsutis, intus glabris, 2-bracteolatis, bracteolis oblique rotundato-obovatis 8 mm. longis, 6 mm. latis, apice rotundatis, pauce brevissime dentatis, pedicellis brevibus 5 mm. longis. Calyx majusculus extus villosito-tomentosus, intus brevissime pubescens, cupula concava, lobis acuminato-triangularibus apice acuminatis laciniato-serratis, serris 3 mm. longis vel subintegris, 14 mm. longis, 7 mm. latis. Petala late rotundata, apice rotundata brevissime-mucronata, basi acuta. Stamina 5 mm. longa, antheris oblongis, carpophora semiglobosa, longe-barbata, carpellis circ. 1 mm. longis, stylis 7 mm. longis, stigmatibus 2-lobatis.

HAB. Randaisan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7001).

Near *R. diffusus*, but differs from it in having more deeply lobed leaves and not prickly branches and petioles. Also near *R. hainanensis* FOCKE (in sched.) from which the present plant is easily distinguishable by elongated denticulate stipules.

Rubus retusipetalus HAYATA sp. nov. Ramuli graciles glabri, angulato-striati, spinosi, spinis longitudinaliter complanatis, basi dilatatis, recurvis, 2 mm. longis. Folia ovato-cordata, vel oblongo-ovata, 9 cm. longa, 5 cm. lata, apice acuto-acuminata, basi cordata vel truncato-cordata, margine serrata, serris cuspidatis, membranacea, obscure trinervia, vel pinnatinervia, venis lateralibus primariis 6-7, curvato-rectis, a costis angulo 40° divaricatis, supra glaba, subtus glaucissima, ad costas et venas aculeata, petiolis 3 cm. longis, supra sulcatis, infra aculeatis, stipulis lineari-filiformibus 1 cm. longis, 1 mm. latis, prope basin petiolorum insertis. Flores ad axillas foliorum superiorum, vel terminales, racemosi vel solitarii, longe pedunculati, pedunculis 3 cm. longis, bracteis lineari-filiformibus. Calyx subplanus, extus glaber, intus villosopubescens, cupula subplana 8 mm. in diametro, lobis acuminato-oblongis, cum acuminibus 1 cm. longis, acuminibus teretibus 4 mm. longis, margine tomentosis. Petala elongato-obovata, 1 cm. longa, 5 mm. lata, apice rotundato-emarginata, basi cuneato-angustata, deorsum tenuiter hirsuta. Carpellum $\frac{1}{2}$ mm. longum, glabrum, stylis 2 mm. longis basi hirsutis, stigmatibus oblique capitatis. Carpophora subplana, tomentosa.

HAB. Tōyen: Kōtōsan, leg. T. KAWAKAMI et U. MORI, Mart. 1907, (No. 2675).

Near *R. conduplicatus* DUTHIE, but differs from it in having more or less retused or emarginate petals.

Rubus shinkoensis HAYATA sp. nov. Rami teretes, subglabrati, striati spinosi, spinis brevibus 2 mm. longis, recto-curvis, rubescentibus basi dilatatis, cicatricibus spinarum oblongis, 4 mm. longis, 1 mm. latis, ramulosi, ramulis divaricatis rectis, pubescentibus, alabastris foliorum dispositis, alabastris perulatis, perulis ovatis, integris, obscure dentatis vel leviter laciniatis subglabratiss, apice molle pubescentibus 1 cm. longis vel brevioribus. Folia elongato-ovata, 7 cm. longa, 3½ cm. lata, apice acuminata, basi leviter cordata, serrulata vel duplicato-serrulata, chartaceo-membranacea, trinervia, lobo centrali majore ovato-acuminato, lobis basilaribus minoribus, apice acutis basi latere inferiore rotundato-acutis nervo centrali quam iis basilaribus 3-plo longiore, nervis basilaribus a centrali angulo 45° divergentibus, utrinque ad nervos pubescentia, cæterum glabrata, petiolis 14 mm. longis, canaliculatis pubescentibus, stipulis prope basin petiolorum insertis, lanceolato-acuminatis 4 mm. longis. Ramuli floriferi breviores, 2-3 cm. longi, floribus terminalibus, pedicellis 4 mm. longis pubescentibus. Calyx extus dense pubescens, intus glaber, lobis ovato-triangularibus 6 mm. longis, acuminatis, acuminibus obtusis. Petala ovata, 7½ mm. longa, 4 mm. lata, apice obtuso-acuta, basi breve cuneata, reticulato-nervosa. Stamina filamentis complanatis 4 mm. longis, apice contractis filiformibus. Carpophora oblonga, elevata, glabra, carpellis hirsutis, stylis filiformibus 1½ mm. longis, basi hirsutis, stigmatibus capitatis.

HAB. Shinkō : Kakurei, leg. T. KAWAKAMI et U. MORI, Mart. 1907, (No. 2652).

This plant is near *R. conduplicatus* DUTHIE; but differs from

it in having solitary flowers. Also very near *R. incisus* THUNB. from which the present *Rubus* differs in having more acuminate leaves and broader lobes of calyx.

Rubus sorbifolius MAXIM.; FOCKE in ENGL. Jahrb. XXIX. p. 391.

HAB. Formosa, HENRY, in Herb. Kew.

DISTRIB. Japan : Kiu-shiu ; Himalaya, Central China.

Rubus taitoensis HAYATA sp. nov. Rami tenuiter pubescentes, teretes, fusco-purpurascens, breve spinulosi, spinis 4 mm. longis, transverse recto-recurvis, ramulis molle pubescentibus. Folia, simplicia, coriacea, ovata in ambitu, basi leviter cordata, apice acuminata, $5\frac{1}{2}$ cm. longa, $4\frac{1}{2}$ cm. lata, 3-lobata, lobo centrali elongato-ovato, $3\frac{1}{2}$ cm. longo, 2 cm. lato, apice acuminato, basi leviter contracto, margine leviter dentato-serrulato, dentibus serrulatis, ad sinus inter lobos dentata, lobis basilaribus ovatis apice acutis, basi latere inferiore rotundato-acutis, trinervia, nervo centrali $5\frac{1}{2}$ cm. longo, nervos laterales 2-plo in longitudine superante, nervis lateralibus $2\frac{1}{2}$ cm. longis, a nervo centrali angulo 45° divergentibus, supra tenuiter pubescentia demum glabrata, subtus glauca, ad nervas et venas pubescentia venulis supra impressis subtus elevatis, petiolis 1 cm. longis, pubescentibus, stipulis ad basin petiolorum insertis, lanceolatis pubescentibus 7 mm. longis. Flores terminales solitarii, pedunculis 1 cm. longis villosopubescentibus. Calyces campanulati, 2- $2\frac{1}{2}$ cm. in diametro, utrinque villosopubescentes, aculeati aculeis minutis 1 mm. longis parce obtecti, 5-lobati, lobis triangulari-acuminatis 6-12 mm. longis, 4 mm. latis. Fructus (syncarpium) conico-globosus, 1 cm. in diametro. Drupeolæ 2 mm. longæ, cum stylis persistentibus 2 mm. longis hirsutæ.

HAB. Taitō: Shinsuikei, leg. T. KAWAKAMI et U. MORI, 1907, Aprili. (No. 3141).

The present *Rubus* is near *R. conduplicatus* and *R. incisus*, but differs from both in having prickled calyx.

Fragaria LINN.

***Fragaria vesca* LINN. var. *minor* HAYATA n. n.**

Fragaria sp. HAYATA Fl. Mont. Formos. p. 82. Folia et flores quam typica valde minores, cæterum ut typicæ. Folia trifoliolata, foliolis rhomboideis basi cuneatis dentatis, terminali 1 cm. longo 8 mm. lato. Flores 7 mm. in diametro. Petala orbicularia apice rotundata, basi abrupte contracta, 3½ mm. in diametro.

HAB. Randaizan, leg. U. MORI et B. HAYATA, Aug. 1908; Ganzan, in montibus Morrison, ad 9141 ped. alt., leg. S. NAGASAWA, Oct. 1906, (No. 739).

Differs from the type by the rounded petals which are strongly contracted at the base.

Rosa LINN.

***Rosa morrisonensis* HAYATA sp. nov.**

Rosa sp. HAYATA Fl. Mont. Formos. p. 85.

Suffrutices spinosissimi, aculeis albidis rectis subulatis, ramis patentibus gracilibus. Folia pinnata 7-11-foliolata, glabra, ambitu elliptica, cum petiolis 5 cm. longa, 2½ cm. late, petiolis gracilibus minutissime aculeolatis, foliolis subsessilibus late obovatis vel subrotundatis 13 cm. longis 7 mm. latis medio denticulatis apicem versus dentatis, dentibus acutis, stipulis petiolo adnatis apice liberis acutis glabris glanduloso-serrulatis, serrulis argutis. Flores secus ramulos quasiracemosi, e gemmis solitarii breviter pedun-

culati, pedunculis $1\frac{1}{2}$ cm. longis apice ad calycis tubum abeuntibus. Calycis tubi post anthesin pyriformes 8 mm. longi apice constricti basi attenuati, lobis integris lanceolatis longe acuminatis intus lanato-pubescentibus extus parce pubescentibus marginibus parcissime glandulosis. Petala ignota. Carpella 4-5, trigona 5 mm. longe apice hirsuta, stylis persistentibus.

HAB. in monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. MORI (No. 2293), ibidem, leg. S. NAGASAWA, Nov. 1905, (Nos. 572 et 618).

The present *Rosa* is near *R. Willmottiae* HEMSL. and *R. Webbiana* WALL.; but differs from both in having larger lobes of calyx and more acutely serrated leaves. Also near *R. xanthina* LINDL.; but quite separable by the narrower sepals and more acutely serrated leaves.

Pyrus LINN.

***Pyrus aucuparia* var. *randaiensis* HAYATA** v. n. Ramuli validiusculi, cinereo-vel fusco-purpureo-rubescentes, cicatricibus anuliformibus foliorum transverse notati, et lenticellis globosis minitis dispersis. Folia pinnata, angustato-elliptica in ambitu, 13 cm. longa, 4 cm. lata, pinnis lateralibus 8-9-jugis, inferioribus et superioribus brevioribus, mediocribus longioribus, pinnis sessilibus, infimis oblongis, 2 cm. longis 12 mm. latis, mediocribus oblongo-angustatis, $4\frac{1}{2}$ cm. longis, 12 mm. latis, apice acuminatis basi oblique rotundatis, latere superiore obtusis, latere inferiore longioribus rotundato-cordatis, costis supra impressis, subtus elevatis venis lateralibus supra impressis subtus elevatis, ad costas et venas subtus hirsutis, utrinque glabris subtus pallidis margine arguto-serrulatis, serrulis ascendentibus, acuminatis 1-2 mm. longis,

pinna terminali oblongo-obovata, 3 cm. longa, 13 mm. lata, interjugis 1 cm. longis, brevissime stipellatis, stipellis subulatis, rhachis alatis supra glabris sulcatis, subtus ferrugineo-hirsutis, petiolis 4 cm. longis, supra glabris alatis, sulcatis, basi dilatatis, stipulis linearibus 9 mm. longis basi ad petiolum connatis, crassiusculis. Alabastrum foliorum acuto-ovatum, perulis late ovatis, apice rotundato-apiculatis, glabris. Cymæ terminales 8 cm. longæ, 9 cm. latæ, pedunculis et pedicellis subglabratis, vel pauce hirsutis, rubescentibus, lenticellis elongatis obtectis, pedicellis 8 mm. longis. Fructus globoso-pyriformes, 5 mm. in diametro, generalliter 4 rarius 3- vel 5-loculares apice calycis lobis persistentibus coronati, lobis triangularibus obtusis.

HAB. Randaizan, leg. U. MORI et B. HAYATA, 1908, Aug. (No. 7027).

There is nothing like this at Kew. It is easily distinguishable by the minutely and very shapely toothed leaves.

Pyrus aucuparia var. **trilocularis** HAYATA n. v. Fructus subglobosi circ. 1 cm. in diametro, 3-loculares, loculis 1-2-spermis, vel reductu 1-spermis. Semina oblongo-compressa, 3½ mm. longa, rubra. Cætrum ut typica.

HAB. Seizan, leg. S. NAGASAWA, Nov. 1905, (No. 576).

Very like the type, but differs in having 3-celled fruit.

Pyrus Kawakamii HAYATA sp. nov. Ramuli fusco-purpurascentes, glabri, longitudinaliter rugulosi, secus apicem cicatricibus annularibus foliorum transversim notati. Alabastrum foliorum cylindricum, 12 mm. longum, perulis imbricatis, triangularibus, obtuso-acutis, margine ciliatis. Folia ad apicem ramulorum approximativim 3-4-sub-fasciculata, longe petiolata, coriacea, patentia,

late oblonga, vel ovato-oblonga, 7 cm. longa, 5 cm. lata, apice breve cuspidato-acuta, vel acuta, basi acuta vel obtusa, margine crenulato-serrulata, serrulis obtusis, utrinque glabra, venis tenuiter elevatis, subtus pallidiora, petiolis 3 cm. longis. Fructus racemosi, racemis brevibus 1 cm. longis, pedicellati, pedicellis longiusculis 2 cm. longis. Drupæ globosæ 9 mm. in diametro, exsiccato rubescentes, parce punctatæ, (punctis subalbicantibus minutis globosis), 2-3-spermæ. Semina quadrantiformia dorso convexa, 4 mm. longa, 2 mm. lata utrinque obtusa, fusco-rubro-purpurascencia.

HAB. Nantō, leg. T. KAWAKAMI, Nov. 1906, (No. 4705).

Very like *P. sinensis* from which this is distinguishable by the leaves which are acute on the both ends. Also near *P. Pratii* HEMSL. and *P. baccata*; but differs from both in having much smaller fruit and oblong leaves, acute at the both ends.

Pyrus formosana KAWAKAMI et KOIZUMI sp. nov. Ramuli validiusculi longitudinaliter rugosi, fusco-purpurascetes, vel cinerascetes, cicatricibus foliorum transversim notati. Alabastrum foliorum ovatum 5 mm. longum, perulis triangulo-acutis, glabris. Folia ad apicem ramulorum 2-3-sub-fasciculata, patentia, membranaceo-coriacea, elongato-oblonga, vel ovato-oblonga, 9-10 cm. longa, 4 cm. lata, apice acuta vel acuminata, basi acuta, vel rotundato-acuta, margine irregulariter serrulata, serrulis obtusis, utraque glabra, subtus pallidiora, venulis transversim utraque tenuiter elevatis, venis primariis utraque latere 9-10, supra inconspicuis, subtus elevatis, costis supra sulcatis, subtus prominentibus, petiolis 3 cm. longis, supra sulcatis, glabris. Fructus maliformes, depresso-globosi 3 cm. longi $3\frac{1}{2}$ cm. lati, sub maturitate flavescetes.

HAB. Rinkiho, leg. N. KONISHI, 1904, Feb. (No. 7).

This differs from *P. Malus* in the serration and the shape of the leaves.

Cotoneaster MEDIK.

Cotoneaster formosana HAYATA sp. nov. Ramuli erecti rubro-fuscentes cinereo-pubescentes demum glabrati interdum spinosi. Folia 3-5 ad apicem ramulorum brevissimorum aggregata, breve petiolata oblongo-obovata, 23 mm. longa, 12 mm. lata, apice truncata emarginata, basi truncata, integerrima cano-pubescentia, supra demum glabrata, subtus pallidiora, pubescentia, petiolis 4 mm. longis. Flores albi ?, 7 mm. in diametro corymbosi, (corymbis bracteatis), ad axillas foliorum superiorum, vel terminales. Calyces $4\frac{1}{2}$ mm. in diametro, lobis 5, triangularibus pilosiusculis, tubis intus pilosissimis. Petala 5, orbicularia 3-4 mm. longa, totiusque lata, apice emarginata, basi leviter contracta. Stamina ∞ . Carpella 5, pilosissima, stylis glabris.

HAB. Taitō : Tabari, leg. G. NAKAHARA, Juni. 1906, (No. 741).

Cotoneaster Koizumii HAYATA sp. nov. Rami cortice cinerascete longitudinaliter rugoso obtecti, ramulis divaricatis apice spinosis, dense pubescentibus, pilis mollissimis, cum ramulis brevissimis foliosis alternatim suffultis. Folia ad apicem ramulorum brevissimorum alternatim 2-3-fasciculata, (ramulis foliosis brevissimis $\frac{1}{2}$ mm. longis) obovata, vel spathulato-obovata, 18 mm. longa, 11 mm. lata, apice rotundato-emarginata, brevissime apiculata, basi cuneato-obtusa, integerrima, coriacea supra subnitida, subtus pallidiora, exsiccato utraque rubescentia, petiolis 3 mm. longis. Cymæ ad apicem ramulorum brevissimorum lateralium terminales, sessiles, $2\frac{1}{2}$ cm. longæ, 3 cm. latæ, glabratae. Drupæ

adpresso-globosæ, 4 mm. longæ, 5 mm. latæ. Calyces fructiferi suburceolato-globosi, lobis persistentibus late triangularibus, pyrenes subincludentes. Pyrenes 5, apice nudæ, rotundato-quadrantiformes $2\frac{1}{2}$ mm. longæ, $1\frac{3}{4}$ mm. latæ, apice stylis persistentibus apiculatæ, fusco-rubrescentes.

HAB. Pinan, Oct. 1896, (A. 26).

The present plant is very distinct from any other species of the genus, in having obovate or even spathulate leaves which are emarginate at the apex. From *C. formosana*, this differs in the inflorescence on the shortened branchlets standing nearly alternately on a lateral branch.

Cotoneaster taitcensis HAYATA sp. nov. Frutex. Rami valde cinereo-fuscentes, cortice subnitido longitudinaliter rugoso obtecti, ramulis divaricatis breve pauceque pubescentibus spinosis, spinis simplicibus 1 cm. longis. Folia ad ramulos brevissimos laterales approximativim alternativimque disposita, vel ad apicem ramulorum brevissimorum 3-4-fasciculata, obovato-spathulata, vel spathulata, $3\frac{1}{2}$ cm. longa 1 cm. lata, apice truncato-emarginata, brevissime apiculata, margine integerrima, tenuiter pubescentia, demum glabrata, basi cuneato-angustata; coriacea, supra subnitida, subtus pallidiora, exsiccato rubescentia, petiolis 3 mm. longis. Fructus paniculati, paniculis ad apicem ramulorum brevissimorum terminalibus. Drupæ globosæ $\frac{1}{2}$ cm. in diametro 5-pyrenæ; pyrenibus quadrantiformibus osseis, $3\frac{1}{2}$ mm. longis, apiculatis.

HAB. Taitō, leg. K. MIYAKE, 1899, Dec.

This species is very like *C. formosana*, but differs from it in the inflorescence.

Photinia LINDL.***Photinia niitakayamensis* HAYATA sp. nov.**

Photinia Notoniana WIGHT et ARN. var. *eugenifolia* KOIZUMI, (non. HOOK.) in Tōkyō Bot. Mag. XXIII. p. 170.

Photinia integrifolia MATSUM. in Tōkyō Bot. Mag. XII. p. 55 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 130, (non. LINDL.)

Rami fusco-cinerascentes, lenticellis globosis minutis notati, longitudinaliter rugulosi, ramulis tenuiter tomentosus vel pubescentibus foliosis. Folia oblongo-oblancheolata, vel oblancheolata, chartacea, $7\frac{1}{2}$ cm. longa, $2\frac{1}{2}$ cm. lata, apice acuto-acuminata, breve aristata, vel callosa-aristata basi obtusa vel acuta, integra supra ad costas et venas tenuiter hirsuta, demum glabrata, costis supra planis vel tenuiter impressis, subtus prominentibus, venis lateralibus utrinque tenuissimis, petiolis $2\frac{1}{2}$ cm. longis teretibus tenuiter hirsutis, basi abrupte dilatatis, stipulæformibus. Flores cymosi, cymis terminalibus 5 cm. longis totiusque latis, hirsutis. Fructus globosi 8 mm. longi, 5-loculares, carpellis hirsutis leviter exsertis, calycis lobis triangularibus 1 mm. longis, totiusque latis hirsutis persistentibus.

HAB. Ganzan, leg. S. NAGASAWA, 1905, Oct. (No. 551).

The present plant was identified with *P. integrifolia* LINDL. by Prof. J. MATSUMURA in Tōkyō Bot. Mag. XII. p. 55, and was corroborated by myself in Enum. Pl. Form. p. 130. It was finally identified with *P. Notoniana* WIGHT et ARN. var. *eugenifolia* HOOK. by Mr. G. KOIZUMI in Tōkyō Bot. Mag. XXIII. p. 170. While studying here at Kew, I have examined the types of the species and variety and found that they are not at all in accord with the present plant. They differ from our plant in many points, but especially in having much larger and thicker

or even coriaceous leaves. The present plant is distinct from any other species of the genus at Kew, and I think this may be a species not yet described.

Photinia serrulata LINDL. in Bot. Mag. t. 2105; FORBES et HEMSL. Ind. Fl. Sin. I. p. 263.

HAB. Taitō: Daishinzan, ad 6000 ped. alt., leg. T. KAWAKAMI et U. MORI, Jan. 1908, (No. 4517).

DISTRIB. Chekiang, Fokien, Hupeh.

So far as external comparison is concerned, the present plant is quite referable to this species. Although my plant has no flowers but only young fruit, it is in general appearance exactly identical with the LINDLEY'S species.

Photinia taiwanensis HAYATA sp. nov.

Photinia variabilis HEMSL. (pro parte) in FORBES et HEMSL. Ind. Fl. Sin. I. p. 263; MATSUM. et HAYATA Enum. Pl. Formos. p. 130.

Photinia arguta var. *membranacea* KOIZUMI in Herb. Tōkyō.

Rami cinereo-fuscentes, vel fusco-purpurascetes, longitudinaliter rugulosi, lenticellis minutis obtecti, ramulis gracilibus foliosis albo-tomentosis. Folia obovato-oblonga, vel oblanceolata, 8 cm. longa, 3 cm. lata, apice cuspidato-acuminata, basi acuta, sursum minute serrulata, serrulis minutis, deorsum remote serrulata prope basin integra, chartacea, utraque pagine indumentis mollissimis primum obtecta, demum subglabrata, costis et venis tenuissimis, petiolis 7 mm. longis. Flores breve umbellati, cymosi, cymis brevibus terminalibus 2 cm. longis totiusque latis, pedicellis 1 cm. longis bracteis subulatis 2 mm. longis. Calyx campanulatus glaber, 2½ mm. longus, lobis patentibus, triangularibus vel late rotundatis,

mucronatis, 1 mm. longis, $1\frac{1}{2}$ mm. latis. Petala 5, rotundata, $3\frac{1}{2}$ mm. longa totiusque lata, apice rotundato-truncata, prope basin subito cuspidato-obtusa, vel acuta, margine apice sub-emarginata vel non emarginata. Stamina circ. 15, filamentis basi leviter dilatata. Ovarium sub-inferius apice albo-tomentosum, 2-loculare, stylis 2, toto longitudine connatis, vel apice leviter distinctis, basi hirsutis, stigmatibus oblique capitatis. Fructus elliptico-pyriformes, 6 mm. longi, $4\frac{1}{2}$ mm. lati, longe pedunculati, pedunculis 4 mm. longis.

HAB. Taihoku, leg. T. MAKINO, Nov. 1896.

The present plant is included in *P. variabilis* by W. B. HEMSLEY in Ind. Fl. Sin. I. p. 263. While studying here at Kew, I have examined all specimens included under the same name by this authority, and found that the Formosan specimens are very distinct from any of the other forms of the species collected in continental China. I think, therefore, the present plant should be regarded as a species distinct from *P. variabilis*. It is near *P. arguta*, but differs in having more minutely toothed leaves.

Prinsepia ROYLE.

Prinsepia utilis ROYLE; Hook. f. Fl. Brit. Ind. II. p. 323.

HAB. Ganzan, ad 9141 ped. alt., leg. S. NAGASAWA, Oct. 1905, (No. 562); in monte Morrison, ad 8000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2025); in Montibus Centralibus, leg. T. KAWAKAMI et U. MORI, ad 12000 ped. alt., Nov. 1906, (No. 1855).

DISTRIB. Temperate Himalayas.

OBSERV. Rami virides glabri spinosi, spinis alternis $1\frac{1}{2}$ cm. longis axillaribus solitariis. Folia viridia, alterna, petiolata, oblongo-lanceolata $4\frac{1}{2}$ cm. longa, $1\frac{1}{2}$ cm. lata, subintegra vel obscure sub-

crenulata apice acuta breve aristata, basi breve attenuata, petiolis 7 mm. longis. Flores breve racemosi vel 3-5-fasciculati; racemis axillaribus 2-3 cm. longis, paucifloratis, pedicellis 1 cm.-2 cm. longis. Flores $1\frac{1}{2}$ cm. in diametro. Sepala 5, valde inæqualia 2-exteriora minora rotundata 2 mm. longa crassiuscula, 3-interiora majora rotundata 4 mm. longa, margine scariosa. Petala 5, ovato-rotundata, 6 mm. longa, 5 mm. lata, apice rotundata, basi breve obtusa. Stamina ∞ ad marginem discorum inserta, filamentis 2 mm. longis, antheris 2-ocularibus, connectivis latioribus apice emarginatis. Ovarium globosum 1 mm. longum, stylo 2-3 mm. longo laterali spiraliter recurvo vel ascendente, stigmatibus capitellato-peltato. Fructus ignotus.

Very interesting genus closely allied to Celastrineæ.

Saxifrageæ.

Astilbe HAM.

Astilbe longicarpa HAYATA n. n.

A. chinensis var. *longicarpa* HAYATA Fl. Mont. Formos. p. 86.

As the present plant is very remarkable for its flowers which are all turned on the same direction on a spikelet, it should be raised up to a specific rank, distinct from *A. chinensis*. There is nothing like this at Kew.

Astilbe macroflora HAYATA Fl. Mont. Formos. p. 86.

The present plant is near *A. rubra* Hk. et T., but differs from it in having smaller carpels and much broader petals.

Schizophragma SIEB. et ZUCC.

Schizophragma hydrangeoides S. et Z. var. ***Fauriei*** HAYATA n. n.

Schizophragma Fauriei HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 131.

I have examined the type of *S. integrifolia* FRANCHET in the Herbarium at the Jardin des plantes at Paris, and found that my plant is quite distinct from FRANCHET'S species. The latter species may be another variety of *S. hydrangeoides* S. et Z.

Cardiandra SIEB. et ZUCC.

Cardiandra formosana HAYATA in Tōkyō Bot. Mag. XX. p. 54 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 132.

Cardiandra sinensis HAYATA Fl. Mont. Formos. p. 92, (non HEMSL.).

The present plant is described by myself in Tōkyō Bot. Mag. XX. p. 54, and afterwards is reduced to a synonym of *C. sinensis*, in Fl. Mont. Formos. p. 92. Having examined the type of *C. sinensis* HEMSL. at Kew, I have, however, found that my plant does not quite agree with HEMSLEY'S species. *C. formosana* differs from *C. sinensis* mainly in having narrower leaves with shallower dentation, and much larger petaloid sepals. The Formosan plant should, therefore, be regarded as a species distinct from the continental plant.

Hydrangea LINN.

Hydrangea angustipetala HAYATA sp. nov. Frutex, scandens?, ramis deorsum subglabris fusco-rubrescentibus, sursum cinereo-tomentosis. Folia opposita longe oblonga vel late lanceolata, 12 cm. longa, 3½ cm. lata, serrata, serris ascenduntibus, supra hispidula, subtus villosa-tomentosa, pallidiora, petiolis 1 cm. longis. Cymæ terminales 7 cm. longæ totiusque latæ, ramis tomentellis. Flores marginales steriles, longe pedicellati, pedicellis 1½ cm. longis, sepalis 4, petala-

loideis, inæqualibus, exterioribus longioribus, obovatis 14 mm. longis, 6 mm. latis, utrinque acutis margine obscure dentatis, interioribus minoribus, 5 mm. longis, 3 mm. latis. Flores fertiles : sepalis 5, lanceolatis, 2 mm. longis tomentellis utrinque acutis ; petalis 5, sepalo longioribus, longe obovatis apice obtusis. Stamina 10, circ. 3 mm. longa, antheris late orbicularibus, utrinque retusis. Ovarium subsuperius vel semisuperius, stylis 2-3, $1\frac{1}{2}$ mm. longis.

HAB. Giran : Chūrei, leg. T. KAWAKAMI et U. MORI, Juni. 1906, (No. 1383).

Remarkable for nearly superior ovary and very narrowed sepals of the fertile flowers. Somewhat near *Hydrangea Davidi* FRANCH.; but differs from it by the more densely hairy leaves, peduncles, and hairy longer sepals ; also near *H. Hemsleyana* DIELS, from which this is distinguishable by the much elongated leaves.

Deutzia THUNB.

Deutzia kelungensis HAYATA sp. nov. Rami graciles, cinerascens, teretes, ut videtur scandentes, ramulis gracilibus angularibus tenuiter stellato-pubescentibus. Folia opposita, ovato-oblonga, vel ovato-lanceolata, 8 cm. longa, 3 cm. lata, apice acuminata, acuminibus acutis vel obtusis, basi obtusa rotundata, vel acuta, margine serrulata, serrulis brevissimis breve apiculatis, supra scabra, stellato-pubescentia, costis et venis tenuissimis, subtus pallidissima, pilis stellatis densiuscule vel parce oblecta, costis et venis lateralibus prominentibus, petiolis 6 mm. longis, supra sulcatis, inter petiolos transverse striatis. Paniculæ ad apicem ramulorum terminales vel axillares, 6 cm. longæ, pauci-floratæ, pedicellis 2 mm. longis, bracteis minutis subulatis. Calyx campanulatus extus plus minus stellato-pubescentis, 3 mm. longus,

lobis patentibus triangularibus, obtusis, vel acutis $1\frac{1}{2}$ mm. longis, 2 mm. latis, caducissimis. Petala 5-6, duplicato-valvata erecta vel erecto-patentia, oblonga $8\frac{1}{2}$ mm. longa, 4 mm. lata, apice subacuta, basi late truncata margine plicata, plus minus pubescentia, vel subglabrata. Stamina 10-12, altera longiora, altera breviora, staminibus longioribus 7 mm. longis, filamentis dilatatis 6 mm. longis 1 mm. latis, apice obtuse ob-sagittato-attenuatis. Discus annularis integer, stylis 4 distinctis, apice leviter 2-lobatis stigmatosis. Capsulæ subglobosæ $3\frac{1}{2}$ mm. longæ, 4-lobatæ, septicide in coccos 4 dehiscentes. Semina numerosa, fusiformia, late leviter compressa, utrinque alis productis $\frac{1}{2}$ mm. longis longitudinaliter striatis.

HAB. Kelung: Zuihō, leg. T. KAWAKAMI, Mart. 1907, (No. 4235).

Near *D. gracilis* and *D. parviflora*; but differs from the former in having much broader hairy calyx-lobes, and more scabrous leaves, and from the latter in having nearly erect duplicately valvate petals, and a few flowered panicles, or even racemes. The petals of *D. parviflora* appear to be deeply imbricate, but those of the present plant are apparently valvate.

Deutzia taiwanensis HAYATA sp. emend.

Deutzia crenata S. et Z. *δ. Taiwanensis* MAXIM. Hydrang. Asia. Orient. p. 23.

Deutzia scabra HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 92, (pro parte).

Frutex, ramis rubescentibus, albo-punctatis. Folia opposita, ovata vel oblonga 10 cm. longa 5 cm. lata, subintegra remote obscureque mucronato-crenata, supra pallido-viridia minute punctato-lepidota, subtus albo-lepidota pallidissima, venis primariis 6-7, prope marginem conniventibus, utrinque scaberrima apice

cuspidato-acuta vel -obtusa, ad summum obtusa, basi rotundata. Paniculae terminales 15 cm. longae 6 cm. latae, pyramidales, vel racemosae, axillares. Calyces punctati late campanulati obscure 5-sulcati, 4 mm. longi, 7 mm. in diametro, 5-lobati, lobis late triangularibus 2 mm. longis 3 mm. latis, breve acutis. Petala 5, valvata, angustata 12 mm. longa, 5 mm. lata, apice acuta, margine lamellata. Stamina 10, 2-seriata, exterioribus longioribus $12\frac{1}{2}$ mm. longis, filamentis 11 mm. longis angustatis circ. 1 mm. latis apice 2-dentatis, supra dentem abrupte contractis. Antherae orbiculares utrinque retusae. Styli 5, 11 mm. longi, apice capitellati.

HAB. Akō : Tanashū, leg. G. NAKAHARA, Jan. 1907 ; Taitō : Bokusekikaku, leg. K. MIYAKE, Dec. 1899 ; Kachinpo, Mart. 1898 ; Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA, Feb. 1906, (No. 988) ; Giran : Hachirisha, leg. T. KAWAKAMI et U. MORI, Juni. 1906, (No. 1376) ; Taitō : Suibi, leg. T. KAWAKAMI et G. NAKAHARA, Jan. 1906 (No. 670).

The present plant is very near *D. scabra* THUNB. and *D. pulchra* VIDAL; but it differs from the former in having dentate stamens and in the number of styles which are usually five; and from the latter, in having quite obtuse leaves. In VIDAL's plant, the leaves are usually more acuminate, and very acute at the apex. *Deutzia crenata* S. et Z. *δ. Taiwanensis* MAXIM. cited above may possibly be identical with this plant, though I have found some different points between the description of MAXIMOWICZ and that of the present one; for the *Deutzia* credited in Formosa by MAXIMOWICZ, so far as is considered from the locality given by him, may not be otherwise than this plant as it is the only one to be found in the lowland of Formosa. MAXIMOWICZ's plant is not near *D. crenata* S. et Z., nor is it referable to a variety of that species; but it must be a quite different one, so far as the diagnosis is concerned.

As far as I can judge from the description of the variety *δ*, *Taiwanensis*, it is so very different from *D. crenata* S. et Z., that it is quite proper to raise it up to specific rank. The fruit of the present plant is very similar to those of HENRY'S specimen at Kew.

Crassulaceæ.

Kalanchoë ADANS.

Kalanchoë gracilis HANCE in Journ. Bot. (1870) p. 6; FORBES et HEMSL. Ind. Fl. Sin. I. p. 280; MATSUM. et HAYATA Enum. Pl. Formos. p. 134.

HAB. Takao, leg. G. NAKAHARA, Sept. 1905, (No. 577).

DISTRIB. An endemic plant.

OBSERV. A very slender herb, nearly 20 cm. high, erect; radical leaves triparted, terminal segment trilobed $2\frac{1}{2}$ cm. long, 1 cm. broad, trilobulate, lobules lanceolate, obtuse at the apex, lateral segments, linear-lanceolate as long as the terminal one, divaricate nearly in right angle from the terminal one; petioles 5 mm. long; cauline leaves a very few, opposite, linear, simple or triparted, cymes terminal, rachis ternate very few-flowered, flowers yellow $2\frac{1}{2}$ cm. long, $1\frac{1}{2}$ cm. in diameter; sepals lanceolate 5 mm. long; petals $2\frac{1}{2}$ cm. long, acute at the apex.

Halorageæ.

Callitriche LINN.

Callitriche stagnalis SCOP.; C. B. CLARKE in Hook. f. Fl. Brit. Ind. II. p. 435.

HAB. Tamsui, leg. T. KAWAKAMI et Y. SHIMADA, 1908, Mart.

DISTRIB. Europe, North Asia, India, Tropical Africa, Malaya, Australia and New Zealand.

Myrtaceæ.

Eugenia LINN.

Eugenia acutisepala HAYATA sp. nov. Rami graciles corticibus cinereo-pubescentibus gradatim solutis, ramulis foliatis, tetragonis, subalatis. Folia opposita elongato-oblonga, $4\frac{1}{2}$ cm. longa, $1\frac{1}{2}$ cm. lata, vel majora, apice obtusa basi cuneato-angustata, ad petiolum 8 mm. longum abeuntia, integra, chartaceo-coriacea, exsiccato rubescentia, supra nitida, subtus pallidiora, costis supra impressis subtus prominentibus, margine leviter revoluta integra, venis lateralibus tenuissimis rectis prope marginem attingentibus, a venulo marginali connectis, petiolis 8 mm. longis supra sulcatis. Flores cymosi, cymis ad apicem ramulorum terminalibus, vel axillaribus, 3 cm. longis ternatim ramosis, pedicellis 3 mm. longis, bracteis subulatis, bracteolis 2, oppositis, angustatis 1 mm. longis basi calycis instructis. Calyx elongato-obconicus, 4 mm. longus 3 mm. latus, basi cum pedicellis articulatus, punctatus, basi attenuatus, lobis 4, minutis triangularibus, acutis $\frac{3}{4}$ mm. longis, 1 mm. latis. Petala 4 rotundata 2 mm. longa, in calyptram plus minus connata, caduca. Stamina 20-25, filamentis teretibus 3 mm. longis, antheris cordatis $\frac{1}{4}$ mm. longis. Styli simplices, 4 mm. longi, apice truncati, stigmatosi. Ovarium 2-loculare.

HAB. Formosa.

This differs from *E. sinensis* HEMSL. in having acute calyxlobes, and in many other points.

Eugenia formosana HAYATA sp. nov. Rami graciles, glabri, cinerascetes, ramulis oppositis. Folia opposita petiolata, oblonga vel obovata 6 cm. longa, 27 mm. lata, apice abrupte acuminata vel acuta ad summum obtusa, basi gradatim attenuata, coriacea, glabra, supra nitida, subtus pallidiora, petiolis 12 mm. longis. Flores cymoso-paniculati, paniculis terminalibus vel axillaribus 5 cm. longis 3 cm. latis, ramis furcatim vel ternatim ramosis, bracteis bracteolisque minutis, floribus breve pedicellatis. Calycis tubus 1 mm. longus, limbus campanulatus $1\frac{1}{2}$ mm. longus, 3 mm. in diametro truncatus, lobis obsoletis. Petala valde imbricata orbicularia 2 mm. in diametro, in calyptram plus minus connata, decidua. Stamina ∞ , multi-seriata, longiora 5 mm. longa, filamentis liberis patentibus. Ovarium tubo calycis connatum, stylo $3\frac{1}{2}$ mm. longo.

HAB. Kōshūn: Kurarusha, leg. T. KAWAKAMI, Juli. 1906, (No. 1649).

Near *Eugenia cymosa* LAM.; but differs from it by the obovate, but not caudate, leaves. The leaves of *E. cymosa* are generally oblong.

Eugenia kashotcensis HAYATA sp. nov. Rami congesti, cortice rubro-cinereo vestiti. Folia opposita breve petiolata, oblonga vel oblanceolata, $3\frac{1}{2}$ cm. longa, $2\frac{1}{2}$ cm. lata, apice rotundata basi acuta vel attenuata, coriacea, petiolis 2-3 mm. longis. Cymæ terminales 4 cm. longæ totiusque latæ, ramis brevibus oppositis congestis, approximatis, pedicellis 3 mm. longis. Calycis tubus 3 mm. longus limbus campanulatus, truncatus, (lobis obsoletis), 3 mm. longus $4\frac{1}{2}$ mm. in diametro. Petala 4, conniventia, in calyptram plus minus connata, decidua, inæqualia, orbicularia, minoribus 2 mm. longis, majoribus 3 mm. longis. Stamina ∞ , multi-seriata libera, filamentis filiformibus inæqualibus, longioribus 7 mm. longis,

erecto-patentibus. Ovarium tubo calycis connatum, stylo 3 mm. longo.

HAB. Kwashōtō, leg. T. KAWAKAMI et G. NAKAHARA, Feb. 1906, (No. 1047).

Near *E. congesta* MERRILL, but differs from it in having terminal cymes and pedicelled flowers.

Melastomaceæ.

Astronia BLUME.

Astronia pulchra VIDAL, Revis. Pl. Vasc. Filip. p. 136; DC. Monogr. Phanerog. VII. p. 1097.

HAB. Hōzan; Kōtōshi, leg. K. MIYAKE, Nov. 1899; Kashōtō, leg. T. KAWAKAMI et G. NAKAHARA, Feb. 1906, (No. 1043); Kōshūn, leg. N. KONISHI, Juli. 1903.

DISTRIB. The Philippines.

Tashirœa MATSUM.

Tashirœa okinawænsis MATSUM. in ITŌ et MATSUM. Tent. Fl. Lutch. p. 480.

HAB. Shintiku: Kareizan, leg. T. KAWAKAMI et U. MORI, Jun. 1906, (No. 1434).

DISTRIB. The Loo-choo islands.

Bredia BLUME.

Bredia scandens (ITŌ et MATSUM.) HAYATA n. n.

Bredia hirsuta var. *scandens* ITŌ et MATSUM. Tent. Fl. Lutch. p. 487; MATSUM. et HAYATA Enum. Pl. Formos. p. 148.

The present plant is first mentioned by Dr. T. Itō, jointly with Prof. J. MATSUMURA, in their Tent. Fl. Lutch. p. 487 and afterwards is corroborated by myself in Enum. Pl. Formos. p. 148. After having examining the type of *B. hirsuta* BLUME. at Kew I have found that the type is far different from the present plant, and I am very much inclined to regard it as a species distinct from BLUME's. Our plant has, as mentioned by Prof. J. MATSUMURA, "smaller stamens, shortly spurred posteriorly, a little auricled anteriorly, and anthers 1-porose, 2-auricled on the anterior side, connective not at all or very shortly produced, tuberculate on the posterior side."

Osbeckia LINN.

***Osbeckia scaberrima* HAYATA sp. nov.**

Osbeckia aspera HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 146; HAYATA Fl. Mont. Formos. p. 97, (non BLUME).

Rami strigosi, cinerascetes recti, teretes, graciles, pilis strigosis, adpresse obtecti, ad apicem ramulorum strigoso-barbati. Folia opposita, elongato-oblonga, vel lanceolato-ovata, 4 cm. longa, 13 mm. lata, apice obtuso-acuta, basi rotundata, vel acuta, integerrima, 5-nervia, supra ad nervos glaberrima, cæterum adpresso-strigosa, pilis ad areolas inter nervos regulariter obtecta, ad areolas marginales pilis validioribus longioribus 1 mm. longis obtecta, margine adpresso-ciliata, subtus pallidissima, ad paginam parce tenuiter strigosa, ad nervos validiuscule strigosa, petiolis 4 mm. longis, strigosis. Flores cymosi, cymis 3-5-floratis, 2 cm. longis. Calycis tubus subglobosus 6 mm. longus, extus strigosus, lobis ovato-triangularibus acuminatis, 5 mm. longis, 2½ mm. latis, medio strigosis, cæterum glabris, margine strigoso-ciliatis, intus glabris,

inter lobos longe aristatus, aristis validissimis basi tumidis. Petala rotundata, margine ciliolata. Stamina circ. 15, fauce calycis inserta, 6 mm. longa, filamentibus crassiusculis complanatis $3\frac{1}{2}$ mm. longis, antheris linearibus $2\frac{1}{4}$ mm. longis, $\frac{1}{2}$ mm. latis, apice 1-porosis, connectivis basi productis cum filamentis articulatis. Ovarium semi-inferius. 5-loculare, apice hirsutum, stylo simplici 6 mm. longo, apice truncato, stigmatoso.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, Nov. 1905, (No. 1923).

Near *O. aspera* BLUME, but differs from it in having nearly spherical shorter capsules and much more scabrous leaves.

Barthea HOOK. f.

Barthea formosana HAYATA in Fl. Mont. Formos. p. 97.

This is very near *B. chinensis* BENTH. of Hongkong. I have examined the type of the Hongkong plant in the Herbarium of the island and have also compared my plant with the same species at Kew, and found that my plant is distinct from its congener, *B. chinensis*. The leaves of the Formosan plant is much thinner or even membranaceous while those of the Hongkong one are much thicker or even coriaceous.

Lythrarieæ.

Lagerstrœmia Fauriei KÆHNE in ENGL. Bot. Jahrb. XLI. p. 102.

HAB. Loo-choo.

Lagerstrœmia unguiculosa KÆHNE in ENGL. Bot. Jahrb. XLI. p. 103.

HAB. Formosa : Biyōritsu (FAURIE).

Cucurbitaceæ.

Trichosanthes LINN.

Trichosanthes cucumeroides MAXIM. ; MATSUM. et HAYATA Enum. Pl. Formos. p. 157.

HAB. Kimpōri, leg. G. NAKAHARA, Juli. 1905.

DISTRIB. Japan.

OBSERV. Scandens, caulibus striatis pubescentibus, pilis strigosis patentibus, internodiis 7 cm. longis, cirrhis simplicibus. Folia alterna petiolata, oblongo-cordata, 9 cm. longa, 6 cm. lata, apice acuta vel acuminata, basi profunde cordata, margine remote obscureque serrata, serris mucronatis, 5-nervia, nervis lateralibus reflexis, venis secundariis ad apicem serrarum attingentibus, supra hispidula scabra, subtus villosa-pubescentia, ad nervos hispidula, petiolis 2 cm. longis. Fl. ♂ : racemosi, racemis axillaribus 10 cm. longis, bracteis minutis ; flores tubiformes 8 cm. longi. Calyces longe tubuliformes apice campanulati, tubis 7 cm. longis 5-dentatis, dentibus minutis lanceolatis 3 mm. longis, corollæ 5-partitæ, 1 cm. longæ.

Trichosanthes laceribractea HAYATA sp. nov. Scandens subglabra striata sulcata, internodiis 12 cm. longa, cirrhis oppositifoliis 2-fidis. Folia alterna petiolata, late cordata, 15 cm. longa totiusque lata, apice acuta, basi profunde lateque cordata tenuiter 3-5-lobata, (lobo terminali triangulari, 6 cm. longo, totiusque lato), margine obscure remoteque mucronato-serrata, 5-nervia, nervis 3 centralibus erectis, 2 basilaribus reflexis, nervis omnibus ad apicem loborum attingentibus, pagine supra in exsiccato nigricantia albo-punctata scaberrima, subtus breve hispidula, petiolis 4 cm. longis. Racemi axillares secus apicem florigeri, floribus bracteatis, bracteis magnis

alabastrum amplectantibus, late ovatis acutis, margine laceratis vel fimbriatis multinerviis 3 cm. longis totiusque latis. Flores ♂ breve pedicellati; calyces tubuliformes apice campanulati, tubis 3 cm. longi, apice 1 cm. in diametro, limbis 5-lobatis, lobis laceratis 13 mm. longis, 5 mm. latis. Corollæ non satis notæ.

HAB. Taitō : Hinan, leg. T. KAWAKAMI et Z. KOBAYASHI, Juli. 1906, (No. 1589).

Near *T. Lepiniana* COGN.; but distinguishable by the bifid tendrils; from *T. bracteata* COGN. by the bifid tendrils and much lacerate bracts. Very like, or perhaps quite identical with, a Chinese specimen at Kew which is named *Trichosanthes palmata* ROXB. The type of the same species is quite different from the Chinese specimen and also from the present plant. The bracts of the type are usually entire or but a little fimbriate in the upper ones, while those of my plant are very deeply fimbriate.

Trichosanthes quinquangulata GRAY; COGN. Cucurbit. in DC. Monogr. Phanerog. III. p. 378; MERRILL, in Philip. Journ. Sci. III. Suppl. pp. 84 et 439.

HAB. Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA, Mart. 1906 (No. 1065).

DISTRIB. Mangsi island; the Philippines.

OBSERV. A strong trailing herb, nearly glabrous, internodes 12 cm. long, tendrils 4-divided at the apex; leaves broadly cordate 10 cm. long as broad, cordate at the base, acute at the apex, margin 5-angled, acuminate at the tips of the angles, obscurely very minutely and remotely serrate, or nearly entire; racemes of male flowers, 20 cm. long, bearing flowers nearly at the apex of the axis, bracts conspicuous, very large nearly entire, 3 cm. long, embracing the flower-buds.

Thladiantha BUNGE.

Thladiantha punctata HAYATA sp. nov. Scandens, caulibus glabris striatis, internodiis 8 cm. longis. Folia alterna petiolata, oblongo-cordata, vel ovata, 12 cm. longa, $7\frac{1}{2}$ cm. lata, basi cordato-reniformia, infra basin $2\frac{1}{2}$ cm. longa, sinibus ovatis acutis, margine remote mucronato-serrata, supra albo-punctata, scaberrima, subtus ad costas hispidula cæterum glabra, trinervia, nervis lateralibus nervo terminali angulo 90° divaricatis subito reflexis, venas secundarias 4-5 emittentibus, nervo terminali recto venis secundariis utrinque latere 3-4, prope marginem anastomosantibus, venulis reticulatis, cirrhis solitariis oppositifoliis simplicibus, petiolis 4 cm. longis. Flores diœcii; fl. ♂: solitarii oppositifolii, longe pedunculati, pedunculis 4 cm. longis; calyces campanulati 5-dentati, tubis 3 mm. longis, 8 mm. in diametro, dentibus lanceolatis 5 mm. longis, 1 mm. latis; corollæ 5-partitæ, segmentis late lanceolatis 17 mm. longis 5 mm. latis; stamina 5, 4 mm. longa; rudimentum ovarii convexum. Bractea 0.

HAB. Shintiku: Goshizan, leg. T. KAWAKAMI, Dec. 1905, (No. 1303).

Thladiantha taiwaniana HAYATA sp. nov. Scandens, caulibus striatis, subglabris, internodiis 7 cm. longis, cirrhis oppositifoliis simplicibus. Folia alterna, petiolata, oblongo-cordata in circumscriptione, 10 cm. longa, 8 cm. lata, apice acuta basi profunde cordata, irregulariter dentata vel obscure tenuiterque trilobata, lobo terminali oblongo 6 cm. longo, $3\frac{1}{2}$ cm. lato, obscure remoteque mucronato-repandato, lobis lateralibus irregulariter dentatis, dentibus apice rotundatis et mucronatis, supra breve strigoso-punctata ad costas hispidas scaberrima, subtus ad nervos hispidula, cæterum

subglabra, trinervia, nervo centrali recto cum venis secundariis utrinque 5, nervis lateralibus nervo centrali angulo 60° divaricatis, subito reflexis venis secundariis utrinque 6, ad apicem dentium attingentibus, petiolis 3 cm. longis. Racemi ♂ axillares solitarii, 6-7 cm. longi, ad apicem florigeri, bracteis late obovatis alabastrum amplectantibus 7 mm. longis 5 mm. latis, pubescentibus. Calycis tubus concavus 4 mm. latus, pubescens, lobis 5, triangulari-ovatis 4 mm. longis $2\frac{1}{2}$ mm. latis acuminatis. Petala 5, oblonga apice obtusa, basi truncata nervosa. Stamina 5, filamentis liberis.

HAB. Kishitō, leg. G. NAKAHARA, Aug. 1905, (No. 340).

Very near *T. calcarata* C. DC.; but differs from it in having broad lobes of the calyx. *T. calcarata* has usually linear narrower lobes.

Luffa LINN.

Luffa cylindrica RÆM.; COGNIAUX in DC. Monogr. Phanerog. III. p. 456; FORBES et HEMSL. Ind. Fl. Sin. I. p. 315.

HAB. Kego, Hōsan, leg. G. NAKAHARA, 1906, Feb. (No. 836).

DISTRIB. Cultivated throughout the tropics.

Melothria LINN.

Melothria formosana HAYATA sp. nov. Glabra scandens, striata, cirrhis simplicibus apice papilliferis. Folia alterna, petiolata sagittato-cordata, vel triangulari-cordata, $2\frac{1}{2}$ cm. longa totiusque lata, basi sagittato-cordata apice acuta ad summum obtusa, margine irregulariter dentata, dentibus obtusis mucronatis, vel lobulata, supra scaberrimo-punctata, subtus ad nervum hispidula, 5-nervia, chartaceo-membranacea, ad marginem crassiuscula, petiolis scabriusculis 1 cm. longis. Racemi 2-3 florati, axillares, pedicellis 3 cm. longis.

Flores dioecii? fl. ♀: 11 mm. longi; calyces campanulati, 3 mm. in diametro, breviter 5-dentati, dentibus 1 mm. longis. Corollæ 5-partitæ, segmentis ovatis obtuis 3 mm. longis $2\frac{1}{2}$ mm. latis patentibus flavis. Ovarium oblongum 4 mm. longum, 3 mm. in diametro. apice rostratum, rostro $1\frac{1}{2}$ mm. longo, stylo 3 mm. longo, disco annulari inserto, stigmatibus 3, capitatis, 2-lobis. Fl. ♂ ignoit, Bacca globosa 1 cm. in diametro polysperma capillariter stipitata, stipite 2-3 cm. longo. Semina ovata complanata albescentia 4 mm. longa, glabra.

HAB. Banchoryō; Rokkirisha, leg. G. NAKAHARA, Oct. 1905, (No. 592).

Alsomitra RÆM.

Alsomitra integrifoliola HAYATA n. n.

Alsomitra clavigera HENRY List of Pl. Formos. p. 46; MATSUM. et HAYATA Enum. Pl. Formos. p. 164, (non HOOK. f.)

Gynostemma integrifoliola COGNIAUX in DC. Monogr. Phanerog. III. p. 916.

The present plant is mentioned in HENRY's List of Plants from Formosa p. 46, as *Alsomitra clavigera* HOOK. f. and is also referred to the same species by myself in Enum. Pl. Formos. p. 164, as the description of HOOKER's plant is, in greater part, in accord with my plant. Mr. E. D. MERRILL of the Bureau of Science, P. I., when we were together looking over the Formosan collections in the Herbarium at Tōkyō, told me that he thought the plant to be identical with *Gynostemma integrifoliola* COGN. To what species the present plant should be definitely referred was a very difficult question for me, until I saw the types of HOOKER's and COGNIAUX's species and HENRY's specimen, all preserved here in the Kew Herbarium. A comparison of my plant with the specimens above

mentioned shows me clearly that it is exactly the same as the specimen in HENRY'S collection, (which lacks flowers), but quite different from HOOKER'S plant. I have also found that my flowering specimen accords very well with *Gynostemma integrifoliola* COGN., the specimen of which lacks fruit. In the original description of COGNIAUX, there is mentioned "fructus fuscus glaber vel leviter puberulus, 7-8 mill., crassus." The description must, I infer, have drawn up from a præmature fruit, as there is given no account about seeds. The fruit of this species are, as is seen in my specimen, as long as 4 cm. and has numerous winged seeds. The *Gynostemma* of COGNIAUX, as far as my collections with flowers and fruit are concerned, does not accord with the general characters of *Gynostemma*, but quite agrees with those of *Alsomitra*. My plant and also COGNIAUX'S plant, therefore, should be referred to the latter genus. Accordingly, the new combination, *A. integrifoliola* HAYATA is much to be desired for the present plant. It comes very near to *A. clavigera* Hook. f., but differs from it in having much smaller pod which is only half the size of those of the latter plant, and also in having much smaller seeds with thin wings, which are bluntly and obscurely indented on the margin. The seeds of HOOKER'S plant are much larger and have acutely, clearly and grossly indented wings.

Begoniaceæ.

Begonia LINN.

Begonia aptera HAYATA sp. nov. Caulis validiusculus 40-50 cm. altus, ramosus, glaber, ramis divaricatis. Folia longe petiolata oblique oblonga 14 cm. longa, 6 cm. lata, apice obtusa, basi valde oblique latere superiore acuta vel truncata, latere inferiore cordata,

vel auriculata, auriculis 2 cm. longis, totiusque latis, remote minute mucronateque serrata, inter mucrones 12 mm. longa, 6-7-nervia, utrinque glabra, supra nitida subtus pallidiora, petiolis 4 cm. longis, stipulis lanceolatis 7 mm. longis. Fructus capsularis depresso-globosus, 12 mm. longus, 14 mm. latus, apice depressus, tri-lobatus, 3-locularis, alis obscuris vel 0.

HAB. Randaizan, leg. U. MORI, Aug. 1908, (No. 7121); Shintiku: Goshizan, leg. T. KAWAKAMI, Dec. 1905, (No. 1296).

Near *B. Wageriana* Hook. f. Bot. Mag. t. 4988, from which the present plant differs in having very small wings of the fruit. This resembles *B. microptera* Bot. Mag. t. 4974, in respect of the small wing of the capsule, but differs from that in having the entire sepals and obscurely and remotely serrate leaves. This is also near *B. Roxburgi* A. DC. and *B. inflata* C. B. CLARKE, but differs from both in having not horned, but quite rounded, fruit.

Begonia ferruginea HAYATA sp. nov. Ferruginea, ramosa, exsiccato ferrugineo-rubescens primum lanata demum subglabra 30 cm. alta. Folia petiolata, stipulata oblique cordata, 15 cm. longa, 23 cm. lata, basi valde obliqua, cordata multilobata, vel irregulariter dentato-lobulata, lobulis serrulatis acutis, supra ferrugineo-hispidula, subtus ferrugineo-tomentosa, demum utraque glabrata, 7-9-nervia, petiolis 8 cm. longis, stipulis ovatis 1-2 cm. longis, 7 mm. latis. Cymæ axillares paucifloratæ bracteatae, bracteis stipula conformibus. Fl. ♂: perianthii segmenta 4, 2-exteriora majora late ovata 2 cm. longa, 18 mm. lata, apice rotundata, basi cordata, 2-interiora minora obovata 1½ cm. longa 8 mm. lata, apice rotundata, basi obtusa. Stamina ∞, 4 mm. longa, filamentis liberis 3 mm. longis, antheris oblongis 1 mm. longis, connectivis leviter productis.

HAB. Randaizan, leg. U. MORI et B. HAYATA, Aug. 1908, (No. 7128); Tappansha, leg. S. NAGASAWA, Oct. 1905, (No. 579).

Near *B. Bowringiana* CHAMP.; but differs from it in having elongate stipules and in the connectives of anthers which are obtusely acute, but not truncate as is the case with *B. Bowringiana* CHAMP.

Begonia kotcensis HAYATA sp. nov. Rhizoma repens foliatum, radicans. Folia longe petiolata, stipulata, orbiculata, 8 cm. in diametro, obliqua horizontaliter patentia, apice oblique et abrupte acuta ad summum obtusa, basi profunde cordata latere interiore imbricata, margine crenulata, crenis breve mucronatis, glaberrima, palmatim 10-nervia, herbacea, petiolis incrassatis, 10-20 cm. longis, stipulis triangulari-ovatis 8 mm. longis acutis basi 7 mm. latis. Scapi ad apicem rhizomatis, incrassati, 20 cm. longi, 3-florati, floribus pedicellatis, pedicellis $1\frac{1}{2}$ cm. longis. Fl. ♂: perianthii segmenta 4, 2-exteriora majora orbicularia $1\frac{1}{2}$ cm. longa, totiusque lata, utrinque rotundata; 2-interiora minora, obovata, 1 cm. longa, 5 mm. lata, apice rotundata. Stamina ∞ , $2\frac{1}{2}$ mm. longa, filamentis liberis $1\frac{1}{2}$ mm. longis, antheris oblongis apice obtusis.

HAB. Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA, Feb. 1906, (No. 1022); leg. K. MIYAKE, Nov. 1899.

Near *Begonia Bretschneideriana* HEMSL.; but differs from it in many points.

Begonia laciniata ROXB. var. **formosana** HAYATA v. n.

Begonia laciniata HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 166, (non ROXB.).

Rhizoma repens, caulibus validiusculis striatis 30-40 cm. longis, glabris, pauciramosis. Folia longe petiolata, glabra oblique ovata

15 mm. longa, 7 cm. lata, basi cordata valde obliqua, apice acuminata, irregulariter dentata vel duplicato-dentata palmatim 9-11-nervia, crassiuscula, petiolis 10 cm. longis, stipulis triangulari-ovatis 6 mm. longis. Cymæ paucifloratæ. Fl. ♂ : segmenta 4, 2-exteriora majora late orbiculata, 2 cm. in diametro, 2-interiora minora obovata, apice rotundata $1\frac{1}{2}$ cm. longa, 1 cm. lata. Stamina ∞ , 4 mm. longa, filamentis liberis 2 mm. longis, antheris $1\frac{1}{2}$ mm. longis connectivis leviter productis apice rotundatis. Fructus capsularis 23 mm. longus, inæqualiter trigonus, inæqualiter trilatus, alis 2-anterioribus angustioribus, 4 mm. latis 23 mm. longis, 1-posteriore latiore, 20 mm. lata, 17 mm. longa. Semina minutissima.

HAB. Inter Giran et Heirinbi; inter Urai et Raga; Bokusekikaku, leg. K. MIYAKE, 1899; Shichiseitonzan et Hokuto, leg. B. HAYATA, 1900, Aug.

The present *Begonia* is the most common one in Formosa. It differs from *B. laciniata* ROXB. var. *Bowringiana* in having quite glabrous leaves. The latter variety is always tomentose or pubescent. The Formosan one should, therefore, be another variety of *B. laciniata* to which Mr. W. B. HEMSLEY also refers in Ind. Fl. Sin. I. p. 322. It bears some resemblance to *B. sinensis*; but differs from it in having larger flowers and glabrous leaves.

***Begonia taiwaniana* HAYATA sp. nov.** Caulis glaber, validiusculus ramosus. Folia petiolata, stipulata, glabra, lanceolata, 13 cm. longa, $3\frac{1}{2}$ cm. lata, basi cordata, vel rotundata, irregulariter serrulata, latere inferiore dentata, 5-7-nervia, petiolis 4 cm. longis, stipulis subulatis 3 mm. longis. Cymæ axillares paucifloratæ, bracteis ovatis, acuminatis 5 mm. longis. Fl. ♂ : perianthii segmenta 4, 2-exteriora majora late obovata 6 mm. longa. Stamina

∞, filamentis liberis, connectivis truncatis. Fructus capsularis, 13 mm. longus, trigonus, inæqualiter trialatus, alis 2-anterioribus angustatis 2 mm. latis, 1-posteriore latiore 10 mm. lata, 13 mm. longa, septicide dehiscens.

HAB. Tappansha, leg. S. NAGASAWA, ad 3138 ped. alt., Oct. 1905, (No. 587); in monte Morrison ad 6500 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2046).

Near *B. microptera* in Bot. Mag. t. 4974, from which the present plant differs in having one sided prominent wings.

Umbelliferæ.

Sanicula LINN.

Sanicula petagnioides HAYATA Fl. Mont. Formos. p. 103.

Near *S. orthacantha* S. MOORE; but differs from it in having much smaller flowers and stalked lobes of leaves.

Bupleurum LINN.

Bupleurum falcatum LINN.; Hook. f. Fl. Brit. Ind. II. p. 676; FORBES et HEMSL. Ind. Fl. Sin. I. p. 327.

HAB. Biyōritsu, leg. B. HAYATA, Aug. 1908.

DISTRIB. South of Europe, Asia Minor to China and Japan.

Apium LINN.

Apium integrilobum HAYATA sp. nov. Herba, glabra, 70 cm. alta, ramosa. Folia caulina tripartita, segmentis lanceolatis 25 mm. longis basi cuneatis, petiolis 1 cm. longis. Umbellæ oppositifoliæ

sessiles, 6-7-radiatæ, 3 cm. longæ, totiusque in diametro. Umbellulæ 5 mm. longæ totiusque in diametro, 15-20 floratæ. Flores albi, pedicellis 3 mm. longis, involucri bracteis O. Calycis dentes obsoleti. Petala ovata $\frac{2}{3}$ mm. longa, acuta in acumen inflexum producta, ad costam leviter impressam emarginata. Stylopedia convexa. Fructus late ovatus a latere compressus, ad commissuram constrictus. Carpella 5-gona, juga æqualiter prominula, obtusa; carpophora apice bifida.

HAB. in humidis Maruyama, leg. Rev. U. FAURIE, Mai. 1903, (No. 122).

Pimpinella LINN.

Pimpinella diversifolia DC. Prodr. IV. p. 122; CLARKE in HOOK. f. Fl. Brit. Ind. II. p. 688; FORBES et HEMSL. Ind. Fl. Sin. I. p. 329.

HAB. Taitō: Shinkōkō, leg. T. KAWAKAMI et Z. KOBAYASHI, Juni. 1906, (No. 1508).

DISTRIB. Japan and China; common on the mountains of North India.

OBSERV. A glabrous herb, 50-70 cm. high, striate, leaves trifoliolate, long petioled, lateral leaflets nearly sessile, obliquely ovate, acuminate at the apex, round at the base, $4\frac{1}{2}$ cm. long, 3 cm. broad, terminal one ovately lanceolate 5 cm. long, 3 cm. broad, acuminate at the apex, cuneate at the base or sometimes rotundate, serrate, pubescent, petiolulate, petiolules 1 cm. long, trinerved, petioles of leaves at the basal portion of the stem very long 7 cm. long, base of the petioles dilated, embracing the stem, leaves at the upper portion are shortly petioled, petioles dilated along its length, embracing the stem. Involucral leaves linear 5 mm. long. Umbella 5 mm. long as broad; carpels ovately semiglobose $1\frac{1}{4}$ mm.

long, $\frac{2}{3}$ mm. broad, thinly 5-striate, nearly round in section.

Pimpinella Saxifraga LINN. ; DC. Prodr. IV. p. 120 ; HOOK. f. Fl. Brit. Ind. II. p. 685.

HAB. in monte MORRISON, ad 8000 ped. alt., leg. T. KAWAKAMI, 1906.

DISTRIB. Europe, Northern and Western Asia.

OBSERV. A very small perennial herb ; rhizome erect, stem pubescent or subglabrous rarely branched, 15-20 cm. high ; radical leaves (including petiole) 8 cm. long, $1\frac{1}{2}$ cm. broad, pinnate, pinnæ 4-5 juged, with terminal one, or sometimes bipinnate, lateral leaflets opposite, rotundate, 1 cm. long as broad, subsessile or shortly stalked, dentate, petioles 4 cm. long ; cauline leaves $5\frac{1}{2}$ cm. long, bipinnate or bipinnatifid, leaflets 3-4-juged, oblong in outline, $1\frac{1}{2}$ cm. long 1 cm. broad, 3-5-lobed, lobes lanceolate, acute, terminal lobe usually many-cleft. Umbella 7-radiate ; umbellula small, peduncles 2 cm. long, carpels ovately semiglobose, thinly 5-ribbed $1\frac{2}{3}$ mm. long, nearly round in section. An extremely tiny form of the species.

Phellopterus BENTH.

Phellopterus littoralis BENTH. in BENTH. et HOOK. f. Gen. Pl. I. p. 905 ; FORBES et HEMSL. Ind. Fl. Sin. I. p. 331.

DISTRIB. Saghalien Japan and China.

I have seen this species in the Herbarium at Hongkong, and remember having seen the plant in Formosa. It is not yet represented from Formosa in the Herbarium at Tōkyō.

Oreomyrrhis ENDL.

Oreomyrrhis involucrata HAYATA sp. nov. Herba perennis,

cæspitosa pubescens, caulibus scapiformibus 7 cm. longis. Folia omnia radicalia pinnata vel bipinnata cum petiolis 4 cm. longa 2 cm. lata membranacea, pinnis superioribus sessilibus obovatis 8 mm. longis, 4 mm. latis basi longe cuneatis trilobatis, lobis lanceolatis, pinnis mediocribus obscure petiolulatis, pinnis inferioribus distincte petiolulatis tripartitis segmentis trilobatis, petiolulis 4 mm. longis, petiolis 2 cm. longis basi dilatatis scariosis. Scapi 6 cm. longi pubescentes. Involucri bracteæ 2-seriatæ, circ. 5 longissimæ, 5-6 breviores, bracteæ longiores lineares $2\frac{1}{2}$ cm. longæ $1\frac{1}{2}$ mm. latæ, apice trifidæ, segmentis 5 mm. longis lanceolatis divaricatis, bracteæ breviores lanceolatae 5 mm. longæ. Umbellæ simplices, circ. 10 radiatæ, 8 mm. longæ, 10 mm. in diametro. Flores parvi, pedicellis 6 mm. longis, pubescentibus. Calycis dentes obsoleti. Petala oblonga $\frac{2}{3}$ mm. longa, acuta, apice breviter incurva, integra. Stylodia subconica. Fructus oblongo-linearis, 4 mm. longus, apice contractus, a latere leviter compressus, ad commissuram subconstrictus, exsiccato rubro-nigricans. Carpella 5-gona in sectione, juga æqualiter distincte prominula, lateralia distincta; vittæ ad valleculas solitariae. Carpophorum bipartitum. Semina subteretia facie sulcata.

HAB. in monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI, et U. MORI, Oct. 1906, (No. 2249); leg. S. NAGASAWA, Nov. 1905, (No. 756).

Very distinct species remarkable for its very long bracts. Somewhat near *O. andicola* ENGL., but differs in having the linear involucreal bracts which are very much longer than the fruiting pedicels.

Angelica LINN.

Angelica morrisonicola HAYATA sp. nov. Herba validiuscula

glabra. Folia bipinnata, longe petiolata, triangularia in circumscriptione, 25 cm. longa, 30 cm. lata, petiolis 25 cm. longis, pinnis primariis petiolatis, pinnatis, petiolis 6 cm. longis, pinnulis breve petiolulatis oblongis 7 cm. longis 3 cm. latis, serratis, petiolulis 5 mm. longis, interdum trilobatis, pinnula terminali tripartita, supra glabra, subtus glauca; petiolis foliorum inferiorum basi dilatatis, superiorum vaginatis amplis oblongis, microphyllis glabris. Involucri bracteae lineares $1\frac{1}{2}$ cm. longae. Umbellae circ. 50 radiatae, radicibus 4 cm. longis. Umbellulae basi involuclatae, 8 cm. longae, totiusque latae, bracteolis linearibus 3-4 mm. longis. Calycis dentes obsoleti. Petala oblonga, in acumen inflexum costam planam integra. Stylopedia depressa integra. Fructus ovatus, a dorso valde compressus, commissuris latis. Carpella oblonga lenticularia, $3\frac{1}{2}$ mm. lata, 5 mm. longa, apice rotundata basi cordata, jugis dorsalibus filiformibus, marginalibus in alas dilatatis. Semina a dorso compressa, facie plana.

HAB. in monte Morrison, ad 13094 ped. alt., leg. S. NAGASAWA, Nov. 1905, (No. 600), et leg. T. KAWAKAMI et U. MORI, Nov. 1906 (No. 2129).

Peucedanum LINN.

Peucedanum decursivum MAXIM. ?; FORBES et HEMSL. Ind. Fl. Sin. I. p. 335.

HAB. in littore kelung, (11-2 m. alta), leg. U. FAURIE, 1903, Juni.

This is also near *Angelica kiusiana* MAXIM. As the material is not perfect, the identification is rather conjectural.

Peucedanum graveolens BENTH. et HOOK. f.; FORBES et HEMSL. Ind. Fl. Sin. I. p. 335.

Anethum graveolens LINN.

DISTRIB. Cultivated in North China.

HAB. in ruderiis Biyōritsu, leg. U. FAURIE, Mai. 1903, (No. 392).

Peucedanum terebinthaceum FISCH.; LEDEB. Fl. Ross. II. p. 314;
FRANCHET. Fl. David. p. 143; FORBES et HEMSL. Ind. Fl. Sin. I. p. 335.

HAB. in monte MORRISON, leg. T. KAWAKAMI et U. MORI, (Nos. 2052 et 2122); Nantō, Musha, (No. 4544); Tappansha, S. NAGASAWA, (No. 776); KAWAKAMI (No. 1744).

DISTRIB. China: Chihli, Shingking, Hupeh; Corean Archipelago; Dahuria, Mandshuria.

Peucedanum aff. **Præruptoro** DUNN.

HAB. Tōzan, leg. T. KAWAKAMI et U. MORI, Oct. 1905.

Osmorrhiza RAFIN.

Osmorrhiza longistylis DC. Prodr. IV. p. 232.

HAB. in monte MORRISON, leg. T. KAWAKAMI et U. MORI, Oct. 1905.

DISTRIB. North America.

Araliaceæ.

Aralia

Aralia hypoleuca PRESL., WALP. Ann. II. p. 724.

HAB. Shintengai, leg. S. NAGASAWA, Nov. 1906, (No. 456, Fr.); Akō: Bongarisha, leg. G. NAKAHARA, Sept. 1905, (No. 503); Uraisha, leg. N. KONISHI, Dec. 1908.

DISTRIB. Philippines.

OBSERV. According to W. B. HEMSLEY (Ind. Fl. Sin. I. p. 338), the present species is the same as *A. spinosa* which is in itself very variable.

Dicotyledones.

Gamopetalæ.

Caprifoliaceæ.

Viburnum LINN.

Viburnum formosanum HAYATA (sp. emend.)

Viburnum erosum THUNB. var. *formosanum* HANCE in MAXIM.
Mél. Biol. X. p. 666.

HAB. Sōzan, leg. S. NAGASAWA, 1903, (No. 101).

The present plant is quite referable to HANCE'S var. *formosanum*. The variety, however, has not any stipule, while *V. erosum* has a distinct stipule, as is mentioned by MAXIMOWICZ in the literature above cited. As the Formosan plant differs from the latter species in many other points, it is quite proper to regard it as a plant specifically distinct from *V. erosum* THUNB.

Viburnum integrifolium HAYATA sp. nov. Rami ramulique graciles divaricati, cinereo-fuscentes, glabri. Folia opposita, petiolata, exstipulata, oblonga vel oblongo-lanceolata, 9 cm. longa, 2½ cm. lata, apice abrupte acuminata, acuminibus 2 cm. longis, basi acuta, margine integerrima, venis venulisque supra inconspicuis subtus prominentibus, venis primariis ascendentibus prope marginem anastomosantibus, venulis transversis, utraque pagine glabra, supra nitida, exsiccato nigricantia, subtus pallidiora, petiolis 7 mm. longis. Cymæ ad apicem ramorum terminales, pubescentes, ramis

verticillatis. Flores $3\frac{1}{2}$ mm. in diametro; calycis tubus 1 mm. longus, limbus patens 5-lobatus, lobis triangularibus, acutis $\frac{1}{2}$ mm. longis. Corolla late campanulata patens 4 mm. in diametro glabra, profunde 5-lobata, lobis ovato-rotundatis 1 mm. longis apice rotundatis. Stamina 5, basin corollæ affixa, filamentis 1 mm. longis. Stylus $\frac{3}{4}$ mm. longus basi dilatatus conicus. Drupa ovoidea, carnosa $7\frac{1}{2}$ mm. longa, 1-sperma. Putamen lentiforme plano-convexum, ventrale leviter concavum.

HAB. in monte Morrison, ad 7000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2061); Taiko, leg. T. KAWAKAMI et U. MORI, Aug. 1908, (Nos. 55 et 87).

Very near *V. sambucinum* REINV.; but differs from it in having quite glabrous and much smaller leaves. Also near *V. sempervirens* C. KOCH, and *V. coriaceum* BLUME., but differs from the former in having narrower leaves with different venation and looser racemes, and from the latter by the smaller leaves and very much smaller flowers.

Viburnum luzonicum ROLFE in Journ. Linn. Soc. XXI. p. 310.

Viburnum erosum HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 180, pro parte (non THUNB.).

HAB. Fukkishō, leg. C. OWATARI, 1898; Pachina, leg. T. NIINAMI, Dec. 1895; Hikaku, leg. T. MAKINO, Nov. 1896.

DISTRIB. The Philippines.

The present plant was referred to *V. erosum* THUNB. by myself in my paper above cited. After comparison of this plant with the Philippine plant, I have found they are quite similar. It should, therefore, be properly referred to *V. luzonicum* ROLFE. *Viburnum erosum* recorded from Formosa by Mr. W. B. HEMSLEY may, I infer, be the same as the Philippine plant.

Viburnum morrisonense HAYATA sp. nov. Rami validiusculi,

fusco-cinerascentes, plus minus rugulosi, ramulis oppositis, furcatis, falcitim recurvis, cicatricibus annularibus foliorum notatis, glabratis. Alabastrum foliorum late glabosum, perulis paucis majusculis ovatis acutis glabratis. Folia ad apicem ramulorum 2, opposita chartacea acuminato-ovata, 5-6 cm. longa, $3\frac{1}{2}$ cm. lata, apice acuta, vel acuminata, basi rotundato-obtusa, vel rotundata, margine leviter crenato-serrata, prope basin subintegra, serris latissimis, brevissimis, apice mucronatis, pinninervia, venis lateralibus subrectis, ad apicem serrarum attingentibus, venulis transversim inter venas reticulatis, costis et venis supra tenuissime impressis, subtus leviter prominentibus, utraque pagine subglabrata, subtus ad costas et venas tenuiter pubescentia et ad ramificationem venarum breve barbata, subtus pallidiora, petiolis $2\frac{1}{2}$ cm. longis patentibus. Drupæ ad apicem ramulorum 5-6-fasciculatæ, longe pedunculatæ, subglobosæ, 8 mm. longæ. Putamen oblongum 6 mm. longum, valde complanatum, a dorso longitudinaliter elevatum, a facie medio late sulcatum.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, Nov. 1905, (No. 2115).

Near *V. betulifolium* BATAL.; but differs from it in having much larger putamen, and also in the leaves rounded at the base. Also near *V. dilatatum* and *V. Wrightii* MIQ.; but differs from the former in having quite or nearly glabrous leaves, a very few flowered cymes, and quite glabrous peduncles, and from the latter in having not caudate smaller leaves and less flowered-peduncles. The leaves of *V. dilatatum* is densely hairy beneath, while those of the present plant are quite glabrous beneath, except the midrib and veins.

Viburnum parvifolium HAYATA sp. nov. Rami et ramuli graciles, cinereo-fuscentes, ramulis divaricatis, ramosis, pilis

ramosis dense obtectis. Folia opposita, exstipulata, petiolata, obovata vel ovata, 28 mm. longa, 15 mm. lata, apice acuta, basi cuneata obscure trilobata vel elobata, margine dentata, utrinque pagine pilis ramosis hispida, subtus pallidiora, nervis supra leviter impressis, subtus prominulis, venis primariis ascendentibus ad apicem dentium attingentibus, venulis reticulatis, petiolis hispidis 5 mm. longis. Flores in cymas terminales paniculati. Drupa carnosa, globosa 6 mm. in diametro 1-sperma. Putamen ovatum $6\frac{1}{2}$ mm. longum 4 mm. latum apice acutum basi emarginatum complanatum dorso obtuse prominenteque 1-costatum, ventrale sulcatum.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 2116).

Remarkable for the small size of the leaves.

Viburnum rectangulare GRÆBN. in ENGL. Bot. Jahrb. XXIX. p. 588.

HAB. in monte Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1808); Arizan, leg. G. NAKAHARA Nov. 1906.

DISTRIB. South Central China.

The present plant has rather smaller leaves which are ovate, 4 cm. long, 17 mm. broad, acute at both ends, remotely mucronato-serrate, or entire.

Viburnum Sandankwa HASSK.; in Bot. Mag. t. 6172; MAXIM. in Mém. Biol. X. p. 649; MIQ. in Ann. Mus. Bot. Lugd. Bat. II. p. 268; FORBES et HEMSL. Ind. Fl. Sin. I. p. 355.

HAB. Ōshima; Naze, (T. UCHIYAMA) 1900 Dec.; Yæyama, leg. G. NAKAHARA, 1907, Aprili.

DISTRIB. Kiangsu ; Loo-choo islands.

Viburnum taitcense HAYATA sp. nov. Ramuli graciles, purpureo-rubescens, longitudinaliter rugulosi, fusco-tomentosi, lenticellis rubescentibus elevatis notati, teretes, remote foliati. Folia opposita, oblongo-lanceolata, vel oblongo-elliptica, 9 cm. longa, 3 cm. lata, apice acuminata, basi acuta, margine serrulata, serrulis rotundato-mucronatis, pinninervia, venis lateralibus primariis 5-6, arcuatis, costis et venis supra impressis, venulis tenuiter reticulato-impressis, subtus costis et venis prominentibus, venulis tenuissimis chartaceo-coriacea, utrinque glaberrima subtus pallidiora, petiolis $1\frac{1}{2}$ cm. longis supra late sulcatis, rubescentibus. Flores corymbosi, corymbis terminalibus 3 cm. longis, totiusque latis, ramosis fulvo-tomentosis, pilis densis brevissimisque, bracteis angustis acutis 2-3 mm. longis, pedicellis brevibus cum calycibus articulatis, floribus ad apicem pedicellorum solitariis vel geminis, bracteolis 2-3-congestis, basin calycis amplectantibus, elongato-angularibus acutis 1-2 mm. longis ciliolatis. Flores circ. 1 cm. longi, tubulosi. Calyx tubuloso-campanulatus, extus pubescens, tubo 2 mm. longo, limbo campanulato, intus glabro, leviter 5-lobato, lobis brevibus, obtuso-triangularibus $\frac{2}{3}$ mm. longis obtusis, margine ciliolatis. Corolla tubuliformis, superne leviter ampliata, 9 mm. longa, tubo 5 mm. longo, limbo 5-lobato, lobis brevis rotundatis, 2 mm. longis. Stamina 5, ad faucem corollae affixa, filamentis brevibus 1 mm. longis, antheris oblongis, 1 mm. longis. Ovarium inferius 1-loculare, stylo simplici, incrassato, circ. 2 mm. longo, basi gradatim leviter dilatato, apice 3-lobato.

HAB. Taitō : Daishinzan, leg. T. KAWAKAMI et U. MORI, Jan. 1908, (No. 4546).

Near *Viburnum erubescens* WALL., but differs from it in having

denser and shorter cymes, narrower leaves, and calyx densely covered with stellate hairs. *V. erubescens* has a nearly glabrous calyx, much broader leaves, and more elongated cymes.

Viburnum taiwanianum HAYATA sp. nov. Rami cineraceo-fuscentes, apice pilis stellatis brevissimis obtecti. Folia decidua, opposita, secus apicem ramorum approximate disposita, petiolata, exstipulata, ovato-oblonga vel ovato-lanceolata, 15 cm. longa, $5\frac{1}{2}$ cm. lata, apice acuminata, acuminibus 2-3 cm. longis, basi rotundatis supra glabra in exsiccato nigricantia, subtus pallidiora, pilis stellatis brevissimis pubescentia, margine minute denticulata, vel subintegra, venis primariis ascendentibus, venis secundariis transversis, petiolis 2 cm. longis. Cymæ ad apicem ramorum terminales, pedunculis 4 cm. longis, ramis verticillatis, bracteis linearibus 4 mm. longis. bracteolis subulatis. Calycis tubus cylindricus 2 mm. longus, limbus breve campanulatus 1 mm. longus 2-lobatus, lobis triangularibus obtusis $\frac{1}{2}$ mm. latis. Corolla tubuliformis $3\frac{1}{2}$ mm. longa basi leviter contracta apice 5-lobata, lobis rotundato-triangularibus apice rotundatis $\frac{3}{4}$ mm. latis vel latioribus, glabris. Stamina 5, basi corollæ affixa, $5\frac{1}{2}$ mm. longa, filamentis liberis. Stylus crassiusculus conicus, 1 mm. longus.

HAB. in monte Morrison, ad 6000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1720); Tōzan, in montibus Morrison leg. G. NAKAHARA, Oct. 1906; Nantō: Shojōdaizan, leg. T. KAWAKAMI et U. MORI, (No. 1119); Taitō: Basshishō, leg. N. KONISHI, Juli. 1902, (No. 31); Randaizan, leg. U. MORI, (No. 7033).

Near *Viburnum urceolatum* SIEB. et ZUCC., but differs from it in having very obscurely toothed, or even entire, more acuminate leaves, and in their venation.

Abelia R. BR.

Abelia chinensis R. BR., DC. Prodr. IV. p. 339 ; MAXIM. in Mém. Biol. XII. p. 475 ; FORBES et HEMSL. Ind. Fl. Sin. I. p. 358.

HAB. Taitō : Saidosan, leg. T. KAWAKAMI et U. MORI, 1908, Jan. (No. 4511).

As the specimen is imperfect, the determination is not satisfactory. This is also near *A. Achersoniana* GRÆBN.

Lonicera LINN.

Lonicera affinis HOOK. et ARN. var. **angustifolia** HAYATA n. n. Suffruticosa, ramis gracilibus grabris, cortice rubro-cinereo demum gradatim soluto, internodiis 5 cm. longis. Folia opposita petiolata, lanceolata, $7\frac{1}{2}$ cm. longa, 23 mm. lata, apice gradatim acuminata, basi rotundata, margine integra, vel minute denticulata, ciliolata, coriaceo-membranacea, supra venulis impressis, reticulatis, venis primariis prope marginem anastomosantibus, petiolis 1 cm. longis, ciliolatis. Flores in cymas dispositi, cymis terminalibus vel axillaribus paucifloratis, pedunculatis, floribus ad apicem pedunculi geminis, vel solitariis, pedunculis $1\frac{1}{2}$ cm. longis. Flores basi 1-bracteati, et 2-bracteolati, bracteis linearibus 4 mm. longis, bracteolis late ovatis rotundatis ciliolatis 1 mm. longis. Calyces urceolati 4 mm. longi, limbis campanulatis 5-lobatis, lobis ovatis acutis obscure glanduloso-serratis. Corolla non visa. Bacca globosa 7 mm. in diametro.

HAB. in monte Morrison, ad 6000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (Nos. 1816 et 1946) ; Ganzan, in montibus Morrison, ad 9141 ped. alt., leg. S. NAGASAWA, Oct. 1905, (No. 644) ; Arizan, in montibus Morrison, leg. G. NAKAHARA, Oct. 1906.

Differs from the type in having much narrower leaves, and lanceolate lobes of the calyx.

Rubiaceæ.

Nauclea LINN.

Nauclea taiwaniana HAYATA sp. nov. Rami glabri, validiusculi, fusco-rubrescentes, lenticellis pauce obtecti. Folia opposita, petiolata, ovata, 10 cm. longa, 5 cm. lata, apice acuminata vel abrupte acuta basi rotundata truncata vel leviter cordata subintegra vel obscure repanda, venis primariis utrinque latere 7, intermediis ad costas angulo 40° egressis, basilaribus circ. angulo 90° egressis, supra nitida subtus pallidiora, petiolis $3\frac{1}{2}$ cm. longis. Flores capitulati, capitulis globosis axillaribus, solitariis longe pedunculatis, pedunculis $2\frac{1}{2}$ cm. longis. Fructus 2-coccus, coccis angustis clavatis, $5\frac{1}{2}$ mm. longis, 2 mm. latis, bracteis persistentibus 5 mm. longis complanatis apice peltatis, peltis angularibus, pubescentibus. Semina linearia, testa alata, $3\frac{1}{2}$ mm. longa, $\frac{2}{3}$ mm. lata, apice -lobata.

HAB. Kōshūn : Kōkō, leg. T. KAWAKAMI, Juli. 1906, (No. 1654).

Nauclea transversa HAYATA sp. nov. Rami validiusculi ramosi, cortice cinerascete, lenticellis dispersis. Folia opposita, longe petiolata, ovata, vel oblonga, 12 cm. longa, 5 cm. lata, utrinque pallidiora apice abrupte acuminata, basi rotundata, vel truncata, venis primariis utrinque latere 6-7, ad costas angulo 60° egressis, basilaribus circ. angulo 90° egressis, petiolis 4-5 cm. longis. Flores capitulati, capitulis axillaribus solitariis, pedunculatis, pedunculis 3-4 cm.

longis. Fructus 2-coccus, coccis clavatis 5 mm. longis, $1\frac{2}{3}$ mm. latis, apice truncatis, basi acutis, bracteis peltatis 4 mm. longis peltis 5-lobatis. Semina linearia 3 mm. longa, testa alata, apice 2-lobata.

HAB. Nanshikiaku, leg. S. NAGASAWA, ad 2663 ped. alt., Nov. 1905, (No. 601).

Near *N. taiwaniana* HAYATA; but distinguishable in the longer leaves, in the paucity of the primary veins, which are inserted in a more obtuse angle, and in the unpolished surface of the leaves.

Nauclea truncata HAYATA sp. nov. Rami cinerascetes, lenticellis transversis dispersi. Folia opposita, subsessilia, oblonga 16 cm. longa, 8 cm. lata utrinque obtusa vel basi truncata, glabra exsiccato pallidiora, integerrima, supra venis primariis impressis, subtus prominente elevatis, ad costas angulo 25° egressis, venulis inconspicuis late reticulatis, stipulis oblongis utrinque rotundatis, 14 mm. longis, 8 mm. latis, deciduis. Flores capitulati, capitulis terminalibus, globosis, subsessilibus 2 cm. in diametro.

HAB. Kōshūn, Kōkō; leg. T. KAWAKAMI, Juli. 1906, (No. 1660).

Near *N. sessilifolia* ROXB. and *N. reticulata* HAV., but differs from both by the obovate and shortly acute leaves.

Uncaria SCHREB.

Uncaria Kawakamii HAYATA sp. nov. Frutex scandens, ramis fusco-rubrescentibus, tereto-tetragonis, parcissime hirsutis, ramulis gracilibus tetragonis, parce ferrugineo-pubescentibus vel subglabratis, remote foliatis, internodiis 7 cm. longis. Folia opposita, chartacea, elliptico-ovata, vel oblonga, 6-12 cm. longa, 3-5 cm. lata, apice abrupte acuminata, acuminibus obtusis basi truncato-rotun-

data, vel truncato-acuta, margine subintegra, venis lateralibus primariis utraque latere circ. 7, tenuibus, ad costas utrinque parcissime hirsuta, cæterum glabrata, subtus pallidissima, petiolis 1 cm. longis, hirsutis, stipulis interpetiolaribus triangulari-ovatis, 1 cm. longis, apice 2-lobatis, lobis acuminatis, glabris, margine hirsutis. Capitula florum axillaria, solitaria, longe pedunculata, pedunculis (pedunculis sterilibus) hirsutis 2 cm. longis, apice cum pedicello articulatis, apice 4-bracteatis, bracteis verticillatis, 2-alteris latioribus, 2-fidis reflexis, 12 mm. longis, 7 mm. latis, lobis ovato-lanceolatis, acuminatis, 10 mm. longis, $3\frac{1}{2}$ mm. latis, margine ciliolatis, basi barbatis, 2-alteris angustioribus linearibus, 13 mm. longis, $1\frac{1}{2}$ mm. latis, simplicibus margine parcissime ciliolatis, basi barbatis, pedicellis (pedunculis floriferis) $1-1\frac{1}{2}$ cm. longis, dense adpresse hirsutis. Capitulum globosum sine corolla $1\frac{1}{2}$ cm. longum, calycis tubus longe fusiformi-urceolatus, $4\frac{1}{2}$ mm. longus, pubescens, limbo campanulato, $2\frac{1}{2}$ cm. longo, profunde 5-lobato, lobis angustis, lanceolatis, obtusis, extus et margine pubescentibus, intus glabris. Corollæ tubus filiformis, 1 cm. longus, sursum plus minus dilatatus, limbo campanulato, 2 mm. longo, profunde 5-lobato, lobis oblongo-ovatis vel spathulato-oblongis, crassiusculis, $1\frac{1}{2}$ mm. longis, $\frac{3}{4}$ mm. latis, glabris, apice rotundatis vel brevissime mucronatis, margine leviter reflexis, dorso medio carinatis, antheris fauce corollæ affixis, ovato-oblongis, 1 mm. longis, basi 2-lobatis, (lobis aristato-acutis), sessilibus, vel filamentis brevissimis. Ovarium 2-loculare.

HAB. Kōshūn leg. T. KAWAKAMI.

The present plant is the nearest to *Uncaria philippinensis* ELMER, but differs from it in having larger heads and longer corolla-tubes. Also near *U. florida* Vid., but differs from it in having lanceolate calyx-lobes and longer peduncles of flower-heads.

Thysanospermum CHAMP.

Thysanospermum diffusum CHAMP. ; WALP. ANN. V. p. 118 ; BENTH. FL. HONGK. p. 146 ; FORBES et HEMSL. IND. FL. SIN. I. p. 371 ; MATSUM. et HAYATA ENUM. PL. FORMOS. p. 182.

HAB. Formosa in Herb. Taihoku-Museum.

DISTRIB. Kiangsu, Hongkong, Loo-choo islands.

This species is represented in the Museum of Taihoku. It is not yet represented from the island in the Herbarium at Tōkyō.

Hedyotis LINN.

Hedyotis nantensis HAYATA sp. nov. Herba basi suffrutescens, ut videtur scandens, vel volubilis, viridissimi, ramis angulatis, plus minus scabriusculis vel lævibus, internodiis 6-7 cm. longis. Folia oblonga, oblongo-lanceolata, mutabilia in magnitudine, 5-10 cm. longa, 2-3½ cm. lata, apice acuta, vel acuminata, basi acuta, subito attenuata ad petiolum abeuntia, integra, chartaceo-membranacea, pinninervia, venis lateralibus 5-6, basilaribus cum marginibus parallelis, cæterum ascendentibus angulo acuto divergentibus, sursum recurvatis, supra impressis subtus tenuiter prominentibus, supra viridissima subtus pallidiora, utraque pagine glabra, sed plus minus scabriuscula, petiolis 5 mm. longis, stipulis interpetiolaribus membranaceis, aristato-4-dentatis, sinibus inter dentes truncatis. Flores paniculato-cymosi, cymis terminalibus, vel axillaribus, ramosis, floribus ad apicem ramulorum umbellatim 10-30 fasciculatis, bracteis lanceolatis, pedicellis 2 mm. longis. Calycis tubus campanulatus, 1½ mm. longus, lobis 4, linearibus 2 mm. longis ½ mm. latis, recurvis, sinibus inter lobos trun-

catis latis appendiculatis, appendiculis setiformibus $\frac{1}{2}$ mm. longis. Corolla campanulato-tubuliformis, tubo $1\frac{1}{2}$ mm. longo, utraque glabro, limbo 4-lobato, lobis angustatis $5\frac{1}{2}$ mm. longis 1 mm. latis, a medio revolutis apice obtusis, 3-nerviis, extus glabris, intus deorsum barbatis, sursum glabris. Stamina 4, filamentis exsertis, 7 mm. longis filiformibus basi intus barbatis, antheris ovato-linearibus, 2 mm. longis, basi profunde 2-lobatis. Ovarium inferius, apice setulis erectis albis dense fasciculatis coronatum, 2-loculare, ovulis numerosis, stylo 5 mm. longo, a medio albo-barbato, apice profunde 2-lobato, lobis linearibus complanatis, hirsutis, 2 mm. longis, patentibus, recurvis, fuscentibus.

HAB. Nantō, leg. T. KAWAKAMI, (No. 4883) ; Giōchi, leg. G. NAKAHARA, 1905, Aug.

Near *H. capitellata* WALL. and *H. Elmeri* MERRILL, but differs from the former in having stalked flowers, and from the latter in having narrower leaves, and much narrower calyx-lobes. The flowers of *H. capitellata* are nearly sessile. This appears also to be near *H. macrostemon* H. et A., which I have seen in the Herbarium at Hongkong, but so far as I can judge from the floral characters of the species given in HOOK. et ARN. Bot. Beech. Voy. p. 192, they are not at all similar, but very distinct.

Mussænda LINN.

Mussænda kotcensis HAYATA sp. nov.

Mussænda macrophylla MATSUM. in Tōkyō Bot. Mag. XIV. p. 147; MATSUM. et HAYATA Enum. Pl. Formos. p. 188, (non WALL.).

Herba suffrutescens, ramis teretibus, subangulatis, a centro medullosis, lenticellis oblongis parce dispersis, ad nodos barbatis, cæterum glabris. Folia majuscula, membranacea vel tenuiter

chartaceo-membranacea, oblonga vel obovato-oblonga, 20-24 cm. longa, 8-10 cm. lata, apice cuspidato-acuminata, basi cuneato-acuta, integra utraque ad costas et venas parce hirsuta, cæterum glabra, venis lateralibus utraque latere 9-10, venis basilaribus angulo acuto divergentibus, a margine parallelibus, mediocribus ad costas angulo 40° recto-ascendentibus, sursum arcuatis, subtus pallidissima, petiolis 5 cm. longis, stipulis interpetiolaribus latissimis, 12 mm. latis, 8 mm. longis, ad insertionem minute extus deorsum longe barbatis, intus glabris sed setosis, (setis digitiformibus numerosis), apice, 2-fidis, lobis apice divergentibus margine ciliolatis, reflexis. Cymæ terminales 10 cm. longæ, totiusque latæ, foliis floralibus 1, vel 2, majusculis, albicantibus, membranaceis, ovato-cordatis, 11 cm. longis, $7\frac{1}{2}$ cm. latis, apice cuspidato-acutis, basi rotundato-cordatis, vel rotundato-acutis, ima breve attenuatis, margine ciliolatis, utraque ad costas et venas parce hirsutis, cæterum glabris, distincte 5-nerviis, nervis angulo acuto divergentibus, bracteis palmatim trilobatis, extus dense hirsutis intus parcissime hirsutis, ad insertionem dense hirsutis lobis centralibus angusto-acutis, longioribus, 8 mm. longis, 2 mm. latis, lobis lateralibus ovato-acutis brevioribus. Calyx dense hirsutus, cylindrico-obconicus, 5 mm. longus, lobis triangulari-lanceolatis, 8 mm. longis 3 mm. latis, acuminatis, extus dense hirsutis, intus parce pubescentibus. Alabastrum floris, corolla cylindrica, apice leviter dilatata acuta, 5-costata, extus dense hirsuta, pilis longis 2 mm. longis, tubo 23 mm. longo, intus densissime villosa-barbato prope basin glabro. Corollæ limbus patens 5-fidus, lobis ovatis, 5 mm. longis, cuspidato-acutis, extus hirsutis, intus glabris, exsiccato fusco-rubrescentibus. Stamina prope basin tubi corollæ inserta, filamentis brevioribus $1\frac{1}{2}$ mm. longis, antheris linearibus $5\frac{1}{2}$ mm. longis, apice connectivis leviter productis obtusis, basi apice locelli appendiculatis, appendiculis obtusis.

Stylus brevior 3 mm. longus apice 4-5-fidus. Discus annularis.

HAB. Kōtōshō, leg. K. MIYAKE, Nov. 1899; leg. S. KUSANO, 1909.

Near *M. macrophylla* WALL. but differs from it in having smaller bracts, much larger floral leaves, and smaller calyx-lobes.

Guettarda LINN.

Guettarda speciosa LINN.; HOOK. f. Fl. Brit. Ind. III. p. 126; WIGHT Ic. Pl. Ind. Or. t. 40; FORBES et HEMSL. Ind. Sin. I. p. 384.

HAB. Pratas: leg. T. KAWAKAMI, 1907.

DISTRIB. Common on the shores of the Tropics.

Pæderia LINN.

Pæderia tomentosa BLUME form. **tenuissima**.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908.

OBSERV. Extremely delicate form of *P. tomentosa*.

Nertera BANKS et SOL.

Nertera nigricarpa HAYATA Fl. Mont. Formos. p. 115.

This is very near *N. depressa* BANKS; but differs from it in having black coloured berries, and in the leaves, quite obtuse or even rounded at the apex, and slightly cordate at the base. *N. depressa* has yellow coloured fruit, and the leaves are more or less acute at the apex and much more cordate at the base.

Coprosma FORST.

Coprosma Kawakamii HAYATA sp. nov. Rami validi, tetra-

goni, longitudinaliter rugulosi, cinerascetes, nigricantes, ramulis validiusculis divaricatis, fusco-nigricantibus, tenuibus tetragonis 2-3 cm. longis, $1\frac{1}{2}$ mm. in sectione, pulvinis approximatis foliorum cruciatim dispositorum obtectis, pulvinis pulviniformibus $\frac{1}{2}$ mm. longis $\frac{2}{3}$ mm. latis, cum petiolo articulatis. Alabastrum foliorum pyramidale, tetragonum, perulis oblongo-triangularibus 2 mm. longis, $1\frac{1}{3}$ mm. latis, apice acutis dorso carinatis, persistentibus. Folia opposita versus apicem ramulorum 4-6-cruciatim disposita, obovata, obspathulata, vel obovato-oblonga, crassiuscula, 1 cm. longa, 5 mm. lata, apice obtuso-acuta, vel rotundata, vel cuneato-rotundata, basi acuta, vel cuneato-acuta, utrinque glabra, supra costis venisque impressis, venulis impresso-reticulatis, subtus costis prominente venis venulisque tenuiter elevatis, rubescentibus distincte reticulatis, pagine subtus albescencia, subtus ad ramificationem venarum membranis minutis rubescentibus instructa, margine integerrima leviter reflexa, petiolis $1\frac{1}{2}$ -2 mm. longis intus concavis extus convexis, basi cum pulvino articulatis. Flores ad axillas foliorum superiorum longe pedunculati, pedunculis solitariis, 7 mm. longis, glabris, apice 4-bracteatis, 2-alteris majusculis angustatis 3 mm. longis 1 mm. latis, dorso carinatis, 2-alteris minoribus quadrangularibus 1 mm. longis $\frac{2}{3}$ mm. latis apice truncatis margine longe ciliatis, floribus geminis ad apicem pedunculorum sessilibus. Calycis limbus cupuliformis irregulariter dentatus, margine parce ciliatus, disco annulari.

HAB. in monte Morrison, ad 12500 ped. alt., leg. T. KAWAKAMI et U. MORI, 1906, Oct. (No. 2257).

Near *Coprosma myrcillifolia* Hook. f. and also *C. parviflora* Hook. f.; but differs from both in having obovate leaves and long stalked fruit.

Rubia LINN.***Rubia cordifolia* LINN. var *stenophylla* FRANCH.***Rubia lanceolata* HAYATA FL. MONT. FORMOS. p. 117.

I have compared my species with FRANCHET'S variety at Kew and found that they are quite identical. The variety is very like the type.

Galium LINN.

***Galium echinocarpum* HAYATA sp. nov.** Procumbens ad nodos radicans, caulibus angularibus, glabris vel nitidis, internodiis 2 cm. longis. Folia 6-verticillata, oblanceolata, sessilia, 12 mm. longa 3½ mm. lata, apice rotundato-mucronata, mucronibus ½ mm. longis, basia attenuata, margine remote serrato-ciliolata, supra pilis paucis ascendentibus dispersa, subtus glabra. Cymæ terminales paucifloratæ, ternatim ramosæ. Flores pedicellati. Calycis tubus ovoideus ⅔ mm. longus, pilis falcatis dense obtectus, limbus obsoletus. Corolla rotata, 2 mm. in diametro, lobis 4, ovatis 1 mm. longis ⅔ mm. latis, apice obtusis. Stamina 4, corollæ lobis alterna ½ mm. longa, stylus 1 mm. longus, apice 2-fidus, stigmatibus capitellato. Fructus didymus orbicularis 1½ mm. in diametro, pilis 1 mm. longis rectis apice falcatis dense obtectus.

HAB. in monte Morrison, ad verticem 13094 ped. alt., leg. S. NAGASAWA, Nov. 1906, (No. 755); ibidem 9000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1805).

Somewhat near *G. trividum* MICHX.; but greatly differs in having much smaller leaves with ascendent hairs. Comes near *G. Aparine* LINN. from which this is distinguishable by the ascending but not retrorted, hairs.

Galium rotundifolium LINN. ; DC. Prodr. IV. p. 599 ; Hook. f. Fl. Brit. Ind. III. p. 204.

HAB. Randaizan, leg. B. HAYATA, Aug. 1908, (No. 7103) ; Arizan, in monte Morrison, ad 11000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1994).

DISTRIB. Europe, India, N. Africa, Western Asia.

OBSERV. Perennis procumbens, caulibus angularibus hispidulis, pilis retrorsis, internodiis 3 cm. longis. Folia 4-verticillata, sessilia oblonga vel ovata, 13 mm. longa, 6 mm. lata, apice breve acuta, basi abrupte attenuata, trinervia, margine subintegra ciliolata, utrinque pagine ad nervos pilis longioribus $\frac{1}{2}$ mm. longis divaricatim et retrorsim dispositis, cæterum pilis brevioribus pauce dispersa. Cymæ axillares paucifloratæ, ternatim ramosæ, ramis divaricatis. Flores ad apicem ramorum cymarum 5-verticillatim dispositi, pedicellati, pedicellis circ. 1 mm. longis. Calycis tubus glaber, circ. $\frac{1}{2}$ mm. in diametro, pilis falcatis dense obtectus. Corolla rotata 4-lobata, $1\frac{1}{2}$ mm. in diametro, lobis ovatis $\frac{1}{2}$ mm. longis, apice obtusis. Stamina 4, stylus $\frac{1}{2}$ mm. longus, profunde 2-fidus, stigmatate capitellato. Fructus late didymus obcordatus, 1 mm. longus $1\frac{2}{3}$ mm. latus, pilis rectis divaricatis falcatis dense obtectus.

Valerianææ.

Triplostegia WALL.

Triplostegia glandulifera WALL. "Cat. 436"; DC. Prodr. IV. p. 6 ; CLARKE in Hook. f. Fl. Brit. Ind. III. p. 215 ; FORBES et HEMSL. Ind. Fl. Sin. I. p. 399.

Hæckia Aschersoniana ENG. et GR. in DIELS Fl. Centr. China p. 598 ; HAYATA in Tōkyō Bot. Mag. XX. p. 57, et Fl. Mont. Formos. p. 118.

DISTRIB. China : Hupeh, Szechuen ; North India.

[For comment as to this being referred to this genus and family, see p. 9, under Introduction].

Compositæ.

Vernonia SCHREB.

Vernonia Kawakamii HAYATA sp. nov. Herba humilis, pilosissima 10 cm. alta, basi suffrutescens, caulibus sursum foliosis, foliis approximatis, deorsum subnudis cicatricibus foliorum notatis, pilis strigosis dense obtectis. Folia alterna spiraliter disposita, spathulata, cum petiolis 33 mm. longa, 7 mm. lata, apice obtusa, basi angustata, in petiolum 17 mm. longum attenuata, utraque pagine pilosissima supra nervis impressis subtus elevatis, venis primariis utrinque latere 3, venis secundariis paucis transversis. Capitula corymbosa vel cymoso-racemosa, globosa 5 mm. longa. Involucrum late campanulatum, 4 mm. longum, 5 mm. in diametro, bracteis 4-5-seriatis, intimis longissimis, obovatis acutis margine denticulatis, exterioribus gradatim brevioribus. Receptaculum subplanum foveolatum. Corolla æqualis regularis, tubo tenui basi æquali, limbo campanulato, tubo latiori, æquilongo, anguste 5-fido. Antheræ apice appendiculatæ, basi sagittatæ, auriculis obtusis. Styli rami subulati acutiuseculi hirtelli. Achænia callo basilari distincto imposita, 3-5-costata, costis valde prominentibus, apice truncata, annulis imposita, inter costas glandulosa glabra. Pappus uniseriatus, caduceissimus, setis scabris subæquantibus paucis.

HAB. Kōshūn : Garanbi, leg. T. KAWAKAMI.

The present plant was provisionally named *V. maritima* by myself which name is mentioned in MATSUM. et HAYATA Enum.

Pl. Formos. p. 202. The description of the plant was not published previously. Recently another plant is described by Mr. E. D. MERRILL, under the same name as *V. maritima*. I, therefore, venture to call the present plant by another name *V. Kawakamii* the description of which I have here given. It is very near *V. maritima* of Mr. MERRILL, still it is quite distinguishable by the shape of achæmium.

Lagenophora CASS.

Lagenophora Billardieri CASS.; BENTH. Fl. Hongk. p. 173; Hook. f. Fl. Brit. Ind. III. p. 248; FORBES et HEMSL. Ind. Fl. Sin. I. p. 407; MAKINO in Tōkyō Bot. Mag. XX. p. 4.

HAB. Nantō: Randaisan, leg. U. MORI, (No. 3154).

DISTRIB. Hongkong; Loo-choo islands; Japan. Khasia mountains in Eastern India, Malay archipelago, and Australia.

Myriactis LESS.

Myriactis longipedunculata HAYATA.

Myriactis Wightii HAYATA Fl. Mont. Formos. p. 124 (non. DC.).

Herba erecta 40 cm. alta, basi foliata, flexuosa, caulibus angulatis striatis. Folia a basi caulis approximate alternatim disposita, inferiora laciniato-lobata, spathulata in ambitu, 7 cm. longa, 3 cm. lata, lobis utraque latere 2, oppositis, transversim divergentibus, rachis (partibus centralibus) linearibus, 3 mm. latis, lobo terminali orbiculari, dentato-lobulato, dentibus apice rotundato-mucronatis, sinibus inter lobum terminalem et lobos laterales superiores truncatis latioribus 6 mm. latis, lobis superioribus lateralibus obovato-cuneatis, lobulato-dentatis, (dentibus mucronatis), 13 mm. longis 1 mm. latis,

lobis infimis angustatis 1 cm. longis 5 mm. latis, acutis paucidentatis, a lobo superiore 9 mm. remotis, infra lobos infimos linearia 33 mm. longa, 3 mm. lata, basi dilatata, caulem amplectantia, (folia superiora remota, mutabilia in magnitudine, minora, lobo terminali generaliter angustiori) utrinque ad marginem costas venasque breve hirsuta, supra paucissime hirsuta, subtus pallidissima. Capitula late globosa, 7 mm. in diametro, axillaria solitaria vel terminalia, longissime pedunculata, pedunculis rectis ascendentibus 15 cm. longis, bracteis minutis 2-3 instructis. Involucrum patens, bracteis 5-6-seriatis, patente-reflexis, angustato-ovatis, 3 mm. longis, 1 mm. latis, sursum ciliolato-laciniatis, receptaculo lato convexo, infra marginem subcontracto, elevato, nudo. Corolla ♀: liguliformis parva, tubo $\frac{1}{3}$ mm. longo, limbo $\frac{2}{3}$ mm. longo, apice obtuso, liguliformi, extus basi papilloso. Styli $\frac{1}{2}$ mm. longi, apice 2-lobati. Corolla ♂ regularis, tubo $\frac{1}{2}$ mm. longo, limbo campanulato $\frac{2}{3}$ mm. longo, 5-lobato, lobis ovatis obtusis, marginatis; antheris oblongis, apice obtusis basi truncato-obtusis, $\frac{1}{2}$ mm. longis; stylo 1 cm. longo, ramis $\frac{1}{3}$ mm. longis, lanceolatis. Achænia oblongo-obovoidea, $1\frac{1}{2}$ mm. longa, $\frac{2}{3}$ mm. lata, lævia, apice truncato-contracta, basi obtusa, compressa prominente 2-costata.

HAB. Tōzan, leg. G. NAKAHARA, Oct. 1906.

The present plant, which was erroneously referred to *M. Wightii* DC. by myself, is quite different from that species. This differs from any other species of the genus preserved at Kew. The nearest I have found at Kew is *M. Wallichii* DC.

Blumea DC.

Blumea conspicua HAYATA sp. nov.

Blumea spectabilis HAYATA in MATSUM. et HAYATA Enum. Pl.

Formos. p. 209, (non. DC.). Herba validiuscula, altissima; caulis a centro medulosus, teres, multi-striatus, tenuiter pubescens, vel subglaber, rectus. Folia radicalia ignota, caulina oblanceolata, sessilia, 19 cm. longa, 5 cm. lata, exsiccato nigricantia, apice breve cuspidato-acuta, basi longe attenuata, margine remote serrulata, (serulis remotis, angustatis, majusculis iis minoribus alternis, majusculis 2 mm. longis, cuspidatis, minoribus 1 mm. longis, setiformibus), supra glabra, subtus sub lente minute albo-punctata, ad costas parcissime pubescentia. Paniculae laxiflorae, axillares vel terminales, si axillares 30 cm. longae, pedunculis 14 longis, bracteis lanceolatis remote serrulatis, pedicellis circ. 1 cm. longis. Involucrum late patento-campanulatum basi depresso-rotundatum 8 mm. longum, bracteis circ. 5-seriatis, pubescentibus, extimis minutis acuminatis, 2 mm. longis, $\frac{2}{3}$ mm. latis, intimis linearibus 1 cm. longis, $\frac{1}{3}$ mm. latis, margine apice ciliolatis. Fl. ♀: corolla filiformis $6\frac{1}{2}$ mm. longa, irregulariter 4-dentata, styli ramis exsertis, circ. 1 mm. longis, filiformibus. Fl. ♂: corolla tubuloso-campanulata, $6\frac{1}{2}$ mm. longa, 5-lobata, lobis $\frac{2}{3}$ mm. longis, triangularibus obtusis, marginatis, dorso papillosis. Stamina medio tubi collaræ affixa, cum filamentis 6 mm. longa, glabra, antheris linearibus 3 mm. longis, apice appendiculatis truncatis, basi longe caudatis. Achænia cylindrico-oblonga, $1\frac{2}{3}$ mm. longa, $\frac{1}{2}$ mm. lata, multicostata, ad costas hirsuta, leviter recurvata, apice truncata, pappis coronata, basi obtusa, annulis deciduis instructa. Pappi setæ 6 mm. longæ, scabriusculæ, rubræ, persistentes.

HAB. Formosa. loco non indicato.

This differs from *B. spectabilis* DC. in having dentate leaves and larger heads.

Gnaphalium LINN.

Gnaphalium lineare HAYATA Fl. Mont. Formos. p. 131, t. XIX.
Near *G. involucratum* FORST.; but differs from it in having much narrower leaves.

Gnaphalium niitakayamense HAYATA Fl. Mont. Formos. p. 132.
Very near *G. nubigena*, but differs from it in having obovate leaves and shorter ovate bracts.

Carpesium LINN.

Carpesium acutum HAYATA Fl. Mont. Formos. p. 133.
Near *C. triste* MAXIM. from which this differs in the shape of the involueral bracts. The distinction is, however, not very clear.

Cotula LINN.

Cotula anthemoides LINN.; BENTH. Fl. Hongk. p. 185; Hook, f. Fl. Brit. Ind. III. p. 316; FORBES et HEMSL. Ind. Fl. Sin. I. p. 439.

DISTRIB. Hongkong, Kwangtung, Szechuen, North and South Africa and India.

I have seen the species in the Herbarium at Hongkong, and remember that I saw the plant in Formosa. It is not yet represented in the Herbarium at Tōkyō.

Artemisia LINN.

Artemisia niitakayamensis HAYATA Fl. Mont. Formos. p. 136, t. XX.

Very near *Artemisia arctica* LESS., but differs from it in having much thinner involucreal bracts and in many other points.

Senecio LINN.

Senecio angustifolius HAYATA sp. nov. Herba validiuscula, 1-2 m. alta, caulibus teretibus glabris striatis, pauci-ramosis. Folia alterna subsessilia, lanceolata, 10 cm. longa, 1 cm. lata, apice acuminata, basi attenuata, remote serrulata, supra costis venisque impressis, subtus venis leviter costis prominente elevatis, utrinque glabra subtus pallidiora. Capitula cymosa, cymis terminalibus 10 cm. longis totiusque latis, pedicellis 1-2 cm. longis, bracteatis, bracteis linearibus 5 mm. longis. Involuerum campanulatum 6 mm. longum, bracteis 1-seriatis, lanceolatis $5\frac{1}{2}$ mm. longis, 1 mm. latis margine hyalinis apice coloratis, basi additis bracteolis minutis linearibus 2 mm. longis. Fl. ♀: ligulati, marginales; corolla 12 mm. longa, tubo 4 mm. longo, apice extus hirsuto, limbo liguliformi 8 mm. longo, $1\frac{1}{2}$ mm. lato, 6-7-nervio, patente, apice minute 3-dentato; stylo 6 mm. longo, apice bifido, ramis complanatis truncatis recurvis. Fl. ♂: corolla regularis tubuliformis 6 mm. longa, tubo 3 mm. longo, limbo dilatato apice 5-lobato, lobis recurvis; styli ramis apice dilatatis penicillatis. Achænia 5-costata, pappus albus.

HAB. Randaizan, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 7058); in monte Morrison, ad 8500 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2072); Ganzan, in montibus Morrison, ad 9141 ped. alt., leg. S. NAGASAWA, Oct. 1905, (Nos. 643 et 780); in Montibus Centralibus, ad 10000 ped. alt., leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 2205).

Senecio intermedius HAYATA (in sched.) in MATSUM. et HAYATA Enum. Pl. Formos. p. 208.

Herba validiuscula 60-80 cm. alta, pauce ramosa vel simplex, glabra, striata, teres. Folia caulina alterna, petiolata, orbicularia in circumscriptione, 15-30 cm. in diametro, peltata, palmatim et lacerate multifida, segmentis lanceolato-linearibus acuminatis 2-3-laceratim fidis, remote serratis, utrinque glabra, subtus pallidiora. Capitula paniculato-cymosa.

HAB. in collibus Biōritsu, leg. U. FAURIE, 1903, (No. 202).

Differs from *S. Krameri* F. et SAV. in having linear lobes of the leaves and cymose inflorescence. Also near *S. aconitifolius* TURCZ., but differs from it in the heads, inflorescence and leaves.

Senecio japonicus SCH. Bip. var. **scaberrimus** HAYATA, (in sched.) in MATSUM. et HAYATA Enum. Pl. Formos. p. 208. Folia caulina longe petiolata, late cordata in circumscriptione, 11 cm. longa, 15 cm. lata, palmatim profunde 5-7-fida, segmentis lanceolatis longe laceratis, lobis lanceolatis serratis, serris acuminatis, palmatim 5-nervia, utraque pagine paleacco-scaberrima. Flores ut typicæ.

HAB. Formosa.

Differs from the type in having much lacerate lobes of the leaves which are very scabrous on both surfaces.

Senecio morrisonensis HAYATA sp. nov. Herba gracilis glabra teres, caulibus simplicibus. Folia alterna, sessilia, pinnatifida, oblongo-lanceolata in circumscriptione 13 cm. longa, 5 cm. lata, acuminata, basi attenuata, lobis remotis alternis lanceolatis 2 cm. longis, 4 mm. latis, 3-lobulatis vel tridentatis, sinibus inter lobos truncatis vel rotundatis 1 cm. longis, lobis terminalibus acuminatis

lineari-lanceolatis grosse serratis. Capitula laxe cymosa, cymis 5 cm. longis, 9 cm. latis, pedicellis 3 cm. longis, secus pedicellum 3-4 bracteatis, bracteis linearibus 5 mm. longis, $\frac{1}{2}$ mm. latis. Involucrum campanulatum, 7 mm. longum, bracteis 1-seriatis linearibus $6\frac{1}{2}$ mm. longis 1 mm. latis, margine hyalinis, basi involucri 3-4 bracteolatis, bracteolis filiformibus 4 mm. longis. Fl. ♀ marginales 5-6, liguliformes; corolla tenuis 12 mm. longa, tubo gracili, 3 mm. longo, limbo ligulato 9 mm. longo, 1 mm. lato lineari, apice obtuso minute 3-dentato, stylo 6 mm. longo, apice 2-fido, ramis sub-teretibus, truncatis. Fl. ♂: tubuliformes regulares 6 mm. longi, limbis 5-lobatis, lobis oblongis obtusis $1\frac{1}{2}$ mm. longis; styli rami complanati truncati penicillati. Receptaculum leviter concavum læve. Achænia lævia, linearia, $3\frac{1}{2}$ mm. longa, $\frac{3}{4}$ mm. lata, 5-costata, apice truncata, basi leviter contracta, pappus albus 7 mm. longus.

HAB. in monte Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI at U. MORI, Oct. 1906, (No. 2270).

Near *S. graciliflorus* DC. from which the present plant differs in being perennial and in having sessile leaves which are divided into dentate lobes; also near *S. nikænsis* MIQ. and *S. Exul* HANCE., but differs from both in having much larger heads.

Senecio taitænsis HAYATA sp. nov. Herba validiuscula, glabra, 40-50 cm. longa, caulibus pauci-foliatis. Folia radicalia, petiolata, ovata, 10 cm. longa, 7 cm. lata, apice obtusa, basi abrupte attenuata, crassiuscula, margine subintegra, vel obscure remoteque undulata, undulis breve apiculatis, utraque glabra, caulina alterna oblonga, 9 cm. longa, 3 cm. lata, apice obtusa basi breve attenuata, remote denticulata. Capitula apice caulium in dense cymas disposita. Involucrum late campanulatum, 8 mm. longum, 15 mm. in diametro, bracteis uniseriatis æqualibus lanceolatis scariosis imbri-

catis apice leviter reflexis 8 mm. longis $1\frac{1}{2}$ mm. latis margine hyalinis. Receptaculum convexum planum, stipitibus plerisque brevibus instructum. Flores majusculi, ligulis plerumque 13, patentibus. Corolla fl. ♀. ligulata, tubo brevi, $1\frac{1}{2}$ mm. longo, lamina lineari, $6\frac{1}{2}$ mm. longa, $1\frac{1}{2}$ mm. lata, apice 3-dentata, dentibus obtusis, stylo $2\frac{1}{2}$ mm. longo, apice 2-fido, ramis truncatis. Fl. ♂: regulares tubulosi, limbo angusto elongato apice ampliato, 4 mm. longo, 5-lobato, lobis lanceolatis obtusis 1 mm. longis. Antheræ basi obtusæ apice appendiculatæ; styli rami complanato-teretes apice subdilatasi truncati. Achænia 10-costata; pappus copiosus albus scaber.

HAB. Taitō: Taruko, leg. G. NAKAHARA, Jan. 1906, (No. 691).

Near *Senecio flammeus* DC. from which this differs in having much broader leaves. Also near *S. Plerotii* MIQ. but differs from it by the shape of the leaves.

Senecio taiwanensis HAYATA sp. nov. Herba validiuscula, 50 cm. longa, simplex, glabra. Folia alterna sessilia, lanceolata, 14 cm. longa 3 cm. lata, apice acuminata, basi attenuata, margine dentata, dentibus horizontaliter divaricatis acutis, costis supra sulcatis, subtus elevatis, utrinque glabra, subtus pallidiora. Capitula cymosa terminalia, cymis 5 mm. longis, totiusque latis pedicellis 2 cm. longis, bracteis linearibus 2 mm. longis. Involucrum campanulatum, 8 mm. longum, bracteis lineari-lanceolatis 8 mm. longis, 2 mm. latis, margine hyalinis apice obtusis coloratis, additis bracteolis linearibus. Fl. ♀: ligulati, marginales, 5-6; corollæ tubo 4 mm. longo, extus sursum hirsuto, limbo liguliformi oblongo-lineari, 13 mm. longo, $1\frac{3}{4}$ mm. lato, apice truncato emarginato breve 3-dentato, 7-nervio. Fl. ♂: corolla tubuliformis, 8 mm. longa, tubo 4 mm. longo, limbo dilatato, $4\frac{1}{2}$ mm. longo, apice 5-lobato, lobis oblongis, styli ramis recurvis truncatis penicillatis. Achænia 10-costata, pappus albus, 9 mm. longus.

HAB. in monte Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 2124); Shukorankei, in monte Morrison, ad 11157 ped. alt., Nov. 1905, (No. 616).

Somewhat near *S. nemorensis* LINN., but differs in both serration and venation of the leaves.

Senecio tozanensis HAYATA sp. nov. Herba validiuscula, 1-2 m. alta, caulibus pauci-ramosis, glabris obscure striatis. Folia alterna, petiolata, lanceolata, 20 cm. longa, 5 cm. lata, apice acuminata, basi acuta, grosse dentata, dentibus horizontaliter patentibus acutis apiculatis triangularibus 4 mm. longis, sinibus truncato-obtusis, costis supra sulcatis, subtus prominentibus, petiolis $2\frac{1}{2}$ cm. longis, sulcatis. Capitula laxe paniculato-cymosa, paniculis ramosis, pedicellis gracilibus 5 cm. longis, bracteolis minutis. Involucrum tubuloso-campanulatum, 8 mm. longum, bracteis 1-seriatis, linearibus, margine hyalinis apice acutis corolatis, basi additis bracteolis minutis 5, linearibus 2 mm. longis. Receptaculum setosum, planum. Fl. ♀ : ligulati, marginales 5-6; corolla liguliformis 20 mm. longa, tubo 5 mm. longo, extus sursum hirsuto, limbo liguliformi patente, apice recurvo, lineari, 15 mm. longo, $1\frac{1}{2}$ mm. lato, 3-4-nervio, apice truncato emarginato. Fl. ♂ : corolla tubuliformis, regularis, 7-8 mm. longa, tubo basi leviter dilatato, 4 mm. longo, limbo dilato, 4 mm. longo apice 5-lobato, lobis recurvis. Achænia 10 costata, pappus albus 8 mm. longus.

HAB. Tōzan, in montibus Morrison, leg. G. NAKAHARA, Nov. 1906.

Cirsium DC.

Cirsium chinense GARD. et CHAMP. in "Hook. Kew Journ. Bot. I. p. 323"; WALP. Ann. II. p. 945; BENTH. Fl. Hongk. p. 168.

Cnicus chinensis MAXIM. in M \acute{e} l. Biol. IX. p. 331; FORBES et HEMSL. Ind. Fl. Sin. I. p. 461.

Cirsium oreithales HANCE in WALP. Ann. II. p. 944.

Cnicus sinensis CLARKE, in HOOK. f. Fl. Brit. Ind. III. p. 364.

HAB. in monte MORRISON, leg. G. NAKAHARA, 1906; Taitō: Bokusekikaku, leg. T. KAWAKAMI et U. MORI, Dec. 1906, (No. 1832); Taitō: Giran, leg. G. NAKAHARA, Jan. 1906, (No. 781); Burōkonsha, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1741).

DISTRIB. China, Eastern India and Birma.

OBSERV. Herba erecta, 60 cm. alta, pauce ramosa, primum indumento lanato oblecta, demum glabrata, caulibus valde striatis teretibus. Folia alterna, sessilia linearia, 8 cm. longa, 4 mm. lata, apice aristato-acuminata, basi ad caulem continua, margine remote dentata, dentibus 2-3 approximatis apice spinosis, inter dentes 1 cm. longis spinulosis, supra glabrata, subtus dense albo-lanata, venis primariis utrinque latere 2-3, furcatis, ramis ad apicem dentium attingentibus. Capitula terminalia solitaria, longe pedunculata. Involuerum globosum $1\frac{1}{2}$ cm. in diametro bracteis ∞ -seriatis intimis longissimis linearibus 14 mm. longis, $1\frac{1}{4}$ mm. latis apice dilatatis acutis reflexis scariosis exterioribus gradatim brevioribus extimis brevissimis subulatis (cum spinis) 6 mm. longis basi $1\frac{1}{2}$ mm. latis, crassiusculis apice aristatis, spinis validis 1 mm. longis. Corolla 2 cm. longa, tenuis tubuliformis apice alto lobata, lobis linearibus $5\frac{1}{2}$ mm. longis.

Cirsium Kawakamii HAYATA sp. nov. Caulis teres, numeroso-striatus, exsiccato nigricans. Folia alterna sessilia, amplexicaulia, lacerata, 23 cm longa, cum lobis 15 cm. lata, utraque latere 5-6-laceratis, lobis divaricatis, recto-patentibus, 8 cm. longis 1 cm. latis, mediocribus longissimis, partibus centralibus (rhachibus)

4 cm. latis, sinibus inter lobos 2 cm. latis, truncatis, lobis spinosis, 2-3-lacerato-dentatis, apice loborum dentiumque longe spinosis, spinis rectis 1 cm. longis, pagine inermia. Capitulum ad axillas foliorum superiorum solitarium, $2\frac{1}{2}$ -3 cm. longum, totiusque latum, ad apicem pedunculorum fere cernuum, longe pedunculatum, (pedunculo gracillimo, 8 cm. longo, parce pubescente), ad basin involucrorum 1-bracteatum, bracteis lanceolatis lacerato-spinosis cum spinis 2 cm. longis. Involucrum late campanulatum, basi truncato-rotundatum 18 mm. longum, bracteatum, bracteis involucri 6-7-seriatis rectis, extimis brevissimis setiformibus, basi leviter dilatatis 8 mm. longis, mediocribus longioribus lineari-lanceolatis, 15 mm. longis apice aristatis, margine ciliato-hirsutis, intimis longissimis lineari-angustatis, 17 mm. longis apice breve aristatis, brevissime duplicato-reflexis, basi attenuatis, margine et dorso tenuiter brevissime pubescentibus, vel glabris. Receptaculum subplanum vel plano-convexum, læve leviter fasciculis numerosis setæ obtectum, setis circ. 7 mm. longis. Corollæ tubus 12 mm. longus, filiformis, limbo tubuloso-campanulato, 10 mm. longo, profunde 5-lobato, lobis linearibus 5 mm. longis, $\frac{2}{3}$ mm. latis, leviter marginatis, utrinque glabris, apice obtuso-acutis. Stamina longe exserta, ad faucem tubi corollæ affixa, cum filamentis 12 mm. longis, filamentis 6 mm. longis tenuiter barbatis, antheris linearibus 7 mm. longis, apice appendiculatis, appendiculis obtuso-acutis, basi caudatis, caudicibus fimbriato-laceratis. Stylus filiformis 28 mm. longus basi clavatus, ramis $3\frac{1}{2}$ mm. longis linearibus complanatis, apice truncatis, infra ramos leviter tumidus brevissime tomentosus; stylophora obconica, circ. 1 mm. longa. Achænia oblongo-obovoidea, 4 mm. vel ultra longa 5-costata. Setæ plumosæ 16 mm. longæ rubræ basi annulo affixæ.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, Oct. 1905, (No. 2279).

Near *C. effusus* MAXIM., but differs from it in having much larger involucre bracts. Also near *C. Wallichii* DC. from which my plant is distinguishable by its long pedunculate heads and larger involucre bracts.

Ainsliaea DC.

Ainsliaea okinawensis HAYATA sp. nov. Caulis teres exsiccato sulcatus, ferrugineo-tomentosus, 40 cm. altus. Folia versus sursum caulem approximate disposita, longe petiolata, ovato-cordata, vel ovata, circ. 10 cm. longa 6 cm. lata, apice acuta, basi cordata, vel rotundata, ima subito acuta, margine remote undato-repandato-serrulata, undis 7 mm. latis, apice mucronato-aristatis, aristis 1 mm. longis, supra glabra, subtus ad costas et venas fulvo-hirsuta, caeterum subglabra subtus albo-rubescens. Capitula racemosa, racemis inter folia terminalia subverticillata generaliter geminis, cum pedunculis 20 cm. longis, rhachibus 12 cm. longis. Capitula sessilia 3-florata, cylindrico-campanulata, 1 cm. longa, bracteis 7-seriatim dispositis, extimis brevissimis, intimis longissimis, extimis triangularibus 1 mm. longis, intimis, oblanceolatis, 1 cm. longis utrinque acutis, 1-nerviis. Corollae tubus 5 mm. longus, limbo liguliformi, 6 mm. longo 4-nervio, apice profunde 5-lobato, lobis linearibus 3 mm. longis $\frac{1}{2}$ mm. latis, marginatis. Stamina exserta, cum filamentis $5\frac{1}{2}$ mm. longa, filamentis 3 mm. longis glabris, antheris linearibus $4\frac{1}{2}$ mm. longis apice truncatis basi profunde sagittatis auriculatis, leviter laceratis vel integris; stylus filiformis 11 mm. longus, basi ob-cupuliformis, apice 2-fidis, lobis truncatis complanatis. Achænia obconico-cylindrica, 3 mm. longa, apice 1 mm. in diametro, subcompressa, dense

villosa-hirsuta, apice truncata, pappi setæ plumosæ, 7 mm. longæ, basi annulo affixæ.

HAB. Okinawa, leg. Y. TASHIRO, Aprili. 1887.

Near *Ainsliæa aptera* DC., but differs from it in having slightly cordate leaves and in the shape of the involucre.

Ainsliæa secundiflora HAYATA sp. nov. Herba perennis, pauce lanata, demum glabrata, 30 cm. alta. Folia omnia radicalia, longe petiolata cordata in circumscriptione, 5 cm. longa $4\frac{1}{2}$ cm. lata, palmatim 5-lobata, basi profunde cordata, ad petiolum acuta, lobis basilaribus auriculiformibus apice obtusis vel rotundatis, lobis lateralibus ascendentibus oblongis $1\frac{1}{2}$ cm. longis 12 mm. latis obtusis, sinibus inter lobos rotundatis, lobo terminali longe triangulari 3 cm. longo, 2 cm. lato, apice obtuso, margine grosse undulata, apice undularum et loborum breve mucronata, mucronibus 1 mm. longis, supra glabra, subtus pallidiora, ad nervos lanato-tomentosa, petiolis 8 cm. longis gracillimis hispidis, pilis patentibus. Scapi 25 cm. longi, aphylli, sursum leviter arcuati, gracillimi, hispiduli, partibus florigeris 9 cm. longis, floribus spicatis secunde dispositis. Involucrum cylindrico-campanulatum, 1 cm. longum, bracteis ∞ -seriatis, intimis longissimis linearibus 8 mm. longis $1\frac{1}{2}$ mm. latis, 3-nerviis, apice obtusis, margine hyalinis, subplicatis, vel subplicato-teretibus, exterioribus gradatim brevioribus, extimis brevissimis late ovatis obtusis 3-nerviis, additis bracteolis minutis secus pedicellum brevem 4-5 dispositis. Corolla 12 mm. longa, tubuloso-campanulata, lobis linearibus 5 mm. longis, apice acutis. Achænia angustata apice truncata, basi attenuata, adpresse hirsuta, pappus 7 mm. longus ruber, plumosus.

HAB. Kōshūn : Botanrosha, leg. G. NAKAHARA, Dec. 1906, (No. 922).

The present plant is just intermediate between *A. cordifolia* FR. et SAV. and *A. apiculata*; It differs from the former in having palmately lobed leaves, and from the latter, in having secund spikes.

Crepis LINN.

Crepis formosana HAYATA sp. nov. Herba humilis, 7 cm. alta. Folia omnia radicalia cæspitosa, spathulato-lineararia, lyrata, cum petiolis 7 cm. longa, 2 cm. lata, apice rotundata, basi attenuata ad petiolum 1-1½ cm. abeuntia, utraque latere lyrato-lobata, margine remote mucronato-serrulata, lobo terminali majusculo, inferioribus minoribus, infimis minutis, lobis lateralibus descendentibus rotundatis, 1 cm. longis, lobis infimis acutis 2 mm. longis, membranacea, supra minute punctato-pubescentia, subtus brevissime villosopubescentia. Capitula ad apicem caulis aphylli paniculata, paniculis paucifloratis, bracteis linearibus minutis. Involuerum cylindricum 5 mm. longum, 3 mm. latum, bracteis 1-seriatis, circ. 8, subliberis lanceolatis, 6 mm. longis, 1½ mm. latis, apice obtusis margine hyalinis, basi dorso subcordatis, basi involucri additis bracteolis ovatis 1 mm. longis. Corolla liguliformis flava. Achænia fusiformi-ovoidea 2½ mm. longa, ⅔ mm. lata, leviter compressa, leviter recurva prominente multi-costata, ad costas scabro-hirsuta, apice leviter attenuata, truncata, basi obtusa. Pappi setæ albæ 2 mm. longæ, minute hirsutæ deciduæ.

HAB. Takao, leg. G. NAKAHARA, Feb. 1906, (No. 825).

Near *C. japonica* BENTH., from which the present plant differs in having velvety leaves. I have examined various forms of *C. japonica* from China, Japan, India, and Malaya, in the Herbarium at Kew, but I have not found any form with velvety leaves.

Lactuca LINN.

Lactuca formosana MAXIM. in Mél. Biol. IX. p. 353 ; S. MOORE in Journ. Bot. (1875), p. 231 ; FORBES et HEMSL. Ind. Fl. Sin. I. p. 482 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 212.

HAB. Agincort, leg. T. KAWAKAMI, Mai. 1907.

DISTRIB. China : Chekiang ; Kiangsi.

OBSERV. Herba validiuscula, 50-70 cm. alta, ramosa, caulibus erectis ferrugineo tomentosis. Folia alterna sessilia, amplexicaulia, obovata in circumscriptione, 10 cm. longa, 7 cm. lata, transversim alternatimque 5-7-lobata, lobo terminali latissimo 5 cm. longo 6 cm. lato, irregulariter lobulato transverse dentato, apice cuspidato (cuspide $1\frac{1}{2}$ cm. longo $\frac{1}{2}$ cm. lato), lobis lateralibus approximatis transverse dispositis, ovatis 5 cm. longis $2\frac{1}{2}$ -3 cm. latis, apice breve cuspidatis irregulariter dentatis, dentibus acutis, lobis basilaribus minoribus conformibus, (sinibus rotundato-obtusis), basi amplexicaulia auriculata, auriculis 1 cm. longis et latis lacerato-dentatis utraque pagine ferrugineo-hispida, subtus ad costas venasque pilis strigosis 1-2 mm. longis 1-seriatim obiecta. Capitula paniculato-cymosa. Involucrum campanulatum, 1 cm. longum, 6 mm. latum, bracteis 3-4-seriatim dispositis, intus longissimis oblongo-lanceolatis, 1 cm. longis, 3 mm. latis, apice obtusis basi leviter contractis, exterioribus gradatim brevioribus, extimis minoribus ovatis $3\frac{1}{2}$ mm. longis 2 mm. latis apice acutis basi cordatis. Flores perfecti non visi.

Near *L. brevirostris*, but quite distinguishable by its transverse-ly and deeply lobed leaves and by being tomentose all over the plant. The leaves is like those of *L. Scariola*, but the former are tomentose, while the latter are entirely glabrous.

Campanulacæ.

Codonopsis WALL.

Codonopsis Kawakamii HAYATA sp. nov. Herba tenuissima, scandens, parce hirsuta, ramis teretibus, foliosis, foliis semper ad axillas ramuliferis. Folia alterna ovata vel triangulari-ovata, 13 mm. longa, 8 mm. lata, apice obtusa vel acuta, basi truncato-rotundata, vel rotundato-acuta, supra breve subtus longe hirsuta, pilis 1 mm. longis patentibus, pinninervia herbacea, petiolis 5 mm. longis, ramulis axillaribus generaliter brevibus 5 mm. longis, foliis parvioribus. Capsulæ longe pedunculatæ, turbinatæ, 1 cm. longæ, totiusque latæ apice triangulari-pyramidales, cupulis calycis basi late rotundato-semiglobosis 6 mm. longis, 10-costatis, lobis calycis persistentibus triangularibus 7 mm. longis, 4 mm. latis, membranaceis, marginibus cupularum elevatis, inter lobos calycis loculicide 3-valvatim dehiscentes. Semina elliptica utrinque rotundata, 1 mm. longa, $\frac{2}{3}$ mm. lata, leviter compressa, lævia, rubra, basi maculata.

HAB. Mt. Morrison, leg. G. NAKAHARA et T. KAWAKAMI, 1905, Nov.

Very remarkable for its very small leaves. The leaves are as small as those of *C. fatens* H.K. et T. and *C. thalictrifolia* WALL., but not so densely hairy as the former, nor so velvety as the latter. Also near *C. ovata* BENTH., but differs from it in having much smaller leaves.

Adenophora FISCH.

Adenophora morrisonensis HAYATA sp. nov.

Adenophora polymorpha var. *coronipifolia* HAYATA Fl. Mont. Formos. p. 148, (non TRAUTV.) Herba gracilis basi suffrutescens,

35 cm. alta, cauli præter inflorescentiam simplici, angulato, pubescente vel subglabrato, angulis acutis. Folia ad partem inferiorem caulis approximativè alternatim disposita, lanceolata, lineari-lanceolata, vel linearia, 5-8 cm. longa, apice acuminata, basi sessilia leviter angustata, margine approximate vel remotissime serrulata, utraque glabrata vel pubescentia, foliis superioribus semper minoribus angustioribus paucissimis. Racemi terminales, simplices, vel paucissime ramosi, 10-20 cm. longi, bracteati, bracteis lanceolatis vel linearibus circ. 1-2 cm. longis, pedicellis 1-1½ cm. longis, bracteolis linearibus. Calyces tubuloso-subglobosi, 3 mm. longi, 5-costati, limbis 5-partitis, laciniis lanceolatis, 7 mm. longis 1½ mm. latis, glabris, utrinque latere 2-serrulatis, serrulis obtusis ascendente-recurvis, dorso 1-costatis. Corollæ campanulatæ cæruleæ 2 cm. longæ, totiusque latæ leviter 5-lobatæ, lobis rotundato-triangularibus 6 mm. longis, 7 mm. latis, apice mucronatis, 1-nervatis, nervis ad apicem lorum attingentibus. Stamina 5, cum filamentis 13 mm. longa, inclusa, filamentis 8 mm. longis, sursum filiformibus, deorsum dilatatis, partibus dilatatis elongate triangulari-ovatis 4 mm. longis, 1½ mm. latis, margine ciliato-barbatis, partibus filiformibus duplicato-reflexis, 4 mm. longis, ½ mm. latis, glabris, antheris linearibus 5 mm. longis ½ mm. latis, apice obtusis basi emarginatis. Discus elevatus, lato-cylindricus, ⅔ mm. longus, basin styli amplectans. Styli filiformes, 2 cm. longi, apice leviter gradatim dilatato-clavati, apice 2-lobati, lobis latis brevissimis.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, (Nos. 1942 et 2290); (No. 7331, NAGASAWA).

Near *A. polymorpha* LEDEB. and its varieties, but differs from them in having much narrower calyx-lobes. I have examined a considerable number of the named species and its varieties preserved at Kew, but I have not found any specimen with so narrow and serrate calyx-lobes

as the present plant. It is also near *A. khasiana* H. f. et T., but quite distinguishable by its very much narrower leaves and also by its narrower serrate calyx-lobes. Plants belonging to this genus are generally very variable, still the points above mentioned may be regarded as comparatively fixed characters. So far as my observations extend, the present plant is quite distinct from any species of the genus.

Vacciniaceæ.

Vaccinium LINN.

Vaccinium formosanum HAYATA sp. nov. Rami fusco-purpurascens, minute rugulosi, ramulis gracilibus teretibus cinerascens, cicatricibus foliorum remote notatis, pulvinis elevatis, superiore gracillimis pubescentibus. Folia obovata, vel oblonga, coriacea, 3 cm. longa, 16 mm. lata, apice acuta vel aristato-acuta, vel callosa-acuta, basi acuta, margine callosiuscula leviter reflexa serrata, serris ascendens, latiusculis, prope basin subintegra, costis et venis supra inconspicuis, subtus tenuissime elevatis, venis primariis lateralibus utrinque 3-4, tenuissimis, exsiccato supra pallida, subtus pallido-rubescens, petiolis 3 mm. longis supra sulcatis. Racemi terminales $7\frac{1}{2}$ cm. longi, pedunculis $1\frac{1}{2}$ cm. longis, parvissime pubescentibus vel glabratis ad insertionem pedicellorum 1-bracteatis, bracteis valde conspicuis, ovatis $1\frac{1}{2}$ cm. longis 7 mm. latis, folio circumformibus, pedicellis $1\frac{1}{2}$ cm. longis. Baccæ globosæ, 5 mm. in diametro, rubræ, apice calycis lobis late triangularibus 1 mm. latis arcu clausis coronatæ.

HAB. Taitō : Taruko, leg. G. NAKAHARA, 1906, Jan. (No. 695).

The present plant is near *V. bracteatum* THUNB., but differs from it in having smaller leaves and in the persistent calyx-lobes. Also

near *V. Griffithianum* WIGHT and *V. Macgillivrayi*, SEEM. but distinguishable from the former by its smaller adpressed calyx-lobes which crown the fruit and from the latter by the much smaller calyx and long pedunculate fruit.

Vaccinium japonicum THUNB. var. **ciliare** MATSUM. (in sched.). in Herb. Tōkyō.

HAB. Randaisan, leg. U. MORI, 1908.

DISTRIB. The variety is limited to the southern part of Japan. Compared with a specimen so labelled at the Tōkyō Herbarium. The description of the variety is not yet published.

Vaccinium randaiense HAYATA sp. nov. Rami graciles fusco-cinerascentes, rugulosi, ramulis gracillimis, foliatis. Folia lanceolata vel oblongo-lanceolata, chartaceo-coriacea, 5-7 cm. longa, $1\frac{1}{2}$ -2 cm. lata, apice cuspidato-acuminata, basi rotundata, rotundato-acuta, vel cuneato-acuta, margine adpresso-serrulato-integra, serrulis obtusis remotis prope apicem et basin subintegra, pinninervia, basi obscure tri-nervia, costis et venis supra non elevatis inconspicuis, subtus tenuiter elevatis, gracilibus, petiolis brevibus 2-3 mm. longis. Racemi ramosi terminales 10-15 cm. longi graciles, floribus secundatis, pedicellis 5-6 mm. longis, calycis lobis triangularibus acutis glabris, ciliolatis. Stamina cum filamentis 5 mm. longa, filamentis $2\frac{1}{2}$ mm. longis, barbatis. Antheræ lineares $2\frac{1}{2}$ mm. longæ, prope basin affixæ, dorso breve 2-calcaratæ, calcaribus brevissimis $\frac{1}{3}$ mm. longis, transversim patentibus, apice attenuatæ 2-fidæ, locellis apice acutis, leviter reflexis, poris ovalibus margine dehiscentibus, basi connatis rotundatis. Ovarium apice dense barbatum.

HAB. Randaisan, leg. T. KAWAKAMI et U. MORI, 1908, Aug. (No. 7004).

The present plant comes near *V. bracteatum* THUNB. from which it is distinguishable by its more acuminate or even caudate leaves and by its larger and glabrous calyx. Also near *V. Carlesii* DUNN, and *V. malaccense* WIGHT; but differs from the former in having leaves, obtusely serrulate on the margin, more or less acute at the base, and from the latter in having glabrous calyx.

Ericaceæ.

Gaultheria LINN.

Gaultheria bornensis STAFF in TRANS. LINN. Soc. Bot. II. 4, (1894), p. 190, t. 15, f. C, 4-6; RENDLE in Journ. Bot. (1896) p.355; Merrill in Philip. Journ. Sci. III. Suppl. p. 378.

Gaultheria Itoana HAYATA Fl. Mont. Formos. p. 150, t. XXV.

DISTRIB. Borneo and Luzon.

After the publication of my paper above mentioned, my attention was called, by Mr. E. D. Merrill of the Bureau of Science, P.I., to a Bornean species described by Dr. O. STAFF. At that time, I could not compare my plant with the named species, as there was nothing of the Bornean collection in the Tōkyō Herbarium, nor is the paper of Dr. O. STAFF accessible to me. Since coming to Kew, I have compared my plant with the type of the same species, and found that they are exactly identical, as Mr. E. D. Merrill suggested to me some years ago.

Pieris DON.

Pieris taiwanensis HAYATA sp. nov.

Pieris formosa MATSUM. in Tōkyō Bot. Mag. XIV. p. 59; MATSUM. et HAYATA Enum. Pl. Formos. p. 219; HAYATA Fl. Mont. Formos. p. 151.

Rami recti, glabri fulvo-cinerascentes, longitudinaliter sulcato-rugulosi, cicatricibus foliorum notati, pulvinis elevatis, ramulis ut videtur cæspitosis rectis suberectis, apice foliatis. Folia ad apicem ramulorum approximate disposita coriacea sessilia, oblongo-obovata, vel oblongo-oblancoolata, $6\frac{1}{2}$ cm. longa, 2 cm. lata, apice cuspidato-acuta vel acuta, basi cuneata, vel cuneato-attenuata, margine a medio sursum crenato-serrata, serris obtusis vel obtusissimis, deorsum integra, ad marginem subcallosa, plus minus reflexa, utraque glabra, supra costis prope basin sulcatis, prominentibus, subtus leviter elevatis, venis primariis lateralibus tenuissimis, supra tenuiter impressis, subtus planis inconspicuis, exsiccato supra fulvo-rubescencia, subtus pallidiora, petiolis brevissimis 3-5 mm. longis, supra sulcatis. Racemi ad apicem ramulorum 3-4-fasciculati, dense florati, pauce ramosi, 6 cm. longi, pedunculis 1-2 cm. longis, pedicellis 4-5 mm. longis, floribus cernuis. Calyx 5-partitus, laciniis $3\frac{1}{2}$ mm. longis, 2 mm. latis, ovatis, acutis, crassiusculis, extus glabris intus pubescentibus. Corolla urceolata 7 mm. longa, $4\frac{1}{2}$ mm. lata, infra apicem contracta, 5-lobata, lobis latis rotundatis 1 mm. longis, $1\frac{1}{2}$ mm. latis patentibus. Stamina 10, 4 mm. longa, ad basin corollæ affixa, filamentis $2\frac{1}{2}$ mm. longis, incrassatis complanatis barbatis, medio 1-rubro-striatis, apice supra antherarum insertionem 2-calcaratis, calcaribus $1\frac{1}{2}$ mm. longis recurvato-pendulis, rubris, antheris oblongis $2\frac{1}{2}$ mm. longis dorso medio affixis apice 2 fidis, locellis apice acutis, poro ovali dehiscentibus basi connatis emarginatis. Discus 10-lobus rotundatus $\frac{1}{4}$ mm. longus. Ovarium late globosum, 2 mm. latum apice 5-loculare. Stylus columnaris 5 mm. longus, basi intra ovarium intrusus, stigmatibus truncato. Capsulæ late globosæ 5 mm. longæ, 6 mm. latæ, elobatæ, 5-loculares, valvis medio septiferis ab axi persistente placentifero solutis, loculis polyspermis. Semina scobiformia, cum alis $2\frac{1}{2}$ mm. longa, $\frac{1}{2}$ mm. lata, utrinque alata, rubescencia.

HAB. Taitō : Daironsan, leg. T. KAWAKAMI et U. MORI, (No. 2184).

The present plant was first identified with *Pieris formosa* D. DON by Prof. J. MATSUMURA. I was also of the same opinion as the Professor regarding the reference of the plant, as the figures given in WIGHT, Ic Pl. t. 1200 quite agree with it. Since coming to Kew, when I have examined the type of *P. formosa* D. DON, I have, however, found that the type does not agree with the Formosan plant. The inflorescence of the latter spreads less, the flowers are smaller, the leaves are obovately spathulate, less acute at the apex, more obtusely serrate on the margin, and very faintly reticulated on the surface. There are at Kew some specimens from continental China, referred to *P. formosa* D. DON. They are also different from my plant.

Rhododendron LINN.

Rhododendron Kawakamii HAYATA sp. nov. Frutex, ramis gracilibus cortice cinerascete vestitis, ramulis apice rubescentibus rugosis. Folia breve petiolata, obovata, $3\frac{1}{2}$ cm. longa, 17 mm. lata, apice rotundata, basi acuta vel cuneata, utrinque glabra, coriacea, crassiuscula, margine leviter recurva vel revoluta, supra viridia glabra nitida costis venisque impressis, subtus costis prominente elevatis, venis leviter elevatis vel inconspicuis, albo-flavescentia minute atropunctata, venis primariis medioeribus ad costas angulo 60° egressis, basilaribus angulo 40° egressis, utrinque latere 4. Alabastra ovoidea acuta, 13 mm. longa, 8 mm. lata. Flores ad apicem ramorum terminales, umbellati, umbellis basi bracteatis, bracteis ∞ -seriatis, exterioribus brevibus, concavis rotundatis 8 mm. longis 7 mm. latis, medio sursum punctatis margine ciliolatis, medioeribus longissimis 12 mm. longis, spathulatis, intimis linearibus 8 mm.

longis, 1 mm. latis, apice truncatis ciliolatis. Flores extus glanduloso-punctati, pedicellis 1 cm. longis, glanduloso-punctatis declinatis. Calyx patelliformis $1\frac{1}{2}$ mm. longus $3\frac{1}{2}$ mm. latus, 5-lobatus, lobis inæqualibus glanduloso-ciliolatis, lobo infimo oblongo vel lanceolato 2 mm. longo, cæteris triangularibus 1 mm. longis totiusque latis crassiusculis persistentibus. Corolla campanulato-hypocraterimorpha 1 cm. longa, tubo latiore, 4 mm. longo, 5 mm. lato, limbo 12 mm. in diametro, lobis late oblongis $5\frac{1}{2}$ mm. longis, 4 mm. latis, apice rotundatis. Stamina 10, 2-seriata, filamentis inæqualibus circ. 6 mm. longis, basi barbatis crassiusculis, antheris oblongis $2\frac{1}{2}$ mm. longis, apice 2-porosis. Ovarium ovoideum 2 mm. longum, $1\frac{1}{2}$ mm. latum 5-lobatum, brevissime pubescens, stylo declinato 5 mm. longo crassiusculo 5-sulcato, apice capitellato, disco annulari 10 lobato. Capsula longe pedicellata, (pedicellis $2\frac{1}{2}$ cm. longis, calycis lobis persistentibus erectis vel reflexis), cylindrico-clavata, basi angusta apice latior et truncata, minute glanduloso-punctata, et dense pubescens, 12 mm. longa, 5 mm. lata, septicide dehiscens valvis 5, reflexis horizontaliter patentibus. Semina linearia 3 mm. longa, $\frac{1}{3}$ mm. lata, testa alata, alis utrinque acuminatis, vel lobatis.

HAB. in monte Morrison, ad 7000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2005); Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (Nos. 7002 et 7043).

The flowers of the present plant are near *R. pumilum* of Himalaya, but the habit is quite different. Somewhat near *R. anthopogonoideæ* MAXIM., but greatly differs from it in having much elongated bracts, and obovate emarginate leaves which are glabrous above, and glandulose below. Comes nearer *R. emarginatum* HEMSL. et E. H. WILSON, from which this is distinguishable by the larger lobes of the calyx and shorter, broader, thicker, and more conspicuously gland-dotted leaves.

Rhododendron Morii HAYATA sp. nov. Rami divaricati, cortice albo-cinerascente vestiti. Folia ad apicem ramorum conferta, petiolata, oblongo-lanceolata, $9\frac{1}{2}$ cm. longa, 27 mm. lata, apice acuta vel breve acuminata, basi rotundata, venis primariis utrinque latere 14, ad costas angulo 50° egressis, subtus costis prominentibus, venulis minute reticulatis, subtus indumento lanato deciduissimo obtecta, utrinque demum, glabrata, petiolis $1\frac{1}{2}$ cm. longis. Flores terminales 5-6-umbellati, pedicellis 2 cm. longis, paleis lanceolatis obtectis. Calyx 5-dentatus, dentibus triangularibus. Corolla campanulati-infundibuliformis $3\frac{1}{2}$ cm. longa, 2-labiata, labio superiore trilobato, inferiore 2-lobato, lobis subæqualibus 13 mm. longis, 16 mm. latis, rotundatis, emarginatis, fauce superiore latere punctata glabra. Capsula cylindrica arcuata, pilis strigosis brevibus obtecta, septicide dehiscens. Semina oblonga complanata, 3 mm. longa 1 mm. lata, testa alata utrinque laciniata, minute et longitudinaliter reticulata.

HAB. Randaizan, leg. U. MORI, Aug. 1906, (No. 7041); Arizan, in monte Morrison, leg. G. NAKAHARA, Oct. 1906.

Very like *R. pachytrichum* FRANCH. in the shape of the leaf-buds, but differs in not having so much hirsute petioles.

Rhododendron rubro-pilosum HAYATA sp. nov. Rami cortice fusco-cinerascente vestiti, ramulis subgracilibus adpresse tomentosis fusco-rubrescentibus, novellis paleis lanceolatis rubris 1 mm. longis albo-marginatis dense adpresseque obtectis. Folia alterna vel subopposita, petiolata, lanceolato-oblonga, 4 cm. longa, 17 mm. lata, apice acuta glanduloso-mucronata, basi acuta, margine integra leviter recurva, coriacea, supra exsiccato nigricantia, subtus pallidissima supra rugosa et scaberrima, pilis brevibus strigosis parce obtecta, subtus ad costas paleis lanceolatis adpresse denseque obtecta, ad venam et paginem pilis strigosis ferrugineis dispersa,

venis primariis utrinque 5-6, venulis utrinque impressis reticulatis, intervenuliis utrinque elevatis, petiolis 1 cm. longis paleis lanceolatis adpresse strigosis. Alabastrum foliorum ovoideum 8 mm. longum, 5 mm. latum, basi 2-3-foliolis parvis suffultum, foliolis parvis 8 mm. longis basi dilatatis, perulis ferrugineo-sericeis ovatis acutis. Capsula cylindrica, 1 cm. longa, 4 mm. lata, pilis strigosis dense oblecta, septicide dehiscens, valvis erectis, calycis lobis persistentibus, oblongis 4 mm. longis, pilis strigosis dense oblectis, stylo persistente strigoso. Semina subteretia 1 mm. longa, $\frac{1}{4}$ mm. lata, plus minus angulata, non alata, vel alis brevissimis.

HAB. Tōzan, in montibus Morrison, leg. G. NAKAHARA, Oct. 1906; in Montibus Centralibus, leg. T. KAWAKAMI et U. MORI, Nov. 1906, (Nos. 1857 et 1859); Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7044).

Rhododendron shoense HAYATA sp. nov. Rami graciles teretes, corticibus cinerascens longitudinaliter rugulosis demum solutis, ramulis rubescentibus, teretibus, ad ramificationem cicatricibus foliorum transverse approximateque notatis, ad apicem ramulorum 2-3-foliatis, foliis suboppositis. Folia ovato-rhomboida, circ. 3 cm. longa 2 cm. lata, apice calloso-obtusa, basi acuta, margine subintegra, vel leviter crenulato-integra, supra costis et venis leviter impressis subtus tenuiter prominentibus venulis distincte reticulatis, costis venis venulisque rubescentibus, pagina subtus albicantia, venis primariis lateralibus utraque latere 2-3, arcuato-ascendentibus. Fructus terminales, solitarii, pedunculis 7 mm. longis dense strigoso-tomentosis, pilis rubescentibus 1-2 mm. longis adpressis. Capsulæ cylindricæ $1\frac{1}{2}$ cm. longæ, 4 mm. latæ leviter recurvatæ strigoso-pilosæ, pilis rubescentibus longiusculis adpressis, apice stylis persistentibus coronatæ, basi calycibus circ. obsoletis, stylis

filiformibus recurvatis 4 cm. longis apice capitatis. Semina minute oblongo-complanata, $\frac{2}{3}$ mm. longa.

HAB. Nantō : Shojō, leg. T. KAWAKAMI et U. MORI, 1905, Aug. (No. 1160).

Near *R. Farreræ* TATE, which has leaves much acuter at both ends, less reddish beneath, and has soft villose fruit and pedicels. Also near *R. dilatatum* MIQ., but quite distinguishable by the smaller leaves and densely pilose capsules; from *R. rhombicum* MIQ., this differs in having longer leaves and much more densely pilose capsules. It comes most near *R. Farreræ* TATE, with which it may, perhaps, be identical.

Plumbagineæ.

Statice LINN.

Statice sinensis GIRARD in "Ann.. Sc. Nat. 3-Série II. p. 329"; DC. Prodr. XII. p. 646; BENTH. Fl. Hongk. p. 281; FORBES et HEMSL. Ind. Fl. Sin. II. p. 35.

Statice Wrightii HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 220, (non HANCE).

HAB. Shintiku: Chūkō, Aprili. 1895, (No. 31, A.) leg. Y. TASHIRO.

DISTRIB. China: Shingking, Shangtung, Fokien, Kwangtung, Hongkong, Hainan. Corea.

Compared with a specimen at Kew.

Primulaceæ.

Lysimachia LINN.

Lysimachia fragrans HAYATA sp. nov. Herba ascendens basi pro-

cumbens ad nodos radicans, ad totam longitudinem foliata, angulata, subalata, glabra, vel subglabrata, 40 cm. alta. Folia membranacea rhomboideo-ovata, $4\frac{1}{2}$ cm. longa, 22 mm. lata, apice calloso-aristata, acuta, basi rotundata, subito cuspidato-attenuata, vel abrupte cuneato-angustata, ad petiolum 1 cm. longum attenuata, margine subintegra vel sursum tenuissime serrato-integra, prope basin integerrima supra parcissime brevissime tenuissime pubescentia. Flores fragrantés axillares, longe pedunculati, solitarii, pedunculis 4 cm. longis gracillimis, apice cernuis. Calyx 5-fidus, laciniis lanceolatis 4 mm. longis $1\frac{1}{2}$ mm. latis. Corolla campanulata, 5-fida, laciniis ovatis 5 mm. longis, $2\frac{1}{2}$ mm. latis, apice rotundato-acutis. Stamina 5, cum filamentis $4\frac{1}{2}$ mm. longa, basin corollæ adnata, filamentis basi dilatatis in tubum brevissimum connatis, (tubo filamentorum 1 mm. alto,) apice angustissimis liberis, partibus liberis $\frac{1}{2}$ mm. longis, antheris linearibus apice obtuso-mucronatis basi obtuso-sagittatis, $3\frac{1}{2}$ mm. longis, basifixis apice poris dehiscentibus. Ovarium conico-globosum 5-albo-striatum, 1-loculare, placenta centrali, stylo columnari apice obtuso.

HAB. Randaizan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7126).

Near *L. fœnum-græcum* HANCE and *L. capillipes* HEMSL., but differs from the former in having very much smaller flowers, and from the latter, in having much larger calyx and herbaceous leaves. The filaments of the present plant are connate forming a very short tube, the stamens are opposite the petals, and the anthers are opened by terminal pores facing outward, though they are, however, originally introrse.

Myrsineæ.

Mæsa FORSK.

Mæsa randaiensis HAYATA sp. nov. Rami recti fuscentes lenticellis prominentibus densiuscule notati, subglabrati, ramulis gracilibus rectis, foliatis. Folia chartaceo-coriacea, angusto-lanceolata, vel lanceolata, 8 cm. longa, $1\frac{1}{2}$ cm. lata, apice acuminata, basi obtusa, plus minus obliqua, margine remotissime serrulata, serrulis minutis $\frac{1}{2}$ mm. longis mucronatis 1 cm. a se remotis, utraque glabra, costis et venis planis inconspicuis vel tenuissimis, subtus pallidissima, petiolis 7 mm. longis supra sulcatis. Racemi axillares, 3 cm. longi, bracteis minutis ovatis 1 mm. longis, pedicellis 5 mm. longis, prope apicem pedicellorum 1-bracteolatis, ovatis 1 mm. longis. Calyx campanulatus, limbo 5-lobato, lobis rotundato-triangularibus $1\frac{1}{2}$ mm. longis, 2 mm. latis, crassiusculis margine denticulatis, apice obtuso-rotundatis. Corolla glabra, urceolato-cylindrica, 6 mm. longa, 3 mm. lata, tubo apice sub lobis leviter contracto, 5-lobata, lobis late rotundatis, erecto-patentibus $1\frac{1}{4}$ mm. longis 2 mm. latis apice rotundatis basi leviter auriculatis, margine minute denticulatis. Stamina corollæ lobis opposita, cum filamentis 5 mm. longa, prope basin corollæ affixa, antheris ovatis $1\frac{1}{5}$ mm. longis. Ovarium semi-superius apice conicum ad stylum attenuatum. Stylus brevior, circ. 1 mm. longus, apice leviter 3-lobatus.

HAB. Randaizan, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 8547).

This comes near *Mæsa Dorana* BL., but differs from it in having very much looser racemes, larger flowers, and narrower leaves.

Mæsa sinensis A. DC. ; BENTH. Fl. Hongk. p. 208 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 60 ; MATSUM. et HAYATA Enum Pl. Formos. p. 225.

Mæsa Doræna HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 224, (non BLUME).

HAB. Nantō : Mushazan, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1147) ; Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7020) ; Nantō : Hinokiyama, leg. G. NAKAHARA, Feb. 1907.

DISTRIB. China : Kwangtung.

Myrsine LINN.

Myrsine capitellata WALL. ; BENTH. Fl. Hongk. p. 512 ; HOOK. f. Fl. Brit. Ind. III. p. 512 ; Bot. Mag. t. 3222 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 61 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 225.

HAB. Uraisha, leg. N. KONISHI, Oct. 1907, (No. 74) ; Byōritsu, Hakkeirin, leg. T. KAWAKAMI et U. MORI, Juli. 1906, (No. 1097).

DISTRIB.

Myrsine marginata MEZ in Engl. Pfl.-reich IV. 236, Myrsinaceæ, p. 339.

OBSERV. Rami et ramuli gracillimi, cortice rugoso atro-rubescente glabro. Folia alterna remota, petiolata, coriaceo-membranacea obovata vel obovato-lanceolata, 6 cm. longa, 2½ cm. lata, apice gradatim vel abrupte acuta ad summum obtusa, basin gradatim acuta, utrinque glabra pallidiora costis supra impressis subtus prominentibus, venis et venulis utrinque pagine elevatis, venis primariis 9, ad costas angulo 40° egressis, prope marginem curvatis anastomosantibus ultra reticulatis, venulis reticulatis, subtus minute parceque punctata margine integra, petiolis 5 mm.

longis. Flores axillares 5-6-fasciculati basi fasciculorum bracteati, bracteis brevibus, subulatis, pedicellis 4 mm. longis glabris. Calyx late campanulatus, 1 mm. longus, $1\frac{2}{3}$ mm. in diametro, 5-partitus, segmentis oblongis apice obtusis 1 mm. longis, $\frac{1}{2}$ mm. latis, rubro-punctatis, crassiusculis. Corolla rotata crassiuscula $2\frac{1}{2}$ mm. longa, 4 mm. in diametro, 4-partita, segmentis oblongo-angustatis vel obovatis apice truncatis vel obtusis subæqualibus, valvatis albis 2 mm. longis, $\frac{2}{3}$ mm. latis, punctatis, punctis rubro-purpurascensibus, tubo brevi $\frac{1}{3}$ mm. longo. Stamina 5, basin segmenti corollæ affixa, iis opposita, $\frac{3}{4}$ mm. longa, filamentis crassiusculis $\frac{2}{3}$ mm. longis, antheris dorsifixis reniformi-cordatis latoribus quam longis, $\frac{1}{3}$ mm. longis, connectives leviter productis obtusis, loculis 2, subdivaricatis, introrsum longitudinaliter dehiscentibus crassiusculis. Ovarium ovatum $\frac{3}{4}$ mm. longum sursum punctatum apice in stylum brevem attenuatum, stigmate punctiformi, 1-loculare, ovulis paucis in placenta globosa immersis. Fructus globosus 4 mm. in diametro, endocarpio crustaceo longitudinaliter striato, 1-spermus. Semina depresso-globosa 3 mm. lata 2 mm. longa, basi profunde excavata, reliquiis placentæ membranaceis, albumine corneo-lævi; embryo cylindræus transversus curvatus, cotyledones parvæ, radícula æquilatæ.

Embelia Juss.

Embelia sp. Scandens, rami et ramuli graciles, cortice cinerascente. Folia opposita breve petiolata, obovata, 36 mm. longa, 15 mm. lata, apice acuta, basi attenuata, costis supra impressis subtus elevatis, venis et venulis utrinque pagine elevatis, glabra, petiolis 3 mm. longis. Paniculæ ad apicem ramulorum brevium terminales. Flores non visi.

HAB. Atamusha, Aug. G. NAKAHARA, 1905, (No. 343).

Ardisia Sw.

Ardisia chirensis BENTH. Fl. Hongk. p. 207.

HAB. Shinkō : Shirakku, leg. T. KAWAKAMI et U. MORI Juni. 1906, (No. 1396).

Near *A. japonica* BLUME.

DISTRIB. Hongkong.

Ardisia cornudentata MEZ Myrsinaceæ, in ENGL. Pfl.-reich IV. 236, p. 144.

HAB. Taitō : Shinsuiye, (No. 2908) ; Shinkō ; Urai, (No. 5071) ; Kwashōtō, (No. 4822) ; Garanbi, (No. 854).

DISTRIB. An endemic plant.

Ardisia crenata ROXB. "Fl. Ind. ed.-CAREY et WILLD. II. p. 276" ; CLARKE, in HOOK. f. Fl. Brit. Ind. III. p. 524.

HAB. in Montibus Centralibus, leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 1933) ; Tōzan, in montibus Morrison, leg. G. NAKAHARA, Oct. 1906.

DISTRIB. Malaya, India, China, Japan.

Ardisia kotcensis HAYATA sp. nov. Rami et ramuli validiusculi, fusco-tomentosi, cortice fusco-rubescente glabrato vel fusco-tomentoso, lenticellis longitudinaliter dispersis, et cicatricibus semiglobosis notati. Folia alterna subsessilia crassiuscula longe obovata, 10 cm. longa, 4½ cm. lata, apice obtusa vel rotundata vel obtuso-acute, basi attenuata, margine leviter recurvata, costis et venis utraque leviter elevatis vel inconspicuis, venis primariis utrinque latere 12, a costa angulo 60° egressis, prope marginem curvatis anastomosantibus, exsiccato pallidiora. Cymæ axillares pedunculatæ,

pedunculis 6 cm. longis. Flores 8 mm. longi, pedicellis $1\frac{1}{2}$ cm. longis. Calyx 5-partitus, segmentis patentibus, rotundatis 2 mm. longis, imbricatis, punctatis, punctis albo-purpureis. Corolla rotata 5-partita, segmentis ovatis 8 mm. longis 6 mm. latis, apice acutis, punctatis, punctis, atropurpureis. Stamina 5, basin corollæ affixa, subsessilia, (vel filamentis brevibus, dilatatis, latis), $1\frac{1}{2}$ mm. longa totiusque lata, apiculata. Ovarium globosum apice in stylum filiformem 6 mm. longum attenuatum. Fructus ignotus.

HAB. Kōtōshō, Taitō, leg. T. KAWAKAMI.

Near *A. Moonii* C. B. CLARKE; but differs from it in the leaves which are quite rounded at the apex.

Ardisia morrisonensis HAYATA sp. nov. Frutex, ramis validis, cortice fusco-cinerascente, lenticellatis, cicatricibus foliorum globosis notatis, ramulis rubescentibus, subglabratis, sursum ferrugineo-tomentosis. Folia alterna, breve petiolata, lanceolata, vel oblanceolata, 6 cm. longa, 28 mm. lata, apice acuta, basi longe attenuata, margine remote serrata, serris acuminatis ascendentibus, costis supra impressis, subtus elevatis, venis primariis numerosis ramosis, supra glabra, subtus parce tomentosa, pauce punctata vel epunctata, petiolis 7 mm. longis ferrugineo-fuscentibus. Cymæ axillares, longe pedunculatæ, peduncalis 10 cm. longis, apice 3-4 approximate foliatis, simplicibus vel pauce ramosis, floribus ad apicem pedunculorum umbellatim dispositis, pedicellis 14 mm. longis. Calyx 5-lobatus, lobis dextrorsum obtegentibus rotundatis 2 mm. longis. Fructus globosus, 5 mm. in diametro aequans.

HAB. Suizan, in montibus Morrison, ad 7702 ped. alt., Oct. 1905, (No. 671); Tōseikaku, Suiteiryō, Soobonsha, leg. C. OWATARI, Jan. 1897; Taitōchō: Raikōkwa, leg. K. MIYAKE, Dec. 1899; Toroku: Washa, leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 1912).

Very near *A. cornudentata* MEZ, but differs from it in having ferrugineo-tomentose leaves which are turned reddish black when dried.

Ardisia pusilla A. DC. in "Trans. LINN. Soc. XVII. p. 126" et Prodr. VIII. p. 137; MIQ. in Ann. Mus. Bot. Lugd.-Bat. II. p. 263; HANCE in Journ. Bot. (1883), p. 322; FORBES et HEMSL. Ind. Fl. Sin. II. p. 66.

Bladhia villosa THUNB. Fl. Jap. p. 96, t. 19.

HAB. Oshima, leg. T. UCHIYAMA, Dec. 1900.

DISTRIB. Kwangtung and Japan.

Ardisia rectangularis HAYATA sp. nov. Suffrutex, caulibus erectis, simplicibus glabris cinerascens, 30-50 cm. altis. Folia alterna petiolata, oblongo-lanceolata, 11 cm. longa 3 cm. lata apice acuminata basi acuta, costis supra impressis, subtus prominentibus, venis utrinque pagine prominulis, venis primariis 30, a costa angulo 50° egressis, prope marginem anastomosantibus, utraque pagine glabra pallidiora, subtus minute punctata, petiolis 1 cm. longis. Cymæ terminales inclinatae, sessiles, breves, 2 cm. longae, 10 cm. latae, ramis gracilibus, rectangulariter divaricatis, floribus ad apicem ramorum 5-6, pedicellis 1½ cm. longis. Calyx 5-partitus, segmentis ovatis 2 mm. longis apice rotundatis imbricatis, punctatis, punctis atro-purpureis. Corolla rotata, 5½ mm. longa, tubo brevi ½ mm. longo, limbo 5-partito, segmentis ovatis 5 mm. longis 3½ mm. latis apice obtusis, punctatis, punctis atro-rubris, dextrorsum obtegentibus. Stamina 5, fauce corollae affixa, segmentis opposita, filamentis brevibus 1 mm. longis, antheris subulatis 4 mm. longis, apiculatis. Ovarium globosum 1 mm. longum apice in stylum filiformem 4 mm. longum attenuatum. Fructus globosus, 8 mm. in

diametro apiculatus, glaber, leviter minute tuberculatus, endocarpio membranaceo. Semina globosa 6 mm. in diametro.

HAB. Shintiku: Goshizan, leg. T. KAWAKAMI et U. MORI Juni. 1906, (No. 1435); Kusshaku, leg. S. NAGASAWA, 1905, (No. 358); Taitō; Murimurisha, leg. K. MIYAKE, Dec. 1899.

Very near *A. crenata* SIMS., but differs from it by the much broader leaves.

Ardisia remotiserrata HAYATA sp. nov. Frutex, ramis glabris, cortice cinerascete, lenticellis minutis dispersis, ramulis divaricatis gracilibus. Folia alterna breve petiolata obovata, $7\frac{1}{2}$ cm. longa, 3 cm. lata, apice abrupte acuta, basi attenuata, utraque glabra punctata, costis supra impressis, subtus elevatis, venis utraque pagine leviter elevatis, margine remote serrata, serris acutis, venis primariis utrinque latere 5, a costa angulo 50° egressis, rectis apice furcatis, ramis ad apicem serrarum attingentibus, petiolis 4 mm. longis. Flores cymosi, sessiles, ad apicem ramulorum terminales. Fructus globosus 7 mm. in diametro.

HAB. Garanbi, leg. T. KAWAKAMI et G. NAKAHARA, Dec. 1906, (No. 854).

Near *A. morris-mensis* HAYATA from which the present plant is easily distinguishable by its very remotely serrate leaves.

Ardisia simplicicaulis HAYATA sp. nov. Caulis simplex, suffrutescens, fusco-purpurascens, longitudinaliter rugulosus, 30 cm. altus. Folia ad apicem caulis approximate alternatim disposita, chartaceo-membranacea lanceolato-angustata, 13 cm. longa, 18 mm. lata, apice acuminata basi obtusa vel breve attenuata, margine subintegra, vel mucronibus minutis obtusis remote instructa, utrinque glabra, costis et venis subtus tenuiter distinctis, venulis inconspicuis,

subtus pallidiora, minute punctata, petiolis 6 mm. longis supra subsulcatis. Flores prope apicem caulis hypophylli, 5-6 umbellati, umbellis cernuis longe pedunculatis, pedunculis gracilibus 3 cm. longis, pedicellis 1 cm. longis, apice leviter incrassatis. Fructus late globosi, 6 mm. in diametro, brevissime apiculati rubri, 1-spermi, endocarpiis membranaceis. Semina late globosa 5 mm. in diametro, albuminibus corneis, embryo minutus prope miropylum verticaliter situs, 2 mm. longus, plus minus complanatus, cotyledonibus a dorso complanatis.

HAB. Shinkō : Tannaisan, leg. T. KAWAKAMI et U. MORI, 1907, Mart. (No. 2700); Shichiseitonzan, leg. B. HAYATA, Aug. 1900.

Near *A. hortorum* MAXIM.; but differs from it in having much narrower leaves.

Sapotaceæ.

Palaquium BLANCO.

Palaquium formosanum HAYATA n. sp.

Palaquium ellipticum HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 227, (non ENGL.).

Rami validiusculi cortice subglabro cinerascente vestiti, cicatricibus foliorum magnis reniformibus notati. Folia breve petiolata elliptica, 11 cm. longa, 5 cm. lata, apice retundata vel emarginata basi rotundata, vel plus minus cordata, supra glabra, subtus pilis minutis adpresse parce dispersa, supra costis et venis impressis, subtus costis prominentibus, venis primariis haud conspicuis, utrinque latere 7, a costa angulo 60° egressis, rectis prope marginem subito curvatis anastomosantibus, petiolis 5 mm. longis. Flores perfecti non visi.

HAB. Sharyōtō, leg. T. MAKINO, Nov. 1896.

Differs from *P. ellipticum* ENGL. in having very obtuse or even emarginate leaves with a rounded or cordate base.

Palaquium polyandrum HAYATA sp. nov. Rami validiusculi cinerascetes, glabri, cicatricibus foliorum orbicularibus notati. Folia alterna petiolata, obovata, 12 cm. longa, 7-8 cm. lata, apice truncato-rotundata, basi rotundata, margine integra leviter recurvata, costis et venis supra impressis, subtus costis prominentibus venis leviter elevatis, venis primariis utrinque latere 7, rectis, a costa angulo 50° egressis, rectis, prope marginem anastomosantibus, venulis inconspicuis petiolis 5 mm. longis. Flores axillares 3-4-fasciculati longe pedicellati, pedicellis 13 mm. longis. Calyx 6-partitus, segmentis imbricatis, rotundatis, 5 mm. longis, crassiusculis. Corollæ tubus 3 mm. longus totiusque latus, limbus 6-lobatus, lobis contortis lanceolatis, obtusis 1 cm. longis, 3 mm. latis. Stamina 20-25, basin corollæ affixa, inæqualia circ. 1-½ cm. longa, filamentis filiformibus basin plus minus connatis, antheris 3½ mm. longis, 1 mm. latis apice obtusis basi sagittatis extrorsum dehiscentibus. Ovarium conicum 2 mm. longum, apice attenuatum in stylum abeuns, stylo recto 1 cm. longo basi incrassato. Bacca oblonga, 3½ cm. longa, 3 cm. lata, calycis lobis persistentibus, rotundatis 5 mm. longis, pedicellis 3 cm. longis.

HAB. Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA.

Near *P. obovatum* CLARKE, (Hook f. Fl. Brit. Ind. III. p. 542) from which the present plant is distinguishable by not protruding connectives and number of stamens which are usually more than twenty.

Ebenaceæ.

Maba FORST.

Maba *buzifolia* PERS.; WIGHT Ic. Pl. Ind. Or. t. 763; A. DC. Prodr. VIII. p. 240; CLARKE, in HOOK. f. Fl. Brit. Ind. III. p. 551.

HAB. Kōtōshō, leg. T. KAWAKAMI et G. NAKAHARA.

DISTRIB. Tropical Africa, Malay archipelago, India, N. Australia, Philippines, and Loo-choo islands.

Diospyros LINN.

Diospyros *Kusanoi* HAYATA sp. nov. Rami cinerascens, glabri. Folia coriacea, obovata vel obovato-oblonga, $7\frac{1}{2}$ cm. longa, 4 cm. lata, apice rotundata, vel rotundato emarginata, basi obtusa ad petiolum brevem 6 mm. longum attenuata, margine integra, costis supra impressis, subtus prominentibus, venis primariis lateralibus tenuissimis supra planis subtus leviter elevatis, utrinque pallidissima. Fructus globosus, 3 cm. in diametro, basi calycibus persistentibus suffulti, calycis lobis 4, incrassatis, triangularibus 8 mm. longis 9 mm. latis, apice reflexis, obtusis, extus glabris rugulosis, intus villosa-tomentosa. Semina oblique-oblonga, a latere compressa, facie acuta, dorso rotundata, 12 mm. longa.

HAB. KURAFU, leg. N. KONISHI; et leg. S. KUSANO, 1909.

Diospyros *Oldhami* MAXIM. var. *chartacea* HAYATA n. n. Rami fusco-rubescens, glabri. Folia alterna chartaceo-coriacea petiolata, oblonga, $9\frac{1}{2}$ cm. longa, $3\frac{1}{2}$ cm. lata, apice abrupte acuta, basi gradatim acuta, margine subintegra, utrinque glabra, supra venis

venulisque impressis, subtus leviter elevatis, venis primariis utrinque latere 4-5, a costa angulo 20° egressis, prope marginem anastomosantibus, venulis reticulatis, petiolis $1\frac{1}{2}$ cm. longis. Fructus globosus 3 cm. in diametro.

HAB. Nantō: Musha, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1181).

Styraceæ.

Symplocos LINN.

Symplocos arisanensis HAYATA sp. nov. Rami fusco-purpurascentes, hirsuto-pubescentes, demum subglabrati, cicatricibus foliorum notati, longitudinaliter profundeque rugosi, ramulis gracilibus ferrugineo-hirsutis, vel subglabratibus. Folia oblonga, vel oblongo-lanceolata, $7\frac{1}{2}$ cm. longa, 26 mm. lata, apice cuspidato-acuminata, basi obtusa, cuneato-obtusa, margine tenuiter obscureque crenulato-serrulata, crenis obtusis brevissimis, basin subintegra, costis et venis supra planis, subtus leviter elevatis, venis tenuissimis, chartacea, supra ad costas prope basin parce hirsuta, cæterum subnitida, subtus pallidiora, petiolis brevibus 2 mm. longis parce hirsutis. Racemi pubescentes ad axillas foliorum superiorum solitarii, 5 cm. longi, a basi usque ad apicem floriferi, simplices, pedicellis brevissimis, vel floribus sessilibus, bracteis rotundatis, margine ciliolatis 2 mm. longis, $2\frac{1}{2}$ mm. latis, bracteolis 2, triangularibus acutis ciliolatis, 1-costatis. Calycis tubus brevis, lobis rotundatis imbricatis 2 mm. longis, $1\frac{1}{2}$ mm. latis, extus subglabratibus vel tenuissime pubescentibus. Corolla campanulata, 5 mm. longa, circ. 5-partita, segmentis basi leviter connatis rotundatis, valde concavis 5 mm. longis, $4\frac{1}{2}$ mm. latis, integris. Stamina circ. 25,

basin corollæ affixa, extimis longissimis 10 mm. longis, antheris globosis $\frac{2}{3}$ mm. longis utrinque profunde 2-lobatis, intimis brevissimis. Stylus columnaris, 4 mm. longus, leviter recurvus, apice capitatus.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI 1908, Mart. (No. 3710).

The present plant comes near *S. prunifolia* S. et Z. and *S. Candolleana* BRAND; but differs from the former in having larger calyx and sessile leaves, and from the latter, by the very short petioles and longer corolla. Also near *S. grandiflora* WALL. and *S. formosana* BRAND, but is distinguishable from the former by the smaller leaves and pubescent inflorescence, and from the latter, by the much larger flowers.

Symplocos formosana A. BRAND in ENGL. Pfl.-reich IV.-242, Symplocaceæ, p. 67.

DISTRIB. An endemic plant.

Symplocos japonica A. DC. Prodr. VIII. p. 255; FRANCH. et SAVAT. Enum. Pl. Jap. I. p. 307; FORBES et HEMSL. Ind. Fl. Sin. II. p. 73.

HAB. Tōyen: Nankakuzan, leg. T. KAWAKAMI et U. MORI 1908, Mart. (No. 2658).

DISTRIB. Hupeh, Szechuen; Loo-choo islands and Japan.

Symplocos prunifolia S. et Z. Fl. Jap. Fam. Nat. II. p. 9; MIQ. in Ann. Mus. Bot. Lugd.-Bat. III. p. 101; FRANCH. et SAVAT. Enum. Pl. Jap. I. p. 308; FORBES et HEMSL. Ind. Fl. Sin. II. p. 74.

HAB. Tōyen: Ukuzan, leg. T. KAWAKAMI et U. MORI, 1908 Mart. (No. 2678).

DISTRIB. Eastern India, Japan and China.

Alniphyllum MATSUMURA.

Alniphyllum Fauriei PERKINS in ENGL. Pfl.-reich IV.-241, Styracaceæ, p. 93.

DISTRIB. An endemic plant.

Oleaçeeæ.

Fraxinus LINN.

Fraxinus formosana HAYATA sp. nov. Rami fusco-rubescentes, lenticellis orbicularibus obtecti, ramulis novellis rubescentibus pubescentibus. Folia opposita, petiolata, pinnata utrinque glabra, foliolis 5 petiolulatis oppositis, foliolo terminali longissimo lanceolato 5 cm. longo 17 mm. lato utrinque attenuato ad summum obtuso, petiolulo 2 cm. longis, lateralibus brevioribus ovatis utrinque attenuatis, petiolulis 3 mm. longis, venis primariis inconspicuis, petiolis 2 cm. longis. Paniculae terminales, ramis divaricatis gracilibus, floribundis, bracteis et bracteolis parvis lanceolatis obtusis, pedicellis 3 mm. longis. Calyx campanulatus, circ. 1 mm. longus, truncatus, lobis obsolete. Corolla profunde 4-lobata, lobis angustatis 2½ mm. longis, ⅔ mm. latis, erectis, apice obtusis. Stamina 2, basin corollae affixa, 3 mm. longa, antheris oblongis, 2 mm. longis apiculatis, basi sagittatis. Ovarium ovatum apice attenuatum, stylo lineari 2 mm. longo, stigmatibus 2-fido.

HAB. Kōshūn : Maripa, leg. G. NAKAHARA, Feb. 1907.

Near *F. bracteata* HEMSLE., but differs from it in having smaller flowers and very much smaller bracts which in the other species are very much larger and conspicuous. From *F. ferruginea* this is

distinguishable by the much smaller flowers and less hairy inflorescence; from *F. Griffithii* CLARKE, by the ovate leaves which are less attenuate at the apex; from *F. philippinensis* MERR., by the ovate leaves which are less acuminate at the apex and quite obtuse at the point.

***Fraxinus minute-punctata* HAYATA sp. nov.**

Fraxinus floribunda WALL. var. *integerrima* MATSUM. in Tōkyō Bot. Mag. XII. p. 14 (non WEZIG). Ramuli cenerascentes, lenticellis minutis nototi, augulati. Folia pinnata cum petiolis 20 cm. longa, 9 cm. lata, ambitu obovata, membranaceo-chartacea, pinnis utraque latere 2-3 circ. 3 cm. a se remotis oppositis, infimis minimis, superioribus majoribus, pinna terminali magna, oblonga, vel elongata-oblonga, 8 cm. longa, 2½-5 cm. lata, apice cuspidato-obtuso-acuminata, vel acuta, basi acuta, margine integra, supra costis planis vel impressis, subtus elevatis, venis lateralibus utrinque tenuibus, supra minutissime lepidoto-punctata, subtus glabra, pallidiore, petiolulo 2½ cm. longo, supra sulcato, pinnis lateralibus oppositis minoribus, plus minus obliquis oblongo-ovatis, usque ad ovatis, infimis minimis pinnam terminalem ¼-plo in longitudine æquantibus, petiolulis brevioribus, petiolis 3 cm. longis, rhachis et petiolis supra sulcatis subglabris. Paniculæ terminales, ternatim ramosæ, 11 cm. longæ, totiusque latæ, ramis divaricatis, cinereo-pubescentibus, bracteis minutis 3 mm. longis oblongo-angustis, pedicellis tenuibus 3 mm. longis. Capsulæ samaroidæ, spathulatæ, 22 mm. longæ, 3½ mm. latæ apice rotundato-emarginatæ, basi cuneato-attenuatæ, minute lepidoto-pubescentes. Calyces fructiferi campanulati, ⅔ mm. longi, obscure 4-dentati.

HAB. Loo-choo islands.

Very near *F. bracteata* HEMSL., but differs from it in having

capsules which are very narrowly attenuate at the base and in having very small bracts. The capsules of *F. bracteata* are far less attenuate at the base, and the bracts are very much larger, and conspicuous.

Osmanthus LOUR.

Osmanthus Aquifolium BENTH. et HOOK. Gen. Pl. II. p. 677 ; "Gard. Chron. n. s. VI. p. 689, f. 132" ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 87.

Olea Aquifolium SIEB. et ZUCC. Fl. Jap. Fam. Nat. n. 562 ; MIQ. in Ann. Mus. Bot. Lugd.-Bat. II. p. 264 ; FRANCH. et SAV. Enum. Pl. Jap. I. p. 312.

Ilex Aquifolium THUNB. Fl. Jap. p. 79, (non LINN.).

HAB. Sōtenzan, leg. N. KONISHI, Aug. 1907, (No. 37).

DISTRIB. China and Japan.

Osmanthus integrifolius HAYATA sp. nov.

Osmanthus sp. nov. HAYATA Fl. Mont. Formos. p. 161.

Folia alterna oblonga 5 cm. longa, 2 cm. lata, apice aristato-acuta basi obtusa rigide coriacea supra (exsiccato) reticulato-rugosa subtus obscure venosa, petiolata, petiolis 1 cm. longis. Flores ad axillas foliorum circ. 10 fasciculati, fasciculis squamis 2-3 late ovatis minutis 1 mm. longis instructis, pedicellis 1 cm. longis. Calyx brevis 1 mm. longus, 4-lobatus, lobis late ovatis. Corolla late campanulata 4 mm. longa, tubo brevissimo, limbo 4 lobato, lobis late ovatis obtusis. Stamina 2 supra basin corollæ affixa, filamentis brevibus, antheris oblongis apiculatis. Ovarium conicum, stylo brevi, stigmatibus conico 2-lobato. Fructus ignoti.

Near *Osmanthus Cooperi* HEMSL., but differs from it by the

oblong or ovate leaves with a nearly rounded base, and a callosoristate apex.

HAB. in monte Morrison, ad 8000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2003).

Osmanthus lanceolatus HAYATA sp. nov.

Osmanthus sp. nov.? HAYATA Fl. Mont. Formos. p. 161.

Folia alterna, rigide coriacea, lanceolata, 10 cm. longa, $2\frac{1}{2}$ cm. lata longe acuminata basi acuta petiolata, petiolis 1 cm. longis. Flores ad axillas foliorum circ. 20-fasciculati, fasciculis squamis 2-3 ovatis acutis coriaceis 5 mm. longis instructis, pedicellis 1 cm. longis. Calyx brevis late 4-lobus. Corolla subcampanulata 4 mm. longa 4 loba, lobis $2\frac{1}{2}$ mm. longis late ovatis subclausis. Stamina 2 ad medium tubi corollæ affixa, antheris suborbicularibus, connectivis latis apiculatis. Ovarium conicum, stylo ovario longiore, stigmatate peltato crasso 2-lobo. Fructus ignoti.

HAB. Tōzan, in montibus Morrison, leg. G. NAKAHARA, Oct. 1906.

Osmanthus Matsumuranus HAYATA sp. nov. *Osmanthus marginatus* MATSUM. in Tōkyō Bot. Mag. XII. p. 29; MATSUM. et HAYATA Enum. Pl. Formos. p. 247, (non BENTH. et HOOK.). Ramuli glabri, complanati, angulati, læves, fusco-purpurascens, pulvinis plus minus elevatis. Folia chartacea, oblonga, oblanceolata, obovato-oblanceolata, vel elongato-oblonga, 12 cm. longa, 33 mm. lata, apice breve cuspidato-acuta, ad summum obtusa, basi cuneato-acuta, ima subito breve attenuata, margine subintegra, vel plus minus undulata, costis supra impressis, subtus prominentibus, venis primariis lateralibus tenuissime elevatis tenuissimis, utraque latere 12-15, recto-patentibus, prope marginem subito arcuatis, anastomosantibus, a costa angulo 60° divaricatis,

venulis inconspicuis, utraque pagine minute elevato-punctata, glabra, exsiccato pallido-fulvescentia subtus pallidiora, petiolis 13 mm. longis, subalatis supra subplanis plus minus sulcatis. Racemi novelli 13 mm. longi, floribus non satis notis. Ex descriptione Prof. J. MATSUMURÆ: "A typo differt foliis subito acuminatis. Cortex trunci griseus. Folia petiolata, oblonga, basi attenuata apice subito acuminata, integerrima, interdum versus apicem obscure paucidentata, glaberrima, costis utrinque 10-13, subpatentibus. Racemi novelli 13 mm. longi, ad basin bibracteati, villosi, bracteis oppositis, oblongis obtusis, carinatis, dorso subvillosis margine ciliolatis. Calyx 4-lobatus, lobis obtusissimis, ciliolatis. Corolla sp. nos. nondum explicata, non satis examinata, æstivatione imbricata. Folia subpatentia maxima 140 mm. longa, 35 mm. lata."

HAB. Linkiho, leg. S. HONDA.

The present plant comes near *Osmanthus marginatus* BENTH., but differs from it in having much thinner leaves, which are abruptly acuminate at the apex. As is pointed out by Prof. J. MATSUMURA in the paper above cited, the plant does not accord with BENTHAM'S plant, especially in the shape of leaves. I have compared my plant with the type of the latter species at Kew, and found that they are quite different even in general appearance, though they come very near.

Apocynaceæ.

Melodinus FORST.

Melodinus angustifolius HAYATA sp. nov. Scandens, ramis gracilibus glabris flavo-cinerascentibus teretibus, lævibus, ramulis gracillissimis divaricatis. Folia opposita petiolata, lineari-lanceolata,

8 cm. longa, 1 cm. lata, apice attenuata obtusa basi acuta, margine subintegra, obscure undulata, utrinque glabra, supra fuscentia subtus pallidiora, venis primariis a costa angulo 60° egressis, rectis prope marginem anastomosantibus, venulis reticulatis utrinque elevatis, petiolis 5 mm. longis. Cymæ terminales, paucifloratæ, bracteatae, bracteis et bracteolis late ovatis obtusis 1 mm. longis. Calyx 5-partitus, eglandulosus, segmentis triangularibus obtusis, $2\frac{1}{2}$ mm. longis, basi 2 mm. latis, crassiusculis coriaceis ciliolatis. Corolla hypocratherimorpha, tubo cylindrico 8 mm. longo, $1\frac{1}{2}$ mm. lato, ad insertionem staminum dilatato, fusco-hirsuto, limbo 5-lobato, lobis rotundatis 6 mm. longis basi oblique angustis, (ad basin 2-squamulatis, squamulis erectis 1 mm. longis), contortis sinistrorsum obtegentibus. Stamina 5, medio tubi inclusa, filamentis 1 mm. longis, antheris lanceolatis apice acutis basi cordatis. Discus 0. Ovarium conicum integrum 1 mm. longum, stylo breve $\frac{1}{2}$ mm. longo, stigmatate incrassato $\frac{2}{3}$ mm. longo, apiculo $\frac{1}{2}$ mm. longo, 2-fido. Bacca oblongo-fusiformis, 5 cm. longa, $2\frac{1}{2}$ cm. lata, utrinque acuta, pulpa carnea repleta. Semina ∞ , pulpa nidulantia, ovata 8 mm. longa 5 mm. lata; albumen carnosum; cotyledones foliaceæ.

HAB. Kōshūn : Naibunsha, leg. G. NAKAHARA, Feb. 1907; ibidem, leg. T. KAWAKAMI, Dec. 1906, (No. 840); Kurarusha, leg. T. KAWAKAMI, Juli. 1906, (No. 1621); Taitō : Pashikō, leg. Z. KOBAYASHI, Juni. 1906, (No. 1552).

Near *M. suaveolens* CHAMP.; but differs in having much narrower or even linear leaves and ellipsoidal fruit.

Ecdysanthera HOOK. et ARN.

Ecdysanthera utilis HAYATA et KAWAKAMI in Tōkyō Bot.

Mag. XX. p. 51; MATSUM. et HAYATA Enum. Pl. Formos. p. 251.

This is very near *E. micrantha* A. DC., but differs from it by the leaves which are much narrower at the base, denser cymes, and terete and fusiformed follicles. This is also near *E. napeensis* PIERRE, which is known as a rubber plant, but differs from it in having shorter corolla-lobes.

Anodendron A. DC.

Anodendron læve MAXIM. in litt. ex FRANCH. et SAVAT. Enum. Pl. Jap. I. p. 315; BENTH. et HOOK. Gen. Pl. II. p. 717, sub *Ichmocarpo*, et p. 719; FORBES et HEMSL. Ind. Fl. Sin. II. p. 99.

HAB. Nagodake, leg. G. NAKAHARA, Aprili. 1907.

DISTRIB. Kwangtung, Hongkong, and Japan.

Asclepiadeæ.

The following species have been kindly examined by Mr. N. E. BROWN, assistant keeper of the Herbarium at Kew. He has found several new species in my collections. As he is very much occupied with colonial floras which at present monopolize nearly all the staff of the Herbarium, he has urged me to describe the new species in the present paper.

Tylophora BR.

Tylophora Browni HAYATA sp. nov. Scandens, ramis gracilibus teretibus, pubescentibus demum glabratis, longitudinaliter rugosis rugulis prominentibus, pulvinis plus minus elevatis, ramulis tetragonis reflexo-pilosis. Folia oblongo-ovata, vel late ovata generaliter 8 cm. longa, 4 cm. lata, apice obtusa vel rotundata brevissime

mucronata, vel cuspidata, chartacea, basi cordata vel rotundata, margine integerrima, angustissime reflexa, utraque glabra vel parcissime hirsuta, exsiccato supra nigro-fuscentia, subtus pallidissima, costis et venis utrinque tenuibus, petiolis 1-2 cm. longis. Cymæ axillares, longe pedunculatæ, pedunculis gracilibus 2 cm. longis simplicibus, vel pauci-ramosis, ramis divaricatis, floribus 20-30 ad apicem pedunculorum umbellatim dispositis, basi pedicellorum 1-bracteatis, bracteis acuminatis 1 mm. longis, pedicellis gracillimis, patentibus glabris, basi articulatis. Calyx campanulatus, 5-fidus, laciniis acuminato-triangularibus, glabris 1 mm. longis. Corolla patens extus glabra, 5-fida, laciniis oblongo-ovatis $4\frac{1}{2}$ mm. longis, 2 mm. latis, apice acuminato-reflexis, vel obtusis, extus glabris, intus deorsum glabris sursum longe barbatis. Columna $\frac{3}{4}$ mm. longa.

HAB. Kōshūn : Kurarusha, leg. T. KAWAKAMI, Juli. 1905, (No. 1648).

The present plant is named in honour of Mr. N. E. BROWN, who has kindly examined this plant at my request.

Tylophora hispida DECNE. var. **Browni** HAYATA n. v. Scandens, caulibus gracilibus teretibus, pallidioribus, pubescentibus, pilis reflexis. Folia opposita, membranaceo-chartacea, pallida, oblongo-ovata, $4\frac{1}{2}$ cm. longa, 6 cm. lata, apice brevissime cuspidato-mucronata, basi rotundata, vel rotundato-cordata, vel truncata, integra, ciliolata, supra primum brevissime pubescentia, demum glabrata, vel parcissime pubescentia, subtus dense brevissime villosa-pubescentia ad costas et venas subtus fusco-tomentosa, pinninervia, vel basi obscure 3-nervia, costis et venis utrinque tenuissimis, petiolis 1 cm. longis tomentosus. Cymæ axillares pedunculatæ, simplices, vel pauci-ramosæ, pedunculis 1-2 cm. longis pubescentibus, floribus 20-30 ad apicem pedunculorum umbellatim dispositis,

longe pedicellatis, pedicellis glabris gracillimis, 1 cm. longis, bracteis ad basin pedicellorum 1, lanceolatis, 1 mm. longis, barbatis, pedicellis ad basin articulatis, cicatricibus pedicellorum cupuliformibus. Flores patentes, 7 mm. in diametro. Calyx campanulatus, patens, extus parcissime barbatus, 5-fidus, laciniis acuminatis, triangularibus $1\frac{1}{2}$ mm. longis, inter lacinias glanduliferis, glandulis triangularibus minutis. Corolla subrotato-patens, 5-fida, laciniis acuminato-ovatis, 3 mm. longis, $1\frac{2}{3}$ mm. latis, apice obtusis, obscure 7-nerviis. Columna $\frac{2}{3}$ mm. longa. Folliculls ovato-fusififormis apice attenuatus, 4-6 cm. longus, horizontaliter divaricatus. Semina ovata, complanata, $4\frac{1}{2}$ mm. longa, apice obtusa, basi retundata. Coma alba 1 cm. longa.

HAB. Taitō: Maraoo, leg. T. KAWAKAMI et Z. KOBAYASHI, 1908, Aug. (Nos. 5025, 5603 et 5700); Shintiku, leg. Y. SHIMADA, (No. 5700).

The flowers of this are nearly twice as larger as those of DECAISNE's type, but scarcely larger than some of the Hongkong specimens. The pedicels also are glabrous or with only a few hairs, whilst in the type they are covered with hairs. These specimens here given, are identical with OLDHAM, 326 and HENRY, 1162, B, both from Formosa. —N. E. BROWN, May, 13, 1910.

Tylophora japonica MIQ. (det. N. E. BROWN).

HAB. Kumejima, leg. H. KURUIWA.

Tylophora Oshimæ HAYATA sp. nov. Herba tenuissima scandens, caulis gracillimus, teres, 1 mm. in sectione, facie dorso et ventrale glaber, utraque latere pubescens, striatus, cinereo-viridis, foliatus, internodiis 4 cm. longis. Folia opposita, breve petiolata, angustissime linearia, 6 cm. longa, 3 mm. lata, apice acuta, basi obtusa, margine integerrima, revoluta-reflexa, prope apicem basin-

que paucissime ciliolata, supra ad costas impressas hirsuta, subtus costis prominentibus paucissime hirsutis, vel glabris, utraque pagine glabra, venis et venulis utraque pagine longitudinaliter impresso-reticulatis, exsiccato supra pallido-viridia, subtus albo-pallidissima, ad insertionem petiolorum abrupte reflexo-inclinata, petiolis 5 mm. longis, supra plani sive subsulcatis hirsutis, subtus glabris. Cymæ paucifloratæ, floribus 2-3, axillares, solitariae longe pedunculatæ, pedunculis gracilibus, 2-3 cm. longis, floribus pedicellatis, pedicellis glabris, 4 mm. longis, bracteis acuminatis obtusis, extus hirsutis. Flores patentes, 8 mm. in diametro. Calyx patens, 5-fidus, segmentis triangulari-ovatis, acutis, margine ciliolatis, $\frac{2}{3}$ mm. longis, inter segmenta glanduliferis, glandulis punctiformibus. Corolla patens subrotata, 5-fida, segmentis elongato-ovato-triangularibus apice obtusis, 3 mm. longis, $1\frac{1}{2}$ mm. latis, extus glabris, intus brevissime pubescentibus. Corollæ squamæ 5, carnosæ, tubo staminali connatæ. Stamina tubo corollæ affixa, filamentis in tubum $\frac{1}{2}$ mm. longum connatis, antheris erectis $\frac{1}{2}$ mm. longis, membrana inflexa terminatis. Pollinia in quoque loculo solitaria, parva, globosa, caudiculis horizontalibus affixa. Stigma medio vertice umbonatum.

HAB. Taitō : Sumegan, ad 9000 ped. alt., leg. T. KAWAKAMI et U. MORI, Jan. 1908, (No. 4551).

The present plant is distinct from any species of the genus known to us. The nearest congener is *T. tenerrima* WIGHT which is however perfectly distinct from our plant. It is named in honour of Mr. K. OSHIMA, Ex-Civil Governor of Formosa, by whose graciousness extended towards myself, I was able to visit the principal herbaria of the West.

Tylophora stenoloba WARB. in FEDDE Rep. III. (1907) p. 339.

HAB. Loo-choo islands.

Near *T. Tanakæ* MAXIM.

Cynanchum LINN.

Cynanchum liukiense WARB. in FEDDE Rep. III. (1907), p. 304.

HAB. Loo-choo (WARBURG).

Near *C. formosanum* MAXIM.

Gymnema BR.

Gymnema formosanum WARB. in FEDDE Rep. III. (1907) p. 307.

HAB. Formosa : South Cape, (WARBURG).

Marsdenia BR.

Marsdenia tomentosa MORR. et DECNE. (det. N. E. BROWN.)

HAB. Oshima : leg. T. UCHIYAMA, Dec. 1900.

Heterostemma W. et ARN.

Heterostemma Browni HAYATA sp. nov. Scandens, caulibus gracilibus lævibus, glabris teretibus tortuosis, remote foliatis. Folia ovata, vel oblongo-ovata, majuscula, 10 cm. longa, $5\frac{1}{2}$ cm. lata, apice cuspidata vel cuspidato-acuta, basi rotundata, vel cordata, basi laminae ad insertionem petiolorum supra multiglandulosa, glandulis minutis circ. 10-aggregatis, margine integra leviter angustissime marginato-reflexa, supra parcissime hispidula vel glabra, subtus glabra,

supra viridia, subtus pallidissima, basi 5-nervia, nervis centralibus lateralibusque conspicuis, basilaribus tenuissimis, chartacea, petiolis 3 cm. longis supra leviter sulcatis glabris. Cymæ axillares, pedunculatæ, pedunculis simplicibus 2-3 cm. longis, glabris, floribus ad apicem pedunculorum umbellatim 10-20-dispositis, longe pedicellatis, pedicellis gracilibus, $1\frac{1}{2}$ cm. longis, patentissimis, basi articulatis, 1-bracteatis, bracteis late ovatis $\frac{1}{2}$ -1 mm. longis, obtusis. Flores patentēs circ. 1 cm. in diametro. Calyx 5-partitus, segmentis ovatis obtusis $1\frac{1}{2}$ mm longis, medio dorso crassiusculis, margine hyalinis tenuibus minute denticulatis, inter segmenta glanduliferis, glandulis minutis, triangularibus $\frac{1}{5}$ mm. longis. Corolla patens campanulata, 1 cm. in diametro, 5-lobata, lobis late ovato-triangularibus 3 mm. longis, 3 mm. latis, obtuso-acuminatis, utrinque glabris, sursum margine reflexis, apice leviter recurvatis. Corollæ squamæ acuto-acuminatæ, 2 mm. longæ, $\frac{2}{3}$ mm. latæ, patentēs, liberæ.

HAB. Shintiku : Taitōga, leg. T. KAWAKAMI et U. MORI, Juni. 1905, (No. 1373); Taiko, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 41).

[I believe all these (specimens given above) belong to one species which I regard as a new species of *Heterostemma*. It is not represented at Kew.—N. E. BROWN May, 13, 1910].

Gentianaceæ.

Erythræa RICH.

Erythræa australis R. BROWN.

HAB. Oshima, leg. TASHIRO, Nov. 1887, (Fl.)

Compared with a specimen of the species at Kew.

Crawfordia WALL.

Crawfordia lanceolata HAYATA sp. nov. Herba scandens glabra, gracillima, 1 mm. in sectione, internodiis 5 cm. longis. Folia opposita, petiolata, lanceolata, $5\frac{1}{2}$ cm. longa, 7 mm. lata trinervia, apice acuminata, basi rotundato-acuta, integra, petiolis 1 cm. longis. Flores axillares vel terminales, pedunculis 1 cm. longis foliolis bracteæformibus parvis instructis. Calyx campanulatus, tubo 1 cm. longo, 5-costato, limbo 5-dentato, dentibus linearibus 8 mm. longis 1 mm. latis. Corolla tubuloso-campanulata, 3 cm. longa apice dilatata, 5-lobata, lobis brevibus triangularibus $4\frac{1}{2}$ mm. longis $3\frac{1}{2}$ mm. latis, acutis basi obliquis, sinibus plicatis, obliquis dentatis. Discus annularis, 2 mm. longus 5-lobatus. Ovarium stipitatum, stipite 9 mm. longo, lanceolatum complanatum 10 mm. longum 2-costatum, stylo filiformi 12 mm. longo apice 2-lamellato.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908.

Near *C. Pterygocalyx* HEMSL. from which this differs in having narrower and thicker leaves, much shorter pedicels, minute bracts at the base of the flowers, much longer calyx-lobes, not winged calyx, and larger flowers.

Gentiana LINN.

Gentiana cæspitosa HAYATA Fl. Mont. Formos. p. 165.

Near *G. pulla* FRANCH., but differs from it in having much larger flowers.

Gentiana parvifolia HAYATA sp. nov. Herba gracillima, glaberrima, procumbens ad nodos radicans, caulibus prostratis, gra-

cillimis $\frac{2}{3}$ mm. in sectione, internodiis 4 cm. longis. Folia opposita petiolata ovata cum petiolis $1\frac{1}{2}$ cm. longa 7 mm. lata, apice aristato-acuta basi abrupte attenuata in petiolum 5 mm. longum abeuntia, margine integra vel sub lente denticulata ablo-lamellata, utrinque glabra, 1-3-nervia, subtus pallidiora. Flores axillares vel terminales, erecti pedunculati, pedunculis 7 mm. longis, bracteis oppositis lanceolatis 1 cm. longis. Calyx campanulatus membranaeus 12 mm. longus, tubo campanulato 7 mm. longo 5 mm. lato, 5-costato, limbo 5-dentato, sinibus inter dentes latis truncatis, dentibus 5 mm. longis $\frac{2}{3}$ mm. latis, linearibus dorso carinatis acuminatis. Corolla tubuloso-campanulata, $2\frac{1}{2}$ cm. longa, tubo superne dilatato, limbo 5-lobato, lobis brevibus triangularibus, 4 mm. longis $4\frac{1}{2}$ mm. latis acutis, contortis, sinibus plicatis denticulatis subtruncatis. Stamina 5, ad basin tubi affixa, filamentis filiformibus 22 mm. longis complanatis basi dilatatis, antheris ovatis, sagittatis, versatilibus. Discus annularis $\frac{1}{2}$ mm. longus obscure 5-lobus vel lobis obsoletis. Ovarium angustatum vel lanceolatum complanatum 12 mm. longum 3 mm. latum, stylo 17 mm. longo, filiforme apice 2-fido, ramis 5 mm. longis filiformibus turbulenter recurvatis, stipite 2 mm. longo.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7117).

Near *Gentiana filicaulis* HEMSL., but differs from it in having longer corolla with broader lobes, and much smaller leaves. Remarkable for the small leaves which are nearly ovate with acute apex and narrowed base attenuated to the petioles.

Gentiana scabrida HAYATA Fl. Mont. Formos. p. 168.

Near *G. Piasezkii* MAXIM. but differs from it in having much shorter calyx.

Swertia LINN.***Swertia arisanensis*** HAYATA n. n.

Swertia alata HAYATA Fl. Mont. Formos. p. 168, (non ROYLE.).

As the name *Swertia alata* had been used for a Himalayan plant, another name *S. arisanensis* is very desirable for the one from Formosa.

Swertia randaiensis HAYATA sp. nov. Herba altiora, caulibus glabris tetragonis subalatis, (alis angustissimis 1 mm. latis,) flabescentibus ramosis, ramis oppositis gracilibus, divaricatis. Folia opposita, sessilia, 7-nervia lanceolata, 37 mm. longa, 6 mm. lata, apice acuminata utraque pagine glabra. Flores racemoso-paniculati, vel racemosi, racemis axillaribus vel terminalibus, foliatis, pedicellatis, pedicellis 1 cm. longis, bracteis lanceolato-ovatis 8 mm. longis. Calyx 5-partitus, segmentis lanceolatis acutis 4 mm. longis 1 mm. latis, 1-nerviis. Corolla rotata $4\frac{1}{2}$ mm. longa, tubo $\frac{1}{2}$ mm. longo, limbo 5-lobato, lobis oblongis acuminatis $4\frac{1}{2}$ mm. longis 2 mm. latis, 5-nerviis, prope basin glanduloso-maculatis, maculis 2, margine macularum longe ciliolatis, fauce tubi pilis brevibus, pagine lorum intus sub microscopio minute glanduloso-punctatis, dextrorsum obtegentibus. Stamina 5, fauce tubi corollæ affixa, filamentis $2\frac{1}{4}$ mm. longis campanulatis, antheris $\frac{2}{3}$ mm. longis ovatis apiculatis. Ovarium sessile, oblongo-ovatum, 3 mm. longum, $1\frac{1}{2}$ mm. latum, acuminatum, stigmatate sessili, 2-fido, capituliformi.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7114); Ganzan, in montibus Morrison, ad 9141 ped. alt., leg. S. NAGASAWA, Oct. 1905, (No. 642).

Near *Swertia purpurascens* WALL., but greatly differs from it in having erect corolla and shorter carpels. Also near *S. tetragona* EDGW., from which this is distinguishable by the much broader lobes of the calyx.

Swertia tozanensis HAYATA sp. nov. Herba erecta, gracillima, 20 cm. alta, caulibus glabris tetragonis leviter alatis, vel non alatis, 4-striatis. Folia opposita, petiolata, vel subsessilia, lanceolato-oblonga cum petiolis 3 cm. longa, 7 mm. lata, apice obtusa basi attenuata ad petiolum 7 mm. longum abeuntia, 3-nervia, venulis reticulatis. Flores axillares solitarii vel racemosi, racemis paucifloratis, pedicellis 2 cm. longis. Calyx 3-4 partitus, segmentis lanceolatis obtusis $1\frac{1}{2}$ mm. longis, apice reflexis. Corolla rotata 6 mm. longa, tubo breve 1 mm. longo, limbo 4-lobato, lobis oblongis $5\frac{1}{2}$ mm. longis, $2\frac{1}{2}$ mm. latis apice obtusis, prope marginem medio 2-maculatis, fauce glabro. Stamina 4, fauce tubi affixa, filamentis $1\frac{2}{3}$ mm. longis complanatis apice extrorsum reversis, antheris globosis $\frac{2}{3}$ mm. longis obtusis. Ovarium lanceolatum $4\frac{1}{2}$ mm. longum, $1\frac{1}{2}$ mm. latum apice obtusum, stigmate 2-fido, sessili. Capsula elongato-ovoidea, 11 mm. longa, 4 mm. lata, apice attenuata, valvis 2, apice leviter recurvatis. Semina globosa compressiuscula $\frac{2}{3}$ mm. in diametro.

HAB. Tōzan, in montibus Morrison, leg. G. NAKAHARA, Nov. 1906.

Limnanthemum GRISEB.

Limnanthemum cristatum GRISEB. in DC. Prodr. IX. p. 139; HANCE in Journ. Bot. (1878), p. 229; HOOK. f. Fl. Brit. Ind. IV. p. 131; FORBES et HEMSL. Ind. Fl. Sin. II. p. 142.

HAB. Tainan, leg. T. KAWAKAMI et G. NAKAHARA, Feb. 1906, (No. 1073); in orizetis Suihenkiaku, leg. U. FAURIE, Juni. 1903.

DISTRIB. China: Kwangtung, Fokien. India, Malay and the Philippines.

Boragineæ.

Bothriospermum BUNGE.

Bothriospermum tenellum FISCH. et MEY. var. ***majusculum*** HAYATA n. n. Herba strigosa 20-30 cm. alta, caulibus pilis strigosis patentibus rectis obtectis. Folia radicalia obovato-spathulata, 7 cm. longa, 23 mm. lata, apice apiculata, basi longe attenuata, margine irregulariter denticulata, vel subintegra, supra pilis strigosis rectis longis parce dispersa, et pilis brevioribus mollis pubescentia, subtus pilis mollis pubescentia; folia caulina obovato-oblonga 5 cm. longa, 17 mm. lata, apice acuta, basi breve attenuata. Racemi pauce remoteque florati, (floribus ad axillas bractearum solitariis, cernuis), pauce ramosi, ramis divaricatis. Calyx 5-partitus, segmentis oblongis 4 mm. longis, $1\frac{1}{2}$ mm. latis, utraque facie longe strigosis. Corolla campanulata, 6 mm. longa, 5-lobata, tubo 3 mm. longo fauce squamis truncatis reflexis instructo, lobis oblongo-rotundatis, 3 mm. longis. Stamina 5, medio tubi affixa, filamentis brevibus vel subsessilibus, antheris oblongis 1 mm. longis. Ovarium depresso-globosum 1 mm. longum, stylo validiusculo 1 mm. longo.

HAB. Kelung, leg. S. NAGASAWA, Mai. 1908, (No. 375).

The present variety differs from the type in having much larger flowers and fruit.

Convolvulaceæ.

Ipomæa LINN.

Ipomæa carnosa R. BR. ; BENTH. Fl. Austral. IV. p. 420 ; HOOK. f. Fl. Brit. Ind. IV. p. 213 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 158 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 261.

HAB. Kōshūn : Garanbi, leg. T. KAWAKAMI, 1905, Juni. (No. 5804).

Ipomæa denticulata CHOIS. in DC. Prodr. IX. p. 379 ; CLARKE in HOOK. f. Fl. Brit. Ind. IV. p. 208.

HAB. Kōtōshō, leg. T. KAWAKAMI et U. MORI, 1907, Aprili. (Nos. 2485 et 2909).

DISTRIB. India, Malay, Australia, Polynesia and Seychelles.

Ipomæa linifolia BLUME ; CLARKE in HOOK. f. Fl. Brit. Ind. IV. p. 205.

HAB. Daikwaikēi, leg. T. KAWAKAMI et INOUI, Sept. 1908.

DISTRIB. India, Malay archipelago, Australia.

Ipomæa quinata BR. ; CHOIS. in DC. Prodr. IX. p. 385 ; BENTH. Fl. Hongk. p. 237 ; HOOK. f. Fl. Brit. Ind. IV. p. 214 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 162.

HAB. Kagi : Rokuryōshō, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1962) ; Tainan : Shōhabō, leg. G. NAKAHARA, Oct. 1905, (No. 623).

DISTRIB. Kwangtung, Hongkong, and Eastern India to Northern Australia.

Ipomæa rotundisepala HAYATA sp. nov. Herba scandens,

glabra, caulibus obscure striatis teretibus. Folia alterna petiolata, late cordata, 7 cm. longa, 5 cm. lata, apice acuminata, basi rotundata, truncata, vel leviter cordata, integra, venis primariis divaricatis basilaribus a costa circ. angulo 90° egressis, venis secundariis ascendente-transversis, utrinque glabra, petiolis $2\frac{1}{2}$ cm. longis. Cymæ axillares, pedunculatæ, pedunculis $1\frac{1}{2}$ cm. longis, pedicellis 5 mm. longis, bracteis late ovatis $2\frac{1}{4}$ mm. longis, 2 mm. latis, apice rotundatis basi late truncatis. Calyx globoso-campanulatus 6 mm. longus, 5-partitus, segmentis imbricatis orbicularibus basi contractis 5 mm. in diametro. Corolla infundibulari-campanulata, $3\frac{1}{2}$ cm. longa. Stamina 5, basi corollæ affixa, filamentis filiformibus 1 cm. longis, basi dilatatis intus barbatis. Discus annularis, 1 mm. altus. Ovarium conicum $1\frac{1}{2}$ mm. longum, stylo 14 mm. longo, stigmatibus didyme 2-globoso.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 1915).

Near *I. polyantha* MIQ., from which the present plant differs in having entirely glabrous leaves and longer flowers. Also near *I. staphylina* RÆM. et SCH. but differs by the larger flowers, and acuter leaves with different venation.

Solanaceæ.

Solanum LINN.

Solanum lysimachioides WALL.; ROXB. "Fl. Ind. II. p. 259"; DUNAL in DC. Prodr. XIII, -1, p. 181; FORBES et HEMSL. Ind. Fl. Sin. II. p. 171.

HAB. Tappansha, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1737); Nantō: Rakurakusha, leg. G. NAKAHARA, Aug. 1905, (No. 466).

DISTRIB. North India, and China : Hupeh, Szechuen.

OBSERV. Herba puberula, gracilis, caulibus striatis pubescentibus procumbentibus ad nodos radicanibus, internodiis 5 cm. longis. Folia opposita, inæqualia, sæpe alterum majus, alterum minus interdum ad nullum reductum, longe petiolata, ovata $4\frac{1}{2}$ cm. longa, 3 cm. lata, apice abrupte acuta, ad summum obtusa, basi acuta ima attenuata, basi valde obliqua, utraque pagine ad costas laxè pubescentia, petiolis 3 cm. longis. Flores axillares, solitarii, pedunculis gracillimis 3 cm. longis, apice subnutantibus. Calyx campanulatus, tubo campanulato, 3 mm. longo, $4\frac{1}{2}$ mm. in diametro, 10-costato, apice truncato limbo 10-dentato, dentibus aristatis, 3 mm. longis, horizontaliter patentibus, latere compressis, $\frac{1}{2}$ mm. latis. Corolla rotata, 8 mm. longa, tubo breve $\frac{1}{2}$ mm. longo, limbo 5-lobato, lobis ovato-lanceolatis 7 mm. longis, $2\frac{1}{2}$ mm. latis, induplicato-valvatis. Stamina 5, libera, filamentis brevibus 1 mm. longis, fauce tubi affixis, antheris oblongis, $3\frac{1}{2}$ mm. longis, $1\frac{1}{2}$ mm. latis, apice 2-poris. Ovarium ovatum $1\frac{1}{2}$ mm. longum, stylo filiformi $7\frac{1}{2}$ mm. longo, stigmatè capitellato. Bacca globosa 8 mm. in diametro. Semina complanata, orbicularia, 2 mm. in diametro, testa crustacea minute annulariter reticulata. Embryo linearis turbulenter recurvatus.

Remarkable for its creeping habit, free stamens, and 10-toothed calyx.

Scrophularineæ.

Ellisiophyllum MAXIM.

Ellisiophyllum pinnatum MAKINO ; HAYATA Fl. Mont. Formos.

p. 170; A. BRAND *Ellisiophyllum*, in *Zwei kritischen Pflanzengattungen*, p. 5.

For comment as to this being referred to *Scrophularineæ*, see p. 8, under Introduction.

Paulownia SIEB et ZUCC.

Paulownia sp. nov.? HAYATA in Bull. III. Congrès International de Botanique de Bruxelles, (1910), p. 41, Pl. XXIV.

HAB. Mt. Sōtenzan, B. HAYATA, Aug. 1908.

The present *Paulownia* was pointed out to me by Mr. T. KAWAKAMI in August, 1908, when I was botanizing on the mountain with the same gentleman. I found the plant in full foliage, but lacking flowers. The photograph given in the paper above cited was taken by myself on the spot. I may add that there exist three species spontaneous in continental China and another also spontaneous in the Island of Formosa. The Chinese species of *Paulownia* are *P. imperialis* SIEB. et ZUCC. (which exists also in Japan where it is found only in cultivation), *P. Fortunei*, which is easily distinguished from the preceding species by its much elongated leaves, and finally *P. Fargesii* FRANCH.

Hemiphragma WALL.

Hemiphragma heterophylla WALL.; BENTH. in DC. Prodr. X. p. 429; HOOK. f. Fl. Brit. Ind. IV. p. 289; FORBES et HEMSL. Ind. Fl. Sin. II. p. 192.

**Logonia dentata* HAYATA Fl. Mont. Formos. p. 162, Pl. XXVIII.

DISTRIB. North India, South China, the Philippines.

* For comment as to this being referred to this species, see p. 6, under Introduction.

Lentibulariæ.

Utricularia LINN.

Utricularia biflora HAYATA sp. nov. Herba parva tenuissima 4 cm. longa. Folia radicalia linearia spathulata, 2 cm. longa, $\frac{5}{8}$ mm. lata. Scapi 4 cm. longi prope medium bracteis instructi, (bracteis ovatis 1 mm. longis), apice 1-2 flores gerentes, floribus pedicellatis, pedicellis 2 mm. longis, basi bracteolatis, bracteolis ovatis 1 mm. longis. Calyx profunde 2-lobatus, lobis inæqualibus, inferiore minore ovato obtuso 2 mm. longo, superiore majore ovato obtuso, $2\frac{1}{4}$ mm. longo simplice plicato. Corollæ profunde 2-labiata, lobis anterioribus horizontaliter patentibus, calcaratis, (calcar $2\frac{1}{4}$ mm. longo, medio $\frac{1}{2}$ mm. lato,) 3 mm. longis basi 1-concavo-foveolatis (foveola $\frac{3}{4}$ mm. longa pubescente) glabris valde convexis margine planis; lobis posterioribus erectis $3\frac{1}{2}$ mm. longis, $1\frac{1}{2}$ mm. latis basi urceolato-concavis prope medium callosiusculis, apice reflexis. Stamina 2, antice basi corollæ affixa, 1 mm. longa. Ovarium globosum, cum stylo brevissimo 1 mm. longum, stigmatate 5-laminato, laminis inæqualibus. Capsula 2-valvata, late oblonga, 2 mm. longa, $1\frac{1}{2}$ mm. lata, valvis 2, membranaceis, calycis lobis accrescentibus inclusa. Semina ovoidea longitudinaliter reticulata $\frac{1}{3}$ mm. longa utrinque obtusa.

HAB. Taiko, leg. T. KAWAKAMI et U. MORI, 1908.

Near *U. bifida* LINN. from which the present plant is easily distinguishable by the much smaller flowers, which are usually in pairs at the apex of the scape. Also near *U. diantha* R. et S., but differs from it by the yellowish flowers and linear leaves with bladders.

Utricularia racemosa WALL. ex A. DC. Prodr. VIII. p. 21; BENTH.

Fl. Hongk. p. 256 ; HOOK. f. Fl. Brit. Ind. IV. p. 333 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 224.

HAB. Shizangan, leg. B. HAYATA, Juli. 1908.

DISTRIB. India, Ceylon, Malaya, Cochinchina and China.

Gesneraceæ.

Titanotrichum SOLERED.

Titanotrichum Oldhami SOLERED. in Berichte der Deutsch. Bot. Gesellsch. V.-27, p. 400, (Sept. 1909).

Matsumuria Oldhami HEMSL. in Kew Bull. Dec. (1909) p. 361.

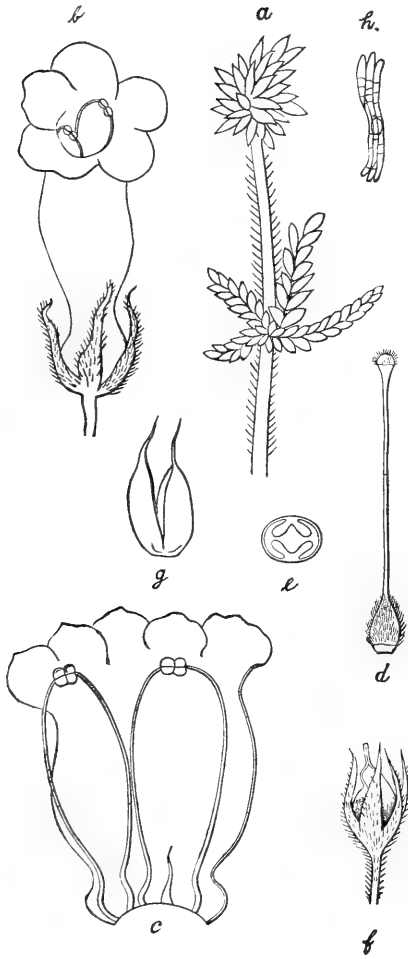
**Rehmannia Oldhami* HEMSL. Ann. Bot. IX. p. 154 ; Ind. Fl. Sin. II. p. 194 ; HENRY List Pl. Formos. p. 88 ; MATSUMURA et HAYATA Enum. Pl. Formos. p. 282 ; HAYATA Fl. Mont. Formos. p. 174.

DISTRIB. An endemic genus.

OBSERV. Herb base shrubby, hirsute ; stem slender, simple, hirsute, scape-like, erect, with a few leaves a little above the base, with a few flowers a little below the middle, and with many deformed ones spicately arranged upwards. Leaves shortly petioled, approximately alternate, obliquely oblong acute at both ends, margin serrate towards the apex, intire near the base, strigose above, pubescent below. Segments of deformed flowers very small oblong acute, terete, fleshy, numerous clustered ; clusters alternate, or approximately superposed. Flowers a few, racemosely arranged a little below the middle of the stem, pedicled. Calyx 5-parted, segments lanceo-

* For comment as to this being referred to this species and family, see p. 5, under Introduction.

late. Corolla tubuloso-campanulate, tube constricted a little above the base, base gibbose, limb patent, 2-lipped, upper lip 2-lobed, lower lip 3-lobed. Ovary hirsute, ovate, perfectly 1-celled, with two parietal placentas. Capsule ovate loculicidally dehiscent, valves afterwards again 2-parted, lignified. Seeds very minute winged.



Titanotrichum Oldhami SOLERED.—a, clusters of deformed flowers; b, a flower; c, a corolla expanded; d, an ovary; e, cross-section of the same; f, a fruit in the calyx; g, a fruit after dehiscence; h, a seed.

***Oreocharis* BENTH.**

***Oreocharis Benthami* C. B.**

CLARKE in DC. Monogr. Phanerog. V.-1, p. 63, t. 5; HANCE in Journ. Bot. (1883), p. 165; FORBES et HEMSL. Ind. Fl. Sin. II. p. 226.

HAB.

DISTRIB. Kwangtung.

I have seen the species at Hongkong, and remember that I saw a plant in Formosa. It is not yet represented from Formosa in the Tōkyō Herbarium.

***Chirita* HAM.**

***Chirita anachoreta* HANCE; MATSUM. et HAYATA Enum. Pl. FORMOS.**

HAB. Nantō: Rakurakusha. leg. G. NAKAHARA, Aug. 1905, (No. 476).

Acanthaceæ.

Hemigraphis NEES.

Hemigraphis reptans T. ANDERS. ex HEMSL. in Bot. Voy. Challenger, I.-3, p. 173.

HAB. Kōtōshō, leg. G. NAKAHARA, Mart. 1906.

DISTRIB. Ins. APOU.

Lepidagathis WILLD.

Lepidagathis formosensis CLARKE sp. nov. (in sched.), Typ. in Herb. Kew.

Lepidagathis hyalina HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 293, (non NEES). Suffrutescens erecta, gracilis 45 cm. alta, caulis tetragonus, (angulis acutis), angustissime alatus, subglaber, vel parcissime pubescens. Folia oblongo-ovata, cum petiolis 8-10 cm. longa, 2-2½ cm. lata, apice obtusa, basi subito angustata, in petiolum 2 cm. longum attenuata, margine repandata, chartacea, utrinque brevissime parcissime pubescentia, supra exsiccato fuscentia, subtus pallidissima, costis et venis utrinque tenuiter elevatis, venis lateralibus utrinque 4, prope marginem anastomosantibus. Spicæ terminales vel axillares, sessiles, 3-5-congestæ, oblongo-ovatae, 1-2 cm. longæ, floribus dense secundatim dispositis, bracteis lanceolatis, extus hirsutis, 5-6 mm. longis imbricatis. Calyx tubulosus 6 mm. longus, 5-fidus, extus barbatus, laciniis lanceolatis acuminatis, longe aristatis, 1-costatis, marginatis, inæqualibus, posteriore latissimo, lateralibus angustissimis, anterioribus longissimis. Corolla 8-9 mm. longa, tubuloso-campanulata,

extus brevissime reflexo-pubescentis, tubo $3\frac{1}{2}$ mm. longo, apice leviter constricto, limbo campanulato basi intus reflexo-barbato, 4-lobato, lobis oblongis, rotundatis, apice rotundatis, lobo postico latissimo, apice breve et obscure 2-dentato vel integro. Ovarium ovatum hirsutum, stylo parvissime hirsuto, stigmatibus oblongo-capitato. Discus annularis leviter 5-lobatus.

HAB. Biōritsu, leg. S. NAGASAWA, (Nos. 670 et 356).

The type of the late C. B. CLARKE is preserved in the Herbarium at Kew. I have compared my specimens with the type and found that they are exactly identical. So far as I am aware, the description of this species has not been published before, owing to the untimely death of the eminent authority who determined it. The description here given is drawn from my own specimen, but not from CLARKE's type.

Lepidagathis stenophylla CLARKE sp. nov. (in sched.) Typ. in Herb. Kew. Suffruticens, circ. 40 cm. alta, caulis erectus, gracillimus, rectus vel flexuosus, tetragonus, (angulis acutis), superiore angustissime subalatus, pauca pubescens. Folia angustissime linearia, 7 cm. longa, 3 mm. lata, subsessilia vel breve petiolata leviter falcato-recurvata vel subrecta, apice obtusa basi gradatim angustata in petiolum 3 mm. longum attenuata, margine repandata, utrinque brevissime parce pubescentia, chartacea, venis lateralibus patentissimis, a costis angulo 90° divaricatis utrinque elevatis tenuibus, subtus pallidiora. Spicæ ovatæ vel elongato-ovatæ, terminales vel axillares, 13 mm. longæ, bracteis dense imbricatis lanceolatis acuminatis, 5 mm. longis, $1\frac{1}{2}$ mm. latis, apice aristatis margine ciliatis, dorso tenuiter barbatis, 1-costatis, floribus sessilibus. Calyx tubuliformis, extus adpresso-barbatus intus glaber, 6 mm. longus, 5-fidus, segmentis 1-costatis, aristatis, marginatis

ciliatis, inæqualibus, posterioribus latissimis lanceolatis, lateralibus angustissimis brevissimis, anterioribus longissimis. Corolla calycem vix superans tubuloso-campanulata, tubo $1\frac{1}{2}$ mm. longo, ad faucem valde constricto, subgloboso, glabro, limbo campanulato extus reflexo-pubescente, intus glabro basin barbato, 4-lobato, lobis rotundato-ovatis, lobo postico apice breve 2-dentato. Stamina 4, ad basin limbi corollæ affixa, antheris locellis distinctis. Ovarium ovatum hirsutum. Stylus parce hirsutus, stigmate capitato-globoso. Discus annularis leviter 5-lobatus.

HAB. Botansha, leg. K. MIYAKE, Jan. 1900.

The type of the late C. B. CLARKE is preserved in the Herbarium at Kew. I have compared my specimens with the type at Kew and found that they are exactly identical with it. So far as I am aware, the description of this species has not been published before, owing to the untimely death of the eminent authority. The description here given is drawn up from my own specimen, but not from CLARKE's type.

Dicriptera JUSS.

Dicliptera longiflora HAYATA sp. nov. Herba pubescens, vel leviter breve lanata, demum glabrata, caulibus angulatis sulcatis lanato-pubescentibus, pilis patentibus. Folia opposita, petiolata, oblonga, 9 cm. longa, 4 cm. lata, apice cuspidato-acuminata, ad summum obtusa, basi acuta leviter obliqua, costis et venis utrinque prominulis, venis primariis utrinque latere 4, utraque pagine primum dense breve lanata demum glabrata, petiolis 3 cm. longis. Cymæ terminales paucifloratæ, ad ramos 2-bracteatae, bracteis subulatis acuminatis basi dilatatis $2\frac{1}{2}$ mm. longis. Flores 5-6 fasciculati, sessiles, basi bracteis 2

oppositis suffulti, bracteis magnis ovatis $2\frac{1}{2}$ cm. longis, $1\frac{1}{2}$ cm. latis, acutis, plicatis, viridibus membranaceis venulis reticulatis elevatis, bracteolis intra bracteas triangularibus connatis. Calyx tubuloso-campanulatus, 4 mm. longus, alte 5-lobatus, lobis lanceolatis $2\frac{1}{2}$ mm. longis acutis. Corolla extus laxe pubescens, $4\frac{1}{2}$ cm. longa, tubo tenui $2\frac{1}{2}$ cm. longo, superne vix ampliato, limbo longe 2-labiato, labio posteriore interiore erecto oblongo 2 cm. longo, 1 cm. lato apice breve 3-lobo, (lobis rotundatis 1 mm. longis), anteriore latiore patente convexiusculo, obovato 2 cm. longo, 13 mm. lato. Stamina 2, erecta, fauce affixa, labio posteriore breviora, filamentis $1\frac{1}{2}$ cm. longis, pilis patento-reflexis pubescentibus. Ovarium late cylindricum $1\frac{1}{2}$ mm. longum apice acutum, stylo filiformi $2\frac{1}{2}$ cm. longo, stigmate truncato. Discus annularis, $\frac{1}{2}$ mm. longus.

HAB. Formosa.

Near *D. chinensis*; remarkable for the very long corolla which is as long as $4\frac{1}{2}$ cm.

Verbenaceæ.

Clerodendron LINN.

Clerodendron glaberrimum HAYATA sp. nov. Ramuli subtetragoni viridissimi, glabri. Folia opposita, exstipulata, longe petiolata, oblongo-obovata vel oblanceolata, 20 cm. longa, 6 cm. lata, apice acuminata, basi obtusa vel rotundata, leviter obliqua, sub-trinervia, venis primariis utrinque latere 6-7, a costa angulo 50° egressis, arcuatis ad marginem anastomosantibus, venis secundariis transversis distinctis, basi 2-3-glandulifera, utrinque glaberrima viridissima, petiolis 8 cm. longis basi apiceque granuloso-glandulis aggregatis instructis. Cymæ paniculatæ, paniculis terminalibus ramosis,

ramis dichotome furcatis, divaricatis, leviter pubescentibus, bracteis linearibus 2-3 mm. longis. Calyx campanulatus breve pubescens, 3 mm. longus, $2\frac{1}{2}$ mm. latus, 5-lobatus, lobis triangularibus, acutis 1 mm. longis, plus minus glanduliferis. Corolla infundibulo-tubuliformis, tubo longissimo leviter inclinato 12 mm. longo sursum infundibuliformi, limbo 5-lobato, lobis patentibus oblongis 4 mm. longis 2 mm. latis apice rotundatis, tortuosis. Stamina 4, sub fauce corollae affixa, $2\frac{1}{2}$ cm. longa involuta, antheris oblongis $1\frac{1}{2}$ mm. longis apice obtusis basi sagittatis. Ovarium obovatum $1\frac{1}{2}$ mm. longum, irregulariter 8-sulcatum glabrum, imperfecte 4-loculare, vel perfecte 2-loculare, stylo filiformi 22 mm. longo, stigmatibus subulato 2-fido.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7045).

Remarkable for its glabrous leaves, retaining its fresh green colour even in a dried specimen, and quite glabrous panicles. Near *C. acuminatum* WALL. and *C. disparifolium* BLUME, but differs from them in having smaller flowers, more profusely dichotomous cymes, and oblanceolate leaves.

Clerodendron koshunense HAYATA sp. nov. Rami longitudinaliter rugulosi, cinerascens, cicatricibus foliorum elevatis cupuliformibus obtecti, lenticellis oblongis, plus minus elevatis, ramulis oppositis, angulatis fusco-pubescentibus. Folia chartacea, opposita, oblonga, vel oblongo-ovata, 8 mm. longa, $4\frac{1}{2}$ cm. lata, apice breve acuto-cuspidata, vel acuta, basi rotundato-acuta, margine remote dentato-serrata, vel remote mucronato-serrata, serris mucronatis prope apicem basinque integra, ad costas et venas parce pubescentia, subtus pallida, ad costas venasque parvissime pubescentia, ad paginam glabra, prope basin costamque glandulis rubris rotundatis dispersa, petiolis 2-3 cm. longis supra sulcatis,

dense pubescentibus. Cymæ terminales, 8 cm. longæ, 7 cm. latæ, ramosæ, ramis pubescentibus, bracteis linearibus, pubescentibus, 7 mm. longis, pedicellis 5 mm. longis. Flores 23 mm. longi. Calyx obconico-campanulatus, 12 mm. longus 5-gonus, tenuiter pubescens, 5-lobatus, lobis elongato-triangularibus 7 mm. longis, acutis 3 mm. latis obscure 3-nerviis, margine ciliolatis. Corolla tubuloso-campanulata, 23 mm. longa, utrinque glabra, tubo tenuissimo 13 mm. longo, $1\frac{1}{2}$ mm. lato, intus paucissime hirsuto, limbo campanulato, 5-lobato, lobis oblongis apice obtusis 8 mm. longis, 4 mm. latis, margine ciliolatis. Stamina 4, tubi fauce affixa, filamentis 2 cm. longis, complanatis, filiformibus glabris, longe exsertis, recurvatis, antheris oblongis $2\frac{1}{4}$ mm. longis. Ovarium oblongo-globosum, $1\frac{1}{2}$ mm. longum, stylo filiformi $3\frac{1}{2}$ cm. longo, apice brevissime 2-lobato.

HAB. Kōshūn : Kurarusha, leg. T. KAWAKAMI, Juli. 1906, (No. 1646).

Near *C. trichotomum* THUNB., but differs from it in having much acuter calyx-lobes.

Callicarpa LINN.

Callicarpa boninensis HAYATA sp. nov. Rami albicantescercentes, glabri, longitudinaliter rugulosi, cortice hac atque illac transverse fisso-striato sursum foliati, densissime stellato-tomentosi, cicatricibus foliorum rotundatis prominentibus majusculis notati. Folia prope apicem ramulorum approximate oppositæque disposita, oblongo-ovata, 7 cm. longa, 37 mm. lata, membranaceo-chartacea, apice rotundata, vel obtusa brevissime cuspidatata, (cuspidibus 3-5 mm. longis), basi cuneato-acuta, supra fuscentia, ad costas et venas plus minus dense stellato-tomentosa,

pilis brevissimis, ad paginam paucissime tomentosa, vel subglabrata, venis impressis, margine minute denticulato-serrulata, deorsum integra, subtus pallida ad costas venas et venulas prominentes densissime, ad paginam dense, stellato-tomentosa, utrinque glandulis punctiformibus minutis flavis nitidis et glandulis cupuliformibus rubescentibus pauce dispersa, petiolis 2 cm. longis dense tomentosis, supra plano-sulcatis, bracteis lanceolatis vel ovatis obtusis circ. 1 mm. longis, bracteolis minoribus. Flores $3\frac{1}{2}$ mm. longi, parce fulvo-punctati, glabri. Calyx campanulato-cupuliformis $1\frac{1}{2}$ mm. longus, 4-dentatus, dentibus latissimis obscuris. Corolla $3\frac{1}{4}$ mm. longa, 4-lobata, lobis rotundatis, basi leviter contractis, $1\frac{1}{2}$ mm. longis totiusque latis. Stamina 4, longe exserta, 6 mm. longa, filamentis glabris, antheris oblongo-ovatis $1\frac{1}{2}$ mm. longis. Ovarium conicum $\frac{1}{2}$ mm. longum dense pulvibus flavis obtectum, stylo brevissimo $\frac{1}{10}$ mm. longo, stigmatibus globosis minutis.

HAB. Bonin : Chichijima, leg. OKADA.

Callicarpa kotcensis HAYATA sp. nov. Rami validiusculi eimerascentes lenticellati glabrati, ramulis fusco-rubrescentibus stellato-tomentosis. Folia opposita, petiolata, exstipulata, ovato-lanceolata, $8\frac{1}{2}$ cm. longa $3\frac{1}{2}$ cm. lata, apice cuspidato-acuminata, basi gradatim acuta, margine serrata, serris obtusis vel apiculatis, basi integra, venis primariis utrinque latere 6-7, venis basilaribus cum marginibus parallelis, ad costas venasque stellato-tomentosa cæterum glabrata, (foliis novellis dense stellato-tomentosis), subtus pallidiora, petiolis 1 cm. longis. Cymæ axillares pauce ramosæ, ramis divaricatis, pedunculis 1 cm. longis, pedicellis 2 mm. longis, bracteis minutis, subulatis, ramis omnibus stellato-tomentosis. Calyx late campanulatus extus pauce glanduloso-pulveraceus $1\frac{1}{2}$ mm. longus, 2 mm. latus, brevissime latissimeque

dentatus, dentibus acutis. Corolla tubuloso-campanulata 5 mm. longa, extus pauce glanduloso-pulveracea, tubo 3 mm. longo, $1\frac{1}{2}$ mm. lato, limbo 4-lobato, lobis 4 rotundatis $1\frac{1}{2}$ mm. longis. Stamina 4, basi corollæ affixa exserta, filamentis filiformibus $6\frac{1}{2}$ mm. longis, antheris oblongis $1\frac{1}{2}$ mm. longis, apice emarginatis, basi sagittatis. Ovarium globosum $\frac{1}{2}$ mm. longum, stylo filiformi 8 mm. longo, stigmatibus dilatato, 2-lamellato. Drupa globosa 5 mm. longa, calyce inclusa, epicarpio succoso, endocarpio indurato, in pyrenas 4 secedente, pyrenis ovatis dorso convexis ventrali concavis, $2\frac{1}{2}$ mm. longis, 2 mm. latis. Semina oblonga $1\frac{1}{2}$ mm. longa, $\frac{4}{5}$ mm. lata, testa membranacea.

HAB. Kōtōshō, leg. K. MIYAKE, Nov. 1899.

Near *C. psilocalyx* CLARKE and *C. longifolia* LAM., but differs from both by the larger flowers and less hairy leaves.

Callicarpa longifolia LAM. var. **longissima** HEMSL. in FORBES et HEMSL. Ind. Fl. Sin. II. p. 253.

HAB. Uraisha, leg. N. KONISHI, Aug. 1907 ; Nankōkei, leg. G. NAKAHARA, Aug. 1905, (No. 231).

DISTRIB. Kwangtung.

OBSERV. Ramuli graciles, tetragoni, glabri ad nodos intra petiolos pilis barbatis instructi, fusco-purpurascens. Folia opposita, petiolata, oblanceolata, 23 cm. longa, 4 cm. lata, apice acuminata basi attenuata, margine subintegra vel serris minutis obscuris instructa, supra in exsiccato fuscentia, subtus fulvo-pallidiora, supra ad costas venasque dense, cæterum parce, pubescentia, subtus glabrata, prope costas 1-seriatim glandulifera, glandulis orbicularibus depressis, utraque pagine sub lente minute glanduloso-punctata, petiolis $1\frac{1}{2}$ cm. longis supra pilosiusculis. Cymæ axillares vel terminales paniculatæ, ramis panicularum gra-

cilibus, pubescentibus, divaricatis, bracteatis, bracteis linearibus 2-3 mm. longis. Calyx campanulatus 1 mm. longus, 4-dentatus, glanduloso-punctatus. Corolla campanulata, 3 mm. longa, 2 mm. lata, 4 lobata, lobis rotundatis 1 mm. longis. Stamina 4, exserta, 6 mm. longa, filamentis filiformibus, antheris $\frac{1}{2}$ mm. longis, oblongis apice retusis basi sagittatis. Ovarium obovatum, glanduloso-punctatum $\frac{1}{2}$ mm. longum, stylo filiformi 6 mm. longo, stigmatate dilatato 2-lamellato.

Near *C. longifolia* LAM., from which the present plant differs in having glabrous subtire leaves and glabrous calyx.

Callicarpa mollis STEB. et ZUCC. Fl. Jap. Fam. Nat. n. 526; FRANCH. et SAV. Enum. Pl. Jap. I. p. 359; MAXIM. in Mém. Biol. XII. p. 505; FORBES et HEMSL. Ind. Fl. Sin. II. p. 254.

HAB. Okinawa, leg. Y. TASHIRO, 1887, Mart.

DISTRIB. Corean archipelago and Japan.

Callicarpa oshimensis HAYATA sp. nov. Rami recti, rubro-cinerascentes vel cinerascentes, longitudinaliter rugulosi, cortice plus minus soluto, ramulis gracillimis, rectis oppositis divaricatis, foliatis, brevissime tomentosus. Folia rhomboideo-ovata, $6\frac{1}{2}$ cm. longa, 3 cm. lata, apice cuspidata, (cuspidibus 1 cm. longis 4 mm. latis), basi subito cuneata ima obtusa, margine dentata, (dentibus plus minus irregularibus, divaricatis, triangularibus 3 mm. latis, totiusque longis), sursum in acumina, deorsum prope basin, integra, supra exsiccato fuscentia, subtus minute parvissime stellato-pubescentia, demum subglabrata, costis et venis tenuissimis, subtus pallidissima ad costas et venas prominentes stellato-tomentosa, ad paginam minute glanduloso-punctata, punctis purpureis, minutis, petiolis 6 mm. longis supra plano-sulcatis, stellato-tomentosis. Cymæ axillares

petiolum in longitudine 2-plo superantes. Calyx subinteger, vel leviter dentatus.

HAB. Oshima, leg. T. UCHIYAMA, Dec. 1900.

Remarkable for its small dentate leaves.

Callicarpa parvifolia HAYATA sp. nov. Rami cineraceo-albicantes, subglabri, ramulis gracilibus, divaricatis, brevissime pubescentibus, lenticellis elevatis notatis, prope apicem breve tomentosus, pilis stellatis. Folia oblongo-lanceolata, $4\frac{1}{2}$ cm. longa, 1 cm. lata apice acuminata, basi obtusa, vel acuta, margine serrulata, sursum in acumina, et deorsum prope basin, integra, exsiccato supra fuscentia, ad costas venasque brevissime pubescentia, ad paginam parcissime brevissime pubescentia, subtus pallidissima, parcissime stellato-pilosa, prope basin costamque glandulis minutis punctiformibus impressis dispersa, et ad totam paginam glandulis minutissimis flavis nitidis punctata, petiolis 3 mm. longis, brevissime tomentosus. Cymæ axillares, petiolum 2-plo superantes. bracteis angustatis $1\frac{1}{2}$ mm. longis crassiusculis, pedicellis $1\frac{1}{2}$ mm. longis, floribus parvioribus $2\frac{1}{2}$ mm. longis glabris flavo-punctatis. Calyx campanulato-cupuliformis $1\frac{1}{2}$ mm. longus irregulariter 3-4-lobatus, lobis obtusis. Ovarium globosum dense flavo-punctatum, stylo sursum dilatato, stigmatibus 2-lobato.

HAB. Taitō : Daimari, leg. T. KAWAKAMI et U. MORI, (No. 2879).

Callicarpa randaiensis HAYATA sp. nov. Rami graciles, cinereo-rubrescentes glabrati, lenticellati, ramulis stellato-tomentosis divaricatis. Folia opposita petiolata exstipulata, oblongo-lanceolata, 10 cm. longa, 3 cm. lata, margine serrata, (serris apiculatis), basi integra, apice acuminata, basi acuta, utraque pagine glabrata, ad costas venasque stellato-tomentosa, (foliis novellis stellato-tomentosis),

petiolis 1 cm. longis. Cymæ axillares pauci-ramosæ, ramis brevibus divaricatis, pedunculis $1\frac{1}{2}$ cm. longis, pedicellis 1-2 mm. longis, bracteis minutis subulatis. Calyx campanulatus, 2 mm. longus, late dentatus, dentibus triangularibus, acutis, extus glanduloso-pulveraceus. Corolla tubuloso-campanulata, $5\frac{1}{2}$ mm. longa, extus glanduloso-pulveracea, tubo 4 mm. longo, $2\frac{1}{2}$ mm. lato, 5-lobata, lobis rotundatis $1\frac{1}{2}$ mm. longis, patentibus. Stamina 4, exserta basin corollæ affixa, 7 mm. longa, filamentis filiformibus $6\frac{1}{2}$ mm. longis, antheris oblongis, 2 mm. longis, 1 mm. latis apice truncatis, basi sagittatis. Ovarium ovoideum $1\frac{1}{2}$ mm. longum apice attenuatum, stylo filiformi 8 mm. longo, stigmatate dilato late 2-fido.

HAB. Randaizan, leg. U. MORI, Aug. 1908, (No. 7023).

Near *Callicarpa japonica* THUNB., from which the present plant differs in having lanceolate leaves. Also near *C. gracilis* SIEB. et ZUCC. and *C. elegans* HAYEK., but differs from the former by the more conspicuously serrulate leaves, and from the latter, in having less acuminate, more hairy, leaves and larger flowers.

Callicarpa remotiserrulata HAYATA sp. nov. Rami cinerascentes, longitudinaliter rugulosi, rugulis prominentibus, ramulis parcissime pubescentibus vel glabratis. Folia lanceolata vel oblongo-lanceolata, chartaceo-coriacea, 8 cm. longa, 2 cm. lata, apice acuminata, basi cuneato-attenuata, margine remote mucronato-serrata, (serris mucronatis, $\frac{1}{2}$ mm. longis totiusque latis, obtusis, 5 mm. a se remotis), prope apicem basinque integra, exsiccato utrinque pallidiora, interdum supra fuscentia, utrinque glabra, costis et venis utrinque tenuiter elevatis subtus parcissime flavo-punctata, basi ad insertionem petiolorum supra 1-glandulifera, glandulis impressis majusculis, petiolis 6 mm. longis brevissime stellato-

tomentosis supra sulcatis. Cymæ axillares vel terminales petiolum in longitudine 2-3-plo superantes. Calyx campanulato-cupuliformis, irregulariter obscureque dentatus. Fructus $2\frac{1}{2}$ mm. in diametro.

HAB. Kōshūn : Botanrossha, leg. G. NAKAHARA, 1906, (No. 619).

Labiatae.

Mesona BLUME.

Mesona elegans HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 306, t. 16; HAYATA Fl. Mont. Formos. p. 181.

Near *M. chinensis* BENTH.

Acrocephalus BENTH.

Acrocephalus capitatus BENTH. in DC. Prodr. XII. p. 47; Hook. f. Fl. Brit. Ind. IV. p. 611; Hook. Ic. Pl. t. 456; FORBES et HEMSL. Ind. Fl. Sin. II. p. 269.

HAB. Tainan, Tikuchishishō, leg. G. NAKAHARA, Oct. 1905, (No. 5970).

DISTRIB. South China, Tropical Asia, Africa, and Australia.

Plectranthus L'HÉRIT.

Plectranthus lasiocarpus HAYATA sp. nov. Herba, erecta, gracilis, 50-60 cm. alta, pauce ramosa, caulibus tetragonis breviter pubescentibus, sulcatis. Folia opposita, petiolata, oblonga, 42 mm. longa, 17 mm. lata, apice acuta, basi, in petiolum attenuata, margine a medio sursum serrata, (serris acutis), deorsum integra, utrinque scabra, subtus ad costas venasque breve pubescentia, pallidiora.

*Cymæ oppositæ, racemosæ, vel paniculatæ, bracteis et bracteo-
lis minoribus. Calyx jam anthesin campanulatus 1½ mm. longus
pubescens, (fructifer auctus), 5-lobatus, lobis inæqualibus acutis,
lobis posterioribus 3 minoribus, anterioribus 2 longioribus. Corollæ
tubus exsertus latus, basi postice gibbosus declinatus medio sub-
rectus, fauce æquali; limbus 2-labiatus, labro posteriore breviter 3-
lobato, lobis reflexis, labro anteriore integro tubis longiore, concavo.
Stamina 4, didynama declinata, filamentis liberis basi pubescen-
tibus; antheræ confluentes 1-loculares, demum explanatæ. Discus
in glandulam ovoideam brevem productus. Stylus apice integer.
Nucula 2-3, matura ovoidea, 1½ mm. longa, 1 mm. lata, apice rotun-
data, basi oblique acuta, pubescens, minute albo-puncticulata.*

HAB. Shintengai, leg. S. NAGASAWA, (No. 458); Toroku: Rinki-
ho, leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 1761).

Coleus LOUR.

***Coleus mucosus* HAYATA** sp. nov. Caulis obtuse tetragonus,
sulcatus, glabratus, ramosus, ramulis gracilibus adpresse pubes-
centibus, divaricatis. Folia opposita, petiolata, late ovata, vel
globosa 3½ em. longa totiusque lata, apice breve acuminata, basi
rotundata vel truncata ima basi acuta, utrinque breve pubescentia,
subtus pallidiora, nigro-punctata, petiolis 5-7 mm. longis. Verti-
cillaster superpositus racemose dispositus. Racemi verti-
cillastrorum terminales 15-20 cm. longi, pedicellis pubescentibus
punctatis, 1 cm. longis. Calyx ovoideo-campanulatus, 1½ mm.
longus, basi postice leviter gibbosus, extus glanduloso-punctatus
pubescens intus glaber, lobo postico late ovato 1 mm. longo apice
obtusio, cæteris majoribus, lateralibus ovato-truncatis ½ mm. longis,
anticis acutis 1¼ mm. longis, sæpe ultra medium connatis; fructifer

declinatus. Corollæ tubus basi recurvus supra basin horizontaliter declinatus, fauce ampliatus $1\frac{1}{2}$ mm. in sectione; limbus 2-labiatus, labro posteriore obtuso emarginato erecto patente, anteriore elongato integro concavo cymbiformi genitales includenti. Stamina 4, didynama, vel subæqualia declinata, filamentis 3 mm. longis basi breviter in tubum 1 mm. longum a corolla liberum connatis; antheræ confluentes 1-loculares, demum explanatæ. Discus antice in glandulam ovario longiorem tumens. Stylus apice subulatus æqualiter 2-fidus. Nuculæ ovoideæ $\frac{3}{4}$ mm. longæ compressiusculæ læves, minute rubro-punctatæ.

HAB. Kodenshō, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1755); S. NAGASAWA, Oct. 1905, (No. 746); Banchoryō, leg. G. NAKAHARA, Oct. 1905, (No. 582); Kashitō, leg. G. NAKAHARA, Aug. 1905, (No. 302).

The seeds of the present plant afford a considerable amount of mucilage when soaked in water.

Hyptis JACQ.

Hyptis spicigera LAM. "Encyc. III. p. 185".

HAB. Kanaiho, leg. G. NAKAHARA, Oct. 1905, (No. 617).

DISTRIB. Tropical America and Africa.

Dysophylla BLUME.

Dysophylla glabra HAYATA sp. nov. Caulis obtuse tetragonus, rubescens, glaber. Folia opposita, sessilia, ovata, 4 cm. longa, 22 mm. lata, apice acuta, basi rotundata, vel truncata, margine dentato-serrata, (serris acutis), utrinque glabra. Verticillaster fasciculatus dense spicatim dispositus, spicis 4 cm. longis 1 cm.

latis, bracteis lanceolatis flore æquilongis 5 mm. longis, pedicellis brevissimis 1 mm. longis. Calyx globoso-campanulatus, 1½ mm. longus, 10-nervatus basi æqualis leviter 5-dentatus, dentibus posterioribus 3 brevioribus, anterioribus 2 longioribus. Corolla campanulata, tubo exserto, 1½ mm. longo, limbo patente, 4-fido, lobo postico majore late ovato erecto emarginato, lobis anticis patentibus. Stamina 4, exserta, paullum inæqualia, subdeclinata, fauce corollæ affixa, filamentis 3 mm. longis; antheræ globosæ, 2-loculares, apice emarginatæ, basi sagittatæ terminales. Discus æqualis subinteger. Stylus apice breviter 2-fidus, lobis subulatis æqualibus.

HAB. Tamsui, leg. Z. KOBAYASHI, Aug. 1905, (No. 515).

Elsholtzia WILLD.

Elsholtzia cristata WILLD., BENTH. in DC. Prodr. XII. p. 163; HOOK. f. Fl. Brit. Ind. IV. p. 645; FRANCHET Pl. David. p. 234; Bot. Mag. t. 2560; FORBES et HEMSL. Ind. Fl. Sin. II. p. 277.

HAB. Byōritsu: Rokujōdaizan, leg. T. KAWAKAMI et U. MORI, 1908, (No. 7257).

DISTRIB. Japan, Corea, China: Hupeh, Kiangsi. North India, and Siberia to Manchuria.

Lycopus LINN.

Lycopus lucidus TURCZ. ex BENTH. in DC. Prodr. XII. p. 178; FRANCHET Pl. David. p. 235; FRANCH. et SAV. Enum. Pl. Jap. I. p. 367; FORBES et HEMSL. Ind. Fl. Sin. II. p. 282.

HAB. Sekikō: leg. G. NAKAHARA, Sept. 1905, (No. 411).

DISTRIB. Siberia, Manchuria, Japan and China.

Calamintha MÆNCH.

Calamintha laxiflora HAYATA sp. nov. Herba procumbens, caulibus adpresse pubescentibus obtuse tetragonis. Folia opposita, petiolata, ovata, apice obtusa, basi rotundata, ima basi acuta, 18 mm. longa 10 mm. lata, a medio sursum serrata, deorsum integra, (serris obtusis), utrinque hispidula vel subglabrata, subtus purpurascens, petiolis brevibus 1-2 mm. longis. Flores axillares solitarii, vel gemini, pedicellis 1 mm. longis, bracteis linearibus $3\frac{1}{2}$ mm. longis, $\frac{1}{4}$ mm. latis, purpurascens ciliatis. Calyx tubulosus $7\frac{1}{2}$ mm. longus, 12-nerviis, ad nervos pilis 1 mm. longis obtectus, 2-labiatus, labro posteriore patente 3-dentato, dentibus cuspidatis $1\frac{1}{2}$ mm. longis $\frac{3}{4}$ mm. latis margine hispidis, labro anteriore 2-partito, segmentis linearibus $3\frac{1}{2}$ mm. longis $\frac{1}{3}$ mm. latis margine hispidis, fauce intus hispidulus. Corollæ tubus exsertus, 11 mm. longus leviter recurvus ad faucem amplius 3 mm. in diametro, limbus 2-labiatus, labro posteriore plano $2\frac{1}{2}$ mm. longo, apice 2-lobato, labro anteriore patente 5 mm. longo 3-fido, lobis planis, medio latiore late rotundato 3 mm. lato. Stamina 4, didynama (anterioribus longioribus), ascendens, antheræ 2-loculares, loculis distinctis divergentibus, connectivo sæpius incrassato. Discus æqualis. Styli lobus anterior longior complanatus.

HAB. in monte Morrison, ad 9000 ped. alt., leg. T. KAWAKAMI et U. MORI, Nov. 1906, (Nos. 1900 et 1921).

Melissa LINN.

Melissa parviflora BENTH. var. ***purpurea*** HAYATA n. v. Caulis glaber, distincte 4-gonus, profunde sulcatus, ramosus, ramulis gracilibus, glabris. Folia opposita, petiolata, ovato-lanceolata,

5 cm. longa, 2 cm. lata, apice acuta, basi gradatim angustata in petiolum longum attenuata, margine dentata, dentibus obtusis ascendentibus, deorsum integra, utrinque glabra, subtus pallidiora et purpurascens, petiolis 2 cm. longis. Verticillaster 3-5 florus, axillaris, oppositus, pedicellis 4 mm. longis. Calyx tubuloso-campanulatus 8 mm. longus 11-nerviis, (nerviis 5 prominentibus longe pilosis, pilis patentibus, nerviis 6 obscuris glabris), 2-labiatus, labro posteriore subplano reflexo, 3-dentato, dentibus latis rotundato-acutis, labro anteriore 2-partito, segmentis lanceolatis, fauce intus nudus fructifer declinatus. Corolla tubulosa 1 cm. longa, tubo subincluso, recurvo-ascendente, superne paulum ampliato, intus extusque nudo, limbo 2-labiato, extus piloso, labro posteriore erecto lato profunde emarginato 1 mm. longo, anteriore patente 3-fido, lobis planis rotundatis 1 mm. longis, intermedio majore emarginato. Stamina 4, subæqualia, anterioribus paulo longioribus, infra labrum posticum arcuato-conniventia; antheræ 2-loculares, loculis divergentibus. Discus æqualis; styli 7 mm. longi inclusi, lobis subæqualibus, subulatis recurvis. Nucula obovoidea $\frac{7}{4}$ mm. longa, $\frac{3}{4}$ mm. lata rubescens, lævis, apice rotundata basi attenuata.

HAB. in monte Morrison ad 9000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1813); Tōzan, in montibus Morrison, leg. G. NAKAHARA, Oct. 1906.

Near *M. officinalis* LINN. of Europe and *M. parviflora* BENTH. of the Himalayas.

Dicotyledones.

Monochlamydeæ.

Amarantaceæ.

Celosia LINN.

Celosia taitœnsis HAYATA sp. nov. Caulis erectus glaber, sulcatus, albicans. Folia lanceolata, vel lineari-lanceolata, membranacea 19 cm. longa, 17 mm. lata, apice acuminata, basi attenuata, margine repandato-integra, costis subtus prominentibus, venis lateralibus tenuissimis, petiolis $2\frac{1}{2}$ cm. longis. Spicæ densissime floratæ, axillares et terminales, axillaribus ovatis apice acuminatis, circ. 2 cm. longis, terminali cylindrico-ovata apice flabellato-dilatata, 4 cm. longa, $1\frac{1}{2}$ cm. lata. Flores brevissime pedicellati, pedicellis $\frac{2}{3}$ mm. longis, basi 1-bracteatis, bracteis lanceolato-acuminatis, 5 mm. longis, hyalinis, 2-bracteolatis, bracteolis bractea conformibus, ovato-acuminatis, 4 mm. longis, $1\frac{1}{2}$ mm. latis, apice dorso aristatis. Perianthii segmenta erecta, 3 exteriora, 2 interiora, æqualia, oblongo-ovata, 5 mm. longa, 2 mm. lata, cærulea, hyalina, apice acuminato-acuta. Stamina 5, vix exserta, filamentis hyalinis, complanatis, basi in tubum brevem connatis, antheris angustato-oblongis, $1\frac{1}{4}$ mm. longis: Ovarium obconicum, 1 mm. longum, prope basin ad marginem contractum margine leviter recurvum, stylo columnari 3 mm. longo apice truncato stigmatoso.

HAB. Taitō, Hakaye, leg. T. KAWAKAMI et U. MORI, 1907, Oct. (No. 6005).

Ærua FORSK.

Ærua scandens WALL.; Hook. f. Fl. Brit. Ind. IV. p. 727; Moq. in DC. Prodr. XIII.-2, p. 302; FORBES et HEMSL. Ind. Fl. Sin. II. p. 321; MATSUM. et HAYATA, Enum. Pl. Formos. p. 327.

HAB. Kōshūn: Botansha, leg. G. NAKAHARA, Dec. 1906, (No. 939).

DISTRIB. China: Kwangtung; India, Malaya, to the Philippines and in west tropical Africa.

Chenopodiaceæ.

Suaeda FORSK.

Suaeda maritima DUMORT.; Hook. f. Fl. Brit. Ind. V. p. 14; FORBES et HEMSL. Ind. Fl. Sin. II. p. 329.

HAB. Anping, leg. S. NAGASAWA, Dec. 1904, (No. 250); Takaw, leg. B. HAYATA et Y. SHIMADA, Aug. 1908, (No. 92).

DISTRIB. Dispersed all round the northern hemisphere.

This is perhaps the plant recorded from Formosa as *Suaeda nudiflora* in FORBES et HEMSL. Ind. Fl. Sin. II. p. 330; for I could not find any other *Suaeda* in the island. As my plant has 2-styles, it is not to be referable to *S. nudiflora*, but quite identical with the plant figured in WIGHT Ic. t. 1793, which is rendered by Sir J. D. HOOKER a synonym of *S. maritima*. It demands further investigation whether or not this is exactly the same as the European *S. maritima*.

Polygonaceæ.

Polygonum LINN.

Polygonum alatum HAMILT., HOOK. f. Fl. Brit. Ind. V. p. 41 ;
FORBES et HEMSL. Ind. Fl. Sin. II. p. 332.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7071).

DISTRIB. Afghanistan to Ceylon, Japan and China, and the Malay Archipelago, and in Abyssinia.

Polygonum biconvexum HAYATA Fl. Mont. Formos. p. 184.

Near *P. arifolium* LINN., differs from it in having biconvex seeds.

Polygonum glabrum WILLD.; MEISN. in DC. Prodr. XIV. p. 114 ;
BENTH. Fl. Hongk. p. 288 ; HOOK. f. Fl. Brit. Ind. V. p. 34 ; WIGHT
Ic. Pl. Ind. Or. t. 1799 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 340.

HAB. Tenchōshō, leg. T. KAWAKAMI, 1907, Juni. (No. 5879).

DISTRIB. China ; tropical and subtropical regions in Asia, Africa and America.

Polygonum minus HUDS.; MEISN. in DC. Prodr. XIV. p. 111 ;
HOOK. f. Fl. Brit. Ind. V. p. 36 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 342.

HAB. Nantō : Kwakōzan, leg. T. KAWAKAMI et U. MORI, Juli. (No. 3183) ; Shijō (No. 3455).

DISTRIB. China ; temperate and subtropical Asia and Australia.

Polygonum muricatum MEISN. in DC. Prodr. XIV. p. 133 ;
HOOK. f. Fl. Brit. Ind. V. p. 45, (var.) ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 343.

HAB. Giochi, leg. G. NAKAHARA, Aug. 1905, (No. 300).

DISTRIB. Central and Eastern Himalaya and the Khasia mountains. China: Hupeh.

This is near *P. pedunculare* WALL., but differs from it in having more slender, and more branched peduncles and shortly spicate, but not capitate, sessile flowers. The flowers of *P. pedunculare* are pediceled and capitate.

Polygonum quadrifidum HAYATA sp. nov. Herba gracilis, glaberrima 25 cm. alta, caulibus glabratis striatis pauce ramosis internodiis 4 cm. longis. Folia alterna, subsessilia oblonga, 22 mm. longa, 1 cm. lata, apice acuta, basi rotundata in petiolum attenuata, utrinque glabra margine albo-marginata, sub lente minute serrulata, utrinque glanduloso-punctata, membranacea, vaginis tubulosis 3 mm. longis hyalinis basi pilis retrorsis instructis. Flores capitellati, capitulis bracteis involucralibus 1 suffultis, vel bracteis involucralibus 0, (floribus 1-15, 4 mm. longis), pedunculis 2 mm. longis vel longioribus, apice pilosis glandulosis retrorsis instructis, bracteis (floralibus) ovatis $3\frac{1}{2}$ mm. longis 2 mm. latis hyalinis pauce glanduloso-punctatis, pedicellis $\frac{1}{2}$ mm. longis, 1-bracteolatis, bracteolis hyalinis ovatis. Perianthium campanulatum $2\frac{1}{2}$ mm. longum, 4-lobum, lobis ovatis obtusis 1 mm. longis. Stamina 5, eglandulifera. Ovarium ovatum $\frac{3}{4}$ mm. longum, stylo $1\frac{1}{4}$ mm. longo, apice 2-fido, stigmatate capitellato. Achæmium biconvexum orbiculare vel late ovatum, apiculatum $1\frac{3}{4}$ mm. longum, $1\frac{1}{2}$ mm. latum, minute tuberculatum nigrum.

HAB. in monte Morrison, ad 6500 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2032).

Near *P. glaciale* Hook. f. from which the present plant differs in having biconvex nuts.

Aristolochiaceæ.

Asarum LINN.

Asarum caudigerum HANCE in Journ. Bot. (1881), p. 142 ;
HEMSL. in Gard. Chron. 3-series, VII. p. 422 ; Pot. Mag. t. 7126 ;
FORBES et HEMSL. Ind. Fl. Sin. II. p. 358.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, 1908, Mart. (No. 3496)

DISTRIB. Kwangtung.

Piperaceæ.

Piper LINN.

• **Piper hispidum** HAYATA, sp. nov. Caulis procumbens, ad nodos radicans striatus ferrugineo-hispidus, pilis patentibus. Folia petiolata, oblongo-cordata, $5\frac{1}{2}$ cm. longa, $3\frac{1}{2}$ cm. lata, apice obtusa, basi cordata, sinibus basilaribus latis, subintegra, 5-nervia, supra parce hispidula subtus ad nervos tementella, petiolis $2\frac{1}{2}$ cm. longis. Fl. ♂ spicati, spicis oppositifoliis pedunculatis, pedunculis 2 cm. longis, partibus floriferis cylindraceis 3 cm. longis, bracteis peltatis orbicularibus $\frac{3}{4}$ mm. in diametro.

HAB. Kōshūn ; Garanbi, leg. Y. TASHIRO, 1896.

Piper Kawakamii HAYATA sp. nov. Caulis scandens, glaber, striatus, (internodiis 5 cm. longis), ad nodos radicans. Folia ramis opposita petiolata, ovato-cordata, 12 cm. longa, 7 cm. lata, apice acuta, vel breve acuminata, rotundata, vel rotundato-cordata, margine integerrima, basi sub-5-nervia, membranacea crassiuscula.

Fl. ♂ spicati, spicis pedunculatis, oppositifoliis, cylindraceis $3\frac{1}{2}$ cm. longis, 4 mm. latis, pedunculis $1\frac{1}{2}$ cm. longis. Fl. ♂ subsessiles. Stamina 2, filamentis brevibus, bracteis peltatis, peltis stipitatis $1\frac{1}{2}$ mm. in diametro.

HAB. Kōshūn, Kurarusha, leg. T. KAWAKAMI, Juli. 1906, (No. 1645).

Near *Piper sarmentosum* ROXB., but differs from it by the subcordate leaves with different venation.

Piper kwashōense HAYATA sp. nov. Caulis scandens prostratus, ad nodos radicans, (internodiis 6-7 cm. longis), longitudinaliter rugulosus, rugulis prominentibus. Folia membranaceo-chartacea, cordato-rotundata, 8-10 cm. longa, 5-6 cm. lata, apice rotundata, subito cuspidata, (cuspidibus $1\frac{1}{2}$ cm. longis, 3-4 mm. latis), basi peltato-cordata, vel subpeltata, (ab insertione petiolorum usque ad basin laminae 2 mm.), margine integerrima, utrinque pallidissima, nervis utrinque tenuibus distincte elevatis, 5-nervia, utrinque pagine glabra, petiolis 4 cm. longis, multistriatis, brevissime pubescentibus. Alabastrum foliorum oppositifolium, cylindricum, 1 cm. longum, 2 mm. latum, 1-perulatum, perulis brevissime fusco-pubescentibus.

HAB. Kwashōtō, leg. T. KAWAKAMI et Z. KOBAYASHI, 1907, Aug. (No. 475).

Near *P. ornatum* N. E. BROWN, but differs from it in having much more cordate leaves with primary lateral veins curving upwards and reaching the apex of the blade.

Piper sarmentosum ROXB.; C. DC. in DC. Prodr. XVI.-1, p. 352; MAXIM. in Mém. Biol. XII. p. 533; FORBES et HEMSL. Ind. Fl. Sin. II. p. 366.

Piper Futokadsura TASHIRO, (in sched.) Herb. Tōkyō.

HAB. Okinawa, leg. Y. TASHIRO, 1884, Juni.

DISTRIB. Kwangtung, Hongkong, Hainan; Malay archipelago.

Piper subpeltatum WILLD.; WIGHT Ic. t. 1925; HOOK. f. Fl. Brit. Ind. V. p. 95.

HAB. Kōshūn: Kurapusha, leg. T. KAWAKAMI, Feb. 1906, (No. 1439).

DISTRIB. India, Malay archipelago, Philippines, Tropical Africa and Madagascar.

Myristiceæ.

Myristica LINN.

Myristica laurifolia HOOK. f. ?

HAB. Kōtōshō, leg. G. NAKAHARA, 1906, Dec.

In the imperfectness of the specimen, the determination is rather conjectural.

Laurineæ.

Cryptocarya R. BR.

Cryptocarya chinensis HEMSL. in FORBES et HEMSL. Ind. Fl. Sin. II. p. 370.

Beilschmiedia chinensis HANCE in "Journ. Bot. (1882), p. 79."

HAB. Uraisha, leg. N. KONISHI, Aprili. 1908, (No. 71).

DISTRIB. Kwangtung, Hongkong.

OBSERV. Rami fuscentes vel fusco-rubescentes lenticellati.

Folia alterna, persistentia, petiolata, oblonga, 11 cm. longa, $4\frac{1}{2}$ cm. lata, apice cuspidato-acuminata, (acuminibus $1\frac{1}{2}$ cm. longis apice oblongis), basi acuminata, nervis supra impressis, subtus elevatis, supra basin 3-nervia, nervis lateralibus margine parallelis, supra glabra subtus glauca, utrinque minute reticulata, petiolis 1 cm. longis. Flores paniculati, paniculis axillaribus vel terminalibus, 3 cm. longis, ramosis, ramis sericeo-pubescentibus $1\frac{1}{2}$ cm. longis, floribus ad apicem ramorum ternatim dispositis, pedicellis $\frac{1}{2}$ mm. longis. Perianthium campanulatum 3 mm. longum extus intusque pubescens, tubo 1 mm. longo, limbo 6-lobato, lobis ovatis 2 mm. longis acutis. Stamina perfecta 9, fauce tubi affixa, 2 mm. longa, hirsuta, (filamentis $1\frac{1}{4}$ mm. longis, antheris ovatis $\frac{3}{4}$ mm. longis, connectivis vix productis), ordinis primarii et secundarii eglandulosa, ordonis tertii utrinque glandula stipitata aucta, antheris ordonis primarii et secundarii introrsum 2-locellatis, ordonis tertii interdum introrsum interdum extrorsum plerumque laterale 2-locellatis. Staminodia ordinis quarti, subulata $1\frac{1}{2}$ mm. longa. Ovarium perianthii tubo inclusum, longe ovatum apice attenuatum 1 mm. longum, 1-ovulatum, stylo breviter exserto, 1 mm. longo, stigmatе oblique truncato. Fructus tubo perianthii aucto indurato depresso-globozo ∞ - costato 1 cm. longo $1\frac{1}{3}$ cm. lato inclusus, ore clauso limbo deciduo; pericarpium membranaceum tubo perianthii adnatum. Semina depresso-globosa, testa membranacea.

Cryptocarya Konishii HAYATA sp. nov. Rami validiusculi angulati, ferrugineo-fuscentes, striati, lenticellis elevatis oblongis. Folia alterna coriacea pallida subnitida oblonga oblongo-obovata, vel oblongo-ovata, 8 cm. longa, 28 mm. lata, apice acuminato-obtusa, basi acuta, integra utrinque glabra, margine leviter reflexa, supra

ad costas sulcata, venis et venulis tenuiter elevatis, subtus glauca costis venis venulisque elevatis distincte reticulata, venis lateralibus primariis utrinque 5-6, a costis angulo 50° egressis, petiolis 1 cm. longis nigricantibus. Fructus oblique oblongo-globosi, 13 mm. longi, nigricantes, obscure 10-costati.

HAB. Uraisha, leg. N. KONISHI, Dec. 1908.

Near *C. Wightiana*; but differs from it in having much smaller leaves with elevated veins.

Cinnamomum BURMAN.

Cinnamomum randaiense HAYATA sp. nov. Rami et ramuli nigricantes pubescentes, divaricati. Folia subopposita petiolata oblonga vel oblongo-lanceolata $7\frac{1}{2}$ cm. longa $2\frac{1}{2}$ cm. lata apice acuminata, (acuminibus 1 cm. longis apice obtusis), basi acuta, supra nitida, subtus adpresse villosa-pubescentia, 3-nervia, nervis laterali-bus prope basin 1 ramum exteriore emittentibus, venis secundariis transversis obscuris, nervis et venis supra impressis subtus promi-nente elevatis, coriacea, petiolis 7 mm. longis supra sulcatis. Flores ad apicem ramorum cymose paniculati, paniculis pauce floratis. Perianthium campanulatum pauce pubescens $3\frac{1}{2}$ mm. longum, tubo breve, segmentis 6, subæqualibus obovatis, apice obtusis, 3 mm. longis, $1\frac{4}{5}$ mm. latis. Stamina perfecta 9, basi seg-menti affixa, $1\frac{1}{2}$ mm. longa, ordinis primarii et secundarii eglandulosa, antheris oblongis 1 mm. longis introrsum 4-locellatis, ordinis tertii filamentis utrinque glandula stipitata auctis, stipitibus filamentis connatis, antheris extrorsum 4-locellatis; staminodia ordinis quarti 1 mm. longa, staminibus 3-plo breviora, capitellata, capitulis sagittatis breviter stipitatis. Ovarium sessile ovoideum 1 mm.

longum, stylo $1\frac{1}{2}$ mm. longo validiusculo, stigmatē incrassato, obscure 3-lobo.

HAB. in monte Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7017).

Very like *Cinnamomum Doederleinii* ENGL., but quite distinguishable by oblong or oblongo-lanceolate or ovately lanceolate leaves which are villose in younger stages. In *C. Doederleinii* ENGL. the leaves are obovate or obovately lanceolate and glaucous, but not villose even in the young shoots. Also near *Cinnamomum impressinervium* MEISSN.; from which this differs by the much smaller flowers.

Cinnamomum reticulatum HAYATA sp. nov. Ramuli rugosi rubescentes glabri divaricati. Folia subopposita, vel alterna, petiolata, obovata, 5 cm. longa, $2\frac{1}{2}$ cm. lata, apice obtusa, basi in petiolum 13 mm. longum attenuata, supra nitida, subtus glaucescentia 2-nervia, utrinque pagine venis et venulis prominentibus, minute reticulateque elevatis, venis primariis inconspicuis margine integerrima nervo marginali marginata. Cymæ axillares racemosæ, paucifloratæ, 5 cm. longæ. Perianthium 6-partitum, segmentis subæqualibus ovatis, $3\frac{1}{2}$ mm. longis, obtusis, 5-nerviis extus pauce albo-punctatis intus adpresse pubescentibus. Stamina 9, perfecta, 3 mm. longa, subæquilonga, ordinis primarii et secundarii eglandulosa, spathulata, ordinis tertii utraque glandula sessili medio filamentorum instructa, glandulis ovatis 1 mm. longis; staminodia ordinis quarti sagittata $2\frac{1}{2}$ mm. longa, stipitata. Ovarium immersum, stylo validiusculo 3 mm. longo, stigmatē dilatato infundibulari-concavo. Bacca oblonga 1 cm. longa, 7 mm. lata, perianthii tubo explanato parum aucto truncato insidens, segmentis perianthii a basi deciduis.

HAB. Kōshūn : Garanbi, leg. G. NAKAHARA, Dec. 1906, (No. 851); ibidem leg. S. KUSANO, 1909.

Machilus NEES.

Machilus (§ *Notaphœbe**) **Konishii** HAYATA sp. nov. Rami longitudinaliter rugosi, fusco-rubescens, cicatricibus rotundatis foliorum notati, lenticellati, ramulis rubro-nigricantibus. Folia alterna petiolata, coriacea oblongo-obovata, vel oblongo-lanceolata, 8 cm. longa, 3 cm. lata, apice cuspidato-acuminata, (acuminibus 1 cm. longis apice obtusis), basi acuta, supra glabra, subtus pubescentia, pinninervia, venis supra impressis, subtus prominentibus, venis primariis utrinque latere 7, a costa angulo 40° egressis, venis secundariis oblique reticulatis. Paniculæ terminales vel axillares, villosæ, ramosæ, ramis divaricatis. Perianthium extus pilosum intus pubescens, tubo breve, limbo 6-partito, segmentis inæqualibus, exterioribus 3 minoribus ovato-angustatis, 3 mm. longis 1¼ mm. latis, interioribus 3 majoribus ovatis obtusis 4 mm. longis 2½ mm. latis multinerviis, distincte valvatis. Stamina 9, fauce tubi perianthii affixa, æqui-longa, 3 mm. longa, perfecta, filamentis 2⅓ mm. longis basi pilosis

§ *Notaphœbe*. Flores hermaphroditi, perianthii tubus brevis, limbus 6-partitus, segmentis inæqualibus 2-seriatis distincte valvatis, exterioribus 3 minoribus, interioribus 3 majoribus. Stamina 9, fauce tubi affixa, ordinis primarii et secundarii eglandulosa, ordinis tertii basi utrinque glandula stipitata aucta, antheris ordonis primarii et secundarii introrsum 4-locellatis, locellis 2-superioribus minoribus, 2-inferioribus majoribus, ordonis tertii 4-locellatis, locellis 2-superioribus minoribus introrsum, 2-inferioribus majoribus extrorsum, dehiscentibus; staminodia ordonis quarti subulata 1½ mm. longa. Ovarium ovoideum tubo perianthii immersum, stylo exserto, stigmatate truncato, 1-loculare, 1-ovulatum, ovulis anatropis pendulis. Bacca globosa, perianthio vix aucto, segmentis persistentibus reflexis.—Arbor? Folia alterna, petiolata, lanceolata. Paniculæ terminales vel axillares.

* The section *Notaphœbe* is near *Ocotea* from which it differs in having entirely different fruit. It differs from *Haasia* in having 4-celled anthers. The present plant has 9 stamens, of which those of the third order have two lower larger extrorse cells and two upper smaller introrse cells. It is, therefore, rather doubtful whether this should be referred to *Persea*. The staminodes of the fourth order are very small and subulate, the segments of the perianth are rather thin, and the plant does not look like a species of the *Machilus*-allies.

cæterum glabris complanatis, ordinis primarii et secundarii eglandulosa, ordinis tertii baii utrinque glandula aucta, glandulis late reniformibus vel stipitatis, 1 mm. longis complanatis, antheris ordonis primarii et secundarii oblongis 1 mm. longis obtusis, introrsum 4-locellatis, locellis 2-superioribus minoribus 2-inferioribus majoribus, ordonis tertii 4 locellatis, locellis 2-superioribus minoribus introrsum, 2-inferioribus majoribus extrorsum, dehiscentibus. Staminodia ordonis quarti subulata, $1\frac{1}{2}$ mm. longa. Ovarium ovoideum 1 mm. longum, tubo perianthii immersum, stylo exserto, 2 mm. longo, stigmatate truncato, 1-loculare, 1-ovulatum, ovulo anatropo pendulo. Bacca globosa 7 mm. longa, perianthio vix aucto segmentis persistentibus reflexis.

HAB. in monte Morrison, ad 7500 ad. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1949).

Machilus formosana HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 350.

Persea sp. Chekiang, No. 657, (Herb. Hongk.)

Near *M. neurantha* HEMSL. and *M. Sheareri* HEMSL.; but differs from the former in having much larger leaves, glaucous beneath, with much elevated veins, and from the latter, in having glabrous inflorescence and leaves.

Machilus (§ *Persea*) **Kusanoi** HAYATA sp. nov. Rami rubro-cinerascentes longitudinaliter rugulosi, lenticellis elevatis cupuliformibus dispersi, cicatricibus foliorum notati, ramulis apice cicatricibus perularum approximate annulariter notatis glabris. Folia chartaceo-coriacea, oblongo-obovata, vel oblanceolata, 20 cm. longa, $6\frac{1}{2}$ cm. lata, apice acuminata vel cuspidato-acuminata, basi cuneato-acuta, margine integra, utrinque glabra, supra subnitida,

ad costas sulcata, subtus costis prominente venis tenuiter elevatis, venulis minute reticulatis, venis lateralibus 10-14 tenuissimis, medioeribus a costa angulo 50° egressis, costis longitudinaliter rugulosis, petiolis $2\frac{1}{2}$ cm. longis glabris, supra sulcatis, foliis superioribus angustioribus. Paniculæ ad apicem ramorum terminales, circ. 10-cæspitosæ, cum pedunculis 13 cm. longæ, pedunculis 6 cm. longis, glabris, apice ramosis, pedicellis 4 mm. longis. Flores apertientes 4 mm. longi, 9 mm. in diametro. Perianthii segmenta 6; 3-exterioribus minoribus oblongo-angustis, extus glabris intus plus minus pubescentibus $3\frac{1}{2}$ mm. longis, 2 mm. latis, apice rotundato-obtusis, margine ciliolatis, obscure 6-nerviis, 3-interioribus majoribus, ovatis 4 mm. longis, $2\frac{2}{3}$ mm. latis, apice obtusis margine ciliolatis obscure multinerviis. Stamina 9, æquilonga, filamentis crassiusculis, 2 mm. longis plus minus complanatis, basin plus minus barbatis, ordinis primarii eglandulosa, antheris oblongo-quadrangularibus, $1\frac{1}{3}$ mm. longis, introrsum dehiscentibus, 4-locellatis, locellis 2-inferioribus longioribus, 2-superioribus brevioribus, ordinis secundarii basi filamentorum 2-glandulosa, glandulis (formis equi calcei) stipitatis, stipitibus $1\frac{1}{3}$ mm. longis, antheris angustioribus $1\frac{1}{3}$ mm. longis, 2-locellatis, extrorsum dehiscentibus, filamentis glandulisque basin barbatis, ordinis quarti staminodia complanata ensiformia, apice acuta infra apicem dilatata basi barbata $2\frac{1}{2}$ mm. longa. Ovarium glabrum oblongum 1 mm. longum, stylo columnari, 2 mm. longo, stigmate pectinato-barbato. Paniculæ fructiferæ (T. KAWAKAMI, No. 1323!) 10 cm. longæ, pauci-ramosæ, fructibus globosis 8 mm. in diametro, perianthiis accrescentibus persistentibus.

HAB. Kōshibussha, S. KUSANO, 1909 : Shinkō : Remogan, leg. T. KAWAKAMI ; Nantō : Randaizan, (No. 3456).

Machilus longifolia BLUME in Ann. Mus. Bot. Lugd.-Bat. I. p. 331 ; MEISSN. in DC. Prodr. XV-1, p. 43 ; FRANCH. et SAVAT. Enum. Pl. Jap. p. 412 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 375.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (Nos. 6207 et 6209).

My plant is very near BLUME'S species, but the identification is not very satisfactory.

Machilus macrophylla HEMSL. var. **arisanensis** HAYATA n. v. Ramuli glabri, fusco-cinerascentes. Folia alterna, petiolata, lanceolata, 9 cm. longa, $2\frac{1}{2}$ cm. lata, apice acuminata, (acuminibus obtusis), basi acuta vel obtusa, supra glabra subtus glauca, sub microscopio minute lepidota, supra costis venis planis, subtus elevatis, venis primariis utrinque 10, a costa angulo 30° egressis, prope marginem anastomosantibus evanescentibus, venis secundariis et venulis utrinque pagine minute reticulatis, margine integerrima, vix revoluta, coriacea patente cernua, petiolis 1 cm. longis. Flores paniculati, paniculis versus apicem ramorum alternatim dispositis, basi perulatis, perulis caducissimis. Paniculae 6 cm. longae, sursum floriferae, ramis 2 cm. longis, divaricatis, pedicellis 1 cm. longis, glabris. Perianthium glabrum, 6-partitum, segmentis ovatis $5\frac{1}{2}$ mm. longis, $3\frac{1}{2}$ mm. latis, apice rotundatis, 7-nerviis. Stamina 9, subaequalia, $4\frac{1}{2}$ mm. longa, filamentis glabris, ordonis primarii et secundarii eglandulosa, ordonis tertii utrinque glandula stipitata aucta, antheris oblongis $1\frac{1}{2}$ mm. longis, ordonis primarii et secundarii introrsum, ordonis tertii laterale extrorsum, 4-locellatis ; ordinis quarti staminodia ensiformia complanata, $1\frac{1}{2}$ mm. longa. Ovarium globosum $1\frac{1}{4}$ mm. longum, stylo filiformi 3 mm. longo.

HAB. Arizan, in montibus Morrison, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (Nos. 6215 et 3681).

Very near *Machilus macrophylla* HEMSL. in FORBES et HEMSL. Ind. Fl. Sin. II. p. 377, and HENRY'S Herb. No. 5699, from which the present variety differs in having larger flowers and shorter and fewer flowered inflorescens. Also near *Machilus chinensis* HEMSL., but differs from it in having a little broader perianth-segments, and more narrower acuminate leaves.

Machilus Thunbergii SIEB. et ZUCC. Fl. Jap. Fam. Nat. II. No. 704; MEISSN. in DC. Prodr. XV.-1, p. 42; FORBES et HEMSL. Ind. Fl. Sin. II. p. 377; MATSUM. et HAYATA Enum. Pl. Formos. p. 351.

HAB. Kashitō, leg. G. NAKAHARA, Feb. 1906, (Nos. 1039 et 1040); Kōtōshō, leg. T. KAWAKAMI et U. MORI, 1907, Aprili. (No. 2454); Liukiu: Nago, leg. G. NAKAHARA, 1907, Aprili.

Machilus (*Persea*) **zuihōensis** HAYATA sp. nov. Rami longitudinaliter rugosi, rubro-nigricantes. Folia alterna petiolata, oblanceolata, vel longe oblonga, 8 cm. longa, $2\frac{1}{2}$ cm. lata, apice obtusa, basi acuta, supra costis et venis planis subtus leviter elevatis, supra glabra, subtus sub lente minutissime lepidota, adpresse et tenuiter pubescentia, venis primariis utrinque latere 7-8 rectis a costa angulo 50° egressis, venulis indistinctis, petiolis 1 cm. longis. Flores cymoso-paniculati, paniculis ad apicem ramulorum alternatim approximativè dispositis, gracilibus circ. 10 cm. longis sursum floriferis basi perulatis, perulis obovatis, rotundatis 8 mm. longis, deciduis, floribus ad apicem ramorum panicularum ternatim dispositis, ramis panicularum brevibus 7 mm. longis, pedicellis 1-2 mm. longis pubescentibus. Perianthium extus pubescens, tubo brevissimo, limbo 6-partito, segmentis subæqualibus obovatis $4\frac{1}{2}$ mm. longis, 2 mm. latis apice rotundatis. Stamina 9, æquilonga, 4 mm. longa, filamentis complanatis $2\frac{1}{2}$ mm. longis glabris, ordinis pri-

marii et secundarii eglandulosa, antheris oblongis introrsum 4-locellatis, ordinis tertii utrinque glandula stipitata aucta, stipitibus 1 mm. longis, antheris 4-locellatis, locellis laterale extrorsum dehiscentibus; ordinis quarti staminodia ensiformia $1\frac{1}{2}$ mm. longa intus basi barbata. Ovarium globosum $1\frac{1}{3}$ mm. longum, stylo 2 mm. longo, filiformi, stigmatate dilatato, pectinato circ. 3-lobato.

HAB. Kelung: Zuihō, leg. T. KAWAKAMI, Mart. 1907, (No. 4241).

Near *Machilus Nanmu* HEMSL., but differs from it by the more obtuse leaves with different venation.

Litsea LAM.

Litsea akensis HAYATA sp. nov. Rami fusco-cinerascentes, longitudinaliter rugosi, cicatricibus foliorum notati, ramulis dense fusco-pubescentibus. Folia alterna, petiolata, oblongo-obovata, $8\frac{1}{2}$ cm. longa, 3 cm. lata, apice obtusa, basi cuneata, ima basi obtusa, supra glabrata, ad costas basi pubescentia, subtus minute lepidota ad nervos hirtellato-pubescentia, fusco-glaucoscentia, supra costis venis venulisque impressis subtus prominente elevatis, venis primariis utraque latere 5-7, a costa angulo 50° egressis arcuatis prope marginem evanescentibus, venis secundariis oblique transversis, venulis reticulatis, petiolis 1 cm. longis. Fl. ♀: umbellatim cymosi, cymis axillaribus, ramis divaricatis, umbellis 4-5-floratis, floribus subsessilibus vel breve pedicellatis, pedicellis 1 mm. longis, sericeo-pubescentibus, bracteis involucri globosis extus sericeo-pubescentibus, margine ciliatis 6 mm. longis. Perianthium campanulatum 3 mm. longum, tubo intus sericeo, $1\frac{1}{2}$ mm. longo, limbo 6-partito, lobis subæqualibus, ovatis, $1\frac{1}{2}$ mm. longis vel acutis vel cuspidato-

acutis. Staminodia 9-12, linearia vel subulata, $1\frac{1}{2}$ mm. longa, barbata, intimis 2-glandulosis. Ovarium obovatum $1\frac{1}{4}$ mm. longum, apice in stylum $2\frac{1}{2}$ mm. longum attenuatum, stigmate discoideo, 2-3-lobato. Bacca oblonga 1 cm. longa, 6 mm. lata, calycis tubo accrescente cupuliformi insidens, segmentis calycis deciduis.

HAB. Akō : Tanashū, leg. G. NAKAHARA, Jan. 1906 ; Botansha, leg. S. KUSANO, Jan. 1909, (sp. ♀.)

Here is another specimen bearing male flowers which resembles very much the species just described, and may be the partner of it. The following description is drawn from the male specimen.

Folia obovata vel obovato-oblonga, 13 cm. longa, 6 cm. lata apice breve acuta, basi cuneata. Fl. ♂ : umbellæ 3-4-floratae, breve pedicellatae, pedicellis 1 mm. longis, pubescentibus. Perianthium extus pubescens, 6-7-8 partitum, segmentis obovatis $4\frac{1}{2}$ mm. longis, $2\frac{1}{2}$ mm. latis. Stamina circ. 16, subæqualia, 5 mm. longa, exserta, filamentis barbatis exterioribus irregulariter glandulosis. Rudimentum ovarii minutum.

HAB. in monte Morrison, ad 7500 ped. alt., leg. T. KAWAKAMI et U. MORI, 1906, Oct. (No. 1706, sp. ♂.)

Litsea (*Tetradenia*) **aurata** HAYATA sp. nov. Rami cinerascens, rugosi, lenticellati, cicatricibus foliorum notati, ramulis fuscentibus glabris. Folia persistentia coriacea alterna ad apicem ramorum verticillatim approximativè superposita, petiolata oblonga, 8 cm. longa, 32 mm. lata, apice acute obtusa basi obtusa, utrinque venis elevatis, supra glabra, subtus pilis adpressis sericeo-aurata, 3-nervia, venis primariis utrinque 2-3, venis secundariis transverse reticulatis. Umbellæ florum secus apicem ramulorum approximate dispositæ, sessiles, (bracteis involucri 4, globosis deciduis 5 mm.

longis), 5-10-floratæ, solitariæ vel 2-3 congestæ, floribus pubescentibus, pedicellatis, pedicellis 3 mm. longis. Perianthii tubus campanulatus brevis, 1 mm. longus, limbus 4-partitus, segmentis ovatis 4 mm. longis 2 mm. latis, extus margine pubescentibus, intus glabris. Stamina 6-7, æquilonga, 4 mm. longa, exserta, filamentis filiformibus, basi hirsutis, ordinis primarii eglandulosa, ordinis secundarii glandula stipitata utrinque aucta, antheris ovatis $1\frac{1}{2}$ mm. longis connectivo vix producto, 4-locellatis, locellis 2-superioribus introrsum, 2-inferioribus laterale vel extrorsum dehiscentibus. Ovarium globosum $\frac{3}{4}$ mm. longum, stylo validiusculo, $1\frac{1}{2}$ mm. longo, patente hirsuto, stigmate 3-lobato, lobis pectinatis.

HAB. Kōtōshō, leg. K. MIYAKE, Nov. 1899, (Fl. ♂); ibidem leg. G. NAKAHARA, Feb. 1906, (No. 1045).

Litsea citrata BLUME; HOOK. f. Fl. Brit. Ind. V. p. 155; FORBES et HEMSL. Ind. Fl. Sin. II. p. 379.

HAB. Nantō: Nankōkei, leg. U. MORI, Aug. 1906, (No. 1164); Horisha, leg. Y. SHIMADA, Feb. 1907, (No. 4233); Bunbunsha, leg. U. MORI, Juli. 1907, (No. 3171); Hinokiyama, leg. G. NAKAHARA, Feb. 1907; Nantō: Bigenzan, leg. U. MORI, Juli. 1907, (No. 3184); Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7009); ibidem, leg. S. KUSANO, 1909; Hsinchū, leg. HIRAOKA; Shintiku: Daihei, leg. Y. SHIMADA, Sept. 1907, (No. 4690); Taitō: Bunshiseki, leg. U. MORI, Dec. 1906, (No. 2218); in monte Morrison, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2053); Shintiku: Goshizan, leg. T. KAWAKAMI, Dec. 1905, (No. 1310); Mt. Chōron, leg. G. NAKAHARA, Aug. 1905; Akō: Daijoringe, leg. U. MORI, Aprili. 1907, (No. 2893); Tōyen, leg. T. KAWAKAMI et U. MORI, Mart. 1907, (No. 2656); Uraisha, leg. N. KONISHI, Mart. 1907, (No. 33).

DISTRIB. China, Eastern India, Birma and Java.

OBSERV. Rami glabri nigricantes, ramulis gracilibus. Folia alterna, petiolata, subpersistencia membranacea lanceolata, 7 cm. longa, 16 mm. lata, apice acuminata, basi acuta, vel obtusa, costis et venis utrinque paullum elevatis, venis primariis gracillimis, petiolis 8 mm. longis. Umbellæ florum racemose dispositæ, racemis axillaribus $1\frac{1}{2}$ cm. longis, pedicellis umbellarum 8 mm. longis, vel racemis in 1 umbellam reductis. Umbellæ 4-floratæ, basi bracteis 4, persistentibus, globosis 4 mm. longis, 5-nervatis, apice rotundatis membranaceis glabris. Perianthium 6-partitum glabrum, segmentis late ovatis obtusis 2 mm. longis, $1\frac{1}{2}$ mm. latis, integris vel denticulatis. Stamina 9, omnia perfecta, 2 mm. longa, segmento perianthii æqualia, filamentis glabris linearibus, ordinis primarii et secundarii eglandulosa, ordinis tertii glandula breve stipitata utrinque aucta, antheris omnibus introrsum 4-locellatis. Rudimentum ovarii minutum. Fl. ♀ : ignoti. Bacca globosa, nigricans 5 mm. longa, perianthii tubo non accrescente insidens, segmentis calycis deciduis.

As shown in the above list, the species is widely distributed in Formosa.

Litsea (*Tetradenia*) **Konishii** HAYATA sp. nov. Ramuli recti, fusco-nigricantes, glabri, parce lenticellati, ad nodos cicatricibus foliorum approximate notati. Folia persistentia, coriacea, ad apicem ramulorum approximate verticillatim disposita, alterna, petiolata lanceolata vel oblonga, 14 cm. longa, $4\frac{1}{2}$ cm. lata, apice abrupte acuminata, (acuminibus brevibus obtusis), basi gradatim acuta, supra glabra, subtus glauca, pilis longis adpressis parce oblecta, demum glabrata, supra basin trinervia, venis primariis paucis utrinque latere 3, venis secundariis transverse reticulatis,

petiolis 1 cm. longis. Alabastrum foliorum elongatum cylindricum, $4\frac{1}{2}$ cm. longum, 8 mm. latum, perulis ∞ -seriatis, intimis spathulatis exterioribus gradatim brevioribus, extimis minutissimis, extus adpresse sericeo-pubescentibus. Umbellæ florum secus apicem ramulorum aggregatim dispositæ, sessiles 5-6-floratæ, bracteis involucri 4, globosis, 5 mm. longis, floribus pedicellatis, pedicellis 4 mm. longis pubescentibus. Perianthium 4-partitum, extus pilosum, segmentis ovato-lanceolatis 4 mm. longis. Stamina 6, dimera, 3-seriata, omnia perfecta, exserta, $5\frac{1}{2}$ mm. longa, antheris 4-locellatis, 2-superioribus introrsum, 2-inferioribus extrorsum, dehiscentibus, filamentis filiformibus, basi hirsutis, ordonis primarii et secundarii eglandulosa, ordonis tertii glandula stipitata utrinque aucta. Rudimentum ovarii O. Bacca ovoidea, apice acuta, nuda, lobo perianthii deciduo.

HAB. Nantō : Hinokiyama, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3167); Randaizan, leg. T. KAWAKAMI et U. MORI, Juli. 1907 (No. 3317); Shintiku : Goshizan, Dec. 1905, (No. 1290); Risekizan, Jan. 1908, (No. 4543); Uraisha, leg. N. KONISHI, Mart. 1908, (No. 92); Murimuribussha, prope Pinan, leg. K. MIYAKE, Dec. 1899; Hokkōkei, leg. C. OWATARI, Jan. 1898.

Near *Tetradenia glauca* MATSUM.=*Litsea glauca* Sieb. from which the present plant differs in having oblanceolate leaves which are broadest in the upper parts of the blade. In *T. glauca*, the leaves are broadest in the lower parts of the blade.

Litsea lancifolia VILLAR; FORBES et HEMSL. Ind. Fl. Sin. II. p. 382; MATSUM. et. HAYATA Enum. Pl. Formos. p. 352.

HAB. Ginai, leg. K. MIYAKE, Sept. 1899, Fl. ♂.

DISTRIB. Japan.

This is exactly the same as the Japanese plant.

Litsea morrisonensis HAYATA sp. nov. Ramuli graciles, cinereo-rubescens, glabri. Folia alterna, petiolata, oblanceolata, $11\frac{1}{2}$ cm. longa, $2\frac{1}{2}$ cm. lata, apice obtuse acuminata, basi obtuse acuta, integra vel obscure crenulata, supra costis impressis venis et venulis inconspicuis venulis minute reticulatis, subnitida, subtus costis et venis primariis et secundariis prominentibus ad venas et venulas hirtella, venis primariis utraque latere 12, a costa angulo 60° egressis arcuatis prope marginem evanescentibus subtus glaucissima, petioli 1 cm. longis. Flores 5-6 umbellatim dispositi, umbellis pedunculatis, ad axillas foliorum superiorum, pedunculis 2 cm. longis, bracteis involucri 3, inaequalibus persistentibus orbicularibus membranaceis $\frac{1}{2}$ cm. longis, florem amplectantibus, pedicellis brevibus $1\frac{1}{2}$ mm. longis. Fl. ♂: perianthii tubus brevissimus, segmentis 3-4, oblongis, extus pubescentibus, $2\frac{1}{2}$ mm. longis. Stamina perfecta 9, longe exserta, subaequilonga $4\frac{1}{2}$ mm. longa, ordonis primarii et secundarii introrsum 4-locellata, ordonis tertii locellis inferioribus lateralibus, basin utraque latere glandula stipitata instructa, stipitibus basin filamentis connatis, filamentis hirtellatis. Staminodia ordonis quarti 0. Rudimentum ovarii nullum. Fl. ♀: ignoti.

HAB. in monte Morrison, ad 9000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1955).

Litsea mushænsis HAYATA sp. nov. Rami fusco-rubescens, lenticellis globosis notati, ramulis petiolisque dense pubescentibus. Folia alterna petiolata, obovato-lanceolata, oblanceolata, vel oblonga, $12\frac{1}{2}$ cm. longa 4 cm. lata, apice breve acuminata, basi angustata, vel cuneata, supra subglabrata, ad costas tenuiter hispidula, subtus ad costas venas et venulas dense hirsuta, costis et venis supra impressis vel planis, subtus prominente elevatis,

venis primariis utrinque latere 7, a costa angulo 40° egressis, apice arcuatis prope marginem evanescentibus, venis secundariis transversis, venulis reticulatis, subtus pallido-fuscentia. Flores umbellati, umbellis secus apicem ramulorum dispositis. Alabastrum umbellarum globosum a bracteis sericeo-pubescentibus inclusum, pedunculis 1 cm. longis. Flores perfecti ignoti.

HAB. Nantō : Mushazan, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1142).

Near *Litsea elongata* Hook. f., but differs from it by the oblanceolate leaves with a more cuneate base.

Litsea nantensis HAYATA sp. nov. Rami recti graciles fusco-rubescens, glabri, longitudinaliter rugosi, cicatricibus foliorum oblongis remote notati. Folia alterna petiolata, lanceolata, apice acuminata, basi acuta, costis supra sulcatis subtus elevatis venis primariis supra planis subtus prominentibus, utrinque latere 12, apice arcuatis, prope marginem evanescentibus, a costa angulo 60° egressis, venis secundariis reticulatis, supra glabra subtus glaucissima, petiolis $1\frac{1}{2}$ cm. longis. Flores umbellati, umbellis 2-3 ad apicem pedunculorum dispositi, pedunculis 1 cm. longis ad axillas foliorum soritariis. Umbellæ 3-4-floratæ, bracteis 4-5, globosis 4 mm. longis, pubescentibus alabastrum florum includentibus, pedicellis 2 mm. longis pubescentibus. Perianthii tubus brevis hirsutus, limbus 6-partitus, segmentis oblongis $2-2\frac{1}{2}$ mm. longis obtusis. Stamina 9, omnia perfecta, æquilonga, exserta, 4 mm. longa, antheris omnibus introrsum 4-locellatis, filamentis filiformibus basi barbatis, ordonis primarii et secundarii eglandulosa, ordonis tertii glandula sessili utrinque aucta.

HAB. Nantō : Riskizan, leg. U. MORI, Juli. 1906, (No. 3242).

Near *Litsea acuminata* (MEISSN.) MAKINO, from which the present

plant differs in having leaves which have primary veins diverging from the midrib in a more obtuse angle, and in the male inflorescence which is much looser and smaller. Also near *Litsea hupehana* HEMSL. but differs by the venation of the leaves.

Litsea obovata HAYATA sp. nov. Ramuli dense brevique tomentosi fusco-rubrescentes. Folia alterna, petiolata, obovata, vel late oblonga, 13 cm. longa, 8 cm. lata, apice rotundato-acuta, basi acuta supra glabrata, ad costas pubescentia, subtus ad costas venas venulasque hirtellata, ad paginam minute lepidota, pallidissima, costis et venis supra impressis subtus prominente elevatis venis primariis utrinque latere 6-7, a costa angulo 60° egressis arcuatis apice 2-furcatis prope marginem anastomosantibus, venis secundariis oblique transversis, venulis reticulatis, petiolis $1\frac{1}{2}$ cm. longis. Umbellæ florum cymosæ, cymis axillaribus. Involucrum alabastri globosum. Fl. perfecti non visi.

HAB. Banchōryō, leg. T. KAWAKAMI et U. MORI, Nov. 1907, (No. 4143).

Near *L. tomentosa*, but differs from it by the much less hairy and obovate leaves.

Lindera THUNB.

Lindera akœnsis HAYATA sp. nov. Rami fusco-cinerascentes, longitudinaliter rugosi, cicatricibus foliorum elevatis notati, ramulis gracilibus fusco-pubescentibus. Dioeca. Pl. ♂: Folia alterna petiolata, ovata, vel oblonga, 4 cm. longa, 23 mm. lata apice abrupte acuta, basi acuta, supra nitida, subtus glauca, ad costas venas venulasque hirtellata, venulis reticulatis utrinque pagine elevatis, petiolis 5 mm. longis, supra sulcatis. Flores 5-6 ad axillas foliorum congesti, pedicellis brevibus 2 mm. longis pubescentibus, perulis

globosis 3 mm. longis caducissimis. Perianthium extus basi pauce pubescens, 6-partitum, segmentis late ovatis, 2 mm. longis, $1\frac{3}{4}$ mm. latis, obtusis. Stamina 9, omnia perfecta, perianthio æquilonga, introrsum 2-locellata, antheris 1 mm. longis, ovatis connectivis apice productis, ordonis primarii et secundarii eglandulosa, ordonis tertiæ basi glandula subsessili utrinque aucta. Rudimentum ovarii minutum obovatum, $\frac{3}{4}$ mm. longum in stylum $1\frac{1}{2}$ mm. longum attenuatum. Pl. ♀ : Folia late ovata 5 cm. longa, $3\frac{1}{2}$ cm. lata apice abrupte acuta, basi acuta vel truncato-acuta, vel rotundato-acuta, supra nitida, subtus glauca, venis et venulis hirtellatis, venis primariis utrinque 5, a costa angulo 60° egressis, venulis reticulatis utrinque elevatis. Flores ad axillas 5-6 congesti, pedicellis sericeo-pubescentibus 1-3 mm. longis. Perianthium campanulatum, $2\frac{1}{2}$ mm. longum, tubo 1 mm. longo, limbo 6-lobato, lobis rotundato-triangularibus, obtusis $1\frac{1}{2}$ mm. longis. Staminodia 9 in fauce tubi perianthii affixa minuta linearia 1 mm. longa, ordonis tertiæ basi glandula sessili utrinque aucta. Ovarium obovoideum 2 mm. longum, in stylum $1\frac{1}{2}$ mm. longum attenuatum, stigmatate dilatato lobato.

HAB. Tōshiyen, shinkōsha, leg. U. MORI, Mart. 1907, (No. 2794, ♂); Taitō : Tamari, leg. U. MORI, Aprili. 1907 ; Akō : Tanashū, leg. G. NAKAHARA, Jan. 1906 ; Akō : Ryokusha, leg. T. KAWAKAMI et U. MORI, Aprili. 1907, (No. 3147) ; Takaw, (No. 6324) ; Banchoryō, leg. U. MORI, Nov. 1908 ; Akō : Bongari, leg. G. NAKAHARA, Sept. 1905, (Nos. 516, et 3809).

Near *L. præcox* BLUME, but differs from it in having flowers together with full foliage. The leaves of this plant are usually thicker and smaller. The description of the male plant is drawn up from a specimen numbered 2794, and that of the female, from a specimen numbered 2884. There exists some slight difference

between the two specimens in the shape of leaves. I think, however, from the general appearance of the plant, that one may be the partner of the other, and therefore I have here described them under the same name. In case that they should not be of the same species, the present name should be used for the male plant. To prevent a confusion of nomenclature, which may have crept in from such an error, I have here given the descriptions of the male and female separately.

Lindera communis HEMSL. in FORBES et HEMSL. Ind. Fl. Sin. II. p. 387.

HAB. Uraisha, leg. N. KONISHI, Aprili. 1908, (No. 69), (No. 93 ♀); Nantō : Suisha, leg. N. KONISHI, Feb. 1907, (Fl. ♂).

DISTRIB. China : Hupeh, Szechuen, Kwangtung.

OBSERV. Ramuli fusco-cinerascentes, longitudinaliter rugosi, cicatricibus basi elevatis foliorum notati, ramulis fuscentibus breve villosis. Folia persistentia alterna petiolata, oblonga, 8 cm. longa, 23 mm. lata, apice acuminata, basi acuta, (acuminibus 13 mm. longis apice obtusis), supra glabra, subtus breve tomentosa, costis et venis supra leviter impressis, subtus prominente elevatis venis primariis utrinque latere 5, a costa angulo 40° egressis, prope marginem arcuatis, anastomosantibus, venis secundariis transverse reticulatis, petiolis 7 mm. longis hirsutis. Flores umbellatim 5-6 ad axillas foliorum dispositi, perulis caducis globosis 5 mm. longis, extus basi sericeo-pubescentibus. Flores perfecti non visi. Bacca globosa, 5 mm. longa apice breve apiculata, 5-6 umbellatim ad axillas foliorum disposita, pedicellis 1 cm. longis, pubescentibus, perianthii tubo explanato parum aucto 6-lobo insidens, lobis a basi deciduis.

My plant is very like *Lindera communis* HEMSL. It is a little

different from HENRY'S herb. No. 4574, in having villosely pubescent branchlets, longer pedicels, larger receptacle, leaves which are more hairy beneath, and in many other points. The leaves of HENRY'S specimen are rather reddish brown when dried; but those of my plant are never reddish but dark brown or pale brown.

Lindera formosana HAYATA sp. nov.

Litsea lancifolia HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 352, pro parte, (non VILLAR).

Rami rubro-cinerascentes, cicatricibus elevatis foliorum deciduorum notati, ramulis cinerascentibus breve pubescentibus. Folia secundum in annum virentia, alterna, petiolata, obovato-oblonga, 6 cm. longa, 2 $\frac{1}{2}$ cm. lata, apice abrupte acuminata, (acuminibus 7 mm. longis apice obtusis), basi acuta, integra supra glabra, subtus glauca, ad venas venulas hirtella, venis primariis utrinque 5, a costa angulo 50° egressis, venulis transverse reticulatis, costis et venis supra impressis, subtus prominente elevatis, petiolis 8 mm. longis. Flores umbellatim 5-6 ad axillares foliorum (annotinorum) fasciculati, pedicellis 4 mm. longis pubescentibus. Perulae alabastri caducæ orbiculares 5 mm. longæ, extus basi pubescentes. Fl. ♂: perianthium glabrum 6-partitum, segmentis ovatis, 3 mm. longis, 2 mm. latis, apice rotundatis. Stamina 9, omnia perfecta, 2 mm. longa, segmentis perianthii breviora, introrsum 2-locellata, ordonis primarii et secundarii eglandulosa, ordonis tertii basi utrinque glandula aucta. Rudimentum ovarii minutum cum stylo 1 $\frac{1}{2}$ mm. longum.

HAB. Chōkachiraisha, Kachinro, leg. C. OWATARI, Mart. 1898.

Lindera glauca BLUME var. **Kawakamii** HAYATA n. v. Rami albo-cinerascentes, ramulis gracilibus. Folia hysterantha decidua, (novella) alterna, petiolata, oblonga, 3 cm. longa 13 mm. lata,

utrinque acuta, utraque sericeo-pubescentia, venis primariis arcuatis ramosis anastomosantibus, petiolis 2 mm. longis. Flores fasciculati, fasciculis ad cicatricibus foliorum (annotinorum) axillaribus, 5-10-floratis, pedicellis 5-7 mm. longis, pubescentibus, bracteis linearibus 6 mm. longis $\frac{1}{2}$ mm. latis, extus sericeo-villosis, intus glabris, perulis basi fasciculorum caducis rubescentibus orbicularibus 1 cm. longis. Fl. ♂: perianthium 6 partitum, segmentis oblongis 3 mm. longis, $1\frac{3}{4}$ mm. latis, apice rotundatis vel leviter emarginatis. Stamina 9, 2 mm. longa, perianthium non excedentia, perfecta, omnia introrsum 2-locellata, ordoni primarii et secundarii eglandulosa filamentis complanatis $1\frac{1}{2}$ mm. longis, ordonis tertii utrinque basi filamentorum glandula sessili aucta, antheris omnibus oblongis apice emarginatis. Rudimentum ovarii minutum oblongum 1 mm. longum, stylo brevi.

HAB. Taikōkei, leg. T. KAWAKAMI, Dec. 1906, (No. 1071); Akō: leg. T. KAWAKAMI et U. MORI, Aprili. 1907, (No. 2898).

Lindera Oldhami HEMSL. in FORBES et HEMSL. Ind. Fl. Sin. II. p. 390; MATSUM. et HAYATA Enum. Pl. FORMOS. p. 353.

HAB. Shintiku: Shinho, leg. Y. SHIMADA, Oct. 1907, (No. 5688, Fr.)

DISTRIB. An endemic plant.

OBSERV. Ramuli validi fusco-nigricantes (in exsiccato) longitudinaliter rugosi, cicatricibus foliorum orbicularibus et iis pedunculorum planis notati. Folia parte persistentia alterna, petiolata, oblonga, vel oblongo-lanceolata, $15\frac{1}{2}$ cm. longa, 5 cm. lata, apice acuminata, basi acuta integra, supra glabra, subtus glauco-pallida, pubescentia, costis supra impressis subtus prominente elevatis, venis supra leviter subtus prominente elevatis, venulis reticulatis utrinque pagine elevatis, venis primariis utrinque latere 11, ad

costa angulo 40° egressis sursum arcuatis prope marginem evanescentibus, venis secundariis oblique vel transversim reticulatis, membranacea, petiolis 2 cm. longis. Alabastrum foliorum elongatum cylindricum, perulis albo-sericeis ovatis vel oblongis. Flores circ. 20 umbellati, umbellis pedunculatis, pedunculis $1\frac{1}{2}$ cm. longis axillaribus solitariis, bracteis basi umbellarum magnis coriaceis concavis alabastrum floris amplexantibus, globosis extus breve pubescentibus, margine ciliolatis. Fl. ♂ : pedicellis 1 cm. longis, pubescentibus ; perianthium extus parce pubescens 6-partitum, segmentis obovatis vel spatulatis $4\frac{1}{2}$ mm. longis, $2\frac{1}{2}$ mm. latis, apice rotundatis. Stamina 9, segmentis perianthii longiora, 6 mm. longa, omnia introrsum 2-locellata, filamentis hirsutis, antheris late ovatis, apice connectivo apiculatis, ordinis primarii et secundarii eglandulosa, ordinis tertii glandula stipitata utrinque aucta, stipitibus filamentis basi connatis. Rudimentum ovarii minutum apice stylo punctatum. Bacca oblongo-globosa perianthii tubo accrescente segmentis deciduis insidens, pedicellata, 5-6 umbellata, umbellis pedunculatis, pedunculis $1\frac{1}{2}$ cm. longis, pedicellis 1 cm. longis omnibus pubescentibus.

Near *Lindera megaphylla* HEMSL. in Ind. Fl. Sin. II. p. 389, and HENRY'S herb. No. 3345, but greatly differs from it in having broader leaves which are widest in the middle portion. The stamens of the third order are neither entorse nor extrorse, but exactly lateral, and it is rather questionable whether the plant should be referred to the tribe *Litseaceae* or *Perseaceae*.

Lindera randaiensis HAYATA sp. nov. Rami et ramuli validi, glabri, in exsiccato rubro-nigricantes, lenticellati, cicatricibus semi-lunatis foliorum approximate notati. Folia decidua alterna, petiolata, rhomboideo-ovata, 16 cm. longa, $7\frac{1}{2}$ cm. lata, utrinque

acuta, subtus glauca, costis venisque prominentibus, venis primariis utrinque latere 7-8, venis prope basin margine inferiore parallelis, a costa angulo 40° egressis, petiolis 4 cm. longis. Flores racemosi, racemis 3 cm. longis 5-6 umbellatim ad apicem ramorum dispositis. Perulæ alabastri floris 3-4, orbiculares 1½ cm. longæ, extus breve pubescentes, persistentes, bracteis racemorum filiformi-linearibus 1 cm. longis barbatis, pedicellis 6 mm. longis. Fl. ♂ : perianthium basi barbatum 6-partitum, segmentis linearibus 4 mm. longis, 1¼ mm. latis. Stamina 9, segmento perianthii 2-plo breviora, filamentis complanatis basi barbatis, ordinis primarii et secundarii eglandulosa, introrsum 2-locellata, ordinis tertii utrinque basi filamentorum glandula sessili aucta introrsum 2-locellata vel abortu in staminodium reducta. Rudimentum ovarii obovatum 1 mm. longum, stylo breve 1 mm. longo, stigmate dilatato. Flores ♀ : ignoti.

HAB. Mt. Randaizan, leg. S. KUSANO, 1908.

The description of the leaves of the present plant is drawn up from the material collected by Mr. S. KUSANO, who carefully gathered fallen leaves on the spot where this tree stands.

Hernandiaceæ.

Illigera BLUME.

Illigera luzonensis (PRESL.) MERRILL in Philip. Journ. Sci. III. Suppl. p. 407.

HAB. Kōshūn : Botansha, leg. G. NAKAHARA, Dec. 1906.

DISTRIB. Philippines.

Proteaceæ.

Helicia LOUR.

Helicia cochinchinensis LOUR. ; MATSUM. et HAYATA Enum. Pl. Formos. p. 354.

HAB. Daitōsei, leg. T. KAWAKAMI et U. MORI, 1908, Juli. (No. 1088).

Thymelæaceæ.

Daphne LINN.

Daphne Genkwa SIEB. et ZUCC. Fl. Jap. I. p. 137, t. 75 ; MEISSN. in DC. Prodr. XIV. p. 531 ; MAXIM. in Mém. Biol. XI. p. 310 ; FRANCH. et SAVAT. Enum. Pl. Jap. I. p. 404 ; FRANCHET Pl. David. p. 259, (var. *Fortunei*) ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 395.

Daphne Championi HAYATA Fl. Mont. Formos. p. 355, (non BENTH.).

DISTRIB. China : Shantung, Chekiang, Kiangsi, Fokien, Hupeh, Shensi.

Elæagnaceæ.

Elæagnus LINN.

Elæagnus morrisonensis HAYATA sp. nov.

Elæagnus umbellata HAYATA Fl. Mont. Formos. p. 190, (non THUNB.). Rami graciles, ut videntur scandentes, dense vel parce ferruginco-lepidoti. Folia oblongo-ovata, vel oblongo-lanceolata, 8 cm. longa, 3 cm. lata, apice acuminata, obtusa, basi obtusa, vel

rotundato-obtusa, margine repandato-integra, supra subglabra, vel parcissime lepidota, subtus densissime lepidota, albicantia, lepis ferrugineis parce dispersa, chartacea, supra costis subsulcatis vel subplanis, subtus prominentibus, venis lateralibus primariis subtus tenuiter elevatis utrinque 10-12, rectis tenuissimis, a costa angulo 50° egressis. Flores ad axillas foliorum 3-4-fasciculati, vel brevissime racemosi, basi perulati, perulis minutis ferrugineo-lepidotis, pedicellis 3-4 mm. longis. Perianthium infundibuliforme, 1 cm. longum, extus densissime albo-lepidotum, etiamque lepidibus ferrugineis parce dispersum, intus atro-fuscente, tubo oblongo 2 mm. longo, ad faucem constricto, supra constrictionem dilatato, limbo infundibuliformi, 8 mm. longo, basi tubuliformi, apice dilatato, partibus tubuliformibus 4 mm. longis, circ. 2 mm. in sectione, partibus dilatatis 4 mm. longis, 5 mm. in diametro, 4-lobato, lobis triangulari-ovatis, 2 mm. longis apice obtusis intus barbatis. Stamina 4, infra sinus inter lobos inserta, filamentis brevissimis triangularibus basi dilatatis $\frac{1}{2}$ mm. longis, antheris atro-fuscentibus, oblongis $1\frac{1}{3}$ mm. longis, apice apiculatis, basi sagittatis. Ovarium ovatum $1\frac{1}{3}$ mm. longum, glabrum albo-rubescens, stylo incrassato-filiformi, 8 mm. longo, recurvato, atro-fuscente, lepidibus albicantibus parce oblecto.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, 1908, (Nos. 1891 et 1952).

The present plant was referred to *E. umbellata* THUNB. by myself in the paper above cited. Studying more carefully, I have found that there exists some difference between my plant and THUNBERG'S species, especially in the structure of flowers, though they are very near. It is also near *E. Thunbergi*, but differs from it in having narrower leaves, and in the corolla-lobes.

Loranthaceæ.

Loranthus LINN.

Loranthus Owatarii HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 357.

This is near *L. nodiflorus* THW., but differs from it in having spicate and much smaller flowers, which are not clustered as is the case with *L. nodiflorus*. It comes also very near *L. odoratus*; but differs in having broader leaves, and in the fruit. In my species, fruits are rounded at the apex, but, in the other, they are more or less rostrate.

Santalaceæ.

Thesium LINN.

Thesium chinense TURCZ.

HAB. Liukiu, leg. G. NAKAHARA.

Not yet known from Formosa.

Euphorbiaceæ.

Euphorbia LINN.

Euphorbia Atoto FORST.; BOISS. in DC. Prodr. XV.-2, p. 12; HANCE in Journ. Bot. (1878), p. 232; MAXIM. in Mém. Biol. XI. p. 831; HOOK. f. Fl. Brit. Ind. V. p. 248; FORBES et HEMSL. Ind. Fl. Sin. II. p. 411.

HAB. Garanbi, leg. S. NAGASAWA, 1908.

DISTRIB. China : Pratas island, Hongkong, Hainan ; Ceylon, Malaya, Polynesia, Australia.

Euphorbia formosana HAYATA sp. nov.

Euphorbia dendroides HAYATA Rev. Euphorb. et Bux. Jap. p. 65, (non LINN.).

Herba suffrutescens, cinerascens, glabra, cicatricibus foliorum transversis notata. Folia ad summum caulium approximata, alterna, subsessilia, linearia, 6 cm. longa, 6 mm. lata, apice acuta, aristato-apiculata, basi obtusa, integra horizontaliter recurvata, uni-nervia. Umbella 6-radiata, foliis caulinis conformibus involuèrata, radiis 1-2 cm. longis, umbellulis 5-6-radiatis, radiis 3 mm. longis, basi umbellularum foliis 3 obovatis 7 mm. longis involucratis. Involucrum basi 2-bracteatum, (bracteis obovatis apiculatis 5 mm. longis), urceolatum $2\frac{1}{2}$ mm. longum, totiusque latum, 4-glanduliferum, glandulis late rotundatis peltatis, exappendiculatis, 4-lobatum, lobis inflexis ciliolatis, intus bracteolatum, bracteolis obovatis truncatis $2\frac{1}{2}$ mm. longis, longe barbatis. Fl. ♀ : pedicellis apice leviter dilatatis ; ovarium ovoideum, $1\frac{1}{4}$ mm. longum, 3-sulcatum secus sulcum costatum, verrucis conicis dense obtectum, stylis 3, basi coalitis, apice bifidis subincrassatis. Fl. ♂ : stamen 1, pedicellatum pedicello $2\frac{1}{2}$ mm. longo, filamento $1\frac{1}{4}$ mm. longo incrassato, anthera incrassata, rimis transversis.

HAB. Tōseikaku, leg. K. MIYAKE, 1898.

Euphorbia Makinoi HAYATA sp. nov.

Euphorbia microphylla HAYATA Rev. Euphorb. Bux. Jap. p. 79. t. V., H, (non HEYNE).

Caulis filiformis tenuissimus, prostratus, dichotome ramosus, subglaber, foliatus, foliis a se 5 mm. remotis, exsiccato fuscentibus. Folia oblonga 2-3 mm. longa, $1\frac{1}{2}$ -2 mm. lata, valde inæqualia, sub-

cordato-ovata v. ovato-elliptica apice obtusa basi rotundata vel cordata, margine integra, plus minus albo-marginata, venulis reticulatis inconspicuis, brevissime petiolata, stipulis interpetiolaribus late triangularibus apice denticulatis, denticulis acutis. Involuera axillaria solitaria, vel ad apicem ramulorum simplicium brevissimorum axillarium solitaria, sessilia, turbinato-campanulata, utrinque subglabra, lobis 1-3-fidis, glandulis inter lobos transversis, oblongis, appendiculatis, appendicibus 2-3-lobatis, brevibus. Styli breviores bifidi apice subincrassati. Capsulæ depresso-ovoideæ, trigonæ, 3-lobatæ, $1\frac{1}{2}$ mm. in diametro, coccis acute carinatis, facie lævibus. Semina ovato-tetragona (angulis obtusis) 1 mm. longa, tenuiter rugulosa.

HAB. Tamsui, leg. T. MAKINO, 1896.

The present plant was identified with *E. micophylla* HEYNE by myself, only by the description given in Hook. f. Fl. Brit. Ind. V. p. 252, without seeing any specimen of it. Since coming to Kew, I have compared my plant with HEYNE's type and found that they are not exactly identical. The present plant differs from any species of the genus in having very much smaller leaves.

Bridelia WILLD.

Bridelia ovata DECNE.

Bridelia pachinensis HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 362.

Bridelia Kawakamii HAYATA l. c. p. 362.

HAB. Chōsōkei, leg. G. NAKAHARA, Juli. 1905, (No. 156); Shintiku, leg. T. KAWAKAMI et U. MORI, Juni. 1906, (No. 1425); Maruyama, leg. U. FAURIE, Mai. 1903, (No. 18).

DISTRIB. Australia, Birma, Malaya, Ins. Timor.

Compared with specimens of the species at Kew.

Phyllanthus LINN.

Phyllanthus Emblica LINN. MUELL. ARG. in DC. Prodr. XV.-2, p. 352; BENTH. Fl. Hongk. p. 312; HOOK. f. Fl. Brit. Ind. V. p. 289; FORBES et HEMSL. Ind. Fl. Sin. II. p. 421.

Phyllanthus Niinamii HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 360.

DISTRIB. China : Hongkong, Hainan. Throughout tropical India and Malaya.

Glochidion FORST.

Glochidion album MUELL. ARG.

Glochidion formosanum HAYATA Rev. Euphorb. Bux. Jap. p. 20, t. II., G.

Compared with a specimen so labelled at Kew.

Glochidion Fortunei HANCE. ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 424.

Glochidion obovatum HAYATA (pro parte) in Rev. Euphorb. Bux. Jap. p. 19, (non SIEB. et ZUCC.).

HAB. Uraisha, Dec. 1907, (No. 80).

DISTRIB. China ; Fokien.

OBSERV. Folia oblonga 8 cm. longa, 3 cm. lata, apice acuminata basi attenuata, petiolis 4 mm. longis.

Differs from *G. obovatum* by the acuminate leaves.

Glochidion hongkongense MUELL. ARG. in Linnæa XXXII. p. 60 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 424.

Glochidion zeylanicum HAYATA (pro parte) in MATSUM. et HAYATA Enum. Pl. Formos. p. 360.

HAB. Kelung, leg. T. KAWAKAMI et S. SASAKI, Mai. 1908; Hōranzan, leg. T. KAWAKAMI et Y. SHIMADA, (No. 5206).

DISTRIB. Hongkong.

Glochidion liukiuense HAYATA sp. nov. Ramuli graciles striati, fuscentes glabrati. Folia alterna, petiolata, oblongo-lanceolata, 11 cm. longa, 33 mm. lata, apice longe acuminata, (acuminibus $1\frac{1}{2}$ cm. longis), basi acuta valde obliqua, costis et venis utraque pagine elevatis, venis primariis utraque latere 6, a costa angulo 40° egressis, venis secundariis transversis, coriacea. Flores fasciculati, supra-axillares, fasciculis pedunculatis, pedunculis 7 mm. longis ad apicem 30-40-floriferis, floribus pedicellatis, pedicellis 7 mm. longis gracillimis. Fl. ♂: sepala 6, valde imbricata, ovata obtusa. Stamina 6 sessilia, connectivis productis; rudimentum ovarii minutum. Fl. ♀: sepala 6, valde imbricata, ovata acuta. Ovarium globosum, stylo brevissimo, 5-loculare. Capsula depresso-globosa 5-lobata.

HAB. Liukiu.

Breynia FORST.

Breynia officinalis HEMSL. in FORBES et HEMSL. Ind Fl. Sin. II. p. 427.

HAB. Taihoku, leg. T. KAWAKAMI, 1909, Mai. (No. 5853).

DISTRIB. An endemic plant.

Daphniphyllum BLUME.

Daphniphyllum pentandrum HAYATA sp. nov.

Daphniphyllum himalayense HAYATA Rev. Euphorb. Bux. Jap. p. 34, t. II., L, (non MUELL. ARG.).

Folia lanceolata, 8-11 cm. longa, $2\frac{1}{2}$ -3 cm. lata, acuminata,

basi acuta, integra, subtus fusco-glauescentia, supra minute impresso-reticulato-venosa, exsiccato-fuscentia, petiolis $2\frac{1}{2}$ -3 cm. longis, stipulis crassiusculis elongato-triangularibus. Flores ♂ : calyx 5-lobatus, lobis triangularibus acutis, crassiusculis. Stamina 5, rarius 6-7, glandulis simplicibus cylindraceis cum stamina alternis, antheris late globosis apice apiculatis, loculis distinctis, facie minute glanduloso-punctatis, filamentis antheras in longitudine æquantibus.

HAB. Shifun, leg. K. MIYAKE, 1898.

Near *D. himalayense* MUELL. ARG., but differs from it in the leaves and flowers. The lateral primary veins of the new species are not prominent and very obscure, while those of the other species are very prominently elevated. Male flowers of the Himalayan plant are very much larger than those of the Formosan.

Claoxylon A. JUSS.

Claoxylon rubescens MIQ. ?

HAB. Kōtōshō, leg. G. NAKAHARA, Mart. 1906, (No. 1054).

In the imperfectness of the specimen, the determination is rather conjectural.

Acalypha LINN.

Acalypha akensis HAYATA sp. nov. Suffrutescens, ramis rubescentibus, teretibus, sublævibus, subglabris, parcissime pilosis. Folia membranacea, acuto-ovata, 13 cm. longa, 8 cm. lata, apice cuspidato-acuta, sursum obtusa, basi cuneato-cordata, vel rotundato-cordata, margine serrulata, (serrulis acutis), sursum ad cuspides et prope basin subintegra, utrinque ad paginam parce pilosa, ad venas brevissime pubescentia, 5-nervia, costis venis venulisque

distincte elevatis, tenuissimis, petiolis 6-7 cm. longis, brevissime denseque pubescentibus etiamque pilosis, stipulis lanceolatis, 12 mm. longis acuminatis, extus dense intus parce brevissime pubescentibus. Flores monœcii, spicati. Spicæ ♂ : amentiformes, gracillimæ, filiformes, recurvatæ, 18 cm. longæ, villosopubescentes, pedunculis 1 cm. longis, bracteis ovatis $\frac{2}{3}$ mm. longis, extus dense pilosis, intus glabris, margine ciliatis, floribus secus rhachin hac atque illac remote glomeratis, bracteis inter flores lanceolatis, 1 mm. longis, ciliatis. Alabastrum floris ♂ : minutum tetragono-turbinatum, $\frac{1}{2}$ mm. in diametro basi articulatam. Spicæ floris ♀ : graciles 9 cm. longæ, pubescentes, pedunculis 1 cm. longis, bracteis ovatis $\frac{2}{3}$ mm. longis, extus dense pilosis, intus glabris, remote floratis, bracteis latissimis $3\frac{1}{2}$ mm. longis, 5 mm. latis, 10-nerviis, extus pubescentibus, intus glabris, 10-dentatis, ciliolatis, generaliter 2-florem amplectantibus, floribus altero fertilibus, altero sterilibus, bracteoilis minutis ciliolatis. Perianthium 3-fidum, laciniis ovatis acutis $\frac{2}{3}$ mm. longis ciliolatis. Ovarium depresso-globosum, 3-lobatum, hirsutum, stylis distinctis, $2\frac{1}{2}$ mm. longis, prope basin laciniatis, laciniis filiformibus.

HAB. Akō : Kotanshō : leg. G. NAKAHARA, Sept. 1905, (No. 537).

Near *A. grandis* BENTH. and *A. stipulacea* KLOTZS., but differs from the former in having leaves which are cuneately cordate at the base, and from the latter in the bracts of female flowers. The leaves of *A. grandis* are rounded or obtuse, but never cordate, at the base.

Acalypha formosana HAYATA sp. nov. Suffrutescens. Rami hirsuti, teretes, multi-sulcati, læves, patento-hirsuti, pilis transversim patentibus. Folia magna membranacea, longe petiolata, globoso-ovata, 23 cm. longa, 15 cm. lata, apice cuspidato-acuta, (cuspidibus 2 cm. longis, 3 mm. latis, subintegris), basi late rotundata,

ima cordata, (sinibus acutis), margine brevissime serrulata, (serrulis obtusis), sursum in cuspidem et prope basin subintegra, utraque ad nervas et venas dense, ad paginam, pauce hirsuta margine ciliolata, nervis venis venulisque utrinque tenuissime elevatis, tenuissimis, basi 5-nervia, petiolis 8-10 cm. longis, gracilibus, apice dense, cæterum parce pilosis, pilis patentibus, etiamque brevissime pubescentibus, stipulis acuminato-ovatis, 8 mm. longis, extus densissime, intus parce, brevissime pubescentibus. Spicæ ♀ axillares, solitariae, graciles, 7 cm. longæ, remote floratae, pedunculis 1 cm. longis, bracteis conspicuis, semiorbicularibus plicatis, flores amplectantibus, 5 mm. longis, 7 mm. latis, extus dense pubescentibus, intus glabris, margine ciliatis 10-nerviis, palmatim 10-dentatis, (dente centrali majore, $2\frac{1}{2}$ mm. longo, $1\frac{1}{2}$ mm. lato, acuto), bracteolis intra bracteam minutissimis ovatis, $\frac{1}{2}$ mm. longis, pubescentibus. Perianthium 3-fidum, segmentis ovatis, $\frac{2}{3}$ mm. longis, ciliolatis. Ovarium globosum 3-lobatum, hirsutum, $\frac{2}{3}$ mm. longum, stylo 3-partito, 4 mm. longo, ramis apice laciniatis, laciniis filiformibus.

HAB. Randaisan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7085).

Near *A. grandis* BENTH., but differs from it in having very obscurely serrulate leaves and very much smaller bracts of female flowers.

Alchornea Sw.

Alchornea liukiensis HAYATA sp. nov.

Alchornea trewioides HAYATA Rev. Euphorb. Bux. Jap. p. 47, t. IV. A. (non. MUELL. ARG.)

Suffrutex? Folia longe petiolata, cordata, ovata, cuspidato-

acuminata, 7-15 cm. longa, 6-14 cm. lata, margine serrulata, 3-nervia, basi supra 2-glandulosa, stipulis lanceolatis linearibus. Flores monœcii subsessiles. Spicæ terminales simplices, floribus ♂ et ♀ parvis secus rhachin glomeratis, bracteis minutis. Alabastrum floris ♂ depresso-globosum tetragonum, segmentis valvatis. Flores ♂ apertientes 5 mm. in diametro, sepalis 4 triangularibus acutis $1\frac{1}{2}$ mm. longis, intus glabris, extus sursum glanduloso-punctatis. Stamina 8, biserialiter disposita, filamentis crassis, basi in anulum connatis, antheris globosis introrsis, utrinque emarginatis dorsifixis, connectivis antice inter loculos, loculis distinctis apice connatis. Ovarii rudimentum 0. Fl. ♀: sepala 5, imbricata, lanceolata, acuminata, $2\frac{1}{2}$ cm. longa, ovarium superantia, extus pubescentia intus glabra, inæqualia, intimo minuto. Ovarium globosum 3-loculare, (ovulis in loculis solitariis), pubescens, stylis distinctis, linearibus, indivisis, basi connatis, angulo 180° divaricatis intus papillosis, 5 mm. longis apice acuminatis descendente-recurvatis, utrinque pubescentibus.

HAB. Liukiu, leg. J. MATSUMURA, 1897; Kumeshima, leg. H. KURUIWA, 1898.

Near *A. trewioides* MUELL. ARG., but differs from it in having conspicuously serrated leaves. The leaves of the other species are mostly obscurely serrated.

Mallotus LOUR.

Mallotus formosanus HAYATA sp. nov. Rami fusco-purpurascentes, leviter longitudinaliter rugulosi, lenticellis minutis notati, ramulis gracilibus indumentis mollissimis rubro-albicantibus obtectis. Folia longe petiolata, late quinquangularia, divaricate tricuspidata, 7 cm. longa, 8 cm. lata, apice cuspidata, basi truncato-

acuta, marginibus utraque latere ad basin angulo 150° se divaricatis, interdum circ. angulo 180° , vel interdum angulo plus acuto divaricatis, vel basi cuneato-acuta, (folia novella rarius rhomboidea 1-cuspidata), cuspidibus centralibus longioribus $2\frac{1}{2}$ cm. longis, 2 cm. latis apice obtusis, cuspidibus lateralibus æquilongis, valde divaricatis, margine repandato-den'ata, prope basin sub-integra, distincte 3-nervia, nervis ad apicem cuspidum attingentibus angulo 40° a se divaricatis, venulis transversis reticulatis ad basin foliorum semicirculos concentricos ducentibus, supra fusco-purpurascencia, nervis venisque impressis, primum indumentis rubescentibus obtecta, demum subglabrata, ad insertionem petiolorum brevissime minute cordata 2-glandulosa, glandulis lentiformibus $1\frac{1}{2}$ mm. longis, subtus indumentis mollissimis densissimis fulvo-albicantibus densissime obtecta, indumentis pilis stellatis, nervis venisque elevatis, petiolis 4-5 cm. longis indumentis densissime obtectis. Flores paniculato-spicati, paniculis terminalibus vel rarius axillari-bus, gracillimis recurvatis, crassiuscule filiformibus, 14 cm.—15 cm. longis, pauci-vel multi-ramosis, ramis divaricatis, densissime stellato-tomentosis. Fl. ♂ : ad nodos plus minus tumidos spicarum glomerati, bracteis minutis cuspidatis rotundatis $\frac{2}{3}$ mm. longis, pedicellis 2 mm. longis supra basin articulatis. Perianthium 3-partitum, segmentis ovatis, $2\frac{1}{4}$ mm. longis, $1\frac{3}{4}$ mm. latis, obtusis extus stellato-tomentosis intus glabris. Stamina ∞ , circ. 2 mm. longa, antheris latissimis locellis divaricatis distinctis ascendentibus connectivis latissimis, filamentis distinctis vel basi plus minus connatis. Rudimentum ovarii 0. Fl. ♀ ignoti. Fructus ad paniculam spicatum profuse dispositi, depresso-globosi, $5\frac{1}{2}$ mm. in diametro, leviter 3-lobati, (apice plani, inermis), (latere rotundati echinati, echinis reflexis 1 mm. longis), mollissime tomentosi, trivalvatim dehiscentes, (valvis intus glabris), 3-spermi. Semina globosa

plus minus obliqua, nigricantia, nitida, $2\frac{1}{2}$ mm. in diametro.

HAB. in monte Kohoshō; Fukō, 1898, Mart.

Near *M. cochinchinensis*, but differs from it in having less echinate capsules, and much broader, tricuspidate, irregularly dentate leaves.

Mallotus paniculatus MUELL. ARG. in Linnæa XXXIV. p. 189, et in DC. Prodr. XV.-2, p. 965.

HAB. Tappansha, leg. S. NAGASAWA, Oct. 1905, (No. 713).

DISTRIB.

OBSERV. I think this is quite distinct from *M. cochinchinensis* LOUR. to which it is reduced by W. B. HEMSLEY in Ind. Fl. Sin. II. p. 439.

Excœcaria LINN.

Excœcaria crenulata WIGHT var. **formosana** HAYATA n. v.

Excœcaria crenulata HAYATA Rev. Euphorb. Bux. Jap. p. 60, (non WIGHT).

Rami validiusculi, rugosi, fusco-rubescetes, ramulis subgracilibus. Folia opposita, petiolata, oblongo-lanceolata, 10 cm. longa, 3 cm. lata, apice acuminata, (acuminibus 15 mm. longis), basi rotundato-acuta, remote et obscure crenulato-serrulata, crenis obtusis, venis primariis utrinque latere 12, a costa angulo 70° egressis, arcuatis, utraque pagine concoloria, membranaceo-coriacea. Flores minores spicati, spicis axillaribus, vel ad apicem ramulorum terminalibus, cylindraceis dense floriferis, circ. 1 cm. longis, pedunculis 5 mm. longis. Fl. ♂: ad partes superiores spicarum dense spirali-ter dispositi, sessiles basi 1-bracteati et 2-bracteolati, bracteis crassiusculis latissimis $1\frac{1}{2}$ mm. latis, $\frac{1}{2}$ mm. longis, breve cuspidatis utraque latere auriculato-glandulosis, bracteolis ad basin bractearum

et intra bracteam sitis, minutis, ovatis 1 mm. longis laciniatis. Calyx profunde 3-lobatus, lobis $\frac{1}{2}$ mm. longis laciniatis. Stamina 3, subsessilia; rudimentum ovarii 0. Fl. ♀: ad basin spicarum 1-2, sessiles basi 1-bracteati et 2-bracteati, bracteis et bracteolis ut fl. ♂. Calyx 3-partitus, segmentis cuspidatis laceratis 1 mm. longis. Rudimentum staminum 0. Ovarium ovoideum $1\frac{1}{2}$ mm. longum, stylo 3-partito, ramis supra sulcatis, $2\frac{1}{2}$ mm. longis recurvatis. Capsula depresso-globosa 5 mm. longa, 8 mm. lata. Semina subglobosa, 4 mm. lata, 5 mm. longa, lævia, eleganter reticulata.

Urticaceæ

Celtis LINN.

Celtis formosana HAYATA sp. nov.

Celtis philippinensis HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 369, (non BLANCO).

Rami fusco-rubescens lenticellis minutis dispersi, ramulis gracillimis. Folia alterna, petiolata, oblique ovata, 7 cm. longa, 33 mm. lata, apice cuspidata vel acuta, (cuspidibus obliquis), basi oblique rotundata, trinervia, venis supra leviter, subtus prominente, elevatis, venis primariis lateralibus utrinque 1-2, venis secundariis et venulis inconspicuis reticulatis, utrinque glabra, subtus subglauca, exsicato utrinque pallidiora, margine sursum obscure serrata, deorsum integra, vel integerrima, coriacea, petiolis 8 mm. longis. Flores ignoti. Fructus axillares solitarii, pedicellati, pedicellis gracilibus 1 cm. longis. Drupa succulenta ovoidea, 7 mm. longa.

HAB. Kōshūn: Naibun, leg. G. NAKAHARA, Feb. 1907; Shizangan, Kelung, et Pikaku, leg. T. MAKINO, 1896.

The present plant greatly differs from *C. philippinensis*.

In *C. philippinensis*, the leaves are quite entire, more coriaceous, less reticulate and much larger, while in the present plant they are thinly coriaceous, serrate towards the apex, and acuminate or almost caudate. Besides, the two are easily distinguishable by the general appearance. Our plant is near *C. australis* LINN. and *C. tetrandra*, ROXB., but differs from the former by the quite glabrous fruit and from the latter by the leaves, which are serrate only towards the apex.

Broussonetia VENT.

Broussonetia Kämpferi SIEB.; BUREAU in DC. Prodr. XVII. p. 226; KURZ in Journ. Bot. (1873), p. 193; FRANCH. et SAVAT. Enum. Pl. Jap. I. p. 433; FORBES et HEMSL. Ind. Fl. Sin. II. p. 455.

HAB. Randaizan, leg. T. KAWAKAMI et U. MORI, 1909, Mart. (No. 3716); Shinkō : Gatton, 1907, Mai. (No. 2824); Shintiku : Goshizan, leg. T. KAWAKAMI, 1906, Juni. (No. 5971).

DISTRIB. Japan.

Ficus LINN.

Ficus Konishii HAYATA sp. nov. Arbor, truncis 12 m. altis, $\frac{2}{3}$ m. in diametro, ramulis fusco-cenirascensibus longitudinaliter rugosis cicatricibus oblongis foliorum notatis. Folia alterna, petiolata, ovata, 15 cm. longa, $7\frac{1}{2}$ cm. lata, apice subito acuminata, (acuminibus linearibus vel angustis 15 mm. longis 4 mm. latis apice acutis), basi æqualia vel inæqualia rotundata, vel acuta, trinervia, additis 2-nervis basilaribus minoribus, nervis lateralibus a

nervo centrali angulo 40° egressis, (venis secundariis utraque latere 4-5, a costa angulo 60° egressis, arcuatis prope marginem anastomosantibus), utrinque glabrata vel subtus pubescentia, pallidiora margine subintegra vel remote repandata, petiolis longioribus 4 cm. longis, stipulis angustatis acutis 12 mm. longis 3 mm. latis caducissimis. Receptaculum ad truncos vel ramos aphyllis remote fasciculatim situm, pedunculatum, (pedunculis 4 cm. longis gracilibus vix hirsutis), depresso-pyriforme, ∞ -costatum, costis obscuris, extus papilloso-punctatum 12 mm. longum, 16 mm. latum, ore depresso-elevato circa orem bracteatum, (bracteis extus erectis vel clausis latissimis crassiusculis, intus ∞ -seriatis erectis vel ascendentibus, interiore gradatim pendulis angustioribus 2 mm. longis $\frac{3}{4}$ mm. latis apice truncatis), basi receptaculi 3-bracteatum, bracteis triangularibus 2 mm. longis 2 mm. latis obtusis. Fl. ♀: breve pedicellati vel sessiles. Perianthia 3-6-partita, segmentis linearibus vel spathulatis 1-1 $\frac{1}{2}$ mm. longis rubescentibus. Ovarium obovatum 1 mm. longum, obliquum, stipitatum, (stipitibus $\frac{1}{2}$ -1 mm. longis), vel subsessile, stylo laterali ascendente-erecto 1 mm. longo, stigmate cylindrico; bracteis inter flores linearibus 1 $\frac{1}{2}$ mm. longis.

HAB. Giranchō: Banseakō, leg. N. KONISHI, Aug. 1907, (No. 28).

Near *F. Harlandi* BENTH., but distinguishable from it by the ovate trinerved leaves; also near *F. laevis* BL. and *F. pomifera* WALL., but differs from both in the shape of the receptacles.

Ficus koshunensis HAYATA sp. nov. Ramuli validiusculi fuscentes hispido-tomentosi ad nodos lenticellati. Folia subopposita, vel alterna, petiolata, stipulata, lineari-lanceolata, vel lanceolata, 14 cm. longa, 3 cm. lata, apice acuta basi truncata, supra hispi-

dula, scaberrima, subtus hispido-tomentosa, pallidiora, trinervia, nervis basilaribus minoribus, vel pinninervia, venis primariis utrinque latere 7, a costa angulo 60° egressis, arcuatis prope marginem anastomosantibus, margine remote obscureque repandata, petiolis 1 cm. longis, stipulis longe triangularibus 12 mm. longis, basi 5 mm. latis, acuminatis, caducissimis extus pubescentibus. Receptaculum axillare solitarium pedunculatum, (pedunculis 1 cm. longis, pubescentibus), late pyriformi-globosum, $1\frac{1}{2}$ cm. longum, totiusque latum basi 1-seriatim bracteatum, (bracteis 3 rotundato-triangularibus, obtusis 3 mm. longis $3\frac{1}{2}$ mm. latis), apice rotundatum, ore ∞ -seriatim bracteatum, bracteis extus erectis vel clausis latissime triangularibus. Fl. ♀: pedicellati, vel sessiles, perianthia 4-6-partita, segmentis lanceolatis erectis ovarium includentibus $1\frac{1}{2}$ mm. longis rubro-nigricantibus. Ovarium semiorbiculare, stylo obliquo, stigmate truncato.

HAB. Kōshūn, leg. N. KONISHI, (No. 27).

Near *F. erecta* THUNB., but differs from it in having hairy leaves and not stipitate receptacles. Those of *F. erecta* are attenuate to the stalk at the base.

Ficus Kusanoi HAYATA sp. nov. Ramuli validiusculi rubro-cinerascentes longitudinaliter rugosi, cicatricibus oblongis remote notati. Folia alterna petiolata, oblongo-ovata, 12 cm. longa, $5\frac{1}{2}$ cm. lata, apice acuminata, basi rotundata vel truncata, utrinque viridia, scaberula, margine repandata, tri-nervia, venis primariis lateralibus utrinque 3-4, a costa angulo 40° egressis, petiolis 12 mm. longis, stipulis lanceolatis caducissimis. Receptacula 2-3 aggregata axillaria, breve pedicellata, (pedicellis 2-3 mm. longis), late globosa, 8 mm. longa, totiusque lata, facie papilloso-globoso-punctata, (oribus margine elevato-annularibus, extus bracteis brevibus latissimis

∞ -seriatis multo-annulatis), basi 3-bracteata, bracteis late triangularibus, $\frac{1}{2}$ mm. longis 1 mm. latis, caducissimis. Fl. $\text{\textcircled{f}}$; pedicellati vel sessiles, perianthia hyalina 5-6 partita, segmentis lineari-spathulatis, tenuissimis, apice ciliatis, $1\frac{1}{2}$ mm. longis. Achenia ellipsoidea $1\frac{1}{2}$ mm. longa, pericarpis crustaceis flavescens, stylis persistentibus lateralibus, stigmatibus cylindricis coccineis, bracteis inter flores paucis.

HAB. Kōtōshō, leg. S. KUSANO, 1909.

Ficus maruyamensis HAYATA sp. nov. Frutex 2 m. altus, ramis subglabris rubescentibus cicatricibus semiorbicularibus notatis, ramulis nigro-tomentosis, pilis patentibus. Folia alterna petiolata, stipulata, oblonga, 9 cm. longa, $4\frac{1}{2}$ cm. lata, apice oblique acuta, basi rotundato-cordata, vel rotundata, supra scaberula vel scaberrima pilis brevibus parce oblecta, ad costas dense pubescentia, subtus villosa vel breve tomentosa, venis subtus prominentibus, 3-nervia, nervis basilaribus et venis primariis lateralibus prope marginem ascendentibus anastomosantibus, venulis paullo vel valde prominentibus, petiolis $1\frac{1}{2}$ cm. longis, supra tomentososulecatis, stipulis longe triangularibus 12 mm. longis basi 5 mm. latis acutis caducissimis extus pubescentibus. Receptaculum fl. $\text{\textcircled{f}}$ ad axillas foliorum annotinorum solitarium, vel geminatum, pedunculatum, (pedunculis 1 cm. longis pubescentibus), pyriformi-globosum 1 cm. longum, extus hirsutum, (ore extus bracteis erectis vel clausis latissime ovatis $2\frac{1}{2}$ mm. latis $1\frac{1}{2}$ mm. longis, intus bracteis minoribus ∞ -seriatis angustioribus instructo), basi 3-bracteatum, bracteis late ovatis, $2\frac{1}{2}$ mm. longis $3\frac{1}{2}$ mm. latis, apice rotundatis. Fl. $\text{\textcircled{f}}$ breve stipitati, perianthia 3-4-5-partita, segmentis lanceolatis incurvis concavis, 1 mm. longis, $\frac{1}{2}$ mm. latis, rubescentibus, margine hyalinis. Ovarium orbiculare, complanatum, stylo oblique apice

recurvo Achænia semilunaria, $1\frac{3}{4}$ mm. longa, $1\frac{1}{2}$ mm. lata, pericarpis crustaceis flavescens glabris, stylis obliquis persistentibus. Semina achænio conformia, testa membranacea.

HAB. Maruyama, leg. T. KAWAKAMI et B. HAYATA, Juli. 1908.

Near *Ficus glandulifera* WALL., but quite distinguishable by the cordate base of the leaves.

Ficus obscura BLUME; FORBES et HEMSL. Ind. Fl. Sin. II. p. 464; MATSUM. et HAYATA Enum. Pl. Formos. p. 379.

HAB. Uraisha, leg. N. KONISHI, Sept. 1907, (No. 64).

Ficus rapiformis ROXB. "Fl. Ind. III. p. 551"; WIGHT Ic. Pl. Ind. Or. t. 637.

HAB. Kōtōshō, leg. T. KAWAKAMI et U. MORI, 1907, Aprili. (No. 2470).

DISTRIB.

Compared with a specimen so labelled at Kew. The species is reduced to *F. leucantoma* POIR. by some authors.

Ficus taiwaniana HAYATA sp. nov. Ramuli glabri, graciles, fusco-cinerascentes, cortice nudo demum soluto. Folia alterna, petiolata, stipulata, obovato-rhomboidea, 8 cm. longa, $3\frac{1}{2}$ cm. lata, apice cuspidato-acuminata, basi cuneato-acuta, leviter obliqua, utrinque glabra, subtus pallidissima, venis primariis utrinque latere 5-6, a costa angulo 40° egressis, prope marginem arcuatis anastomosantibus, margine sursum grosse 2-3-dentata, dentibus obtusis, deorsum integra, vel omnia integra, petiolis 8 mm. longis, stipulis lanceolatis 3 mm. longis. Receptaculum ad axillas foliorum superiorum solitarium, pedunculatum, (pedunculis $\frac{1}{2}$ -1 cm. longis, pyriformi-ovoideum 12 mm. longum 8 mm. latum, apice acutum

infra apicem contractum, basi abrupte angustatum ad stipitem 2 mm. longum attenuatum, basi 3-bracteatum, (bracteis triangularibus $1\frac{1}{2}$ mm. longis, margine ciliolatis), ore ∞ -seriatim bracteatum, bracteis 3-meris, triangularibus extus erectis vel clausis intus horizontaliter patentibus vel pendulis, triangularibus, margine ciliolatis. Fl. ♀: longe pedicellati, pedicellis $1\frac{1}{2}$ mm. longis, perianthia 4-6-partita, segmentis ovatis $\frac{1}{3}$ mm. longis rubro-punctatis. Fl. ♂: stamina 2 segmento æquilonga vel longiora, antheris parallelis distinctis, connectivis apiculatis. Flores (gall.) maturi sessiles, segmenta 4-6 patentia. Ovarium longe stipitatum, stipite $1\frac{1}{2}$ mm. longo, stylo laterali; bracteis inter flores paucis vel 0.

HAB. Taikō, leg. T. KAWAKAMI et U. MORI, Aug. 1908, (No. 12).

Near *F. formosana* MAXIM., from which the present plant differs in having pyriformed smaller fruit, and leaves with large teeth towards the apex; also near *F. clavata* WALL. (KING, t. 111) from which this differs in having glabrous receptacle. It bears also some resemblance to *F. pyriformis* H. et A. There are very many different forms of the same fig from China and India at Kew; but none is the same as the Formosan plant.

Artocarpus FORST.

Artocarpus incisa LINN. f.

HAB. Kihōsha et Kwarenko, leg. K. MIYAKE, 1899. Found in cultivation.

Laportea GAUDICH.

Laportea subglabra HAYATA sp. nov. Frutex. Rami validiusculi, albo-cinerascentes, subglabri, cicatricibus semilunaribus

remote notati. Folia decidua, alterna, petiolata, stipulata, oblonga vel obovata, 15 cm. longa, 9 cm. lata, apice breve abrupteque acuta, basi rotundata, ima basi pauce cordata, supra scabriuscula, ad venas pubescentia, subtus pubescentia vel subglabra, venis primariis utrinque 10 a costa angulo 50° egressis, membranaceo-crassiuscula, petiolis 6 cm. longis dense pubescentibus, stipulis caducissimis late triangularibus 1 cm. longis, basi 12 mm. latis, apice 2-dentatis, dorso 2-alato-costatis, extus pubescentibus. Flores paniculati, paniculis ad axillas foliorum superiorum ramulorum dispositis patentibus. Paniculae solitariae ad axillas cernuae, 5 cm. longae, romosae, ramis et ramulis rectangulariter divaricatis, ad ramificationem bracteatis, bracteis triangularibus. Fl. ♀ ad apicem dilatatum complanatum ramulorum panicularum 4-5-congesti sessiles, sub singulo flore 2-bracteolati, bracteolis minutis subulatis. Perianthii segmenta 4 strigosa, valde inaequalia, exterioribus minoribus, interioribus majoribus ovatis $\frac{1}{2}$ mm. longis. Ovarium obliquum, stigmate lineari, elongato, uno latere hirtello, reflexo. Achænia obliqua plano-compressa, orbicularia 2 mm. in diametro, breve stipitata vel subsessilia, perianthio membranaceo immutato; pericarpium carnosulum subglabrum; semina conformia, testa membranacea.

HAB. Hokkōkei, leg. C. OWATARI, Jan. 1898.

Near *L. pterostigma* HANCE, from which the present plant differs in having oblong or obovate leaves which are much smaller and nearly glabrous. In *L. pterostigma*, the leaves are much longer, shortly villose beneath, ovate, (broadest at the basal portion), and obscurely toothed. Also near *L. crenulata* GAUD., but differs from it by the leaves with primary lateral veins which spread out in an acuter angle.

Pilea LINDL.

Pilea anisophylla WEDD.; FORBES et HEMSL. Ind. Fl. Sin. II. p. 475.

HAB. Bankingsing, (A. HENRY.)

Pilea petiolaris BLUME.

HAB. Shintiku, Goshizan, leg. T. KAWAKAMI, 1905, Dec. (No. 1298).

Compared with a specimen so labelled at Kew.

Pellionia GAUDICH.

Pellionia radicans WEDD. in DC. Prodr. XVI.-1, p. 167 ; ?
FORBES et HEMSL. Ind. Fl. Sin. II. p. 481; MATSUM. et HAYATA Enum.
Pl. Formos. p. 384.

HAB. Nantō, Suisha, leg. T. KAWAKAMI et U. MORI, 1908, Mart.
(No. 3538) ; Shintiku : Goshizan, leg. T. KAWAKAMI et U. MORI, 1908,
Jan. (No. 5112).

Pellionia trilobulata HAYATA sp. nov. Herba, gracilis, tenuis,
procumbens, ad nodos radicans, glabra. Folia alterna, petiolata,
oblique rectangulo-obovata, 9 mm. longa, 5 mm. lata, apice rotun-
data, 3-lobulata, basi valde obliqua, latere inferiore latiore truncata,
latere superiore angustato-acuta, venis primariis lateralibus utrinque
2-3, margine præter apicem integra, supra pilis brevibus adpresse
obtectis, subtus pallidissima glabra, petiolis 1 mm. longis, basi 1-
squamatis, squamis oppositifoliis lanceolatis 1½ mm. longis. Fl. ♂ capi-
tati, capitulis ad axillas foliorum solitariis, pedunculatis, pedunculis
folio æquilongis. Capitula 5-6 florata, ∞ - bracteata, bracteis ovatis

2½ mm. longis 1½ mm. latis apice ciliatis. Flores ad receptaculum sessiles vel brevissime pedicellati, infra perianthium articulati. Perianthium 4-partitum, segmentis obovatis, hyalinis apice viride coloratis infra apicem calloso-apiculatis, 2 mm. longis, 1 mm. latis. Stamina 4, segmentis perianthii opposita, filamentis expansis, (in alabastro inflexis), antheris albis oblongis 1 mm. longis. Rudimentum ovarii 0.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908.

Very near *Pellionia radicans*, from which the present plant is distinguishable by obovate leaves with a nearly truncate and 3-lobulate apex.

Bœhmeria JACQ.

Bœhmeria spicata THUNB. var. ***duploserrata*** C. H. WRIGHT in FORBES et HEMSL. Ind. Fl. Sin. II. p. 488.

HAB. Nantō : Nankōkei, leg. T. KAWAKAMI et U. MORI, (No. 3389), 1908, Juli.

DISTRIB. Chekiang.

Bœhmeria formosana HAYATA sp. nov. Caules graciles tetragoni in sectione, (angulis obtusis), sulcati, glabri, fuscentes. Folia opposita vel subalterna, petiolata, stipulata, oblongo-ovata, 9 cm. longa, 4½ cm. lata, apice acuta, vel acuminata, basi obtusa vel rotundata, trinervia, utrinque scaberula, venulis reticulatis impressis, margine serrata, (serris acutis ascendentibus), ima basi integra, petiolis gracilibus 2-3 cm. longis, stipulis acuminatis 1-nerviis 6 mm. longis, basi 1½ mm. latis. Spicæ monœciæ, axillares, solitariæ, 8-9 cm. longæ, sursum flores masculinos deorsum flores fœmineos gerentes, floribus ad nodos rhachis spicæ glomerulatis. Fl.

♀ : perianthium ventricosum 1 mm. longum, apice hirsutum 4-5 dentatum, ovarium includens. Ovarium biconvexum ovatum, stigmate elongato-filiformi unilaterali piloso spiraliter recurvo. Fl. ♂ : perianthium 4-partitum, segmentis ovatis apiculatis. Stamina 4, in alabastro inflexa. Achænia perianthio accrescente 2-costato inclusa biconvexa.

HAB. Taitō : Hakuhakusha, leg. T. KAWAKAMI et Z. KOBAYASHI, Mai. 1906, (No. 1472, b.); Shiringai, leg. G. NAKAHARA, Juni. 1905, (No. 68).

Near *Bæhmeria diffusa* WEDD., but differs from it in the glabrous leaves with shorter petioles, and in the flowers.

Chamabaina WIGHT.

Chamabaina Morii HAYATA sp. nov. Herba procumbens, ad nodos radicans, (internodiis 3 cm. longis), caulibus rubescentibus, hispidulis, subgracilibus. Folia opposita, petiolata, stipulata, ovato-rhomboidea, 1 cm. longa, 8 mm. lata, apice acuta, basi abrupte in petiolum attenuata, margine serrata basi integra, supra scabra, pilis longiusculis parce oblecta, subtus ad venas hirtella, petiolis 2-3 mm. longis, stipulis semioblongis $2\frac{1}{2}$ mm. longis $1\frac{1}{2}$ mm. latis scariosis. Fl. ♀ : Flores axillares ∞ - conferti, sessiles minuti, bracteis scariosis tenuibus obovatis, rotundatis, $\frac{1}{2}$ mm. longis, bracteolis lanceolatis $\frac{1}{2}$ mm. longis. Perianthium tubulosum ovarium includens, apice et facie ciliolatum, obscure lobatum. Ovarium obovoideum cum stylo $\frac{1}{2}$ mm. longum, stylo breve, stigmate oblongo dilatato barbato-penicillato.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7101).

Near *C. cuspidata* WEDD., but differs from it by the much smaller leaves with fewer teeth.

Pouzolzia GANDICH.

Pouzolzia elegans WEDD.; FORBES et HEMSL. Ind. Fl. Sin. II. p. 489; MATSUM. et HAYATA Enum. Pl. Formos. p. 388.

HAB. Mamukutsu, leg. T. KAWAKAMI et Z. KOBAYASHI, Aug. 1908, (No. 5593); Sensuizan, Suiteiryō, (No. 1212).

Juglandeæ

Juglans LINN.

Juglans formosana HAYATA sp. nov. Ramuli fulvescentes brevissime pubescentes, lenticellis angustissimis rubescentibus dispersi. Folia majuscula pinnata, 40 cm. longa, 18 cm. lata, oblonga in ambitu, pinnis lateralibus 7-8-jugis, jugis $3\frac{1}{2}$ cm. a se remotis, petiolis 12 cm. longis, pinna terminali rhomboidea, minima, pinnis mediocribus maximis, inferioribus plus minus minoribus (pinnis mediocribus ellipticis 9 cm. longis 3 cm. latis apice cuspidatis basi rotundatis plus minus obliquis latere superiore rotundato-acutis inferiore plus minus cordatis margine minute serrulatis apice obtusis supra parce stellato-pilosis costis et venis tenuibus, subtus glaucis ad costas et venas dense, ad paginam densiuscule, stellato-tomentosis, costis et venis prominentibus, venis lateralibus utraque latere circ. 20, a costa angulo 70° egressis, sessilibus), petiolis 13 cm. longis cum rachibus plus minus sulcatis, pubescentibus. Flores ignoti. Endocarpium lignosum, apiculatum 37 mm. longum 3 cm. latum dorso 3-striatum, inter strias profunde foveolato-rugulosum.

HAB. Taitō : Daironkōsha, leg. T. KAWAKAMI et U. MORI, 1906, Nov. (No. 2168).

Near *J. cordiformis* MAXIM. and *J. Sieboldiana* MAXIM., but differs from the former in having more minutely serrulated leaflets, and from the latter in the serration of the leaflets which are nearly rotundate, but not cordate, at the base.

Platycarya JUCC.

Platycarya strobilacea S. et Z. var. **Kawakamii** HAYATA v. n. Rami fusco-purpurascetes, longitudinaliter rugulosi, lenticellis minutis dispersi, cicatricibus foliorum majusculis late rotundatis, ramulis fusco-fulvis apice parcissime pilosis vel glabratis. Folia versus apicem ramorum alternatim approximativè disposita, pinnata, oblongo-obovata, vel oblonga in ambitu, 30 cm. longa, 12 cm. lata, pinnis utraque latere 8-12, oppositis, jugis 2-2½ cm. a se remotis pinna terminali iis lateralibus æquante, oblongo-lanceolata, 6 cm. longa, 2 cm. lata, apice acuminata, basi sessili, rotundata, vel leviter cordato-rotundata, margine serrulata, serrulis ascendentibus irregularibus. supra glabra ad costas tenuissime elevatas parce pubescente, subtus ad costas prominentes tomentoso-pilosa, venis lateralibus distincte elevatis tenuibus utraque latere circ. 15 subrectis a costa angulo 60° divaricatis, interdum furcatis, ad apicem serrularum attingentibus, ad paginam subtus sub lente glandulis minutis punctiformibus dispersa, punctis flavis, pinnis inferioribus minoribus, infimis minis, (pinnas mediocres ⅓-plo æquantibus), 2 cm. longis, petiolis 4 cm. longis cum rhachibus brevissime pubescentibus basi leviter dilatatis incrassatis. Alabastrum foliorum acuto-globosum 5 mm. longum, perulis late triangularibus, dorso costatis apiculatis margine ciliolatis. Strobili terminales, oblongo-

cylindrici, 3 cm. longi, 11 mm. lati, brevissime stipitati, stipitibus 5 mm. longis, bracteis cuspidato-ovatis nucem superantibus valde imbricatis cuspidato-ovatis vel oblongis $5\frac{1}{2}$ mm. longis $2\frac{1}{2}$ mm. latis castaneis glabris margine ciliolatis incurvis. Noces coroniformes, complanatae apice emarginato-mucronatae, vel obcordatae, basi plus minus contractae, 4 mm. longae, cum alis $4\frac{1}{2}$ mm. latae, utrinque alatae, medio angulo prominente instructae.

HAB. Formosa, in Montibus Centralibus, leg. T. KAWAKAMI.

Differs from the type in having much smaller leaflets, and narrower cones with a little broader bracts.

Myricaceæ.

Myrica LINN.

Myrica adenophora HANCE var. ***Kusanoi*** HAYATA sp. nov. Rami fusco-cinerascentes, longitudinaliter reticulato-rugosi, ramulis fuscis breve pubescentibus. Folia alterna subsessilia vel breve petiolata, tenuiter coriacea, obovato-oblonga 25-24 mm. longa 10-16 mm. lata, apice obtusa rotundata, vel emarginata cum mucronibus, basi cuneata, margine leviter revoluta, remote 2-3-mucronato-serrulata, supra glabra subtus subglabrata, vel minute glanduloso-punctata, punctis flavis, costis et venis utraque pagine prominulis, venis primariis utraque latere 4, a costa angulo 70° egressis, rectis prope marginem subito arcuatis anastomosantibus venis secundariis indistinctis, venulis reticulatis, petiolis brevibus 2 mm. longis. Flores spicati, spicis ad axillas foliorum superiorum. Spicæ $\hat{\sigma}$ 15 mm. longae ascendentes vel nutantes, simplices vel interdum breve paniculato-ramosae, ramis 3 mm. longis vel brevioribus. Fl. $\hat{\sigma}$: sessiles, basi 1-bracteati, bracteis obtriangularibus 1 mm. longis $1\frac{1}{3}$ mm. latis truncatis

mucronatis margine ciliolatis. Stamina 2-4, filamentis brevibus $\frac{1}{2}$ mm. longis, antheris circ. globosis 1 mm. longis $\frac{3}{4}$ mm. latis rubro-cristato-punctatis. Spicæ ♀ : 12 mm. longæ, pubescentes, erectæ vel patentes, interdum breve paniculato-ramosæ, floribus 2-3 ad ramos approximate spicatim sitis. Fl. ♀ : supra bracteam solitarii vel 2-3 siti, bracteis late triangularibus 1 mm. longis extus glanduloso-punctatis margine ciliolatis; perianthium 3-partitum, segmentis exterioribus 2 minoribus late rotundatis ciliolatis, segmento interiore et antico majore rotundato ciliolato; glandulis minutis 3-4 ad basin ovarii sitis : ovarium extus papilloso-tuberculatum, stylo 2-partito, ramis complanatis apice acuminatis leviter plumosis. Drupa ellipsoidea 7 mm. longa, 5 mm. lata, extus ceraceo-lamellato-papillosa, lamellis carnosis obovoideis 1 mm. longis, totiusque latis apice mucronatis, endocarpio duro.

HAB. Rikushizan, Chōzan, leg. S. KUSANO, Jan. 1909.

Very like *M. adenophora* HANCE in Journ. Bot. (1883), p. 357, but quite distinguishable by the number of stamen which is usually 2-4, and by the leaves with fewer veinlets.

Cupuliferæ.

Fagus LINN.

Fagus Hayatæ PALIB. sp. nov.

Fagus sp. var. HAYATA Fl. Mont. Formos. in Journ. Coll. Sc. Imp. Univ. Tōkyō, XXV. Art.-19, p. 206.

Arbor (excelsa); folia adulta longepetiolata, elliptica basi plus minus cuneata, apice longe attenuata, margine supra medium breviter dentata vix undulata, utrinque fere glabra, lucida; nervo medio prominulo, nervis secundariis (11-12) curvatis divergentibus in sinus

dentes obsoletos v. distinctos attingentibus. Flores et fructus ignoti sunt.

HAB. Kuschaku: Sōtēzan, ad 5600 ped. alt., N. KONISHI, Feb. 1906, (spec. steril.).

The description above given was sent to me by M. J. PALIBIN for publication. The nearest kin of this plant is *Fagus japonica* MAXIM.

Quercus LINN.

Quercus amygdalifolia SKAN in FORBES et HEMSL. Ind. Fl. Sin. II. p. 506; MATSUM. et HAYATA Enum. Pl. Formos. p. 393.

HAB. Nantō: Mushazan, ad 6000 ped., leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1194).

OBSERV. Rami glabri nigricantes, ramulis fusco-tomentosis validiusculis. Folia alterna, petiolata, lanceolata, 13 cm. longa, 28 mm. lata, acuminata, ad summum obtusa, basi acuta, integra, supra glabra, subtus adpresse tenuiter pubescentia, costis et venis supra planis leviter tomentellatis vel subglabris subtus prominentibus, venis primariis utraque 8 arcuatis prope marginem evanescentibus, venis secundariis tenuiter transversis, petiolis 18 mm. longis supra planis, stipulis caducissimis lanceolatis 1 cm. longis. Spicæ 1-2, ad apicem ramorum terminalium incrassatorum aphyllorum terminales, circ. 10 cm. longæ, erectæ incrassatæ, floribus dense spiraliter dispositis, partibus superioribus floribus ♂, inferioribus floribus ♀. Fl. ♂: 7-8-aggregati, bracteati, bracteis triangularibus; perianthium 6-partitum, segmentis ovatis tomentosis 1½ mm. longis. Stamina circ. 12, exserta, filamentis 2½ mm. longis, antheris cordatis, connectivis breve apiculatis. Rudimentum ovarii 3-4-lobulatum breve tomentosum. Fl. ♀: 5-6-aggregati; bracteis ∞-seriatis valde imbricatis, perianthium 6-partitum, segmentis ovatis ovario fere adnatis, stylo tripartito.

Quercus brevicaudata SKAN in FORBES et HEMSL. Ind. Fl. Sin. II. p. 508.

HAB. Shinkō : Agyokuzan, leg. T. KAWAKAMI et K. HINO, Dec. 1905, (No. 5776) ; Uraisha, leg. N. KONISHI, Feb. 1907, (No. 24, Fr.) ; ibidem. Mai. 1906, (Fl. ♂) ; Raga : leg. N. KONISHI, Dec. 1908, (Fr.).

OBSERV. Rami nigricantes validiusculi, cicatricibus longitudinaliter notati, ramulis nigricantibus vel fusco-nigricantibus, 5-angulatis, angulis obtusis, facie sulcatis, validiusculis. Alabastrum foliorum 5-gonum pyramidale, 1 cm. longum, perulis caducissimis acutis. Folia alterna petiolata, elliptica 9-15 cm. longa, $3\frac{1}{2}$ - $5\frac{1}{2}$ cm. lata, apice cuspidato-acuminata, (cuspidibus $1\frac{1}{2}$ cm. longis 3 mm. latis apice obtusis), basi rotundata, vel acuta, vix obliqua, margine integerima, utrinque glabra, supra nitida, subtus pallidiora, costis supra sulcatis, subtus elevatis, venis primariis lateralibus supra planis subtus tenuiter elevatis untrunque 10 a costa angulo 50° egressis, prope marginem arcuatis evanescentibus, venis secundariis et venulis reticulatis, valde coriacea, petiolis $2\frac{1}{2}$ - $4\frac{1}{2}$ cm. longis supra sulcatis basi incrassatis. Spicæ florum masculinorum ad axillas foliorum summorum 5 cm. longæ graciles subnutantes. Fl. ♂ : perianthium irregulariter 6-partitum, segmentis obovatis $\frac{1}{2}$ mm. longis extus barbatis ; stamina circ. 12, filamentis exsertis $2\frac{1}{2}$ mm. longis, antheris orbicularibus, utrinque emarginatis. Rudimentum ovarii obovoideum $\frac{3}{8}$ mm. longum, obscure 3 lobatum apice barbatum. Fructus ad rachin validam spicatum dispositi. Cupula matura patelliformis 4 mm. longa, 17 mm. in diametro, (partibus marginalibus 3 mm. latis, partibus centralibus elevatis planis 1 cm. in diametro), intus extusque tenuiter depresso-pubescentibus, extus squamis 7-seriatim dispositis adnatis triangularibus cuspidato-acutis $1\frac{1}{2}$ mm. longis. Glans late turbinato-globosa, 2 cm. longa, 22 mm. lata, apice brevissime acuta,

apiculata, basi truncata, cicatricibus parvis, glandem in diametro $\frac{1}{2}$ -plo æquantibus profunde depressis planis, castanea.

Quercus Calresii HEMSL. in HOOK. Ic. Pl. t. 2591; FORBES et HEMSL. Ind. Fl. Sin. II. p. 509.

HAB. Taiko, leg. T. KAWAKAMI et B. HAYATA, 1908, Aug. (No. 46).

DISTRIB. Fokien.

Exactly agrees with the figure above cited, excepting that this plant (Formosan) has a quite sessile fruit, while the other (Chinese) has always short stalked one.

Quercus Championi BENTH. Fl. Hongk. p. 321; DC. Prodr. XVI. -2, p. 94; FORBES et HEMSL. Ind. Fl. Sin. II. p. 509; MATSUM. et HAYATA Enum. Pl. Formos. p. 393.

HAB. Kōshūn : Hieranzan, leg. S. KUSANO, Jan. 1909.

DISTRIB. Hongkong.

OBSERV. Rami adpresse fusco-pubescentes, cinerascetes, ramulis angulatis facie sulcatis. Folia alterna, petiolata, ad nodos approximate disposita, valde coriacea, oblongo-obovata $6\frac{1}{2}$ cm. longa, $2\frac{1}{2}$ cm. lata, apice obtusa basi gradatim attenuata, margine integerrima, leviter revoluta, supra nitida, subtus dense brevissime pilis stellatis indumentis oblecta, costis et venis supra impressis, subtus prominentibus, venis primariis utrinque latere 8 a costa angulo 50° egressis rectis prope marginem arcuatis evanescentibus, venis secundariis et venulis indistinctis, petiolis 12 mm. longis adpresso-pilosis supra sulcatis, (folia novella utraque pagine dense adpresse pilis stellatis fusco-flavescentibus oblecta), stipulis lineari-filiformibus 8 mm. longis. Spicæ ad axillas foliorum summorum approximatorum dispositæ, erecto-nutantes, spicibus florum masculinorum inferioribus, femineorum superioribus. Fl. ♂ : sessiles 1-bracteati, bracteis

triangularibus pilis fusco-flavescentibus dense obtectis $\frac{1}{2}$ mm. longis. Perianthium cupuliforme, 3 mm. in diametro, subplanum obscure tenuiterque 5-6-lobatum, pilosum extus fusco-flavescens. Stamina 12, subsessilia vel filamentis brevibus, antheris globosis pilis stellatis dense obtectis. Redimentum ovarii O. Fl. ♀ : 1-bracteati ; perianthium 6-partitum, segmentis 2-seriatim dispositis, extus pilosis ; stylus 3-partitus, ramis brevibus, stigmatibus capitellatis interiore tenuiter 2-lobulatis. Cupula late obconica campanulata, 22 mm. longa, ore 28 mm. in diametro truncato, basi rotundata, extus dense sericeo-villosa, fusca, 10-annulata, annulis prominentibus subglabratibus, inter annulos sericeo-floccoso-tomentosa, intus ferrugineo-fuscente dense sericeo-tomentosa, pilis rectis patentibus. Glans cupula semi-involucrata, obovata, oblonga, vel longe globosa, 23 mm. longa, 18 mm. lata, apice breve apiculata, basi rotundata, vel leviter contracta, primum sericeo-tomentosa, demum glabrata, castanea, cicatricibus planis vel leviter convexis glandem $\frac{2}{3}$ -plo in diametro æquantibus leviter rugosis prope marginem minute 13-cicatricosis.

The present plant is near *Q. pachyloma* O. SEEM. in the shape of the cone and cupule. The cupule of this plant is far larger than that of the other species. The former differs from the latter in having oblong, obtuse, and entire leaves. The leaves of *Q. pachyloma* are acute and dentate at the apex. I suspect if HENRY'S No. 1367 mentioned in Ind. Fl. Sin. II. p. 519, under the name of *Q. pachyloma* SEEM. may not be this species.

Quercus Ilex LINN. var. **spinosa** FRANCHET in "Journ. de Botanique, (1899), p. 152" ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 516.

HAB. in Montibus Centralibus, ad 11000 ped. alt., leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 1857).

DISTRIB. Hupeh, Shensi, Kansuh., Szechuen.

Quercus impressivena HAYATA sp. nov. Rami nigricantes, lenticellis minutis notati, cicatricibus foliorum elevato-depressis, ramulis 5-gonis, angulis obtusis, faciesulcatis, basi perulis persistentibus triangularibus ∞ -seriatis instructis. Folia alterna petiolata stipulata oblongo-lanceolata 11 cm. longa 42 mm. lata apice acuminata, (acuminibus angustis 15 mm. longis 3 mm. latis apice obtusis), basi acuta cuneata vel rotundata supra venis impressis subtus prominentibus, primariis utrinque latere 10, a costa angulo 70° egressis prope marginem arcuatis evanescentibus, venis secundariis et venulis tenuissimis reticulatis, costis subtus valde elevatis, utrinque glabra coriacea, petiolis 2 cm. longis basi calloso-incrassatis. Spicæ terminales geminæ, validiusculæ, breve villosæ, 14 cm. longæ, laxifloratæ, floribus ♀ geminatis ternatis vel solitariis. Fl. ♀ : sessiles, bracteis ∞ -seriatis involucrati, bracteis triangularibus pubescentibus, stylo 3-partito, ramis vix recurvis.

HAB. Hokkōkei, leg. C. OWATARI, Jan. 1898.

Near *Quercus Henryi* SEEM., but differs from it by the sessile, female flowers, and smaller leaves.

Quercus lepidocarpa HAYATA sp. nov. Ramuli validiusculi fusco-cinerascentes lenticellati angulati, (angulis obtusis), facie sulcati. Alabastrum foliorum oblongum vel globosum acutum fusco-castaneum, perulis triangularibus. Folia alterna petiolata obovato-oblonga 18 cm. longa $6\frac{1}{2}$ cm. lata apice breve cuspidata, (cuspidibus plerumque 1 cm. longis apice obtusis), basi rotundato-acuta margine sursum obtuse dentata deorsum integra utrinque glabra, costis supra basi sulcatis subtus prominente elevatis, venis supra impressis subtus prominentibus, venis primariis utrinque latere circ. 10 a costa angulo 70° egressis arcuatis prope marginem gracilibus anastomosantibus, venis secundariis tenuissimis oblique transversis, venulis utrinque reticulatis, petiolis $1\frac{1}{2}$ cm. longis supra sulcatis basi calloso-

incrassatis. Involucrum fructiferum truncato-globosum solitarium vel 2-3-connatum $2\frac{1}{2}$ cm. in diametro glandem perfecte includens apice truncatum basi breve attenuatum intus glabrum extus bracteis accrescentibus spiraliter dense instructum, bracteis tuberculiformibus triangularibus adnatis inferioribus latioribus superioribus gradatim angustioribus minoribus falcatis acutis extus margine carinato-elevatis intus profunde depressis vel sulcatis. Glans late globosa $1\frac{1}{2}$ cm. in diametro, apice truncato-depressa, medio apiculata, (stylo brevi persistente), basi rotundata, involuero perfecte inclusa, endocarpio confluens.

HAB. Taitō : Inikufukusha, leg. T. KAWAKAMI et U. MORI, Dec. 1906, (No. 2164).

Near *Quercus confragosa* (KING. t. 71), from which the present plant differs in having acute scales of the involucre and the obscurely dentate leaves. This is still nearer *Q. cleistocarpa* SEEMEN, from which it is distinguishable by the much larger leaves which are obscurely dentate towards the apex, and by the much more prominent scales of the cones.

Quercus longinux HAYATA sp. nov. Rami et ramuli graciles fusco-nigricantes lenticellis minutis notati. Folia alterna ad nodos approximate disposita petiolata oblongo-lanceolata 8 cm. longa 16 mm. lata apice acuminata, (acuminibus 2 cm. longis), basi acutis margine a medio deorsum integra, sursum (præter acumina) tenuiter serrata, (serris acutis aristatis), tenuiter coriacea, costis supra planis sulcatis, costis et venis subtus prominentibus, venis primariis utrinque latere 7-8 tenuissimis prope marginem evanescentibus vel ad apicem serrarum attingentibus, supra nitida subtus glauca, petiolis 1 cm. longis supra sulcatis basi calloso-incrassatis. Cupula late semigloboso-campanulata, glandem in longitudine usque ad $\frac{1}{4}$ inclu-

dens. Glans ellipsoidea 16 mm. longa 9 mm. lata apice acuta basi rotundata usque ad $\frac{1}{4}$ in longitudine a cupula involucreta, cicatricibus minoribus 4 mm. in diametro.

HAB. Shinkō : Uraisha, leg. T. KAWAKAMI et U. MORI, Juli. 1906, (No. 1384).

Near *Q. myrsinæfolia*, but differs in having much longer glans and much narrower leaves. Cupules are wanting in this specimen and the description here given is not satisfactory.

Quercus Morii HAYATA sp. nov. Rami ramulique validiusculi cineraceo-nigricantes longitudinaliter rugosi lenticellis minutis fuscis oblongis parce dispersi. Alabastrum foliorum oblongum 5-gonum, perulis ∞ -seriatim imbricatis rotundato-triangularibus. Folia alterna petiolata oblonga $8\frac{1}{2}$ cm. longa 4 cm. lata apice acuta vel breve acuminata basi rotundata sursum gradatim serrata, (serris breve mucronatis), utraque glabra, costis et venis supra sulcatis, venulis reticulatis sensim depressis, subtus costis elevatis venis planis, venis primariis utrinque latere 13 rectis a costa angulo 50° egressis ad apicem serrularum attingentibus, petiolis 18 mm. longis. Fructus ad rachin validiusculam dispositi. Cupula fructifera præmatura glandem subincludens turbinata 1 cm. longa 13 mm. lata extus sericeo-tomentosa (pilis brevibus fuscis) 8-annulata intus sericeo-tomentosa, pilis longioribus fuscentibus. Glans præmatura globosa, apice contracta apiculata, cicatricibus parvis glandem $\frac{1}{2}$ -plo in diametro æquantibus.

HAB. in monte Morrison, ad 6500 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2192).

Somewhat like *Q. acuta* THUNB., in its cupules and leaf-buds, but differs from it by the leaves which are rounded at the base, and impressively veined.

Quercus nantcensis HAYATA sp. nov. Rami fusco-purpurascen-

tes subglabrati, lenticellis prominentibus notati ramuli complanati prominente angulati. Folia tenuiter coriacea lanceolata 16 cm. longa $3\frac{1}{2}$ cm. lata apice acuminato-cuspidata, (cuspidibus subfalcato-recurvatis linearibus 3-4 cm. longis 2-3 mm. latis), basi cuneato-attenuata in petiolum 1-2 cm. longum abeuntia, margine undulato-revoluta vel integra supra glabra exsiccato fulvo-pallida glaberrima, costis prominentibus basin complanatis, venis rectis tenuissimis planis, venulis minute reticulatis, subtus sub lente tenuissime denseque adpresse-glaucopubescentia demum subglabrata, sub microscopio inter reticula minute pubescentia, costis subtus planis venis et venulis primum inconspicuis demum distincte reticulatis, petiolis 1-2 cm. longis complanatis subalatis, alis angustissimis. Spicæ floris ♂ ad axillas foliorum superiorum solitariae vel ad apicem ramorum approximate dispositæ erecto-recurvatæ 6 cm. longæ. Fl. ♂ sessiles secus rhachin 2-3-aggregati. Perianthium 6-fidum, extus dense pubescens, segmentis ovatis crassiusculis intus glabris 1 mm. longis. Stamina circ. 10, longe exserta 2 mm. longa, filamentis filiformibus basi perianthii affixis, antheris late globosis apice rubro-apiculatis basi cordatis. Spicæ ♀ ut ♂. Fl. ♀: subsessiles, secus rhachin 3-glomerati, perianthiis basi connatis, in stipitem incrassatum 1 mm. longum confluentibus. Ovarium conico-globosum segmentis ovatis perianthii involucreto apice villosum, stylis 3 distinctis glabris $\frac{2}{3}$ mm. longis digitiformibus.

HAB. Nantō: Hinokiyama, leg. T. KAWAKAMI et U. MORI, 1907, Juli. (No. 3399); Nantō: Shizōsan, 1906, (No. 1157).

Somewhat resembles *Q. amygdalifolia* SKAN, but differs from it in having leaves with very faint primary veins which are slightly curved towards the apex, and with a midrib elevated on the upper surface, and also in having very much slender spikes of male flowers.

Quercus pseudo-myrsinæfolia HAYATA sp. nov. Rami ramulique nigricantes, lenticellis minutis parce notati. Alabastrum foliorum oblongum 5-gonum acutum 4 mm. longum, perulis ∞ -seriatis triangularibus obtusis minutis. Folia alterna petiolata coriacea oblongo-lanceolata 8 cm. longa 2 cm. lata apice longe acuminata, (acuminibus 13 mm. longis 2-3 mm. latis), basi acuta margine a medio deorsum integra sursum (præter acumen) serrata, serris recurvis obtuso-aristatis, costis et venis supra sulcatis, subtus costis elevatis venis subplanis, tenuissimis, venis primariis lateralibus utraque 9 rectis a costa angulo 30° egressis tenuissimis vix arcuatis ad apicem serrarum attingentibus, petiolis 2 cm. longis. Cupula breve cyathiformis 1 cm. in diametro, 5 mm. longa, extus 4-annulata, intus extusque breve tenuiter sericeo-pubescens, glandem circ. usque ad $\frac{1}{3}$ in longitudine includens; glans globosa 12 mm. longa, 1 cm. lata, apice contracto-acuta, basi late truncata, (cicatricibus elevatis convexis parvis glandem in diametro $\frac{1}{2}$ -plo æquantibus).

HAB. Heirinbi: Shishi-Kyakukōzan, leg. N. KONISHI, Nov. 1902, (No. 22); Shinkō: Agiyokuzan, leg. T. KAWAKAMI et K. HINO, Dec. 1905, (No. 5779).

Near *Q. myrsinæfolia*, from which the present plant is easily distinguished by much shorter acorns, and narrower leaves which are usually dark purple in dried specimens.

Quercus randaiensis HAYATA sp. nov. Rami ramulique graciles, longitudinaliter reticulato-pugosi, non lenticellati fusco-cinerascentes. Folia tenuiter coriacea alterna sub-sessilia vel breve petiolata ovato-oblonga 10 cm. longa $3\frac{1}{2}$ cm. lata apice obtuso-acuminata basi acuta margine integra utrinque glabra, costis venisque supra planis subtus elevatis, venis primariis untrinque latere 9 rectis a costa angulo 60° egressis tenuissimis prope marginem arcuatis anas-

tomosantibus, venis secundariis indistinctis inter venas primarias depresso-reticulatis, utraque glabra pallidiora, petiolis brevissimis vix 1 mm. longis callosio-incrassatis. Perulæ alabastrorum foliorum ad basin rumuli persistentes, scariosæ triangulares 4 mm. longæ Fructus maturi ad rachin spicæ spicatim dispositi, rachibus validiusculis 7 cm. longis. Cupula patelliformis vel breve cyathiformis, basi glandis sita, 3 mm. longa, 8 mm. in diametro utrinque facie tenuiter pubescens, extus squamulis ∞ -seriatis adnatis planis triangularibus imbricatis instructa. Glans ovata 9 mm. longa 7 mm. lata, apice apiculata basi truncata, (cicatricibus parvis planis glandem in diametro $\frac{1}{2}$ -plo æquantibus).

HAB. Tokunsha, ad pedem montis Randai, leg. S. KUSANO, Feb. 1909.

Quercus sessilifolia BLUME ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 521.

HAB. Giran, Chūreizan, ad 3700 ped. alt., leg. N. KONISHI, Aug. 1907, (No. 42).

Quercus taichuensis HAYATA sp. nov. Rami grisei sed hac atque illac cinerascens, ramulis basi cicatricibus approximativè annulatim instructis, lenticellis minutis densiuscule notatis. Alabastrum foliorum ovato-pyramidale, pentagonum, 5 mm. longum obtusum, perulis ovatis 3 mm. longis obtusis castaneis margine ciliolatis. Folia oblongo-lanceolata 6 cm. longa 16 mm. lata apice cuspidato-acuminata obtusa basi acuta margine sursum remote serrulata, sed in cuspidem et a medio deorsum integra, (serrulis setiformibus $\frac{1}{2}$ mm. longis 3 mm. a se remotis), supra nitida glaberrima, exsiccato fulva, costis et venis distincte impressis, subtus glauca costis prominentibus venis lateralibus primariis distincte tenuissime prominulis, petiolis $1\frac{1}{2}$ cm. longis supra subsulcatis.

HAB. Taichū. Kashigatani, leg. G. NAKAHARA.

There is nothing like this at Kew. As the plant is very distinct in the shape of leaves and leaf-buds, I have thought it better to describe it, though the specimen is very imperfect.

Quercus taitōensis HAYATA sp. nov. Rami cinerascens, ramulis adpresso-cinereo-pubescentibus. Folia alterna petiolata oblonga vel obovato-lanceolata vel oblongo-lanceolata 11 cm. longa $3\frac{1}{2}$ cm. lata apice acuminata basi acuta in petiolum attenuata margine integra vel obscure repandata utrinque pagine subglabrata sub microscopio tenuissime depresso-pubescentia, costis et venis supra depresso-sulcatis subtus elevatis, venis primariis utrinque latere 8 a costa angulo 30° egressis prope marginem subito arcuatis evanescentibus, petiolis $1\frac{1}{2}$ cm. longis. Spicæ erectæ, ad axillas foliorum summorum, validiusculæ 11 cm. longæ, partibus inferioribus floribus masculinis, superioribus fœmineis. Fl. ♂ : 4-5 aggregatim dispositi ; perianthium 6-partitum, segmentis 1 mm. longis ovatis extus pilosis intus tenuiter pubescentibus rubescentibus. Stamina 12 exserta. Rudimentum ovarii depresso-globosum apice dense barbatum. Fl. ♀ : 5-4-aggregatim dispositi, involucris prominentibus ; perianthium 6-partitum, segmentis adpressis ; stylus tripatitus, ramis erectis. Fructus maturi ad rachin spicatim 2-3 aggregatim vel distinctim dispositi. Cupula peltata vel patelliformis 4 mm. longa 9 mm. in diametro æquans, intus tenuissime pubescens, partibus marginalibus 3 mm. latis, partibus centralibus elevatis planis in diametro cupulam $\frac{1}{2}$ -plo æquantibus, extus cinerascens tuberculata. Glans ovoidea apice acuta apiculata basi rotundata $1\frac{1}{2}$ cm. longa 12 mm. lata, (cicatricibus parvis profunde depressis planis), extus castanea.

HAB. in Montibus Centralibus, leg. T. KAWAKAMI et U. MORI, Nov.

1906, (No. 2216); Taitō : Iryokukakusha, leg. T. KAWAKAMI et U. MORI, Dec. 1906, (No. 2187).

Near *Q. polystachya* WALL. (KING. t. 44), from which the present plant is quite distinguishable by the shape of glans which is ovoid, acute at the apex and round at the base. Also very like *Q. thalassica* HANCE, but differs from it by the smaller cups with more elevated central scars, and more obscure marginal rings, and by the larger leaves.

Quercus ternaticupula HAYATA sp. nov. Rami fusco-nigricantes, lenticellis minutis dispersi, cicatricibus foliorum et ramulorum notati, ramulis teretibus breve pubescentibus. Folia alterna breve petiolata stipulata, oblongo-elliptica, 12 cm. longa, 4 cm. lata, apice abrupte breveque acuminata ad summum obtusa basi acuta margine integra vel obscure repandata utraque pagine glabra, costis venisque supra prominentibus vel planis subtus elevatis, venis primariis utrinque 14 a costa angulo 60° egressis, venis secundariis et venulis distincte reticulatis, tenuiter coriacea, petiolis 1 cm. longis supra planis basi incrassatis, stipulis caducissimis linearibus 4 mm. longis. Spicæ dense cineraceo-pubescentes terminales, erectæ validiusculæ vel ad axillas foliorum summorum 6 cm. longæ, partibus superioribus floribus masculinis, partibus inferioribus fœmineis. Fl. ♂ : 3-4-aggregati; perianthium 6-partitum, segmentis 2-seriatim dispositis, ovato-rotundatis, $\frac{3}{4}$ mm. longis, extus dense intus parce pubescentibus. Stamina 12, filamentis longe exsertis 3 mm. longis. Rudimentum ovarii convexum apice barbatum. Fl. ♀ : 3-4-fasciculati, fasciculis 1-bracteatis, bracteis triangularibus apice cuspidatis. Involuerum late globosum, squamis brevibus ∞ -seriatis; perianthium 6-partitum, segmentis 2-seriatim ovario adnatis; stylus 3-partitus, stigmatibus punctiformi; rhachis spicæ ad nodos tumescens. Fructus maturi ad rachin accrescentem spicatim ternatim vel abortu geminatim dispositi.

Cupula cyathiformis 1 cm. longa 14 mm. in diametro glandem usque ad $\frac{1}{6}$ in longitudine includens, (extus annulariter tuberculis 8-seriatim dispositis tuberculis cuneatis sæpe connatis annulos multi-seriatos formantibus), intus extusque breve cineraceo,- pubescens, partibus marginalibus 5 mm. latis, partibus centralibus 6 mm. in diametro cupulam in diametro $\frac{1}{2}$ -plo æquantibus elevatis. Glans ellipsoidea 19 mm. longa 14 mm. lata apice rotundata basi rotundato-truncata, (cicatricibus parvis glandem $\frac{2}{3}$ -plo in diametro æquantibus depressis).

HAB. Uraisha, leg. N. KONISHI, Aprili. 1908, (No. 105); Nantō : Jinpinsha, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3402).

Near *Q. thalassica*, from which the present plant differs in having entire acuminate or even cuspidate leaves, and acorns which are round at the apex. The acorns of *Q. thalassica* are acute at the apex.

Quercus uraiana HAYATA sp. nov. Rami ramulique fusco-cinerascentes, longitudinaliter reticulato-rugosi. Alabastrum foliorum acutum biconvexum 5 mm. longum, perulis 2-seriatim dispositis plicatis triangularibus 3 mm. longis. Folia alterna petiolata lanceolata vel oblongo-lanceolata 10 cm. longa 23 mm. lata apice longe acuminate vix obliqua basi acuta vel rotundata obliqua margine a medio deorsum integra sursum (præter acumen) obscure serrata, (serris obtusis), costis elevatis, venis primariis tenuissimis venis secundariis et venulis indistinctis, utraque pagine glabra, supra nitida, subtus pallidiora, petiolis 8 mm. longis basi callosocrassatis. Fructus maturi ad rhachin spicatim siti, distincti. Cupula cyathiformis 5 mm. longa 10 mm. lata utrinque tenuiter sericeo-pubescens extus squamis 5-seriatim instructa, squamis cuspidato-triangularibus acutis apice carinatis 1 mm. longis. Glans late ovata 9 mm. longa, 8 mm. lata, apice apiculata basi truncata, extus primum pubescens demum subglabrata, cicatri-

cibus planis vel vix concavis glandem in diametro $\frac{2}{3}$ -plo æquantibus.

HAB. Uraisha, leg. N. KONISHI et S. KUSANO, Dec. 1908.

Near *Quercus randaiensis*, from which the present plant is easily distinguished by the long-petioled leaves which are acuminate and dentate, and by the much deeper cupules.

Castanopsis SPACH.

Castanopsis brevispina HAYATA sp. nov. Rami nigro-rubrescentes, longitudinaliter rugosi lenticellis parce notati, ramulis fusco-tomentosis. Folia alterna breve petiolata ovato-lanceolata 10 cm. longa 32 mm. lata apice gradatim acuminata, (acuminibus gracilibus 1 cm. longis 1-1½ mm. latis), basi rotundata brevissime ad petiolum attenuata, supra glabra, subtus pilis adpressis tenuiter vel dense tomentellata fusco-flavescentia ad costas et venas pilis longis erectis parce dispersa, supra costis impressis venis planis, subtus costis prominente venis primariis leviter elevatis, venis primariis utrinque latere 11, a costa angulo 60° egressis arcuatis prope marginem anastomosantibus, venis secundariis utrinque pagine inconspicuis oblique transversis, margine integra sæpius sursum infra acumen tenuiter 2-3-serrata, (serris obtusis), acuminibus integris, coriacea, petiolis ½ cm. longis supra sulcatis. Involucrum fructiferum auctum late globosum cum spinis 2½ cm. longum, extus aculeis fasciculatis (fasciculis 5 mm. longis) et ramosis validis dense echinatum, intus pilis rectis dense sericeo-tomentosum, irregulariter fissum. Nuces involucre 2-3 inclusæ, angulares ∞ - costatæ dense sericeo-pilosæ fusco-rubrescentes ovoideo-pyraminales 12 mm. longæ.

HAB. Hieranzan, leg. S. KUSANO, Jan. 1909.

Near *C. tribuloides* var. *echinocarpa*, but differs from it in the leaves which have less conspicuous primary and secondary veins.

Castanopsis Kawakamii HAYATA sp. nov. Rami teretes, cortice

nigricante rugoso, lenticellis minutis transverse longis dispersi, supra cicatricibus late globosis foliorum cicatricibus ramorum majoribus elevato-depressis notati. Folia coriacea alterna petiolata longe ovata $8\frac{1}{2}$ cm. longa 32 mm. lata cuspidato-acuminata, (acuminibus 1 cm. longis 3 mm. latis), basi rotundata vel acuta vix obliqua margine integra infra acumen paullo serrata vel omnio integra, supra nitida, subtus primum tenuiter adpresse pubescentia interdum argenteo tenuissime pubescentia demum subglabrata, costis et venis supra planis subtus elevatis, venis secundariis utrinque latere 7 a costa angulo 40° egressis vix arcuatis prope marginem evanescentibus, venis secundariis inconspicuis, venulis minute reticulatis inconspicuis, petiolis longioribus 2 cm. longis supra planis subtus rotundatis basi calloso-incrassatis. Spicæ fructiferæ incrassatæ. Fructus 5-6, spicatim dispositi, sed maturo in unum reducti. Involucrum fructiferum late globosum cum spinis $6\frac{1}{2}$ cm. longum $4\frac{1}{2}$ cm. latum, spinis fasciculatis et ramosis echinatum, (spinis basi pauce ramosis, rectis 2 cm. longis) apice irregulariter 4-5 fissum intus pilis sericeis adpresse obtectum. Nuces solitariae involuero inclusæ late ovato-globosæ 17 mm. longæ 20 mm. latæ tenuiter sericeo-pubescentes apice breve apiculatæ basi truncato-rotundatæ, (cicatricibus globosis 16 mm. in diametro rugosis convexis).

HAB. Horisha; Shōhakurin, leg. N. KONISHI, (No. 38); Nantō: Naibunsha, leg. G. NAKAHARA, Feb. 1907; Suisha, Nankōkei, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1196); Giochi, leg. Y. SHIMADA, Dec. 1907, (Nos. 5171 et 5170); Biōritsu: Sensuizan, leg. T. KAWAKAMI et U. MORI, Oct. 1908; Randaizan, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3300).

Near *C. javanica* A. DC., but quite distinguishable by the fruits covered with straight, but not curved, spines and quite glabrous leaves with fewer primary lateral veins.

Castanopsis Kusanoi HAYATA sp. nov. Rami fusco-nigricantes lenticellis parce obtecti glabrati. Folia alterna petiolata oblongo-lanceolata 18 cm. longa 5 cm. lata longe acuminata, (acuminibus angustissimis 2 cm. longis), basi acuta margine integra sub acumini obscure paucisque dentata vel omnia integra, costis supra impressis subtus prominentibus, venis supra planis subtus elevatis, venulis reticulatis utrinque pagine prominulis, venis primariis utraque 5-6 a costa angulo 50° egressis arcuatis prope marginem evanescentibus vel obscure anastomosantibus, utrinque glabra exsiccato supra cinereo-pallida, subtus pallido-flavescentia, petiolis brevibus 8 mm. longis. Alabastrum foliorum ovoideum acutum, perulis ovatis 2 mm. longis. Involucrum fructiferum late globosum cum spinis $4\frac{1}{2}$ cm. latum, spinis fasciculatis dense echinatum, (echinis, 8 mm. longis), intus tenuiter sericeo-pubescentibus. Noces 3 involucri inclusæ globoso-pyramidales apiculatæ tenuiter pubescentes vel subglabratae, cicatricibus planis vel leviter convexis.

HAB. Punciō, ad pedem montis Arizan, leg. S. KUSANO, Feb. 1909.

Near *C. diversifolia* KING. (t. 85, A), from which this is quite distinguishable by the lanceolate leaves with inconspicuous secondary veins. Very near *C. argentea* var. β . *martabanica* A. DC.; but the leaves of the present plant are thinner and less coriaceous, the petioles are much shorter, and primary lateral veins are fewer.

Castanopsis stellato-spina HAYATA sp. nov. Ramirubro-nigricantes cicatricibus foliorum et ramulorum notati, lenticellis oblongis paucis dispersi, basi ramuli perulati, perulis scariosis coriaceis triangularibus obtusis 5 mm. longis. Alabastrum foliorum ovatum 1 cm. longum acutum, perulis scariosis coriaceis persistentibus triangularibus, extus sericeo-pubescentibus. Folia alterna petiolata

ovato-lanceolata $9\frac{1}{2}$ cm. longa 3 cm. lata apice acuminata basi rotundato-acuta margine integra sub acumine pauce obscureque serrata, supra glabra subtus dense adpresse tenuiter pubescentia, costis supra sulcatis subtus costis et venis prominentibus, venis primariis utrinque 11 a costa angulo 50° egressis leviter arcuatis prope marginem evanescentibus, venulis inconspicuis, crassiusculo-coriacea, petiolis 13 mm. longis supra sulcatis subtus rotundatis basi callosoincrassatis. Involucrum fructiferum depresso-globosum nucem includens extus echinatum cum spinis $2\frac{1}{2}$ cm. longum $5\frac{1}{2}$ cm. in diametro, spinis validiusculis fasciculatis et ramosis vel spinis stellato-ramoso-fasciculatis, fasciculis $1\frac{1}{2}$ cm. longis supra medium irregulariter bi-trifidis vel variis, spinis recurvis, intus pilis longiusculis adpresse dense sericeo-pubescentibus. Noces 3 in involucre inclusæ, a latere depressis, curvatis, centrali matura globoso-trigonopyramidalis 18 mm. longa totiusque lata apice breve apiculata basi truncata, (cicatricibus planis rugosis), facie tenuiter pubescentibus.

HAB. Banchoryō : Hieranzan, leg. S. KUSANO, Jan. 1909.

The present plant differs from *C. Kusanoi* et *C. brevispina* in having recurved and somewhat stellately branched spines which are more incrassate than the preceding species.

Castanopsis taiwaniana HAYATA Fl. Mont. Formos. p. 205.

HAB. Shintiku : Goshizan, leg. T. KAWAKAMI, 1907, (No. 5124).

As the original description of this species gives no account of flowers, the following lines may properly be added here.

Flores monœcii spicatum paniculati, paniculis ad axillas foliorum summorum vel terminalibus 10 cm. longis a basi ramosis, ramis erecto-ascendentibus. Spicæ fœmineæ et masculinæ in unica panicula mixtæ, sæpe ramis inferioribus masculinis, ramis superioribus

fœmineis, ramis 6 cm. longis laxe floratis, perulis basi panicularum ∞ -seriatim dispositis imbricatis scariosis coriaceis globosis 4 mm. longis, bracteis basi spicæ longe triangularibus crassiusculis 7 mm. longis 4 mm. latis extus ferrugineo-adpresse-tomentosis apice obtusis. Fl. ♂ : basi perianthii 1-2-bracteati, bracteis late rotundatis tomentosus, perianthium 6-partitum, (segmentis ovatis apice rotundatis $1\frac{1}{2}$ mm. longis), extus subglabrum, intus medio tomentosum. Stamina 12-13, filamentis exsertis 4 mm. longis, antheris cordatis apice emarginatis. Rudimentum ovarii depresso-complanatum obscure lobatum apice planum barbatum 1 mm. in diametro. Fl. ♀ : bracteis ∞ -seriatis valde imbricatis; perianthium 6-partitum, segmentis ovatis obtusis $\frac{1}{2}$ mm. longis $\frac{1}{3}$ mm. latis ad ovarium adpressis, extus glabris intus tomentosus valde imbricatis ovarium fere includentibus. Rudimenta staminum 12 minuta basi segmentorum affixa. Ovarium globosum $\frac{1}{2}$ mm. longum, dense pilosum, stylo 3-partito, ramis recurvis $\frac{1}{2}$ mm. longis.

Castanea GÆRTN.

Castanea sativa MILL. var. *formosana* HAYATA sp. nov. Rami nigricantes glabrati lenticellis albis punctati. Folia alterna petiolata stipulata oblongo-lanceolata apice gradatim acuta basi rotundata vel truncata obliqua latere altero rotundata altero paullo cordata, margine tenuiter remoteque serrulata, (serrulis aristatis, aristis 2 mm. longis), costis supra planis pubescentibus, subtus prominentibus, venis primariis lateralibus utraque 18 a costa angulo 60° egressis rectis ad apicem serrularum attingentibus, venis secundariis oblique transversis, supra glabra, subtus dense breve adpresse pubescentia, petiolis 17 mm. longis, stipulis caducis cordato-ovatis obtusis 13 mm. longis. Spicæ terminales vel axillares 15 cm. longæ. Flores 5-6 glomerulati, glomerulis secus rachin spicæ spiraliter dispositis.

Perianthium 6-partitum, segmentis 2-seriatis omnibus tomentosopubescentibus crassiusculis intus tomentosis margine scariosis exterioribus late ovatis 1 mm. longis $1\frac{1}{2}$ mm. latis rotundatis interioribus obovatis $1\frac{1}{2}$ mm. longis 1 mm. latis. Stamina 12, longe exserta, 6 segmentis perianthii opposita, 6 iis alterna, filamentis filiformibus 6 mm. longis glabris, antheris late rotundatis $\frac{1}{3}$ mm. longis. Rudimenta carpellorum 6 obovoidea $\frac{2}{3}$ mm. longa apice barbata segmentis perianthii opposita. Fl. ♀: ignoti.

HAB. Nantō: Horisha, leg. T. KAWAKAMI et Y. SHIMADA, Aug. 1907.

I have examined all the species of the genus at Kew, but have not been able to find any thing like the present plant. There is a specimen labelled *C. sativa* in the Herbarium at Hongkong, which specimen is exactly the same as the Formosan plant, but quite different from the type of the named species.

Salicineæ.

Salix LINN.

Salix tetrasperma ROXB. var. **Kusanoi** HAYATA n. v. Rami validiusculi fusco-rubrescentes longitudinaliter rugosi non lenticellati, ramulis dense fusco-pubescentibus. Folia decidua alterna petiolata chartacea ovata vel ovato-oblonga 6-8 cm. longa 3-4 cm. lata apice breve cuspidato-acuminata, (acuminibus 3-10 mm. longis), basi rotundata brevissime minute cordata margine obscure crenulata vel serrulata vel subintegra supra glabra subtus tenuiter brevissime dense pubescentia, costis supra planis subtus prominentibus, venis primariis utrinque planis distinctis vel supra distincte subtus tenuiter prominentibus utrinque latere 20-25 a costa angulo 60° egressis leviter arcuatis prope marginem ascendentibus evanescentibus, venis secundariis utrinque pagine vix elevatis oblique transversis, venulis minute reticulatis distinctis, petiolis

1 cm. longis supra planis basi haud incrassatis, stipulis minutis circ. obsolete triangularibus $\frac{1}{2}$ mm. longis. Alabastrum florum supra cicatrices foliorum deciduorum situm globoso-ovatum $\frac{2}{3}$ cm. longum, perulis rubris glabris 4-5 seriatim sitis oppositis, exterioribus ovatis 7 mm. longis, interioribus foliaceis late spathulatis extus sericeo-pubescentibus intus glabris 7 mm. longis 5 mm. latis, intimis angustatis 10 mm. longis 2 mm. latis. Amenta fl. ♀ cylindracea 6-7 cm. longa secus totam longitudinem dense florifera (vel præter partem inferiorem), rachis pubescentibus. Fl. ♂ 1-bracteati, floribus distinctis, sessilibus, bracteis ovatis apice rotundatis $2\frac{1}{2}$ mm. longis utraque pagine pubescentibus; discus squamulæformis, squamulis antice 2-3-obscure lobulatis patentibus $\frac{1}{3}$ mm. longis, postice erectis elobulatis. Stamina 5-6, filamentis distinctis 3-4 mm. longis filiformibus validiusculis, antheris late globosis $\frac{1}{2}$ mm. longis utrinque emarginatis. Rudimentum ovarii O. Fl. ♀: 1-bracteati, brevissime pedicellati, pedicellis $\frac{1}{2}$ mm. longis. Capsula longe ovata 2-valvis dehiscentis basi leviter gibbosa $2\frac{1}{2}$ mm. lata 7 mm. longa. Semina obovoidea 3 mm. longa, 1 mm. lata, testa tenuissima hyalina, pilis comæ 7 mm. longis albis.

HAB. Banchoryō, leg. S. KUSANO, 1909.

Near *S. tetrasperma* ROXB., but differs from it by the ovate leaves which are abruptly acute at the apex and cordately rounded at the base.

Salix Mesnyi HANCE in "Journ. Bot. (1882), p. 38"; FORBES et HEMSL. Ind. Fl. Sin. II. p. 530.

HAB. FORMOSA, RICHARD, OLDHAM.

DISTRIB. Kiangsu, Chekiang, Kiangsi, Hupeh, Yunnan, and Kwangtung.

I have seen the specimens at Kew. It is not yet represented at Tōkyō.

Gymnospermeæ.

Coniferæ.

Juniperus LINN.

Juniperus morrisonicola HAYATA in Gard. Chron. (1908), p. 194 et Journ. LINN. Soc. XXXVIII. p. 298; HAYATA Fl. Mont. Formos. p. 211.

This appears very like a specimen of *Juniperus recurva*, preserved at Kew. Further study will prove that they are identical.

Podocarpus L'HÉRT.

Podocarpus neriifolia D. DON ; DC. Prodr. XVI.-2, p. 514 ; Hook. f. Fl. Brit. Ind. V. p. 649 ; FORBES et HEMSL. Ind. Fl. Sin. II. p. 548.

HAB. Nantō : Suikoku, leg. T. KAWAKAMI et U. MORI, 1906, Aug. (No. 1175).

DISTRIB. China : Szechuen. India, and Malaya.

Pinus LINN.

Pinus taiwanensis HAYATA sp. nov. Ramuli fulvo-rubescentes, glabri sursum foliosi, pulvinis longe elevatis 3 mm. longis apice cupuliformibus. Alabastrum foliorum ovatum, perulis lanceolato-ovatis ∞ -seriatis castaneis 6 mm. longis $1\frac{1}{2}$ mm.-2 mm. latis acuminatis margine ciliatis, ciliis tenuissimis longis complanatis. Folia geminata acerosa 9 cm. longa versus apicem ramulorum approximate erecta recta vel plus minus recurvata glabra dorso convexa facie profunde sulcata margine scaberula, vaginis membranaceis castaneis 12 mm. longis. Strobili conico-oblongi

5½ cm. longi 3½ cm. lati, squamis medioeribus angustatis 2½ cm. longis 8 mm. latis apice subrotundatis erectis, umbone impresso-elevato late rotundato vel late rhomboidali. Semina fulvo-albicantia oblique oblonga 5 mm. longa complanata apice obtusa basi acuta, alis cultriformibus 13 mm. longis 5½ mm. latis.

HAB. in Montibus Centralibus, leg. T. KAWAKAMI et U. MORI, 1906, Nov. (No. 2097); Randaizan, B. HAYATA et U. MORI, 1908, Aug. (No. 7142).

The present *Pinus* is very near *P. densiflora*, but differs from it in having more oblong ovate cone, with more elevated umbo; also near *P. yunnanensis* and *P. densata* MASTERS, but distinguishable from the former by the smaller cones and and two leaved shoots, and from the latter by the more slender leaves and not reflexed umbos; from *P. prominens* MASTERS, by the much longer cones with less edged apophysis. I have compared my plant with all the specimens of the genus in the Kew-Herbarium, but I have not been able to identify it. I think this may be a plant not yet described. In this, Dr. A. HENRY concurs.

Cycadaceæ.

Cycas LINN.

Cycas taiwaniana CARRUTHERS in Journ. Bot. (1893) p. 2, t. 331; FORBES et HEMSL. Ind. Fl. Sin. II. p. 560; MATSUM. et HAYATA Enum. Pl. Formos. p. 404.

HAB. China.

I have seen the species in the Herbarium at Hongkong, labelled "Kwang-tung, Lo-fare-shan". This is very near *C. revoluta* THUNB., but differs from it mainly in the female flowers. So far, we have never seen the plant in Formosa.

Monocotyledones.

Hydrocharideæ.

Halophila. THOU.

Halophila ovalis HOOK. f.; OSTENFELD, in Philip. Journ. Sci. IV. Suppl. p. 67.

HAB. Pratas, Jan. 1908, leg. T. KAWAKAMI.

DISTRIB.

This quite differs from *Halophila ovata* GAUDICH., though they are sometimes confounded on account of their bearing very similar names. *H. ovata* exists in Japan.

Orchideæ.

Oberonia LINDL.

Oberonia formosana HAYATA sp. nov. Herba epiphytica, cæspitosa, caulibus simplicibus vel rarius pauciramosis 3-5 cm. longis toto longitudine foliatis. Folia disticha sessilia alterna approximata verticaliter compressa lineari-lanceolata 22 mm. longa $2\frac{1}{2}$ mm. lata apice aristato-acuta margine integra basi latere inferiore recta superiore rotundata vaginosa caulem amplexantia crassiuscula. Spicæ terminales cum pedunculis 8 cm. longæ cernuæ, floribus minutis 1 mm. in diametro, secus rachin interrupte fasciculatim dense sitis, bracteis ovato-acuminatis 1 mm. longis reflexo-patentibus. Sepala lateralia late ovata basi connata $\frac{1}{2}$ mm. longa totiusque lata obtuso-acuta patentissima posticum minus. Petala sepalo angustiora oblonga $\frac{2}{3}$ mm. longa $\frac{1}{3}$ mm. lata obtusa. Labellum sessile concavum rotundatum in circumscriptione $\frac{2}{3}$ mm. longum totiusque latum 3-lobatum, lobo medio

majore apice tenuiter 3-lobulato obtuso, lobis lateralibus acutis brevioribus, basi minute callosum, callis rubris. Columna brevissima $\frac{1}{3}$ mm. longa.

HAB. Nantō : Randaizan. leg. T. KAWAKAMI et U. MORI, Juni. 1907, (No. 3474).

Somewhat near *O. japonica* MAXIM., but differs from it in having long lanceolate leaves which are as three times long as those of the Japanese plant; still nearer *O. Clarkei* in its habit and leaves, but differs from it by the lips with acute side-lobes which in *O. Clarkei* are fimbriate.

Oberonia insularis HAYATA sp. nov. Herba epiphytica, rhizoma repens squamatum, caulibus brevibus 1-2 cm. longis 5-6-foliatis. Folia secus caulem distichum disposita approximata alterna basi brevissime vaginata, cum vaginis oblique articulata, laminis lanceolato-ovatis $1\frac{1}{2}$ cm. longis 4 mm. latis apice acutis crassiusculis verticaliter compressis. Spicæ terminales cum pedunculis 5 cm. longæ cernuæ, bracteis lanceolatis $1\frac{1}{2}$ mm. longis margine serrulatis. Flores ignoti. Capsula breve pedicellata obovoidea $2\frac{1}{2}$ mm. longa apice truncata.

HAB. Nōkōzan, leg. T. KAWAKAMI et U. MORI, Jan. 1907, (No. 6278).

Very near *O. japonica* in the shape of the leaves and in its habit, but the fruits are different.

Liparis RICH.

Liparis Nakaharai HAYATA sp. nov. Caulis 2-foliatus, inferne brevissime vaginatus, vaginis ovatis brevioribus superne gradatim elongatis. Folia 2, ad basin caulis sita, oblanceolata, cum petiolis 35 cm. longa 2 cm. lata, racemum in longitudine æquantia, apice acuminata basi gradatim attenuata in petiolum 10 cm. longum abeuntia

ima basi articulata multinervia utrinque glabra. Flores mediocres 2 cm. in diametro, in racemum laxe-floratum 15 cm. longum terminalem pedunculatum dispositi, pedunculis 18 cm. longis gracilibus erectis, bracteis lanceolatis 1 cm. longis. Sepala libera patentia linearia 9 mm. longa 1 mm. lata apice obtusa, posticum postice reflexum recurvatum, latralia antice paralleliter patentia inferne recurvata. Petala linearia 9 mm. longa $\frac{1}{2}$ mm. lata postice et inferne reflexa. Labellum cuneiforme in circumscriptione 8 mm. longum, $5\frac{1}{2}$ mm. latum a medio antice curvatum apice latissime truncatum irregulariter denticulatum basi columnæ affixum, a medio basi erectum ima columnam amplectans a medio superne patens elobatum basi 2-tuberculatum. Columna elongata 5 mm. longa semiteres.

HAB. Taitō, Manchōsha, leg. T. KAWAKAMI et G. NAKAHARA, Jan. 1906, (No. 766).

This is very distinct species; it is somewhat near *L. flaccida* in its habit, but very much different from it in having much larger lips, longer pedicels and in many other points.

Liparis nervosa LINDL.; Gen. Sp. Orch. p. 26; BENTH. Fl. Hongk. p. 352; FRANCH. et SAVAT. Enum. Pl. Jap. II. p. 21; FORBES et HEMSL. Ind. Fl. Sin. III. p. 7; MATSUM. et HAYATA Enum. Pl. Formos. p. 406.

Liparis formosana REICHB. f.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3355).

DISTRIB. Japan, Loo-choo islands, Hongkong.

Liparis taiwaniana HAYATA sp. nov. Caulis brevissimus in pseudobulbum incrassatus 2-foliatus, vaginis brevioribus 5-6 instructus. Folia oblanceolata, 18 cm. longa 17 mm. lata apice

acuminata basi attenuata ima basi articulata 3-costata. Racemi ad apicem caulium laterales cum pedunculis 20 cm. longi folio æquilongi, partibus floriferis 8 cm. longis laxifloratis, bracteis lanceolatis 7 mm. longis, floribus mediocribus 1 cm. in diametro. Sepala æqualia patentissima, exteriore valde reflexa recurva oblongo-lineararia 1 cm. longa $1\frac{3}{4}$ mm. lata apice obtusa. Petala angustolinearia 1 cm. longa $\frac{1}{2}$ mm. lata sursum margine convoluta teretia apice obtusa postice reflexa. Labellum ad basin columnæ, basi erectum a medio sursum patens, ima basi auriculatum, obovatum in circumscriptione 8 mm. longum, apice dilatatum 7 mm. latum versus basin angustatum, basi $2\frac{1}{2}$ mm. latum, margine latere integrum, apice inæqualiter denticulatum, lobis lateralibus obscuris, supra basin 2-tuberculatum. Columna 6 mm. longa semiteres 2-alata apice incurvata.

HAB. Nantō : Randaizan, leg. T. KAWAKAMI et U. MORI, Jan. 1908, (No. 6309).

This is near *L. plicata* and *L. Uchiyamæ*, but distinguishable from them by the longer and more slender column of the flowers. The columns of the other species are very much shorter; also very near *Liparis viridiflora* L., but differs from it in having larger flowers and in the lips with obscure lobes.

Dendrobium Sw.

Dendrobium flaviflorum HAYATA sp. nov. Caulibus 40-50 cm. longis teretibus gracilibus, internodiis 3 cm. longis 4 mm. latis vix flexuosis suberectis toto longitudine foliatis, vaginis foliorum persistentibus. Folia alterna disticha angusta $9\frac{1}{2}$ cm. longa 9 mm. lata apice obtusa oblique emarginata basi angustata crassiuscula cum vaginis articulata, vaginis brevibus 5 mm. longis totiusque latis, ore oblongo. Racemi pauciflorati laterales graciles basi

incrassati, vaginis imbricatis inferne brevissimis superne gradatim longioribus $2\frac{1}{2}$ cm. longis 7 mm. latis instructi, sursum bracteati, bracteis angustis 23 mm. longis 8 mm. latis apice acutis basi angustis pedicellum amplectantibus, floribus pedicellatis, pedicellis gracilibus divaricatis $1\frac{1}{4}$ cm. longis. Flores flavi majusculi circ. $2\frac{1}{2}$ cm. in diametro. Sepala subæqualia patentia, posticum liberum oblongum 22 mm. longum 8 mm. latum apice apiculato-acutis basi angustatis, lateralia basi obliqua pedi columnæ adnata, mentum gibbosum 4 mm. longum formantia, superne libera, sepalo postico æquilonga. Petala oblongo-obovata, 23 mm. longa, 12 mm. lata apice obtusa basi attenuata contracta. Labellum late rotundatum unguiculatum, unguis angustatus 6 mm. longus 3 mm. latus basi ad pedem columnæ adnatus, in pedem incumbens, lamina late rotundata 18 mm. longa 23 mm. lata obscure 3-lobata vel elobata apice rotundata basi late truncato-rotundata margine eroso-denticulata minute undulata superne dense breveque villosa medio concava basi leviter callosa inferne glabra. Columna 4 mm. longa 3 mm. lata apice 2-dentata, pede 4 mm. longo.

HAB. Formosa, VII. 1907.

Precise habitat of this specimen is not given. I remember having seen the plant on Mt. Manapan, when I was botanizing on the same mountain.

Dendrobium Goldschmidtianum KRÄNZL. in ENGL. Pfl.-reich. IV. 50, II. B. 21, p. 116.

Dendrobium Linawianum REICHE. f. in Walp. Ann. VI. p. 284 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 12. Caulibus 6-7-foliatis 30 cm. longis complanatis, (internodiis superioribus 3 cm. longis clavato-incrassatis apice clavatis 12 mm. latis complanatis basi attenuatis, internodiis inferioribus teretibus subcomplanatis angustioribus 3 mm.

longis globoso-incrassatis brevissimis), caulibus ad nodos flexuosis, superiore foliatis inferiore vaginatis, caulibus annotinis vaginis persistentibus instructis. Folia plana oblonga 7 cm. longa 24 mm. lata apice oblique emarginata supra nitida subtus pallidiuscula crassiuscula integra, petiolis vaginæformibus internodia amplectantibus tubiformibus 15 cm. longis 6 mm. lata. Racemi breves 2-3-florati laterales infra vaginam foliorum deciduorum siti. Flores majusculi 5 cm. in diametro, pedicellis cum ovario 5-6 cm. longis. Sepala subæquilongia, posticum liberum, lateralia oblongo-angustata, 29 mm. longa 9 mm. lata apice breve acuta basi obliqua pedi columnæ adnata, mentum longe calcariforme 1 cm. longum formantia, superne libera. Petala sepalo postico æquilongia latioraque oblonga 29 mm. longa 17 mm. lata apice obtusa basi contracta. Labellum unguiculatum oblongum cum ungue 27 mm. longum 16 mm. latum, unguis angustatus 7 mm. longus 4 mm. latus ad apicem pedis columnæ adnatus in pedem incumbens, lamina late oblonga 2 cm. longa 17 mm. lata apice rotundato-obtusa basi apicem columnæ amplectans supra medium dense breve hirsuta expansa. Columna breviuscula, 5 mm. longa 3 mm. lata apice minute 2-brachiata basi in pedem longiusculum 1 cm. longum producta. Rostellum truncatum. Anthera terminalis opercularis incumbens cucullata 2-locularis. Pollinia 4 cerea oblonga $1\frac{1}{2}$ mm. longa obtusa a latere compressa per paria in loculis collateralia.

HAB. Formosa, leg. T. UCHIYAMA, 1899.

DISTRIB. It is recorded from China, but the precise habitat of the species remains as yet unknown.

Dendrobium Nakaharai SCHLECHT.; HAYATA in Tōkyō Bot. Mag. XX. p. 76.

DISTRIB. An endemic plant.

Dendrobium randaiense HAYATA sp. nov. Caulis longus ramosus superne validus inferne gracilis, (internodiis brevibus 1 cm. longis), sursum foliatus. Folia alterna disticha oblonga 4 cm. longa 5 mm. lata apice acuta basi angustiora cum vaginis articulata, vaginis 1 cm. longis 5 mm. latis. Flores longiusculi, 3 cm. longi solitarii pedicellati, pedicellis 1 cm. longis. Sepala valde inæqualia suberecta, posticum liberum oblongum 17 mm. longum 5 mm. latum apice acutum basi leviter connatum, lateralia majuscula latioraque sepalo postico æquilonga basi obliqua pedicolumnæ connata, mentum calcariforme 2 cm. longum formantia. Petala sepalo postico minora oblique oblonga 15 mm. longa $4\frac{1}{2}$ mm. lata apice acuta basi angustiora. Labellum angustatum unguiculatum cum ungue 3 cm. longum erectum basi pedicolumnæ connatum, (parte connata 6 mm. longa), sursum unguis 2 cm. longus medio latere margine uno dente retrorso instructus basi laminae breve 2-lamellatus, lamina ovata 1 cm. longa 5 mm. lata apice obtusa basi rotundata gradatium in unguem abeuns. Columna brevissima 1 mm. longa basi in pedem 2 cm. longum producta.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Juli, 1907.

Dendrobium equitans KRÄNZL. in ENGL. Pfl.-reich IV. 50, II. B. 21, p. 228.

OBSERV. Caulis elongatus compressiusculus gracilis 30-40 cm. longus, (internodiis superioribus sub-teretibus complanatis 3 cm. longis 4 mm. latis, inferioribus bulboso-incrassatis 3 cm. longis 6 mm. latis), vaginis foliorum persistentibus. Folia disticha, sub-acerosa, tereto-lineararia, recta vel curvata 7 cm. longa 2 mm. lata verticaliter compressa apice acuta crassiuscula cum vaginis articulata. Racemi

in uniflorem reducti, floribus albis medioeribus 2 cm. longis subterminalibus 1-bracteatis, bracteis membranaceis vaginiformibus 4 mm. longis, ore 2-3-fidis. Sepala subæqualia erecta, posticum oblongum, 12 cm. longum $4\frac{1}{2}$ cm. latum apice obtusissimum basi non contractum subconnatum, lateralia basi oblonga pedi columnæ adnata mentum 8 mm. longum calcariforme formantia superne libera. Petala sepalo postico æquilonga angustiora oblongo-obovata 10 mm. longa 4 mm. lata apice obtuso-acuta. Labellum obovatum 18 mm. longum 11 mm. latum apice rotundatum basi cuneatum trilobatum ad apicem pedis columnæ adnatum in pedem incumbens, lobis lateralibus deorsum integris apice denticulatis, lobo medio rotundato-fimbriato 5 mm. longo, inter lobos laterales cristato-hirsutum. Columna brevissima 2 mm. longa, totiusque lata apice minute 2-brachiata basi in pedem 8 mm. longum producta; rostellum truncatum. Anthera terminalis opercularis cucullata 2-locularis. Pollinia 4 cerea oblonga 1 mm. longa obtusa a latere compressa per paria in loculis collateralia. Capsula oblongo-obovoidea apice contracto-angustata truncata basi attenuata 2 cm. longa 8 mm. lata erecta vel leviter nutans pedicellata, pedicellis 5 mm. longis.

HAB. Formosa, leg. T. UCHIYAMA, 1898.

Dendrobium tenuicaule HAYATA sp. nov. Caulis tenuis gracilis, 40-50 cm. longus, $1\frac{1}{2}$ mm. in diametro, internodiis $1\frac{1}{2}$ -2 cm. longis vaginis foliorum persistentibus. Folia linearia 6 cm. longa $2\frac{1}{2}$ mm. lata apice acuta basi angustata cum vaginis articulata, vaginis internodiis æquilongis ore oblique obtusis. Flores laterales solitarii minores $1\frac{1}{2}$ cm. longi, pedicellis 6 mm. longis. Sepala subæqualia, posticum liberum oblongum 12 mm. longum 4 mm. latum apice obtusum basi angustatum, lateralia basi pedi columnæ connata,

mentum calcariforme 4 mm. longum formantia superne libera. Petala sepalo postico æquilonga. Labellum rhombeum a medio sursum abrupte acutum basi attenuatum unguiculatum 14 mm. longum 7 mm. latum obscure 3-lobatum vel elobatum supra medio hirsutum margine apice laceroso-ciliolatum. Columna brevissima $\frac{1}{2}$ mm.—1 mm. longa basi pedem 5 mm. longum producta.

HAB. Shōkwa, leg. T. KAWAKAMI et Y. SHIMADA, Juli.

Bulbophyllum THOU.

Bulbophyllum (*Cirrhopetalum*) **racemosum** HAYATA sp. nov. Herba, caule seu rhizomate repente radicante, pseudobulbis acuminato-ovatis $2\frac{1}{2}$ cm. longis 8 mm. latis apice longe attenuatis 1-foliatis. Folia cum pseudobulbis articulata subsessilia oblongo-lanceolata 12 cm. longa 13 mm. lata apice obtusa minute aristata basi attenuata in petiolum abeuntia crassiuscula supra plana, venis indistinctis, subtus pallidissima venosa utraque glabra. Scapi floriferi a latere pseudobulborum aphylli, vaginis 3-4 instructi 12 cm. longi graciles, vaginis tenuibus 1 cm. longis. Flores laxè spicati, bracteis lanceolatis 9 mm. longis. Sepalum posticum brevius liberum ovato-lanceolatum 5 mm. longum $1\frac{1}{2}$ mm. latum acuminatum basi leviter contractum valde concavum, lateralia multo longiora angusto-acuminata $7\frac{1}{2}$ mm. longa basi parce dilatata 2 mm. lata apice longe caudata columnæ pedi adnata, paralleliter ascendentia. Petala sepalis multo breviora ovata $2\frac{1}{3}$ mm. longa $1\frac{1}{2}$ mm. lata eleganter ciliato-serrata. Labellum basi valde contractum cum pede columnæ mobiliter articulatam in pedem incumbens sursum recurvum elongatum $2\frac{1}{2}$ mm. longum $1\frac{1}{2}$ mm. latum integrum ad basin laminæ utrinque late auriculatum. Discus 2-callosus-lamellatus. Columna recta brevis 2 mm. longa basi in

pedem 2 mm. longum antice arcuatum producta superne 2-alata, alis utrinque in brachium erectum productis, brachiis aristatis $\frac{1}{2}$ mm. longis; clinandrium postice truncatum et in dentem brevem productum antice (rostellum) rotundatum.

HAB. Nantō : Shojōdaizan, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1239).

In referring this plant to the genus *Bulbophyllum*, I am following Mr. R. A. ROLFE who has advised me that the genus *Cirrhopetalum* merges so imperceptibly into *Bulbophyllum* that the two are now regarded as indistinguishable.

Chrysoglossum BLUME.

Chrysoglossum formosanum HAYATA sp. nov. Rhizoma repens, caulibus brevibus leviter incrassatis 1-foliatis. Folia petiolata 25 cm. longa oblonga $6\frac{1}{2}$ cm. lata utrinque acuta basi in petiolum attenuata plicato-venosa utrinque glabra, petiolis gracilibus 20 cm. longis. Scapi aphylli basi vaginati 50 cm. longi validiusculi, racemis laxifloratis 15 cm. longis, pedicellis 1 cm. longis, bracteis ovato-lanceolatis $1\frac{1}{2}$ cm. longis scariosis. Flores medioeres 1 cm. longi, pedicellis (cum ovario) 1 cm. longis. Sepala subæquilonga, erecto-incurvata, lanceolato-angustata, 13 mm. longa 3 mm. lata apice obtusa basi non contracta 3-nervia, posticum liberum, lateralia basi paullo latiora, cum pede columnæ in mentum breve saccatum connata, saccis 1 mm. longis. Petala sepalo postico subsimilia. Labellum basi cum pede columnæ continuum erectum, cruciforme cum ungue 8 mm. longum 7 mm. latum, unguis 2 mm. longus alatus, alis crispatis; lamina explanata 3-lobata, lobo medio rotundato 3 mm. lato margine incurvo, lobis lateralibus transverse divaricatis oblongis 3 mm. longis obtusis; discus 3-lamellatus, lamellis 1 mm. latis undulatis. Columna erecta leviter arcuata semiteres 6 mm.

longa medio 2-cornuta deorsum 2-alata basi in pedem brevem producta ima basi 2-auriculata, auriculis minutis. Clinandrium postice prominens, antice (rostellum) 2-lobatum, lobis albo-marginatis. Anthera terminalis, opercularis, incumbens, late obtriangularis antice truncato-mucronata discrete 2-ocularis, ultra loculos breviter producta; pollinia 2 cerea in quoque loculo solitaria, collateralia angulato-globosa inappendiculata libera.

HAB. Nantō: Tokunkei, leg. T. KAWAKAMI et U. MORI, Juli, 1907, (No. 3490).

Near *C. erraticum*, but differs from it in the shape of the claws of the lips.

Collabium BLUME.

Collabium formosanum HAYATA sp. nov. Herba terrestris rhizomate longe repente, internodiis 4 cm. longis. Folia secus rhizomata solitaria ovata 10 cm. longa 4-5 cm. lata apice acuta basi abrupte contracta ad petiolum attenuata cum petiolis articulata plicato-venosa, petiolis 2 cm. longis incrassatis basi vagina longa scariosa inclusis. Scapi e rhizomate erecti elati 25 cm. longi graciles simplices aphylli basi vaginati, racemis 5 cm. longis laxe floratis. Flores majusculi 2 cm. longi breve pedicellati secus rhachin laxe dispositi, bracteis membranaceis angustis 5 mm. longis. Sepala subæquilonga, posticum liberum spathulato-lineare 17 mm. longum $2\frac{1}{2}$ mm. latum apice acutum, lateralia basi cum pede columnæ in mentum 5 mm. longum $1\frac{1}{2}$ mm. latum calcariforme connata, calcar 5 mm. longo. Petala sepalo postico similia. Labellum obovato-attenuatum 16 mm. longum basi unguiculatum in pedem columnæ incumbens superne erectum, unguis sursum gradatim dilatatus ad laminam abeuns, lamina obovata 7 mm. lata apice minute serrulata profunde 3-lobata, lobis

lateralibus cum lobo medio convergentibus oblique oblongis 4 mm. longis 3 mm. latis, lobo medio lato apice rotundato 5 mm. longo patente margine lacero-serrulato. Columna erecta 1 cm. longa 1 mm. lata semiteres, basi in pedem 5 mm. longum rectum producta; clinandrium erectum obliquam postice in dentem productum, antice (rostellum) truncatum. Anthera late rotundata 1 mm. longa terminalis, opercularis incumbens, ultra pollinia producta, distincte 2-ocularis; pollinia 2 cerea in quoque loculo solitaria globoso-angulata.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3181).

Eria LINDL.

Eria Corneri REICHB. f. in Gard. Chron. (1878), II. p. 106; FORBES et HEMSL. Ind. Fl. Sin. III. p. 16; MATSUM. et HAYATA Enum. Pl. Formos. p. 409.

HAB. Nantō: Batsushaho, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. a).

DISTRIB. Kwangtung.

OBSERV. Caulis brevis in pseudobulbos incrassatus, bulbis ovoideis 4 cm. longis $1\frac{1}{2}$ cm. latis apice 2-foliatis basi 2-3-vaginis suffultis. Folia oblongo-lanceolata cum petiolis 23 cm. longa, 4 cm. lata, apice acuminata, basi angustata in petiolum attenuata. Scapi prope apicem pseudobulborum laterales, erecti, racemis 5 cm. longis, floribus mediocribus 8 mm. in diametro. Sepala valde inæqualia, posticum liberum oblongo-angustatum 7 mm. longum $1\frac{1}{2}$ mm. latum, lateralia latiora falcata 3 mm. lata basi valde obliqua pedi columnæ connata mentum 3 mm. longum calcariforme latius formantia. Petala linearia falcata 7 mm. longa $1\frac{1}{3}$ mm. lata apice obtuso-rotundata. Labellum $6\frac{1}{2}$ mm. longum basi con-

tractum cum pede columnæ articulatam in pedem incumbens a medio sursum reflexum patens 3-lobatum, lobis lateralibus erectis rotundatis semioblongis, lobo medio triangulari acuto $2\frac{1}{2}$ mm. lato; discus ab apicem labelli usque ad basin 3-lamellatus, lamellis sursum crispis. Columna 2 mm. longa basi in pedem 4 mm. longum producta.

Pachystoma BLUME.

Pachystoma chinense REICHB. f. BENTH. Fl. Hongk. p. 356; FORBES et HEMSL. Ind. Fl. Sin. III. p. 17; MATSUM. et HAYATA Enum. Pl. Formos. p. 409. Herba terrestris, caulibus simplicibus cum racemis 40 cm. longis gracilibus erectis aphyllis toto longitudine membranaceo-vaginatibus, vaginis 3 cm. longis apice acutis superioribus acuminatis. Racemi simplices 10 cm. longi, floribus mediocribus 12 mm. longis (præter ovarium) in alabastro erectis post anthesin cernuis vel pendulis, ovaribus et pedicellis brevissime villosis, pedicellis $\frac{1}{2}$ cm. longis, bracteis angustis membranaceis fere hyalinis 1 cm. longis 3 mm. latis acuminatis. Sepala æquilonga extus hirsuta intus glabra erecta conniventia, posticum oblongum 1 cm. longum $3\frac{1}{2}$ mm. latum apice acutum, lateralia basi obliqua pedi columnæ brevissimo adnata. Petala sepalo postico æquilonga angustiora oblanceolata $9\frac{1}{2}$ mm. longa $1\frac{1}{2}$ mm. lata apice obtusa. Labellum pedi columnæ affixum eique basi adnatum nunc erectum ovatum in circumscriptione 9 mm. longum 6 mm. latum 3-lobatum, lobo medio 3 mm. longo 2 mm. lato, lobis lateralibus brevibus oblongis erectis; discus medio laminae carnosulo-lamellatus, lamellis hirtellis cristis minutis instructis. Columna erecta longiuscula 6 mm. longa arcuata subteres basi in pedem brevissimum producta superne clavato-dilata.

HAB. Nantō : Shashizan, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3735).

DISTRIB. Kwangtung, Hongkong.

The present plant is a little different from the Chinese in the shape of lips. In our plant, two lateral nerves of the middle lobe of the lip are strongly crested which unite together at the apex, while the central nerve is very thin and not crested. In the Chinese plant, the middle lobe of the lip has 3-5 nerves which are equally crested.

Spathoglottis BLUME.

Spathoglottis plicata BLUME "Bijdr. p. 401, t. 76."

HAB. Kōtōshō, leg. T. KAWAKAMI et U. MORI, 1907, (No. 2451).

DISTRIB. Malaya.

Phajus LOUR.

Phajus gracilis HAYATA sp. nov. Caules 40-50 cm. longi, racemis a basi caulium emergentibus. Folia elongata plicata in petiolum longum contracta, laminis obovato-oblongis 20 cm. longis $6\frac{1}{2}$ cm. latis apice obtuse acuminatis basi distincte contractis, petiolis 2-3 cm. longis basi vaginatis, vaginis 8 cm. longis striatis. Racemi cum pedunculis 30 cm. longis erecti graciles, partibus floriferis 8 cm. longis laxifloratis, bracteis oblongo-lanceolatis $1\frac{1}{2}$ cm. longis, floribus majusculis $3\frac{1}{2}$ cm. longis (præter ovarium). Sepala libera patentia, posticum angustatum $3\frac{1}{2}$ cm. longum 1 cm. latum utrinque obtusum, lateralia postico breviora oblonga 3 cm. longa 1 cm. lata apice plicato-acuta basi obliqua latere inferiore obscure auriculata. Petala sepalo postico

angustiora spathulata, 3 cm. longa 6 mm. lata apice obtusa basi attenuata. Labellum erectum cucullatum 28 mm. longum 25 mm. latum (expanso) basi in calcar rectum 1 cm. longum productum 3-lobatum, lobis lateralibus amplis erectis columnam involventibus apice undulatis, lobo medio expanso latiore $1\frac{1}{2}$ cm. lato 8 mm. longo patente margine undulato apice emarginato-2-lobulato, prope sinus lamellato-tuberculato, lamellis medio incrassatis hirsutis cæterum glabris. Columna longiuscula 2 cm. longa 2-alata apice clavata, alis latioribus.

HAB. Kōshūn: Botansha, leg. G. NAKAHARA, DC. 1906, (No. 788).

Near *P. philippinensis* N. E. BROWN, but differs from it by the much longer spurs and the oblong blades of leaves; from *P. tetragonus* REICHB. f. and *P. luridus* THW., by the larger flowers with much longer spurs; from *P. maculatus* LINDL. by the smaller flowers with longer slender spurs. The present plant is nearest *P. mishmensis* REICHB. f., but differs from it in having smaller flowers with narrower lips.

Bletia R. et Pav.

Bletia formosana HAYATA sp. nov. Herba 30-40 cm. alta, caulibus e rhizomate repente erectis ima basi leviter incrassatis, basi foliosis a medio sursum aphyllis. Folia plana angusta sessilia cum vagina articulata, laminis linearibus apice acuminatis 20-30 cm. longis 1 cm. latis membranaceis 3-costatis utrinque glabris costis subtus prominentibus, vaginis 5-7 cm. longis cum laminis oblique articulatis. Flores masculi 1-2 cm. longi, in racemum terminalem laxum simplicem dispositi, racemis 10 cm. longis, bracteis conspicuis ovarium in longitudine æquantibus, ante anthesin distichum imbri-

catis lanceolatis scariosis $1\frac{1}{2}$ cm. longis alabastrum florum amplectantibus. Sepala subæqualia libera recto-patentia lanceolata multinervia acuta 16 mm. longa 4 mm. lata. Petala sepalis similia. Labellum ad basin columnæ erectum oblongum sepalis æquilongum 16 mm. longum 7 mm. latum apice emarginato-mucronatum obscure 3-lobatum, lobis lateralibus columnam amplectantibus integris, medio latiore patente margine undulato a basi usque ad prope apicem 5-lamellato-striato, lamellis cristatis. Columna longiuscula 12 mm. longa, cum alis 4 mm. longis suberecta, leviter arcuata, complanata utrinque anguste alata, (alis $1\frac{1}{2}$ mm. latis); pes 0. Capsula oblongo-linearis basi attenuata apice truncata.

Clinandrii lobus posterior rotundatus, dentifer, 1 mm. longus, utrinque latere 1-nervius, anterior (rostellum) rotundatus 1 mm. longus 2 mm. latus integer. Anthera terminalis orbicularis $1\frac{1}{2}$ mm. in diametro opercularis incumbens discrete 2-ocularis, connectivo lato apice 2-lobato; pollinia 8, non satis nota.

HAB. Giran, leg. T. KAWAKAMI et U. MORI, Juni. 1906, (No. 1335); Nantō: Mandaikei, leg. T. KAWAKAMI et U. MORI, Jan. 1908, (No. 6277).

Near *Bletia hyacinthina* R. BR., but differs from it by the much smaller-flowers and by the leaves spreading from the base of the stem.

Bletia morrisonicola HAYATA sp. nov. Herba erecta tenuis, caulibus 20 cm. longis gracilibus, pseudobulbis globosis 8 mm. latis. Folia pauca elongata linearia 20 cm. longa 7 mm. lata apice acuminata plicata basi attenuata, in petiolum contracta, vaginis 3-4 cm. longis cum laminis obscure articulatis. Racemus terminalis 6 cm. longus, (bracteis parvis scariosis 8 mm. longis ante anthesin imbricatis), laxe floratus simplex. Flores fere sessiles. Sepala libera erecta-patentia subæqualia angustata 15 mm. longa 4 mm. lata apice acuta basi angustiora. Petala sepalo postico æquilonga

sed angustiora 3 mm. lata. Labellum basi columnæ suberectum basi contractum oblongum 11 mm. longum 5 mm. latum 3-lobatum, lobis lateralibus semioblongis parallelis integris angustatis columnam non amplexantibus; medio latiore $4\frac{1}{2}$ mm. lato $2\frac{1}{2}$ mm. longo emarginato; discus lamellis 5 denticulato-crispis instructus. Columna elongata semiteres leviter arcuata, utrinque alata, 11 mm. longa cum alis $2\frac{1}{2}$ mm. lata, alis 1 mm. latis; pes 0.

Clinandrium lobo posteriore late rotundato emarginato, lobis lateralibus minutis, lobo anteriore (rostello) horizontaliter patente-incurvato late rotundato; anthera denti postico clinandrii affixa, opercularis incumbens, distincte 2-ocularis, oculis imperfecte 2-locellatis; pollinia 8, in quoque loculo 4.

HAB. in monte Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI et U. MORI, Nov. 1906, (No. 2311).

Bletia kotōensis HAYATA sp. nov. Caulibus 50 cm. longis erectis ima basi leviter incrassatis, basi foliosis, a basi sursum aphyllis. Folia plana angusta sessilia cum vagina articulata, laminis lanceolatis 30 cm. longis 3-4 cm. latis utrinque 3-4-costatis costis subtus prominentibus, utraque pagine glabris apice acuminatis basi angustatis, in vaginam attenuatis, vaginis 6 cm. longis ore obliquis cum laminis oblique articulatis. Flores majusculi 1-2 cm. longi, in racemum terminalem 20 cm. longum pauce ramosum laxè dispositi, bracteis conspicuis ovarium in longitudine æquantibus, ante anthesin arete imbricatis, lanceolato-oblongis scariosis $1\frac{1}{2}$ cm. longis $\frac{1}{2}$ cm. latis, alabastrum florum amplexantibus. Sepala subæqualia libera recto-patentia lanceolata 22 mm. longa 5 mm. lata multinervia acuta. Petala sepalis similia. Labellum ad basin columnæ erectum oblongum sepalis brevius, 16 mm. longum 8 mm. latum apice rotundatum brevissime acutum 3-lobatum, lobis lateralibus columnam subamplexantibus margine integris obtusis, medio latiore 5 mm. longo totiusque lato, margine

profunde undulato, a prope apicem usque ad basin medio 5-lamellato-striato, lamellis undulatis cristatis 1 mm. atis circ. 13 mm. longis. Columna longiuscula 12 mm. longa cum alis $3\frac{1}{2}$ mm. lata, semiteres, utrinque alata, (alis $1\frac{1}{2}$ mm. latis); pes 0.

Clinandrium lobo posteriore late rotundato $1\frac{1}{2}$ mm. longo 2 mm. lato apice tenuiter 2-lobato obscure denticulato vel subintegro; lobo anteriore (rostello) rotundato lato horizontaliter recurvo. Anthera terminalis orbicularis 1 mm. in diametro opercularis incumbens discrete 2-locularis, connectivo lato apice emarginato. Pollinia 8, non satis nota.

HAB. Kōtōshō, leg. T. KAWAKAMI et U. MORI, Aprili. 1907, (No. 2452).

Pleione DON.

Pleione formosana HAYATA sp. nov. Caulis 25 cm. longus inferne vaginatus. Folia oblanceolata 15 cm. longa 2.5 cm. lata apice acuta basi attenuata in vaginam obeuntia plicata 5-costata utrinque glabra inter costas 5-vena, venis parallelis, inferiore vaginis aphyllis superiore gradatim foliatis, vaginis tubiformibus, 5-10 cm. longis circ. 10-nerviis, nervis sursum anastomosantibus. Racemi 2-3 vel pauci-florati, floribus majusculis circ. 5 cm. longis breve pedicellatis, bracteis angustis 4 cm. longis. Sepala æqualia spathulata 5 cm. longa 11 mm. lata apice rotundato-acuta basi angustata 7-nervia. Petala sepalis subsimilia sed plus minus longiora et angustata $5\frac{1}{2}$ cm. longa 7 mm. lata. Labellum basi columnæ affixum subpatens late ovatum 5 cm. longum 42 mm. latum sursum rotundatum deorsum acutum apice emarginatum 2-lobulatum basi contractum columnam subamplectans, margine a medio deorsum integerrimum sursum fimbriatum; discus 4-lamellatus, 2-lamellis centralibus 4 cm. longis $1\frac{1}{2}$ mm. latis, 2-lateralibus brevioribus 3 cm. longis 1 mm. latis dentiformibus,

undulatis. Columna elongata apice leviter arcuata 3 cm. longa 4 mm. lata complanata apice latere alata.

Clinandrium latissimum 8 mm. latum, lobo posteriore obscure 3-lobato, anteriore (rostello) latiore rotundato 4 mm. lato, $3\frac{1}{2}$ mm. longo horizontaliter patente. Anthera a denti postico clinandrii affixa, incumbens. Pollinia non satis nota.

HAB. Nanō: Hyahōsha, Igiris, ad 6000 ped. alt., leg. U. MORI, Aprili. 1909, (No. 16).

Near *Pleione pogonioides* KRÄNZL. = *Cælogyne pogonioides* ROLFE.

Calanthe R. BR.

Calanthe arisanensis HAYATA sp. nov. Caulibus 2-3-foliatis, in pseudobulbos incrassatis, pseudobulbis 1 cm. longis. Folia pauca lanceolata 30 cm. longa 4 cm. lata acuminata basi gradatim attenuata ad petiolum vaginatum abeuntia plicato-venosa glabra inferiore vaginis aphyllis 5 mm. longis. Scapi e rhizomate erecti, 50 cm. longi. Racemi simplices, laxe pauceque florati, bracteis lanceolatis 1 cm. longis. Sepala subæqualia libera patentia, posticum acuminato-ovatum 22 mm. longum 9 mm. latum apice acuminatum, (acuminibus filiformibus 2-3 mm. longis), basi rotundatum contractum, lateralibus longioribus 25 mm. longis. Petala sepalis subsimilia ovato-lanceolata 18 mm. longa 5 mm. lata apice acuminata basi angustata. Labelli unguis cum columna in tubum cylindraceum 5 mm. longum connatus, ima basi in calcar 10 mm. longum leviter incurvum productus; lamina patens, late rotundata basi truncata 13 mm. longa 20 mm. lata profunde 3-loba, sinibus inter lobos rotundatis, lobo medio rotundato basi angustato contracto 8 mm. longo 10 mm. lato emarginato ad sinus aristato, (aristis 2 mm. longis), margine undulato, lobis lateralibus auriculiformibus 1 cm. longis 5 mm. latis margine undulatis latere

inferiore truncatis. Discus supra laminam 3-callosolamellatus, lamellis cristatis. Columna brevis erecta 8 mm. longa apoda intus pilis retrorsis hirsuta, alis usque ad apicem extensis cum ungue labelli connatis. Clinandrium membranaceum, profunde excavatum.

HAB. Arizan, leg. U. MORI, Mart. 1908, (No. 3609).

Calanthe brevicolumna HAYATA sp. nov. Caulis brevis incrassatus 1-2-foliatus. Folia sessilia oblanceolata 35 cm. longa 8 cm. lata apice acuta basi attenuata. Scapi aphylli vel 1-foliati vel vaginati, 70 cm. longi validiusculi, racemis densifloratis 10 cm. longis, bracteis ovatis 2 cm. longis 6 mm. latis. Flores mediocrini 2 cm. in diametro, pedicellis 5 mm. longis. Sepala æqualia erecto-patentia, ovata 9 mm. longa 6 mm. lata apice obtusa basi contracta. Petala sepalis angustiora oblongo-angustata 1 cm. longa 3 mm. lata apice truncata basi angustata. Labellum sepalis longius, (unguis cum alis columnæ in tubum connatus tubo late campanulato 3 mm. in diametro), ima basi in calcar 6 mm. longum $1\frac{1}{2}$ mm. latum productum, calcar subrecto; lamina patens obovata in circumscriptione, 8 mm. longa 5 mm. lata 3-lobata, lobo medio longiore 6 mm. longo apice divaricato-2-lobulato, (lobulis oblongo-truncatis), basi cuneato, lobis lateralibus minoribus oblique oblongis antice falcatis apice obtusis 3 mm. longis $1\frac{1}{2}$ mm. latis; discus callosolamellatus basi labelli 3-seriatim dispositus. Columna brevis 3 mm. longa. Clinandrium excavatum; rostellum 2-lobatum, lobis oblongis obtusis; anthera rotundata antice breve acuta. Pollinia 8 elongato-ovata apice acuminata, caudiculis brevissimis.

HAB. Taitō: Bataian, leg. T. KAWAKAMI, Aprili. 1907.

Near *C. herbacea* LINDL., but differs from it in having much shorter spurs, and in the lips, sepals, and in many other points.

Calanthe elliptica HAYATA sp. nov. Caulibus brevibus in pseudo-bulbum late globosum 5 mm. longum incrassatis unifoliatis. Folia oblonga 18 cm. longa $6\frac{1}{2}$ cm. lata apice breve acuta basi abrupte angustata ad petiolum vaginatum 9 cm. longum abeuntia utrinque glabra plicato-plana. Scapi 30-40 cm. longi basi 3-4-vaginis instructi, vaginis apice foliaceis circ. 10 cm. longis, racemis laxifloratis, bracteis lanceolatis minutis 4 mm. longis. Flores majusculi 2 cm. in diametro æquantes. Sepala æqualia libera oblonga 15 mm. longa 6 mm. lata apice acuminata basi contracta. Petala oblongo-lanceolata 12 mm longa 4 mm. lata basi angustata truncata extus hirtellata. Labelli unguis basi columnæ alis in tubum late campanulatum connatus, ima basi gradatim angustatus in calcar 17 mm. longum productus; lamina elobata late rotundata 7 mm. longa 1 cm. lata margine crispata apice emarginato-mucronata; tubus et calcar extus hirtellati intus pilosi; discus calloso-lamellatus, lamellis 1 mm. latis 4-5 mm. longis incrassatis.

Clinandrium profunde excavatum, cavea intus hirsuta 5 mm. profunda, lobo posteriore oblique truncato, anteriore (rostello) erecto 2-lobato, lobis acutis dentiformibus. Pollinia non satis nota.

HAB. Shintiku: Gakōkei, leg. T. KAWAKAMI et K. WATANABE, Aprili, 1908.

The flowers of the present plant are very near *C. arisanensis*; but distinguishable by its leaves.

Calanthe graciliflora HAYATA sp. nov. Folia 2-3 oblongo-spathulata cum vaginis 30 cm. longa $6\frac{1}{2}$ cm. lata apice acuminata basi gradatim attenuata ad vaginam abeuntia utrinque glabra plicato-plana. Scapi graciles 60 cm. longi, racemis laxifloratis, floribus mediocribus $3\frac{1}{2}$ cm. in diametro, bracteis lanceolatis scariosis 1 cm. longis tenuibus, pedicellis gracilibus 1 cm. longis,

petalis et sepalis valde postice reflexis, labello antice horizontaliter patente. Sepala subæqualia oblongo-lanceolata 2 cm. longa 6 mm. lata apice aristato-acuminata basi leviter contracta 5-nervia, extus breve hirtellata. Petala sepalis angustiora oblanceolata apice acuta basi attenuata 18 mm. longa 4 mm. lata 3-nervia. Label- lum antice patens, unguis cum alis columnæ in tubum connatus, tubo angusto (ore 2 mm. in diametro intus hirtellato) ima basi attenuato in calcar 12 mm. longum 1 mm. latum producto, calcaribus extus et intus hirtellato; lamina rotundata in ambitu, 1 cm. longa totiusque lata 3-lobata, lobo medio angusto 5 mm. longo 2 mm. lato apice emarginato-aristato, aristis 1 mm. longis desuper reflexis lobis lateralibus quadrangulati-rotundatis 4 mm. longis totiusque latis oblique divaricatis; discus calloso-lamellatus, lamellis 3. Columna brevis 5 mm. longa clavata.

Clinandrium excavatum, lobo posteriore truncato, anteriore (rostello) 2-lobato, lobis dentiformibus. Anthera opercularis incumbens, postice cordata antice acuminata 3 mm. longa distincte 2-loculata, loculis distincte 2-locellatis. Pollinia 8 subcomplanata elongato-ovata apice attenuata $1\frac{1}{2}$ mm. longa caudiculis connata, caudiculis 1 mm. longis.

HAB. Nanō, Kimmonsha, ad 3200 ped. alt., Aprili. 1909, (No. 15), leg. U. MORI.

Near *C. Henryi* ROLFE., but differs from it by the much narrower leaves and by the lips with very much divaricate side-lobes which are inserted at nearly 90°. In the other species they are inserted at an acute angle and nearly as long as the middle lobe.

Calanthe Kawakamii HAYATA sp. nov. Caulis brevis in pseudobulbum late globosum 1 cm. longum incrassatus basi vaginatus supra basin foliatus. Folia oblonga 20 cm. longa 9 cm. lata apice breve acuta basi abrupte ad vaginam contracta plicato-plana. Scapi 40-50 cm. longi graciles basi foliati vel aphylli vaginati,

racemis laxe floratis, floribus breve pedicellatis, bracteis lanceolatis 1 cm. longis. Flores majusculi, $3\frac{1}{2}$ cm. longi, pedicellis 5 mm. longis. [Sepala inaequalia extus brevissime hirtellata, posticum majus ovato-oblongum 33 mm. longum 15 mm. latum apice breve cuspidato-acutum basi contractum, lateralia angustiora oblongo-lanceolata 3 cm. longa 1 cm. lata apice obtuse acuminata basi angustata. Labelli unguis alis columnæ in tubum campanulatum (ore 5 mm. in diametro) connatus, ima basi in calcar 7 mm. longum rectum productus, lamina patens 2 cm. longa totiusque lata profunde 3-lobata, lobo medio obovato-oblongo 13 mm. longo 9 mm. lato apice emarginato ad sinus breve aristato basi angustato, lobis lateralibus divaricatis cultriformibus $1\frac{1}{2}$ cm. longis 8 mm. latis apice rotundatis; discus 4-lamellatus, lamellis supra medium laminarum sitis, 2-lateralibus a medio deorsum intus dense pilosis. Columna lata brevis 8 mm. longa, alis cum ungue labelli connatis.

Clinandrium profunde excavatum oblique truncatum, lobo anteriore (rostello) oblique erecto 2-lobato, lobis dentiformibus; anthera ad apicem membranarum posteriorum clinandrii affixa incumbens cordato-ovata apice obtuse acuminata 7 mm. longa 4 mm. lata 2-ocularis. Pollinia 8, in quoque loculo 4, cerea oblonga plus minus complanata apice attenuata basi rotundata circ. $2\frac{3}{4}$ mm. longa apice caudiculis connata, caudiculis filiformibus $2\frac{1}{2}$ mm. longis.

HAB. Shintiku: Gakokeizan, leg. T. KAWAKAMI et K. WATANABE, Aprili. 1907.

Calanthe okinawensis HAYATA sp. nov. Caulis? Folia pauca ovato-lanceolata cum petiolis 30 cm. longa $6\frac{1}{2}$ cm. lata apice acuminata basi gradatim attenuata ad petiolum vaginiformem abeuntia plicato-venosa glabra vel parcissime hirsuta. Scapi circ. 70 cm. longi graciles aphylli tenuiter pubescentes, (pilis brevissimis patentibus), inferiore remotissime squamati, (squamis obtuso-ovatis amplexicaulibus tenuibus glabris 1 cm. longis),

superiore villosi racemosi. Racemi laxe florati 5-6 cm. longi, floribus longe pedicellatis bracteatis, bracteis ovatis hirsutis acutis 1 cm. vel $\frac{1}{2}$ cm. longis, pedicellis (cum ovariis) 3 cm. longis, floribus apertientibus $3\frac{1}{2}$ cm. in diametro. Sepala æquilonga oblongo-obovata 2 cm. longa 8 mm. lata apice cuspidato-acuminata basi leviter angustiora, iis lateralibus angustioribus. Petala sepalis plus minus breviora obovata 16 mm. longa 8 mm. lata apice rotundato-apiculata basi cuneato-acuta. Labelli unguis alis columnæ connatus, basi in tubum campanulatum (ore $2\frac{1}{2}$ mm. in diametro) ima basi in calcar filiforme 2 cm. longum 1 mm. latum rectum vel leviter recurvatum productus; lamina patens 12 mm. longa 13 mm. lata 3-lobata, lobo medio majusculo elongato-flabelliformi apice 13 mm. lato basi 3 mm. lato margine eroso-denticulato apice 2-lobulato, lobulis latere interiore imbricatis 2 mm. longis, rotundatis, lobis lateralibus minimis angustatis 6 mm. longis, 2 mm. latis apice obtuso-truncatis. Discus callosus 3-lamellatus ad basin laminarum situs, lamellis 2-3 mm. longis 1 mm. latis. Columna lata brevissima 3 mm. longa. Ovarium angusto-cylindricum $1\frac{1}{4}$ mm. in diametro, sulcatum hirsutum basin ad pedicellum abeuns, cum pedicellis 3 cm. longum.

HAB. Okinawa, leg. Y. TASHIRO, 1887, Mart. (No. 18); Tanegashima, leg. S. TANAKA, 1891, Sept.

This plant is very near *C. japonica*, but differs from it in having obovate petals and much smaller bracts.

Eulophia R. BR.

Eulophia ramosa HAYATA sp. nov. Caulis circ. 50 cm. longus, glaber angulatus striatus basi squamatus, (squamis amplexicaulis ovatis acutis 15 mm. longis), superiore racemosus. Folia (KAWAKAMI No. 6281) inferiora lanceolato-lineariter 20 cm. longa 6 mm. lata

basi amplexicaulia ad vaginam attenuata, superiora minora, linearia 3-6 cm. longa amplexicaulia plicata. Racemi 20-25 cm. longi pauci-ramosi, ramis gracilibus erectis. Flores erecto-ascendentes 15 mm. longi, pedicellis cum ovario 15 mm. longis, bracteis ovatis acuminatis pedicellum amplectantibus 7 mm. longis. Sepala æquiformia lanceolato-angustata 12 mm. longa $2\frac{1}{2}$ mm. lata, apice acuta, basi leviter angustata erecta. Petala sepalis latiora plus minus breviora 11 mm. longa $3\frac{1}{2}$ mm. lata lanceolato-obovata apice acuta erecta. Labellum a basi columnæ erectum obovatum, sepalum in longitudine æquans, 11 mm. longum 8 mm. latum, inter sepala lateralia in calcar gibbosum 2 mm. longum ad apicem leviter contractum productum, supra basin contractum, 3-lobatum, lobis lateralibus erectis columnam amplectantibus latissimis margine latere integris antice eroso-denticulatis apice obtusis lobo centrali patente globoso-obovato 4 mm. longo 5 mm. lato apice rotundato-truncato basi leviter contracto ad basin 3 mm. lato. Discus medio a basi labellorum usque ad medium 3-lamellatum, lamellis utrinque ramosis, etiamque ad paginam lobi centralis a medio usque ad prope apicem fimbriato-cristatus. Columna brevis crassa apoda sæpius 2-alata. Ovarium cylindricum sulcatum 6 mm. longum.

HAB. Nōkōzan, leg. T. KAWAKAMI et U. MORI, 1908, Jan. (No. 6281).

The present species is near *E. taiwanensis* HAYATA, from which it differs in having branched inflorescence and smaller flowers with slightly denticulate lips.

Eulophia taiwanensis HAYATA sp. nov. Caulis foliatus basi in pseudobulbos oblongos 2 cm. longos incrassatus. Folia linearia 50-60 cm. longa 5-6 mm. lata ad apicem caulis 2-4 disposita.

Scapi aphylli erecti 40 cm. longi ima basi vaginati, vaginis imbricatis 3 cm. longis apice obtusis ore fissis, inferiore squamati, squamis ovato-acuminatis 2-3 cm. longis 7-8 mm. latis amplexi-caulibus, membranaceis, apice racemosi. Racemi simplices 5-6 cm. longi, (bracteis lanceolatis $1\frac{1}{2}$ cm. longis acuminatis), laxiflorati. Flores suberecti circ. 1 cm. longi longe pedicellati, pedicellis cum ovario $1\frac{1}{2}$ cm. longis gracillimis. Sepala æquiformia angustata 12 mm. longa 3 mm. lata apice acuto-obtusa basin æquilata. Petala sepalis minora angustata 11 mm. longa $2\frac{1}{2}$ mm. lata apice acuta basi leviter contracta vel æquilata. Labellum a basi columnæ suberectum 1 cm. longum, basin inter sepala abrupte in calcar cylindricum 4 mm. longum rectum productum, 3-lobatum, lobis lateralibus subintegris latere exteriori 7 mm. longis, latere interiori 1 mm. longis apice obtusis labello circ. adnatis. lobo centrali patente obovato-globo 5 mm. longo totiusque lato apice rotundato, margine alte-denticulato, dentibus $\frac{1}{2}$ mm. longis obtusis patentibus. Discus a basi labellorum 3-lamellatus, lamellis integris, a medio labellorum cristatus, cristis 3-seriatim dispositis, a medio sursum fimbriato-cristatus, cristis 3-5-seriatim dispositis 1- $1\frac{1}{2}$ mm. longis. Columna 5 mm. longa. Ovarium cylindricum 5 mm. longum sulcatum.

HAB. Taitō : Takai, leg. T. KAWAKAMI et G. NAKAHARA, Jan. 1906, (No. 684) ; Akō : leg. T. KAWAKAMI et U. MORI, 1906, (No. 1087).

The present orchid greatly differs from *E. formosana* ROLFE. in having much smaller flowers with much narrower sepals and petals. It may perhaps be the same as a specimen at Kew, labelled "HENRY, No. 560, China."

Cymbidium Sw.

Cymbidium formosanum HAYATA sp. nov. Folia longissima linearia 30-40 cm. longa 8 mm. lata apice acuta basi longe attenuata coriacea 3-costata, costis subtus elevatis, venis utrinque elevatis. Scapi graciles 15 cm. longi ad basin caulis oriundi, simplices ad totam longitudinem vaginati, vaginis laxis alternis scapum amplectantibus, lanceolatis 6 cm. longis 5-7 mm. latis acuminatis. Flores ad apicem scapi solitarii majusculi 5 cm. in diametro breviter pedicellati, bracteis vaginis similibus sed minoribus. Sepala subæqualia libera patentia, posticum lanceolatum 4 cm. longum 7 mm. latum acutum basi non contractum sed leviter angustatum, lateralia angustiora $3\frac{1}{2}$ cm. longa 5 mm. lata apice oblique breve acuta. Petala sepalis breviora latioraque oblonga 25 mm. longa 9 mm. lata apice acuta. Labellum ad basin columnæ sessile subrectum oblongum 19 mm. longum 6 mm. latum basi concavum 3-lobatum, lobis lateralibus latiusculis semi-oblongis 1 cm. longis 4 mm. latis apice obtusis erectis, columnam laxè amplectantibus, lobo medio patente recurvo indiviso longe rotundato 1 cm. longo $6\frac{1}{2}$ mm. lato apice rotundato-mucronato, disco 2-lamellato, lamellis 1 cm. longis a basi usque ad apicem lorum lateralium. Columna longiuscula 12 mm. longa 3 mm. lata semiteres arcuata anguste alata apoda. Anthera terminalis opercularis incumbens late semiglobosa 1-ocularis antice truncato-emarginata.

HAB. AKŌ: Raisha, leg. G. NAKAHARA, ad 3000 ped. alt., Jan. 1907.

Near *C. Leachianum* REICHB. f., but differs from it in having longer sheath-like bracts. Also near a specimen at Kew labelled "HENRY No. 1352."

Sarcochilus R. BR.

Sarcochilus formosanus HAYATA sp. nov. Herba epiphytica, caulibus foliatis abbreviatis 1 cm. longis. Folia carnosa alterna disticha approximata lanceolata 4 cm. longa 7 mm. lata apice acuta leviter falcata basi tortuosa cum vaginis articulata decidua. Pedunculi laterales 5 cm. longi erecti graciles apice 3-5-florati medio 1-bracteati, floribus sessilibus, bracteis minutis 2 mm. longis. Flores parvi. Sepala patentia libera, posticum oblongum 8 mm. longum 3 mm. latum apice obtusum, lateralia obovata 7 mm. longa 5 mm. lata apice obtusa basi valde obliqua pedi columnæ adnata. Petala sepalo postico subsimilia oblongo-angustata 6 mm. longa 2 mm. lata apice obtusa. Labellum pedi columnæ affixum basi saccatum, (sacco latiusculo 5 mm. longo totiusque lato basi 2-lobulato obtuso), 3-lobatum, lobis lateralibus erectis petaloideis rotundatis 4 mm. latis, lobo medio circ. obsolete vel minimo inter lobos laterales crassiusculo dense hirsuto, prope apicem medio lamellato-appendiculato. Columna erecta $1\frac{1}{2}$ mm. longa.

HAB. Formosa, leg. T. KAWAKAMI et U. MORI.

Near *S. pugionifolius* Hook. f., but differs from it by the 3-lobed-lips. Very like *Sarcochilus* sp. from Manila at Kew, but the flowers look like different. Somewhat near *Dendrocolla alba* RIDL. in its habit, but differs by the obtuse sepals and petals which are nearly equal in length.

Saccolabium BLUME.

Saccolabium formosanum HAYATA sp. nov. Herba epiphytica, caulibus foliatis non pseudo-bulbosis prostratis, vaginis foliorum

persistentibus instructis ad nodos radicanibus. Folia disticha patentia carnosae plana oblonga 2 cm. longa 7 mm. lata apice obtusa brevis apiculata basi in petiolum 2 mm. longum cum vaginis articulatum deciduum contracta, vaginis 5 mm. longis persistentibus caulem obtegentibus. Racemi laterales breves 3 cm. longi pauciflorati, bracteis minutis squamosis, pedicellis 1 cm. longis, floribus mediocribus 13 mm. in diametro. Sepala aequalia libera patentia oblonga 5 mm. longa 3 mm. lata, apice utrinque obtusa concava. Petala patentia sepalo subsimilia, apice rotundata margine exteriori recurvata. Labellum ad basin columnae sessile basi saccatum, saccis majusculis 6 mm. longis totiusque latis, ore contracto 4 mm. in diametro, lamina patente latissima 4 mm. longa 1 cm. lata apice truncata latere divaricata obtusa. Discus ad medium laminae incrassatus hirsutus. Columna brevis $1\frac{1}{2}$ mm. longa 3 mm. lata, rostellum 2-dentatum, dentibus desuper recurvis.

HAB. Arizan, in monte Morrison, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3164).

Somewhat near *S. japonicum* but differs from it in having flowers with longer peduncles. There is none like this at Kew.

Saccolabium pumilum HAYATA in Tōkyō Bot. Mag. XX. p. 76.

Sarcanthus LINDL.

Sarcanthus taiwanianus HAYATA sp. nov. Herba epiphytica, caulibus erectis validis teretibus foliatis non pseudo-bulbosis 25 cm. longis, vaginis persistentibus caulem obtegentibus. Folia disticha carnosae plana late linearia 30 cm. longa 4 cm. lata apice oblique emarginata sessilia cum vaginis articulata, vaginis

persistentibus 5 cm. longis. Paniculæ laterales quasi-axillares validiusculæ recurvæ ramosæ, ramis 5-6 divaricatis validiusculis 4 cm. longis, bracteis minutis squamosis triangularibus. Flores parvi 1 cm. in diametro breve pedicellati flavo-viridescentes intus purpurascens, pedicellis 2-3 mm. longis transverse divaricatis. Sepala libera æqualia patentia carnosula obovato-oblonga 5 mm. longa $3\frac{1}{2}$ mm. lata apice obtusa. Petala sepalo angustiora 4 mm. longa $1\frac{2}{3}$ mm. lata apice rotundata postice reflexa. Labellum basi columnæ affixum continuum patens basi calcaratum, (calcar breve cylindræo 3 mm. longo $1\frac{1}{2}$ mm. lato, ore antice lamina longitudinali semi-diviso, ad os postice latereque calloso-appendiculato), 3-lobatum, lobis lateralibus ad latus calcaris brevis auriculiformibus, lobo medio latiusculo 3 mm. longo 5 mm. lato semiorbiculari apice rotundato margine denticulato medio late calloso-ruguloso patente. Columna breve oblonga subteres 2 mm. longa. Clinandrium truncatum.

HAB. Formosa, leg. T. UCHIYAMA, 1899.

Near *S. formosanus* ROLFE, from which the present plant is distinguishable by the labellum which is trilobed, two lateral lobes being very small, and the terminal one very large, broad, and denticulate on the margin. In *S. formosanus* R., the middle lobe of the lip is again trilobed, while in this new species the middle lobe is not lobed, but minutely denticulate. The present genus is separated from *Saccolabium* (which has no plate in the spur), by the longitudinal plate dividing the mouth of the spur; also from *Cleisostoma* which has a transversal plate covering the mouth of the spur.

Cleisostoma BLUME.

Cleisostoma breviracema HAYATA sp. nov. Herba epiphytica,

caulibus 30-40 cm. longis, flexuosis gracilibus foliatis non pseudo-bulbosis, (internodiis 17 mm. longis complanatis 4 mm. latis), vaginis foliorum deciduorum obtectis. Folia disticha sessilia angusto-lanceolata 8 cm. longa 13 mm. lata apice acuminata basi contracta cum vaginis articulata, (costis supra impressis sulcatis subtus indistinctis), patentia carnosae plana, vaginis persistentibus caulem obtegentibus $1\frac{1}{2}$ cm. longis internodiis æquilongis ore oblongis. Racemi sessiles laterales oppositifolii 5-6-florati floribus transverse divaricatis, bracteis triangularibus incrassatis 2 mm. longis. Flores patentes 14 mm. in diametro omnes crassiusculi. Sepala valde patentia inæqualia libera, posticum angustius oblongo-spathulatum 9 mm. longum $3\frac{1}{4}$ mm. latum apice obtusum basi non contractum, lateralibus latioribus oblique obtusis $7\frac{1}{2}$ mm. longis $4\frac{1}{4}$ mm. latis apice obtusis basi leviter contractis latere inferiore truncatis. Petala sepalo postico similia sed angustiora spathulata 8 mm. longa 3 mm. lata apice obtusa basi attenuata. Labellum basi columnæ affixum basi in saccum 4 mm. longum $2\frac{1}{2}$ mm. latum ore angustum hirtellum intus longitudinaliter indivisum sed ore squama postica integra subclausum productum, (squama erecta angustata 2 mm. longa $\frac{2}{3}$ mm. lata, antice incurva apice truncata postice recurva sub rostello extensa incrassata margine ciliata), 3-lobatum, lobis lateralibus ad latus oris saccæ adnatis minutis obtuse dentiformibus 2 mm. longis, lobo medio erecto late rotundato brevi $2\frac{1}{2}$ mm. longo $3\frac{1}{2}$ mm. lato emarginato brevissime obtuso-mucronato medio leviter excavato. Columna brevis lata $2\frac{1}{2}$ mm. longa totiusque lata exalata basi in pedem brevem producta; clinandrium breve truncatum latere leviter 2-dentatum; lobo anteriore (rostello) desuper recurva 1 mm. longo apice 2-lobato; anthera terminalis opercularis incumbens, antice attenuata, supra pollinia producta; pollinia 4 per

paria conferta cerea inappendiculata, stipite angusto $1\frac{1}{4}$ mm. longo $\frac{1}{2}$ mm. lato hyalino; glandula squamiformis rotundata.

HAB. Formosa, leg. T. UCHIYAMA, 1899.

The genus to which the present species is referred, is separated from *Sarcanthus* by the transversal plate covering the mouth of the spur, and also from *Echioglossum*, by the nearly round glandule. In the latter genus, the glandules are horse-shoe-shaped and the mouth of the spur is narrowed by a thickening of the tissue, which characters, however, do not very distinctly separate the genus from *Cleisostoma*.

Appendicula BLUME.

Appendicula formosana HAYATA sp. nov. Herba epiphytica, caulibus secus rhizoma sæpius confertis multi-foliatis teretibus 25 cm. longis 3 mm. in sectione, vaginis foliorum persistentibus. Folia alterna disticha approximata oblonga $2\frac{1}{2}$ cm. longa 7 mm. lata apice rotundata 2-dentata ad sinus dentium aristata basi tortuosa vix contracta cum vaginis articulata, vaginis 5 mm. longis imbricatis, ore obliquis. Racemi pseudo-axillares breves 5-10 mm. longi 5-10 florati basi dense bracteati recurvati, bracteis oblongo-triangularibus acutis minutis 2 mm. longis, floribus minoribus 3 mm. longis. Sepala subæqualia, posticum liberum oblongo-triangulari $2\frac{1}{2}$ mm. longum $1\frac{1}{2}$ mm. latum apice obtusum, lateralia latiora basi pedi columnæ adnata, mentum calcariforme $1\frac{1}{2}$ mm. longum antice productum formantia superne libera. Petala sepalo postico angustiora oblonga 2 mm. longa $\frac{4}{5}$ mm. lata apice obtusa. Labellum ad apicem pedis columnæ basi contractum articulatum incumbens medio reflexum superne patens apice rotundatum $1\frac{2}{3}$ mm. latum integrum; discus liguliformis callosus a medio

deorsum pendulus. Columna brevis 1 mm. longa totiusque lata. Pollinia 8 oblonga apice attenuata.

HAB. Formosa, leg. T. UCHIYAMA, 1896.

Appears to be near *Podochilus reflexus* SCHLECHT., *P. Vieillardii* SCHLECHT., and *P. micranthus* SCHLECHT., but differs from them by the flowers.

Appendicula kotœnsis HAYATA sp. nov. Caulis 20 cm. longus 3 mm. in diametro. Folia alterna disticha oblonga 2 cm. longa 9 mm. lata apice oblique emarginata cum vaginis articulata, vaginis 1 cm. longis imbricatis, ore obliquis. Racemi laterales prope apicem caulium siti, $1\frac{1}{2}$ cm. longi, floribus 10-15 minoribus, 2 mm. in diametro, bracteis minutis 2 mm. longis. Sepala inæqualia, posticum liberum sed basi brevissime cum iis lateralibus connatum oblongo-triangulare 1 mm. longum 1 mm. latum apice obtusum basi dilatatum, lateralia latiora æquilonga basi pedicolumnæ adnata mentum breve latius $\frac{2}{3}$ mm. longum formantia, superne libera. Petala sepalo postico æquilonga angustiora 2 mm. longa $\frac{2}{3}$ mm. lata apice obtusa basi angustata. Labellum ad apicem pedis columnæ basi contractum articulatum gibbosum incumbens a medio sursum patens valde reflexum basi auriculatum intus 2-foveolatum medio contractum sursum expansum rotundatum apice obtusum margine irregulariter denticulatum vel subintegrum; discus prope basin labelli situs collosus minor. Columna brevissima $\frac{1}{4}$ mm. longa basi in pedem $\frac{1}{2}$ mm. longam producta. Pollinia 8 oblonga apice attenuata.

HAB. Kōtōshō, leg. T. KAWAKAMI et U. MORI, Aug. 1906, (No. 5802).

Vanilla SW.

Vanilla Griffithii REICHB. f. ? R. A. ROLFE Rev. Gen. Vanilla, in Journ. LINN. Soc. XXXII. p. 458.

HAB. Tōyen : Sōkaku, leg. T. KAWAKAMI et U. MORI, 1907, Mart. (No. 2799).

There is at Kew a specimen exactly the same as this, which specimen is mentioned in the paper above cited, with the following note : “ A specimen collected at Bankingsing in the island of Formosa, (leg. Dr. A. HENRY, No. 479), has the inflorescence and bracts remarkably like *V. Griffithii*.”

Anætochilus BLUME.

Anætochilus Roxburghii LINDL. Gen. et Sp. Orch. p. 449 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 42 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 415.

HAB. Shintiku : Goshizan, leg. T. KAWAKAMI, 1905, Dec. (No. 1307).

DISTRIB. South China, and Tropical Himalaya.

Goodyera R. BR.

Goodyera albo-reticulata HAYATA sp. nov. Caulis erectus 15 cm. longus gracilis inferiore foliatus. Folia alterna petiolata ovata 4½ cm. longa 2 cm. lata apice acuta basi rotundata ad petiolum contracta supra eleganter albo-reticulata, petiolis 1½ cm. longis a medio ad basin dilatatis caulem amplectantibus. Flores in spicis laxis dispositi, spicis 5 cm. longis, bracteis lanceolato-ovatis 7 mm. longis 2 mm. latis acuminatis. Sepala petalaeque ignota. Capsula sessilis, ovato-oblonga 9 mm. longa 3 mm. lata.

HAB. Taitō : Botansha, leg. T. KAWAKAMI et G. NAKAHARA, Jan. 1906.

Near *G. Matsumurana* SCHLECHT., but distinguishable by the narrower and longer fruit and much smaller flowers.

Goodyera morrisonicola HAYATA sp. nov. Caulis basi inferne radicans superne ascendens 10 cm. longus, tota longitudine foliatus. Folia alterna petiolata ovata vel ovato-oblonga 3 cm. longa $1\frac{1}{2}$ cm. lata apice acuta basi rotundata margine minute crispata 3-5-nervia, petiolis $1\frac{1}{2}$ cm. longis a medio deorsum dilatatis caulem amplectantibus. Scapi terminales 4 cm. longi laxè florati pubescentes, bracteis lanceolatis acuminatis 1 cm. longis basi 4 mm. latis florem subamplectantibus. Sepala subæqualia libera, posticum erectum concavum oblongo-angustatum 1 cm. longum $3\frac{1}{2}$ mm. latum apice obtusum cum petalis angustis in galeam connivens, lateralia libera erecta. Petala oblonga 11 mm. longa 3 mm. lata, apice obtusa basi attenuata. Labellum ad basin columnæ sessile plicato incurvo-ascendens 8 mm. in longitudine basi subsaccatum, (saccis intus villosis apice recurvo-obtusis), margine integrum, apice dentibus lateralibus brevibus. Columna brevis 1 mm. longa apice longe 2-cornuta, cornibus $3\frac{1}{2}$ mm. longis. Anthera erecta ovato-lanceolata $3\frac{1}{2}$ mm. longa apice attenuata acuminata. Capsula recta oblonga erostrata 1 cm. longa 4 mm. lata.

HAB. in monte Morrison, ad 6500 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2323).

Near *G. Henryi* ROLFE., but the leaves of the present plant are narrower, acuter, and the bracts are more acuminate.

Goodyera nantōensis HAYATA sp. nov. Caulis basi repens, erectus 15 cm. longus foliatus superne et inferne squamatus.

Folia petiolata ovata 2 cm. longa 13 mm. lata apice obtusa basi rotundata in petiolum contracta, petiolis lamina folii longioribus $1\frac{1}{2}$ cm. longis basi dilatatis caulem amplectantibus; squamis caulium lanceolatis $1\frac{1}{2}$ cm. longis superiore gradatim brevioribus. Flores minores secus racemum secundatim dispositi, racemis 4 cm. longis dense floratis, bracteis ovato-lanceolatis acuminatis 5 mm. longis. Sepala æqualia libera, posticum ovato-oblongum 2 mm. longum obtusum cum petalis angustioribus connivens, lateralia postico vix longiora æquiformia. Labellum $2\frac{1}{2}$ mm. longum basi ventricosum intus minute tuberculatum. Columna brevissima $\frac{1}{3}$ mm. longa.

HAB. Tōyen: Yuhonsha, leg. T. KAWAKAMI et U. MORI, Mart. 1907, (No. 5932); Horisha, Hinokiyama, leg. G. NAKAHARA, Feb. 1907.

Near *G. repens* R. BR. but differs from it by the much smaller flowers. Also near *G. Schlechtendaliana* REICHB. f., but distinguishable from it by the very much smaller flowers and denser inflorescence.

Goodyera procera HOOK.; LINDL. Gen. et Sp. Orch. p. 493; FORBES et HEMSL. Ind. Fl. Sin. III. p. 45; MATSUM. et HAYATA Enum. Fl. Formos. p. 417.

HAB. Nagodake leg. G. NAKAHARA. 1907, April.

Aphyllorchis BLUME.

Aphyllorchis tanegashimensis HAYATA sp. nov. Scapi aphylli circ. 60 cm. longi basi squamati, squamis amplexicaulibus late ovatis apice rotundato-obtusis subglabris 13 mm. longis 8 mm. latis, superiore squamis remotis linearibus 2 cm. longis $1\frac{1}{2}$ mm.

latis (bractea conformibus) instructi, sursum tortuosi racemosi. Racemi 20 cm. longi remote florati, floribus primum erecto-ascendentibus demum pendulis. Sepala subæqualia libera erecta, posticum apice leviter incurvo-angustatum 12 mm. longum $3\frac{1}{2}$ mm. latum, lateralia plus minus angustiora apice obtusa 3-nervia. Petala sepalo angustiora æquilonga extus carinata 1-nervia margine valde revoluta tenuissima. Labellum ad basin columnæ sessile basi erectum a medio sursum patens, unguis brevis 2 mm. longus latere 2-auriculatis, auriculis transverse divaricatis 3 mm. longis oblique triangulari-cuspidatis; lamina ovata 7 mm. longa 5 mm. lata obscure 3-lobata, lobo medio triangulari obtuso, lobis lateralibus obscuris latere rotundatis. Columna longiuscula 11 mm. longa 1 mm. lata subteretis complanata.

HAB. Tanegashima, leg. S. TANAKA, 1891, Sept. (No. 442).

The genus is new to the flora of the archipelago.

Pogonia JUSS.

***Pogonia Nervilia* BLUME.**

HAB. Kōshūn, leg. T. KAWAKAMI, 1906, Juli. (No. 5159).

In the imperfectness of the specimen, the determination is rather conjectural.

***Pogonia (Nervilia) purpurea* HAYATA** sp. nov. Herba terrestris, caulis foliatus brevissimus bulbosus, scapis floriferis aphyllis vaginatis. Folia cordata 5 cm. longa 6 cm. lata apice rotundata brevissime apiculata basi cordata ad sinus acuta margine integra supra breve setulosa subtus glabra, petiolis $2\frac{1}{2}$ cm. longis. Scapi aphylli inferiore vaginati, (vaginis 3 cm. longis apice rotundatis summum brevissime apiculatis), sursum 2-3 florati, bracteis oblanceo-

latis $1\frac{1}{2}$ cm. longis 2 mm. latis. Sepala æqualia libera erecta spathulata 15 mm. longa 3 mm. lata apice breve acuta basi attenuata. Petala sepalis angustiora lineari-oblongata 14 mm. longa $2\frac{1}{2}$ mm. lata apice breve acuta basi attenuata erecta. Labellum basi columnæ rectum liberum erectum obovatum obscure 3-lobatum 12 mm. longum 10 mm. latum apice rotundatum. Columna elongata 7 mm. longa, apice clavata erecta.

HAB, Kōshūn : leg. T. KAWAKAMI, Juli. 1906, (No. 5150).

Near *Pogonia plicata* LINDL., but differs from it by the broader oblongate sepals and much narrower linear bracts.

Pogonia (Nervilia) taitōensis HAYATA sp. nov. Caulibus bulboso-incrassatis. Scapi aphylli inferiore vaginati 13 mm. longi gracillimi apice racemose 2-3-florati, bracteis linearibus 1 cm. longis, floribus purpureis 15 mm. longis. Sepala erecta linearia libera, posticum 15 mm. longum $1\frac{1}{2}$ mm. latum, lateralia postico angustiora 18 mm. longa 1 mm. lata. Petala sepalo postico æqualia $1\frac{1}{4}$ mm. lata apice acuta. Labellum erectum obovatum 18 mm. longum 10 mm. latum apice acutum basi attenuatum supra hirsutum tenuiter 3-lobatum, lobo medio majusculo margine denticulato oblongo-triangulari, lobis lateralibus brevibus oblique triangularibus acutis margine integris. Columna 7 mm. longa.

HAB. Taitō. Rinō, leg. T. KAWAKAMI.

Didymoplexis GRIFF.

Didymoplexis pallens GRIFF. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 47 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 418.

Herba tenuis aphylla. Scapi simplices 10-15 cm. longi ut videntur volubili, racemis 3 cm. longis paucifloratis vel ad florem unicum reductis, bracteis triangularibus $1\frac{1}{2}$ mm. longis, floribus 7 mm. longis non satis notis.

HAB. Tainan, leg. T. KAWAKAMI et S. ISHIDA, Mai. 1909.

Gastrodia R. BR.

Gastrodia Stapfii HAYATA sp. nov. Tuber non visum. Scapus plus minus recurvatus 20-30 cm. longus glaber inferiore remote vaginatus, vaginis 6 mm. longis apice 2-3-lobatis, medio remote squamatus, squamis obtuso-ovatis 3 mm. longis, superiore florifer racemosus. Racemi 5 cm. longi remote florati, bracteis glabris obtuso-ovatis 3 mm. longis semi-amplexicaulibus, pedicellis 2 mm. longis. Sepala petalo conformia cum petalis in tubum ventricosum 9 mm. longum 6 mm. latum apice 5-lobum antice alte fissum connata, tubo 5-nervio, nervis ad apicem lorum attingentibus, lobis sepaloidalibus triangularibus obtuso-acutis, lobis petaloidalibus rotundatis emarginatis apiculatis $1\frac{1}{2}$ mm. longis, sinibus inter lobos rotundatis. Labellum pedi columnæ affixum sepalis æquilongum dorso perianthio breviter adnatum 9 mm. longum 5 mm. latum, lamina erecta late ovata obtusa indivisa integra 3-nervia, nervis ad apicem convergentibus, versus apicem callosa 5 mm. longa totiusque lata basi subito angustata in stipitem 4 mm. longum $1\frac{2}{3}$ mm. latum abeunte, stipite margine sursum glanduloso-callosa. Columna elongata 6 mm. longa 3 mm. lata complanata apice 3-lobata, lobis lateralibus angustissimis 1 mm. longis $\frac{1}{2}$ mm. latis. Capsulæ obconico-obovoideæ apice truncatæ basi attenuatæ 4 mm. longæ 3 mm. latæ primum erectæ demum pendulæ.

HAB. Yæyama, leg. S. TANAKA, 1891, Juni.

Near *Gastrodia gracilis* BLUME. The present plant is named in honour of Dr. O. STAPF, to whom I am greatly indebted for his constant kindness during my work at Kew.

Galera BLUME.

Galera Rolfei HAYATA sp. nov. Tuber solitarium 3 cm. longum 12 mm. latum elongato-ellipticum apice obtusum carnosum horizontaliter situm. Scapus circ. 35 cm. longus incrassatus erectus rectus basi ascendens teres brunneus inferne squamis distantibus amplexicaulibus obtusis tenuissimis membranaceis instructus, superne florifer, bracteis alternis erecto-patentibus lineari-lanceolatis acuminatis membranaceis circ. 1 cm. longis uni-florem amplectantibus. Flores in pedicellis filiformibus cernui aut tandem penduli scapo concolores. Sepala æquiformia angustata erecta 7 mm. longa 1 mm. lata obtuso-acuminata integra parcissime punctata, lateralibus plus minus obliquis. Petala sepalo latiora 7 mm. longa 2 mm. lata acuminata. Labellum sessile concavum gynostemium amplectans, ima in calcar breve obtusum 3 mm. longum rectum productum, limbo ovato obtuso 9 mm. longo erecto ad margines subintegro vel sub lente minutissime eroso intus papilloso infra apicem parcissime papilloso. Gynostemium brevissimum crassum obtusissimum 2 mm. longum dorso rotundato-convexum. Ovarium obovoideum sulcatum, pedicello 4 mm. longo.

HAB. Okinawa, leg. S. TANAKA, 1891, Mai. (No. 147).

The present plant is near *G. nutans*, but differs from it in having shorter spurs, and in the lips which are obtuse at the apex, nearly entire on the margin, and very much less papillose on the upper surface. It is named in honour of Mr. R. A. ROLFE

who has helped me in determining orchidaceous plants in my collections.

Herminium LINN.

Herminium angustifolium BENTH.; MATSUM. et HAYATA Enum. Pl. Formos. p. 418.

OBSERV. Caulis 30-40 cm. longus erectus glaber inferiore foliatus. Folia lanceolata 13 cm. longa 14 mm. lata apice acuminata arcuata basi angustata caulem amplectantia; squamis a medio caulium sitis, bractæformibus lanceolatis acuminatis 2 cm. longis. Spicæ dense floratæ 2 cm. longæ, bracteis ovato-lanceolatis 1 cm. longis, floribus minoribus 5 mm. latis. Sepala subæqualia 1-nervia suberecta ovato-oblonga $2\frac{1}{2}$ mm. longa $1\frac{1}{2}$ mm. lata apice obtusa. Petala angustiora $2\frac{1}{2}$ mm. longa $\frac{2}{3}$ mm. lata. Labellum ad columnam continuum antice patens angustum profunde 3-lobatum, parte indiviso basilari 3 mm. longo 1 mm. lato basi obscure auriculato, lobo medio brevissimo $\frac{1}{2}$ mm. longo, lobis lateralibus linearibus 6 mm. longis $\frac{1}{2}$ mm. latis apice turbulenter recurvatis. Columna $\frac{1}{2}$ mm. longa. Staminodia globosa breve stipitata.

ИЯВ. Taihoku: Sensui, leg. T. KAWAKAMI et Y. SHIMADA, Mart. 1908, (No. 4267).

var? Caulis gracilis erectus 40-50 cm. longus inferiore foliatus superiore florifer ima basi vaginatus. Folia lineari-lanceolata 15 cm. longa 8 mm. lata apice acuminata basi vaginata caulem amplectantia, folia superiora angustiora minora, inferiora vaginiformia, vaginis 4-5 cm. longis, ore obliquis. Spicæ elongatæ 20 cm. longæ dense floratæ, bracteis ovato-lanceolatis 5 mm. longis 2 mm. latis acuminatis, floribus minoribus. Sepala ovato-oblonga æqualia $2\frac{2}{3}$ mm. longa $1\frac{1}{3}$ mm. lata apice obtusa basi leviter connata 1-nervia. Petala sepalo æquilonga linearia

2 $\frac{2}{3}$ mm. longa $\frac{1}{3}$ mm. lata. Labellum antice patens 6 mm. longum angustum basi dilatatum obscure auriculatum ad medium lobatum, lobo medio brevissimo $\frac{1}{2}$ mm. longo, lobis lateralibus filiformibus 3 $\frac{1}{2}$ mm. longis apice superne recurvatis. Columna brevissima $\frac{1}{3}$ mm. longa, staminodia cum stipitibus complanatis spathulata.

HAB. Nantō: Musha, T. KAWAKAMI et U. MORI, Aug. 1906, (No. 1242); Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7092); Mt. Morrison, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (Nos. 2333 et 2315).

Differs from the type in having much smaller flowers and more slender leaves.

Platanthera RICH.

Platanthera brevicarata HAYATA sp. nov. Caulis erectus cum racemis 10-20 cm. longus inferiore foliatus. Folia oblonga 3 cm. longa, 1 $\frac{1}{2}$ cm. lata, apice obtusa basi contracta in petiolum brevem contracta. Racemi (præter pedunculum) 3 cm. longi laxiflorati, bracteis longe ovatis 8 mm. longis. Sepala patentia subæquilonga oblonga 3 mm. longa 1 mm. lata. Petala erecta ovata 2 mm. longa 1 mm. lata apice obtusa basi valde obliqua. Labellum oblongum 3 mm. longum 1 $\frac{1}{2}$ mm. latum integrum basi calcaratum, calcar 2 mm. longo 1 mm. lato vix recurvo. Columna brevissima.

HAB. in monte Morrison, leg. T. KAWAKAMI, (No. 2332).

Platanthera longicalcarata HAYATA sp. nov. Caulis erectus cum racemis terminalibus 40 cm. longus inferiore foliatus. Folia oblonga sessilia 12 cm. longa 3 cm. lata apice obtusa basi angusta caulem amplexantia. Racemi (præter pedunculum) 10 cm. longi laxiflorati, bracteis lanceolatis 13 mm. longis acu-

minutis. Sepala subæqualia patentia, posticum latius late ovatum 3 mm. longum $2\frac{1}{2}$ mm. latum apice obtusum, lateralia angustiora $1\frac{1}{2}$ mm. lata. Petala sepalo angustiora circ. 3 mm. longa 1 mm. lata basi dilatata obliqua. Labellum basi calcaratum, calcar 3 mm. longo, lobo medio ovato plano 3 mm. longo 2 mm. lato apice obtuso, lobis lateralibus cum columna continuis minutis; columna brevissima.

HAB. Randaizan, leg. B. HAYATA et U. MORI, Aug. 1908; Ganzan, in monte Morrison, ad 9141 ped. alt., leg. S. NAGASAWA, (No. 697), Oct. 1905.

Near *P. usuriensis* MAXIM., but differs from it by the broader petals and ovate middle-lobe of the lip.

Platanthera obcordata LINDL.; MATSUM. et HAYATA ENUM. Pl. Formos. p. 419.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3482).

OBSERV. Caulis erectus gracilis minute brevissime hirtellatus, 35 cm. longus ad totam longitudinem foliatus superne florifer. Folia alterna sessilia oblonga 3 cm. longa 12 mm. lata apice rotundato-acuta basi in vaginam brevem contracta amplexicaulia, vaginis 3 mm. longis. Flores ad axillas foliorum superiorum solitarii vel racemosi, racemis 10 cm. longis. Flores mediocres $1\frac{1}{2}$ cm. in diametro. Sepala inæqualia erecto-patentia, posticum oblongo-angustatum $8\frac{1}{2}$ mm. longum $2\frac{2}{3}$ mm. latum apice rotundato-acutum, lateralia latiora ovata 8 mm. longa 3 mm. lata apice attenuato-obtusa basi rotundata valde obliqua latere labelli connata. Petala ovato-oblonga 7 mm. longa 2 mm. lata basi obliqua ad basin columnæ connata apice attenuato-obliqua. Labellum 13 mm. longum unguiculatum, unguis basi columnæ connatus in calcar

productus, calcar latissimo 5 mm. longo, ore 4 mm. in diametro, lamina obovato-rotundata 1 cm. longa 8 mm. lata apice emarginata margine crispata prope medium parce 3-lamellata, lamellis brevissime hirtellatis. Columna 2 mm. longa.

Habenaria WILLD.

Habenaria ciliolaris KRÄNZL. in ENGL. Bot. Jahrb. XVI. (1892), p. 169; FORBES et HEMSL. Ind. Fl. Sin. III. p. 58.

HAB. Nantō: Tōsha, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3210); Nantō: Randaizan, leg. B. HAYATA et U. MORI, Juli. 1907, (Nos. 3481 et 7093).

DISTRIB. Chekiang, Hupeh, Hongkong.

OBSERV. Caulis erectus 50 cm. longus inferne foliatus a medio superne bracteatus barbatus sulcatus. Folia ovato-lanceolata 16 cm. longa $3\frac{1}{2}$ cm. lata apice acuta basi attenuata; vaginis 3 cm. longis foliatis a medio superne bracteiformibus, bracteis ovato-lanceolatis $3\frac{1}{2}$ cm. longis 8 mm. latis apice acuminatis basi rotundatis. Racemi 18 cm. longi remote florati parce barbati, barbibus glandulosis, bracteis ovato-acuminatis $1\frac{1}{2}$ cm. longis 7 mm. latis, floribus mediocribus $1\frac{1}{2}$ cm. in diametro, ovariis longis pedicelliformibus 2 cm. longis. Sepala inæqualia, posticum erectum galeiforme $5\frac{1}{2}$ mm. longum, lateralia alæformia 8 mm. longa 4 mm. lata obtusa postice reflexa. Petala multo angustiora falcata 6 mm. longa ovato-linearia 6 mm. longa basi 2 mm. lata latere inferiore reflexa cum sepalo postico connata galeam formantia. Labellum cum columna brevissime connatum basi longe calcaratum, calcar 23 mm. longo, apice dilatato, ore 3 mm. in diametro, medio attenuato filiformi basin dilatato saccato ima basi acuto, lamina profunde 3-partita, segmentis æqualibus tentaculiformibus filiformibus 2 cm. longis. Columna brevissima apoda,

rostello inter loculos antheræ late triangulari basi divaricato sub tubo antheræ producto; stigma 2-lobum in processus elongatos 2 mm. longos productum, lobis ad basin labelli connatis; antheræ loculis erectis divaricatis obovatis basi attenuatis 5 mm. longis basi horizontaliter productis cum ramis rostellorum adnatis ima liberis. Pollinia grosse granulosa longe globosa complanata $1\frac{1}{2}$ mm. longa, caudiculis valde elongatis 4 mm. longis, anthera dehiscente glandulis nudis affixis. Staminodia triangularia infra medio ramos rostelli affixa.

Habenaria goodyeroides D. DON.; MATSUM. et HAYATA EDUM. Pl. Formos. p. 419, (sub *Peristyllo*).

HAB. Nantō: Busanyō, leg. T. KAWAKAMI et U. MORI, Juli. 1907; Risekizan, leg. T. KAWAKAMI et U. MORI, Juli. 1907, (No. 3471).

OBSERV. Caulis elongatus 60 cm. longus glaber, partibus inferioribus aphyllis, mediocribus foliis congestis, superioribus aphyllis floriferis, partibus aphyllis infra folia 25 cm. longis vaginatis, vaginis 5 cm. longis remote sitis ore leviter delatatis apice truncatis, partibus foliatis 7 mm. longis 5-6-foliatis. Folia oblonga 13 cm. longa 5 cm. lata apice obtusa acuta basi contracta in vaginam amplexicaulem attenuata, vaginis $2\frac{1}{2}$ cm. longis, squamis superne minoribus ovato-lanceolatis 2 cm. longis. Spicæ elongatæ 15 cm. longæ dense floratæ, bracteis ovato-lanceolatis 13 mm. longis apice aristato-acuminatis, floribus minoribus. Sepala inæqualia subpatentia, posticum ovatum $4\frac{1}{2}$ mm. longum 3 mm. latum apice obtusum, lateralia angustiora basi obliqua cum petala adnata apice dorso breve apiculata. Petala sepalo latiora late oblonga $4\frac{1}{2}$ mm. longa $2\frac{1}{2}$ mm. lata apice obtusa basi valde oblique labello connata. Labellum liguliforme

5 mm. longum 4 mm. latum apice dilatatum 3-lobatum, (lobo medio latissimo triangulari 3 mm. longo totiusque lato apice obtuso, lobis lateralibus angustioribus), basi calcaratum, calcari 2 mm. longo ore contracto $1\frac{1}{2}$ mm. lato; discus basi 2-lamellatus, a medio sursum 1-lamellatus; staminoidia 2 mm. longa angustata.

This form has narrowed leaves and lamellate discs on the lip.

Habenaria tentaculata REICHB. var. **acutifolia** HAYATA n. v. Caulis erectus elongatus 40 cm. longus basi 2-3-foliolatus, cæterum squamis oblongis $1\frac{1}{2}$ cm. longis acutis instructus. Folia sessilia oblonga 8 cm. longa 2 cm. lata acuta basi caulem amplectantia. Spicæ elongatæ 13 cm. longæ, bracteis ovato-lanceolatis 8 mm. longis acuminatis, floribus minoribus 4 mm. in diametro. Sepala æqualia concava erecta oblonga $3\frac{1}{2}$ mm. longa 2 mm. lata apice rotundata. Petala sepalo æquilonga ovata $3\frac{1}{3}$ mm. longa $1\frac{2}{3}$ mm. lata apice acute obtusa. Labellum basi calcaratum, calcari 2 mm. longo oblongo, apice 3-lobatum, parte indiviso 2 mm. longo totiusque lato, lobo medio angustato 2 mm. longo apice obtuso, lobis lateralibus linearibus 7 mm. longis divaricatis. Columna brevissima; stigma antice productum divaricatum; staminodia minuta lamellata.

HAB. Shintengai, Jan. 1904, leg. S. NAGASAWA.

Differs from the type by the acute oblong leaves.

Hemipilia LINDL.

Hemipilia formosana HAYATA sp. nov. Caulis 20 cm. longus glaber basi 1-foliatus, racemo 7 cm. longo pauciflorato, bracteis ovato-lanceolatis vel lanceolatis 7 mm. longis. Folia rotundato-cordata 6 cm. longa $5\frac{1}{2}$ cm. lata margine integra vel parce

crispata. Flores minores 13 mm. longi 8 mm. lati. Sepala oblonga inaequalia patentia, posticum concavum oblongum $5\frac{1}{2}$ mm. longum 3 mm. latum utrinque obtusum, lateralia patentia obliqua 5 mm. longa $3\frac{1}{2}$ mm. lata basi contracta. Petala obliqua obovata 7 mm. longa 3 mm. lata apice obtusa basi acuta a latere inferiore cum unguibus labellorum connata. Labellum cum columna continuum patens, latiusculum basi in calcar productum, calcar longum 13 mm. longo 1 mm. lato ore dilatato 3 mm. in diametro, lamina rhombico-obovata 7 mm. longa totiusque lata apice rotundato-emarginata basi cuneato-contracta medio calloso-lamelata. Columna brevissima, rostello inter antheræ loculos valde elevato-producto.

HAB. in monte Morrison, ad 8500 ped. alt., leg. T. KAWAKAMI et U. MORI, 1906, Oct. (No. 2331).

This is very near *Hemipilia cordifolia*, but quite distinguishable by the larger spur and not lobed lamina of the lip.

Hæmodoraceæ.

Ophiopogon KER.

Ophiopogon japonicus KER.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 78; MATSUM. et HAYATA Enum. Pl. Formos. p. 426.

HAB. Randaizan, leg. T. KAWAKAMI et U. MORI, 1908, Aug. (No. 7094).

Dioscoreaceæ.

Dioscorea LINN.

Dioscorea dæmona ROXB. var. ***reticulata*** HOOK. f.; FORBES et

HEMSL. Ind. Fl. Sin. III. p. 91; MATSUM. et HAYATA Enum. Pl. Formos. p. 432.

HAB. Kagi, Tikutōchi, leg. T. KAWAKAMI et Y. SHIMADA, 1907, Aug. (No. 4199).

Dioscorea glabra ROXB.; HOOK. f. Fl. Brit. Ind. VI. p. 294; FORBES et HEMSL. Ind. Fl. Sin. III. p. 91.

HAB. Kagi, Tikutōchi, leg. T. KAWAKAMI et Y. SHIMADA, Aug. 1908, (No. 4217); Shintiku, Shimo, (No. 4404); Keelung, leg. U. FAURIE, Mai. 1903; Taruko, leg. G. NAKAHARA, Jan. 1905, (No. 715).

DISTRIB. China: Kiangsi, Kwangtung, Hainan. From the subtropical Himalayas to the Malay peninsula.

Roxburghiaceæ.

Stemona LOUR.

Stemona tuberosa LOUR.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 95; MATSUM. et HAYATA Enum. Pl. Formos. p. 434.

HAB. Taiko, (No. 2).

Liliaceæ.

Smilax LINN.

Smilax arisanensis HAYATA sp. nov. Rami subteretes exsiccato fusco-rubescens glabri gracillimi parcissime remotissime spinulati, spinis rectis 2 mm. longis. Folia lanceolata plus minus falcatis recurvata vel ovato-lanceolata 6-11 cm. longa 1-2½ cm. lata apice acuminata plus minus falcata basi rotundata vel obtusa utrinque glabra, nervis et venulis distincte elevatis dis-

tinete 3-nervia, etiamque 2-nerviis basilaribus prope marginem arcu ascendentibus, petiolis 5 mm. longis basi cum stipulis ramos semiamplectantibus, stipulis petiolum in longitudine $\frac{1}{2}$ -plo æquantibus cum petiolis connatis, ad apicem stipularum cirrhiferis, cirrhis 4-5 cm. longis revolutis. Flores umbellati, umbellis longe pedunculatis, pedunculis axillaribus solitariis 5 cm. longis gracillimis subtetibus simplicibus. Fructus pedicellati, pedicellis 8-10 mm. longis a basi cernuis. Baccæ globosæ 4 mm. in diametro 3-spermæ. Semina facie subplana dorso convexa $3\frac{1}{2}$ mm. longa 3 mm. lata sub lente minute reticulata subnitida fusco-fubescencia.

HAB. Arizan, leg. G. NAKAHARA, NOV. 1906; Randaisan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7046).

Near *S. lanceæfolia* ROXB., but differs from it in having much narrower leaves and fruits nodding on a common peduncle; also near *S. flaccida* WRIGHT, from which this differs by the entire lanceolate leaves quite rounded at the base; from *S. glabra* ROXB. by the long common peduncles.

Smilax elongato-reticulata HAYATA sp. nov. Suffrutex, caulibus ut videntur basi prostratis, ascendentibus erectis teretibus plus minus complanatis lævibus subrectis plus minus flexuosis parvissime spinulatis, spinis patentibus 2 mm. longis. Folia lineari-lanceolata vel lanceolata $8\frac{1}{2}$ cm. longa 1 cm. lata apice gradatim attenuata mucronato-obtusa basi rotundata utrinque glabra subtus plus minus glauca margine revoluta 3-nervia, nervo centrali supra leviter subtus prominente elevato, nervis lateralibus plus minus prominulis, venulis inter nervos utrinque plus minus distincte reticulatis, reticulis elongatis. Flores umbellati, umbellis 1 cm. longis totiusque latis longe pedunculatis, pedunculis gracilibus plus minus complanatis 2 cm. longis solitariis

basi perulatis. Flores recto-patentes 3 mm. longi pedicellati, pedicellis 5 mm. longis sub quoque flori 1-bracteatis, bracteis lanceolatis $1\frac{1}{2}$ mm. longis. Segmenta perianthii 6, æquilonga $4\frac{1}{2}$ mm. longa, 3-exterioribus latioribus ovatis $4\frac{1}{2}$ mm. longis $2\frac{1}{2}$ mm. latis apice obtuso-acutis, basi cum staminibus subulatis, 3-inferioribus angustioribus obovato-angustatis apice obtusis basi attenuato-angustatis subincrassatis dorso plus minus carinatis. Ovarium glabrum elongato-ovatum $2\frac{1}{2}$ mm. longum $1\frac{1}{2}$ mm. latum apice ad basin stylorum constrictum, stylis 3 brevibus interiore stigmatosis $1\frac{1}{2}$ mm. longis a medio recurvatis.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, 1908, Mart. (No. 3568).

Near *S. lanceefolia* but differs from it by the much narrower leaves and broader sepals.

Smilax elongato-umbellata HAYATA sp. nov. Rami complanati, obscure striati flexuosi brevissime et parcissime spinulati, spinis horizontaliter $\frac{1}{2}$ mm. longis. Folia membranacea ovato-oblonga vel oblongo-lanceolata 53 mm. longa 23 mm. lata aristato-acuta vel-acuminata basi rotundata margine integra 3-5-nervia, nervis et venis utraque prominentibus, inter venas reticulatis, supra glabra subtus glauca, petiolis 8 mm. longis a facie complanatis stipulis paullo brevioribus, stipulis petiolo connatis apice cuspidatis, (cuspidibus linearibus liberis 5 mm. longis), primum membranaceis demum coriaceis cuspidibus demum ad cirrhos elongatos 5 cm. longos abeuntibus. Flores 5 mm. longi, racemoso-umbellati longe pedicellati, pedicellis $2\frac{1}{2}$ cm. longis, umbellis longe pedunculatis, pedunculis axillaribus 4 cm. longis recurvis simplicibus vel 2-3-ramosis sub quoque ramo 2-bracteatis, bracteis stipula conformibus, sub basi pedunculorum 1-2-perulatis, perulis

majusculis latissimis 8 mm. longis 13 mm. latis plicatis basin pedunculorum amplexantibus medio coriaceis margine membranaceis. Umbellæ 3 cm. longæ 4 cm. latæ, pedicellis divaricatis basi dilatatis, sub quoque pedicello 1-bracteatis, bracteis lanceolatis $1\frac{1}{2}$ mm. longis, rachibus umbellarum 6 mm. longis. Flores erecto-patentes $6\frac{1}{2}$ mm. longi, segmentis perianthii erecto-patentibus 3-exteriores majoribus oblongo-ovatis apice obtusis $6\frac{1}{2}$ mm. longis 3 mm. latis integris margine plus minus incurvis, 3-interioribus angustioribus $6\frac{1}{2}$ mm. longis $1\frac{1}{2}$ mm. latis lanceolatis apice obtusis plicato-recurvis. Stamina 6, segmentis perianthii opposita 5 mm. longa, filamentis basi cum segmentis connatis, antheris ovatis $1\frac{2}{3}$ mm. longis $\frac{3}{4}$ mm. latis apice acuto-obtusis. Rudimentum ovarii 0.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, 1908, Mart. (No. 3639).

This is very distinct from any species of the genus, in having elongate rachis of umbels.

Smilax glabra ROXB.; HANCE in Journ. Bot. (1872) p. 102; BENTH. Fl. Hongk. p. 369; A. DC. Monogr. Phanerog. I. p. 60; Hook. f. Fl. Brit. Ind. p. 302; FORBES et HEMSL. Ind. Fl. Sin. III. p. 97.

HAB. Goshizan, leg. T. KAWAKAMI, 1905, Dec. (No. 1254).

Smilax gracillima HAYATA sp. nov. Rami gracillimi glaberrimi subangulati latere sulcati pallidissimi. Folia petiolata non cirrhata chartacea oblonga oblongo-ovata rarius plus minus obliqua utrinque acuta vel cuspidato-acuta vel basi subito-attenuata $6\frac{1}{2}$ cm. longa 3 cm. lata integra 3-nervia, nervis ad apicem convergentibus, supra pallidissima glabra, (nervis et venis distincte tenuissime elevatis), subtus glaucissimo-albicantia, nervis

et venis prominulis, petiolis 5 mm. longis a facie complanatis supra sulcatis juxta laminas tardius articulatum rumpentibus basi stipulatis, stipulis lanceolatis 3 mm. longis a medio deorsum petiolo connatis apice liberis.

HAB. Giran, Chūrei, leg. T. KAWAKAMI et U. MORI, 1906, Juni. (No. 1379).

Near *S. megalantha*, *S. hypoleuca* BENTH. and *S. stans* MAXIM., but differs from them by the leaves which are acute on both ends.

Smilax lanceæfolia ROXB.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 99; MATSUM. et HAYATA Enum. Pl. Formos. p. 435.

HAB. Randaizan, (No. 7026); Nantō: Kurokōzan, (No. 3169); Horisha, (No. 35); Uraisha, (No. 2707), leg. T. KAWAKAMI et U. MORI; Akō: Tanashū, leg. G. NAKAHARA, 1907.

Smilax liukuensis HAYATA sp. nov. Rami teretes glabri inermes. Folia ovato-acuminata vel ovato-lanceolata 5-7½ cm. longa 2-3½ cm. lata apice acuminata basi rotundata utrinque glabra 3-nervia, inter nervos reticulata utraque pagine distincte elevato-reticulata, margine nervis marginalibus marginata, tenuiter coriacea subtus pallidiora, petiolis 5-10 mm. longis prope basin 2-cirrhiferis, stipulis angustissimis cum petiolis connatis. Flores umbellati, umbellis pedunculatis, pedunculis solitariis axillaribus 1½ cm. longis valde complanatis basi 1-perulatis, perulis ovatis 4 mm. longis pedunculum amplexantibus. Baccæ depresso-globosæ 6 mm. in diametro 3-5-spermæ, pedicellis 6 mm. longis, sub quoque 1-bracteatis, bracteis late triangularibus acutis 1 mm. longis. Semina quadrantiformia facie acuta dorso rotundata 3½ mm. longa 2¾ mm. lata rubescentia subnitida.

HAB. Okinawa, leg. Y. TASHIRO, Mart. 1887.

Smilax nervo-marginata HAYATA. Rami teretes fulvo-cinerascentes inermes sub lente minute muricato-asperi, ramulis foliatis valde flexuosis. Folia coriacea lineari-lanceolata vel ovato-lanceolata vel ovato-oblonga circ. 10 cm. longa 1-4½ cm. lata apice acuminata vel acuta basi rotundata vel cordata, margine nervis validissimis prominentibus marginata repandato-integra utraque pagine glabra distincte elevato-reticulata 3-nervia, petiolis 1½ cm. longis subteretibus non sulcatis prope basi 2-cirrhiferis, cirrhis 2-5 cm. longis revolutis, stipulis circ. obsoletis. Flores ignoti.

HAB. Okinawa, leg. S. TANAKA, 1891, (No. 238, b.).

As the leaves of the present plant are very remarkable and distinct from any species of the genus, I have taken this occasion to describe it, though the specimen is very imperfect and gives no complete account for the species.

Smilax Oldhami MIQ. in Ann. Mus. Bot. Lugd. Bat. III. p. 150; A. DC. Monogr. Phanog. I. p. 53; FORBES et HEMSL. Ind. Fl. Sin. III. p. 100; MATSUM. et HAYATA Enum. Pl. Formos. p. 434.

HAB. Taruko, leg. G. NAKAHARA, Juni. 1906, (No. 722).

Smilax plani-peduncula HAYATA sp. nov. Caulis suffrutescens plus minus complanatus obtuse angulatus vel subteres glaber foliatus. Folia alterna a se 10 cm. remota, petiolata, membranaceo-chartacea ovata oblongo-ovata vel rotundato-cordata 6-8 cm. longa 4-7 cm. lata apice breve cuspidato-acuta plus minus subplicato-recurva basi late acuta rotundata vel leviter cordata margine subundulato-integra vel subintegra, interdum angustissime marginata vel non marginata, utraque pagine glabra, nervis et venulis distincte elevatis, subtus pallidiora 5-nervia, inter nervos

oblique-reticulata, nervis ad apicem convergentibus, venis laterali-
bus arcte secus marginem ascendentibus, petiolis verticaliter (a
facie) valde complanatis laminam in longitudine $\frac{1}{3}$ plo æquantibus
 $2\frac{1}{2}$ cm. longis $1\frac{1}{4}$ mm. latis supra sulcatis subtus angustissime
alatis basi dilatatis stipuliformibus subamplexicaulibus prope
basin 2-cirrhis instructis, (cirrhis circ. 8 cm. longis spiraliter
revolutis), infra laminas tardius rumpentibus. Umbellæ axillares
solitariæ longe pedunculatæ, pedunculis 5 cm. longis, valde com-
planatis $1\frac{1}{4}$ mm. longis. Fructus pedicellati, pedicellis æquilongis
13 mm. longis plus minus complanatis apice plus minus dilatatis
sub quoque pedicello 1-bracteatis, bracteis cuspidato-triangularibus
1 mm. longis totiusque latis. Baccæ obliquæ globosæ 8 mm. in
diametro brevissime rostratæ, rostris truncatis vel obtuse apicu-
latis, 3-4-spermæ. Semina quadrantiformia $4\frac{1}{2}$ mm. longa utrinque
obtusa angulata, (angulis obtusis), rubescentia.

HAB. Kurarusha, leg. G. NAKAHARA, Dec. 1906, (No. 877).

Near *S. China* LINN., but differs from it in having much longer
and flattened peduncles, 3-seeded black berries, and ovate leaves
which are acute at the apex and rounded at the base.

Smilax prolifera ROXB.; Hook. f. Fl. Brit. Ind. VI. p. 312.

HAB. Banchoryō, Rokkiri, leg. G. NAKAHARA, Oct. 1905, (No.
591); Rinōkutsu, leg. S. KUSANO, 1909.

DISTRIB. Tropical and Western Himalaya; Deccan peninsula
and Ceylon.

Smilax randaiensis HAYATA sp. nov. Suffrutescens ut videtur
30 cm. alta suberecta vel scandentio-erecta, ramis subcomplanatis
flavo-pallidis glabris valde flexuosis basi perulatis, perulis ovatis
rotundato-apiculatis, ramos amplectantibus. Folia lanceolato-ovata

vel ovato-oblonga $5\frac{1}{2}$ cm. longa 22 mm. lata apice acuminata rotundata basi rotundato-cordata margine subintegra supra glabra exsiccato nigricantia subtus glauca 5-nervia, nervis 3 centralibus rectiusculis, 2-lateralibus repandatis, inter nervos reticulata, intra reticula venulis liberis ramulosis, venis venulisque utrinque distincte elevatis, petiolis 1 cm. longis cum stipulis connatis caulem amplexantibus, stipulis circ. 9 mm. longis cum petiolis connatis apice cirrhiferis, cirrhis 1 cm. longis filiformibus recurvatis. Fructus 4-5 umbellati, pedicellis $1\frac{1}{2}$ cm. longis sub quoque 1-bracteatis, bracteis ovato-cuspidatis $1\frac{1}{2}$ mm. longis. Umbellæ pedunculatæ, pedunculis cernuis axillaribus solitariis complanatis. Baccæ globosæ 6 mm. in diametro 1-spermæ. Semina globosa plus minus complanata minute impresso-punctata nitida rubescentia 4 mm. in diametro.

HAB. Randaizan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7016).

Near *S. stans* MAXIM., but differs from it in having narrower leaves and umbellate flowers. Also near *S. biflora* SIEB., from which this is distinguishable by the nearly ovate lanceolate leaves with a rotundate or slightly cordate base; the leaves of this plant are usually nodding on petioles.

Smilax Sieboldi MIQ. var. **formosana** HAYATA n. v. Rami angulati ad angulos angustissime alati glabri spinosi, spinis transverse patentibus 2 mm. longis, ramulis divaricatis, basi ramulorum 1-perulatis, perulis ovatis ramulos amplexantibus. Folia petiolata ovato-lanceolata vel oblongo-ovata $6\frac{1}{2}$ cm. longa 22 mm. lata apice acuminata vel cuspidato-acuminata basi rotundata juxta petiolum subito acuto-attenuata utrinque glabra, nervis et venis venulisque distincte elevatis, chartaceo-membranacea 5-nervia,

3-nervis centralibus subrectis, 2-nervis lateralibus repandatis, petioliis 1 cm. longis supra sulcatis subtus carinatis sub lamina tardius rumpentibus basi cum stipulis connatis ramulos amplectantibus, stipulis angustatis cum petiolo connatis apice liberis membranaceis circ. 4 mm. longis apice cirrhiferis, cirrhis demum duriusculis revolutis. Umbellæ axillares solitariæ pedunculatæ, pedunculis $1\frac{1}{2}$ cm. longis complanatis. Fructus 6-7-umbellati, pedicellis 5 cm. longis. Baccæ globosæ, $4\frac{1}{2}$ mm. in diametro, 1-spermæ. Semina globosa 4 mm. in diametro nitida sub lente minute punctata.

HAB. Arizan, leg. G. NAKAHARA, Nov. 1906.

This slightly differs from the type in the leaves and flowers.

Smilax stenopetala A. GRAY; FORBES et HEMSL. Ind. Fl. Sin. III. p. 101; MATSUM. et HAYATA Enum. Pl. Formos. p. 434.

HAB. Bongari, (Botansha, No. 902), (Chioran, No. 290), leg. G. NAKAHARA; Shifun, leg. C. OWATARI; Shirōsha, Suihenkiaku, (No. 49), leg. T. KAWAKAMI et U. MORI.

Lilium LINN.

Lilium Konishii HAYATA sp. nov. Caulis teres glaber ut videtur plus minus tortuosus sursum pauciramosus ad apicem quoque ramorum 1-floratus, ramis a cauli angulo 50° divaricatis. Folia lanceolata 7-15 cm. longa 1-3 cm. lata apice acuminata plus minus falcato-recurvata vel recta basi obtusa in petiolum plus minus attenuata utrinque glabra crassiuscula membranacea vel tenuiter chartacea, supra venis parallelis plus minus conspicuis, subtus distincte 3-nervia, (nervis prominentibus), plus minus pallida, venis inter nervos inconspicuis. Flores cærulei longe pedunculati, pedunculis 14 cm.

longis simplicibus vel pauciramosis ascendentibus apice recurvatis. Perianthii segmenta recurvato-potentia lanceolata 7 cm. longa 2 cm. lata sursum angustata infra medium latissima prope basin acuto-attenuata ad basin 3 mm. lata, apice obtusa dorso carinato-cornuta, (cornu unciformi plus minus recurvo vel subrecto 5 mm. longo), intus (præter basin) glabra, circ. 17-nervata, nervis parallelis undulatis utrinque pagine elevatis erecto-ascendentibus ad marginem evanescentibus, hac atque illac cum venis obliquis rarius anastomosantibus prope apicem generaliter plus minus reticulatis, ad apicem marginemque omnibus liberis, prope basin omnibus convergentibus, prope basin intus medio incrassata colorata, (partibus incrassatis 3 mm. latis prope medium evanescentibus), cristato-tuberculata, (tuberculis ad nervos dispositis columnaribus 1 mm. longis), dorso glabra medio prominente carinato-costata, costa infra apicem ad cornu apicale abeunte basi plus minus dilatata. Stamina 6 cm. longa, filamentis glabris filiformibus $5\frac{1}{2}$ cm. longis complanatis prope apicem teretibus basi 2 mm. latis dorso carinatis, antheris linearibus $1\frac{1}{2}$ cm. longis basi latissimis $3\frac{1}{2}$ mm. latis a medio versatiliter affixis. Ovarium cylindricum 17 mm. longum 2 mm. latum superiore latius apice truncatum, ut videtur multicostatum basi attenuatum, stylo filiformi 5 cm. longo apice plus minus dilatato.

HAB. Dandaigai, leg. N. KONISHI, 1908, Aug. (No. 95).

Near *Lilium japonicum*, but differs from it in having narrower leaves; also near *L. rubellum*, but distinguishable from it by the larger leaves and maculate segments.

Disporum SALISB.

Disporum Kawakamii HAYATA sp. nov. Caulis 2-3-ramosus

glaber striatus vel sulcatus. Folia lanceolata 10-12 cm. longa 14 mm.-22 mm. lata apice acuminata (acuminibus linearibus falcatis), basi obtusa utrinque glabra membranacea distincte 3-nervia, inter nervos paralleliter 6-nervulosa vel obscure 7-nervulosa, nervis et nervulis supra leviter subtus prominente elevatis, brevissime petiolata, petiolis 3-5 mm. longis. Flores umbellati, umbellis paucifloratis generaliter 3-floratis terminalibus oppositifoliis sessilibus, pedicellis florum $2\frac{1}{2}$ cm. longis. Perianthium erectum, segmentis 6 æqualibus 21 mm. longis obovato-oblongis apice obtusis basi plus minus angustioribus extus glabris prominente costatis, utraque latere 1-nervulis plus minus prominentibus, basi latissime calcaratis, (calcaribus 3 mm. longis $2\frac{1}{2}$ mm. latis obtusis), intus prope basin hirtellatis, segmentis interioribus plus minus angustioribus. Stamina 6, segmentis opposita 13 cm. longa, filamentis complanatis 9 mm. longis 2 mm. latis glabris, antheris ovato-oblongis $4\frac{1}{2}$ mm. longis 2 mm. latis, connectivis apice brevissime obtuso-productis. Ovarium glabrum obovato-ellipticum $4\frac{1}{2}$ mm. longum $2\frac{1}{2}$ mm. latum apice obtusum basi plus minus in stipitem brevissimum attenuatum, stylo elongato-columnari 9 mm. longo apice 3-fisso, ramis 2 mm. longis, apice recurvis intus stigmatosis. Fructus (No. 1726) ut videnter globoso-elliptici nigricantes 6 mm. longi.

HAB. Kagi: Suitōryō, leg. T. KAWAKAMI, 1908, Mart. (No. 3493); in monte Morrison, (No. 1726).

Near *D. calcaratum* DON., but differs from it in having much shorter spurs, obtuse segments, and much narrower leaves.

Disporum pullum SALISE.? FORBES et HEMSL. Ind. Fl. Sin. III. p. 143; MATSUM et HAYATA ENUM. Pl. FORMOS. p. 443.

HAB. Taichū, Chūtokō, leg. T. KAWAKAMI et U. MORI, 1906, Aug. (No. 1210).

Disporum Shimadai HAYATA sp. nov. Herba erecta 40 cm. alta, caulibus a basi usque ad prope apicem simplicibus efoliatis squamatis, (squamis vaginiformibus 4 cm. longis apice acuminatis superiore lanceolatis 3 cm. longis semi-amplexicaulibus rubescentibus), apice 2-3-ramosis foliatis. Folia ad ramos apicales alternatim disposita subsessilia ovato-oblonga vel ovato-lanceolata $7\frac{1}{2}$ cm. longa 2 cm. lata 3-nervia, (nervis distinctis), inter nervos tenuissime nervulosa apice acuta basi obtusa utraque glabra subtus pallidiora. Flores solitarii terminales vel axillares oppositifolii, pedicellis 18 mm. longis erectis. Perianthii segmenta æquiformia erecta late spathulata 19 mm. longa 8 mm. lata apice rotundata deorsum sensim attenuata obscure 9-nervata, (nervis 3 distinctis ad apicem convergentibus), utraque glaberrima basi calcarata, calcaribus 2 mm. longis $1\frac{1}{2}$ mm. latis obtusis. Stamina 6, segmentis opposita 14 mm. longa, filamentis complanatis 11 mm. longis 1 mm. latis, antheris lineari-oblongis 3 mm. longis 1 mm. latis, locellis plus minus undulatis. Ovarium obovatum 3 mm. longum 2 mm. latum apice rotundatum, stylo 13 mm. longo filiformi-columnari apice 3-fido, ramis 4 mm. longis suberectis apice rotundato-patentibus.

HAB. Kelung: Masoku, leg. T. KAWAKAMI et Y. SHIMADA, 1907, Mart. (No. 4311).

Near *D. sessile* DON., but differs from it in having quite opened segments and narrower leaves.

Paris LINN.

Paris formosana HAYATA sp. nov. Herba robusta verisimiliter cum pedunculis 120 cm. alta, caulibus glabris teretibus rectis 9 mm. in sectione. Folia ad apicem caulis 8-verticillata

petiolata oblonga vel ovato-oblonga 28 cm. longa 11 cm. lata apice subito acuminata basi acuta brevissime attenuata margine marginata herbaceo-membranacea plus minus crassiuscula utrinque glabra subtus pallidiora supra basin distincte 3-nervia, etiamque plus 2-nervis inconspicuis, nervis margine subparallelis ad apicem convergentibus, venis inter nervos obliquis, inter venas reticulato-venulosis, reticulis elongato-obliquis, nervis basi gradatim attenuato-convergentibus, nervis venisque utraque pagine subplanis conspicuis, petiolis 5 cm. longis ut videntur complanatis. Pedunculi ad centrum verticilli foliorum solitarii recti validiusculi circ. 40 cm. longi glabri 5 mm. in sectione teretes. Perianthium 2-seriatim partitum, basi plus minus campanulatum cum ovario adnatum, segmentis exterioribus 6 herbaceo-membranaceis majusculis oblongo-lanceolatis 9 cm. longis 2 mm. latis apice obtuso-acuminatis basi supra basin subito attenuatis ad stipitem 7 mm. longum 3 mm. latum abeuntibus, nervis et venis ut foliis, segmentis interioribus linearibus $2\frac{1}{2}$ cm. longis 1 mm. latis obtusis. Stamina 12, cum segmentis opposita 23 mm. longa, filamentis complanatis 6 mm. longis, antheris linearibus quam filamentis 2-plo longioribus, locellis undulatis, connectivis apice $1\frac{1}{2}$ mm. in longitudine productis. Ovarium ovatum sub lente muricatum $1\frac{1}{2}$ cm. longum 11 mm. latum basi cum perianthio adnatum apice depresso-marginatum ad centrum etiamque conico-productum in stylum abeuns, rubro-purpurascens; styli 6 basi connati 7 mm. longi recurvato-patentes apice revoluti.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, 1908, Mart. (No. 3573).

Very distinct species which comes near *Paris polyphylla* SMITH. The leaves of the present plant have a quite peculiar venation. Although SMITH's species shows no small varieties and some of

them have nearly the same appearance as my plant, I have never found any specimens representing the same venation.

Paris polyphylla SMITH ; HOOK. f. *Illustr. Himal. Pl.* t. 24 ; HOOK. f. *Fl. Brit. Ind.* VI. p. 362 ; S. MOORE in *Journ. Bot.* (1878), p. 138 et (1883), p. 358 ; FORBES et HEMSL. *Ind. Fl. Sin.* III. p. 145.

HAB. Tōyen, Yubokusha, leg. T. KAWAKAMI et U. MORI, 1907, Mart. (No. 6226).

DISTRIB. Himalaya and China.

This is very near *P. incompleta* FISCH., but the leaves are oblong, outer segments are much narrower and twice as long as those of that species.

Commelinaceæ.

Commelina LINN.

Commelia auriculata BLUME ; FORBES et HEMSL. *Ind. Fl. Sin.* III. p. 155 ; MATSUM. et HAYATA *Enum. Pl. Formos.* p. 448.

HAB. Nantō : Musha, leg. T. KAWAKAMI et U. MORI, 1906, Aug. (No. 1176) ; Tamsui, leg. T. KAWAKAMI et Y. SHIMADA, 1908, Mart. (No. 4347).

Commelina undulata R. BR. ; FORBES et HEMSL. *Ind. Fl. Sin.* III. p. 157 ; MATSUM. et HAYATA *Enum. Pl. Formos.* p. 449.

HAB. Takaw, leg. B. HAYATA et Y. SHIMADA, 1908, Aug. (No. 97).

Floscopa LOUR.

Floscopa scandens LOUR. " *Fl. Cochinch.* p. 193" ; C. B. CLARKE,

in DC. Monogr. Phanerog. III. p. 265 ; Hook. f. Fl. Brit. Ind. VI. p. 390 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 158.

HAB. Nantō : Suisha, leg. T. KAWAKAMI et Y. SHIMADA, 1907, Dec. (No. 5164) ; Randaizan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7072).

DISTRIB. China : Kiangsi, Fokien, Kwangtung, Hongkong ; India, Birma, Malay archipelago and Australia.

Juncaceæ.

Juncus LINN.

Juncus modicus N. E. BROWN in FORBES et HEMSL. Ind. Fl. Sin. III. p. 165.

Juncus Maximowiczii HAYATA Fl. Mont. Formos, p. 229 (non BUCH.).

DISTRIB. Hupeh : Fang, 8000-9000 ft.

Aroideæ.

Pinellia TEN.

Pinellia tuberifera TENORE ; ENGL. in DC. Monogr. Phanerog. II. p. 566 ; HANCE in Journ. Linn. Soc. XIII. p. 88 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 174.

HAB. Sharyōtō, leg. T. KAWAKAMI et Y. SHIMADA, 1908, Mart. (No. 4326).

DISTRIB. Japan and China.

Arisæma MART.

Arisæma alienatum* var. *formosanum HAYATA n. v. Herba erecta glabra majuscula cum petiolis 60 cm. alta 1-foliata, foliis floribusque coætaneis. Folia longe petiolata verticillatim circ. 13-secta, segmentis oblongo-oblanco-latis 20 cm. longis 4 cm. latis apice acuminatis vel cuspidato-acuminatis basi longe attenuatis supra basin 2 mm.-latis basin plus minus leviter dilatatis 3 mm. latis, petiolis robustis rectis 60 cm. longis basi 7 mm. in sectione a medio usque ad basin vaginiformibus pedunculum involventibus basi vaginatis, vaginis 13 cm. longis membranaceis discoloribus apice obtusissimis multinerviis, basi tubiformibus, tubis $2\frac{1}{2}$ cm. longis. Pedunculus floris ♀ solitarius elongatus 25 cm. longus, partibus vaginiformibus petiolorum involucrat, sursum leviter recurvus liber. Spatha oblongo-lanceolata caudata cum tubo 14 cm. longa $2\frac{1}{3}$ cm. lata, tubo ventricoso-oblongo. Spadix inclusus cylindrico-conicus 17 mm. longus 8 mm. latus, appendice longe filiformi 6 cm. longa recurva a medio deorsum tuberculis filiformibus ascendente-recurvis instructa, (tuberculis 3 mm. longis a latere compressis basi dilatatis). Flores diceii. Fl. ♀: Ovarium hexagono-obovoideum $1\frac{1}{2}$ mm. longum 1-loculare 3-ovulatum, stylo subnullo, stigmatate pulvinato rubro-marginato.

HAB. Shintiku, leg. T. KAWAKAMI et K. WATANABE, 1907, Aprili.

Very like the type, from which this is distinguishable by the much slender spadix. Also near *A. neglectum* SCHOTT, *A. Leschenaultii* BLUME and *A. consanguineum* SCHOTT; but differs from them in having spadix with a long hairy thread-like appendage.

Amorphophallus BLUME.

Amorphophallus hirtus N. E. BROWN in FORBES et HEMSL. Ind. Fl. Sin. III. p. 181 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 458.

HAB. Kōshūn, leg. T. KAWAKAMI, 1906, Mart.

DISTRIB. An endemic plant.

Najadaceæ.

Potamogeton LINN.

Potamogeton crispus LINN. ; FRANCH. et SAVAT. Enum. Pl. Jap. II. p. 15 ; Hook. f. Fl. Brit. Ind. VI. p. 566 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 193 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 465.

HAB Kishito, (No. 724).

Zannichellia LINN.

Zannichellia pedicellata BUCH.-HAM. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 197.

HAB. Takaw, leg. B. HAYATA et Y. SHIMADA, 1908, Aug. (No. 122).

DISTRIB. Kiangsu ; Loo-choo islands. Cosmopolitan, excluding Australia.

Cyperaceæ.

Juncellus GRISEB.

Juncellus inundatus CLARKE ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 207 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 470.

HAB. Akō, (No. 611).

Juncellus serotinus CLARKE in FORBES et HEMSL. Ind. Fl. Sin. III. p. 208 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 470.

HAB. Shōriukiu, (No. 533).

Cyperus LINN.

Cyperus diffusus VAHL ; CLARKE in HOOK. f. Fl. Brit. Ind. VI. p. 603 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 211.

HAB. Taitō : (No. 6023).

Cyperus distans LINN. f.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 211 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 472.

HAB. Hokutō : leg. G. NAKAHARA, Oct. 1906 ; Tōyen, Yenjorin, leg. T. KAWAKAMI, 1907, Oct. (No. 4657).

Cyperus eleusinoides KUNTH ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 212 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 472.

HAB. Kōshūn : (No. 5016).

Cyperus nutans CLARKE in Herb. Kew.

HAB. Taitō : Torekisha, leg. T. KAWAKAMI et Z. KOBAYASHI, Aug. 1907, (No. 5626).

Compared with a specimen so named at Kew.

Cyperus radiatus VAHL ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 216 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 474.

HAB. Akō : (No. 526).

Cyperus tuberosus ROTTB.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 219 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 476.

HAB. Takaw, leg. G. NAKAHARA, Oct. 1905, (No. 552).

Cyperus uncinatus POIR. ; BÆCK. in Linnæa XXXV. p. 502 ;
FORBES et HEMSL. Ind. Fl. Sin. III. p. 219.

HAB. Daikō, leg. T. KAWAKAMI et Y. SHIMADA, Aug. 1907, (No. 4203).

DISTRIB. Tropics and warm temperate regions of Asia, Africa, and America.

The present specimen is of a form with much broader spikelets. It will prove to be a variety of this species when the floral parts are fully examined.

Cyperus Zollingeri STEUD. ; BÆCK. in Linnæa XXXVI. p. 352 ;
C. B. CLARKE in HOOK. f. Fl. Brit. Ind. VI. p. 613 ; FORBES et HEMSL.
Ind. Fl. Sin. III. p. 219.

HAB. Taitō : Hōkansha, (No. 1524).

DISTRIB. Yunnan, Hongkong. Tropical Africa and India, extending to Luzon and Queensland.

Mariscus VAHL.

Mariscus microcephalus PRESL. ; C. B. CLARKE in HOOK. f. Fl. Brit. Ind. VI. p. 624 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 221.

HAB. Akō (No. 614).

DISTRIB. Kwangtung. Common in India and Malaya, extending to Mascarenia.

Mariscus Sieberianus NEES ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 221 ; MATSUM et HAYATA Enum. Pl. Formos. p. 477.

HAB. Taikō, (No. 69).

Torulanium DESV.

Torulanium confertum HAM. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 222; MATSUM. et HAYATA Enum. Pl. Formos. p. 478.

HAB. Nantō, leg. G. NAKAHARA, (No. 372).

Kyllinga ROTTB.

Kyllinga cylindrica NEES.; BECK. in Linnæa XXXV. p. 415 ; C. B. CLARKE in HOOK. f. Fl. Brit. Ind. VI. p. 588 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 223.

HAB. Hokuto, (No. 478).

DISTRIB. Yunnan. Dispersed in the tropical and subtropical regions of the old world.

Eleocharis R. BR.

Eleocharis capitata R. BR. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 227 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 480.

HAB. Taitō, (Nos. 1492, 740 et 1492).

Eleocharis plantaginea R. BR.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 228 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 481.

HAB. Shinkō.

Fimbristylis VAHL.

Fimbristylis complanata LINK. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 231 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 482.

HAB. Nantō, (No. 3552).

Fimbristylis schœnoides VAHL. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 243 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 486.

HAB. Taikō, (No. 62).

Scirpus LINN.

Scirpus erectus POIR. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 248 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 488.

HAB. Randaizan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7061).

Scirpus lacustris LINN. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 250 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 488.

HAB. Sōryōshō, Sharyōtō, (No. 4338) ; Suiteiryō, (No. 1215).

Scirpus mucronatus LINN. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 252 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 489.

HAB. Taitō, leg. T. KAWAKAMI et U. MORI, (No. 5734).

Scirpus ternatensis REINW. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 254 ; MATSUM. et HAYATA Enum. Pl. Formos. p.

HAB. G. NAKAHARA, (No. 970).

Scirpus triqueter LINN. FORBES et HEMSL. Ind. Fl. Sin. III. p. 255 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 490.

The present plant is one of the most useful in Formosa. It is the principal source of the material of which the mats called "Taikō-mushiro" are made. The species exists spontaneously in Japan, but it does not there afford so good a material for mats, and therefore it is of no industrial interest. Consequently, the Formosan plant was regarded as quite distinct from the Japanese and, therefore different from *S. triqueter* LINN., which is widely dis-

tributed in the tropical and temperate regions of Eastern Asia. Some years ago, Mr. T. KAWAKAMI sent me a specimen of a sedge which is known as the best material for the Taikōmushiro, and is called by the name of Taikō-i (=Sedge of the Taikō-mat). Studying the specimen, I saw that the plant is quite the same as a Japanese sedge which is known to be identical with *S. triqueter* LINN., although there are some small differences between them in point of inflorescence. The differences are not, however, of such characters which botanically separate one from the other. While working here at Kew, I have compared the present sedge with numerous specimens of the named species preserved here, and found that there is a form of the species with which my plant is exactly identical. I have, therefore, no further hesitation in referring the present plant to *S. triqueter* LINN. It may be added, however, that the Formosan plant is not of the same form as the Japanese, or as the type of the species, but is of a form peculiar to itself and to a few specimens at Kew.

Remirea AUBL.

Remirea maritima AUBL. ; BECK. in Linnæa XXXV. p. 435 ; C. B. CLARKE in HOOK. f. Fl. Brit. Ind. VI. p. 677 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 258 ;

HAB. Formosa.

DISTRIB. Kwangtung. On tropical sea-coasts throughout the world.

Cladium P. BR.

Cladium jamaicense CRANTZ.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 262.

HAB. Hakuhakusha, leg. T. KAWAKAMI, 1906, Mai. (No. 1491).

DISTRIB. Kwangtung, Hongkong. From Sweden to the Cape of Good Hope; from Japan to Victoria, also throughout Polynesia; but absent in India and West Malaya (after HEMSLEY).

Carex LINN.

Carex arenicola F. SCH.

HAB. in monte Morrison, leg. G. NAKAHARA, 1905.

The present specimen exactly accords with those so named in the Herbarium at Kew and also with those at Tōkyō. It would be very remarkable fact if this *Carex* should really exist in the mountains of Formosa. It may be doubted, however, if the specimen might not be one of the collections from Sachalin island, for the collector was sent to Formosa immediately after he had finished his work in Sachalin; and it may be well conjectured that the present specimen, having escaped from the northern collections, was sent to me from the same collector then in Formosa.

Carex arisanensis HAYATA sp. nov. Culmi erecti graciles glabri basi foliis 4-5 confertis. Folia tenuia erecto-recurva basi plicata conferta vaginata, vaginis 2 cm. longis subhyalinis, ligulis brevissimis $1\frac{1}{2}$ mm. longis obliquis ad basin laminarum sitis, laminis 15 cm. longis 4 mm. latis apice acuminato-obtusis utraque pagine et margine plus minus scaberulis subtus tenuiter distincte costatis inter catas et margines 3-nervatis. Spicæ paucissimæ brevissimæ 7 mm. longæ $1\frac{1}{2}$ -2 mm. latæ paucifloratæ, inferioribus longe pedunculatis, bracteis inferioribus longioribus basi vaginiformibus laminis linearibus spicas superantibus, pedunculis apice complanatis vel trigonis subalatis. Spicæ ♂ : triquetræ, squamis inferioribus plus minus majoribus ovatis 4 mm. longis 2 mm. latis apice rotundatis basi $1\frac{1}{4}$ mm. latis dorso costatis, (costis prope apicem abrupte evanescentibus), medio viridi-

bus margine non coloratis. Stamina erecta cum filamentis 5 mm. longa, filamentis validiusculis rectis 3 mm. longis, antheris exsertis linearibus 2 mm. longis $\frac{1}{3}$ mm. latis apice obtuse bi-apiculatis basi leviter emarginatis vel rotundatis facie minute tenuiter striato-maculatis. Spicæ ♀: squamis rhachin semi-amplectantibus. Utriculus præmaturus cylindrico-linearis $4\frac{1}{2}$ mm. longus, $\frac{1}{2}$ mm. latus vel angustior ore brevissime obtuso-2-dentatus 2-costatus glaber. Stylus basi non incrassatus 3-fidus.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3697).

Comes near *C. paucimacula* in having very short male spikes, but differs from it by scales, leaves, and nutlets.

Carex atronucula HAYATA sp. nov. Culmi aphylli erecti 20-25 cm. alti graciles obtuso-trigoni basi squamati, (squamis imbricatis vaginiformibus, inferioribus brevioribus fuscentibus, superioribus longioribus, laminis lanceolatis $1\frac{1}{2}$ cm. longis apice obtusis), partibus squamatis circ. 2 cm. longis, a medio sursum spiciferi, partibus spiciferis 10 cm. longis obtuso-trigonis. Folia conferta linearia validiuscula subcoriacea 65 cm. longa culmos 3-plo in longitudine superantia suberecta 8 mm. lata apice acuminata plicato-nervosa utraque pagina margneque scabriuscula basi explicato-vaginiformia (partibus vaginiformibus 4 cm. longis apice vaginæ vestigiis ligularum), utraque pallida, basi fuscentia. Spicæ ♀: pedunculatæ racemose dispositæ, ad nodos solitariae, vel geminae, internodiis inferioribus 3 cm. longis; spicæ cylindricæ 2-2 $\frac{1}{2}$ cm. longæ 4 mm. latæ, pedunculis 3 cm. longis, bracteis inferioribus majoribus, vaginiformibus, vaginis 8 mm. longis basi pubescentibus ore subtruncatis, laminis cuspidato-lanceolatis 12 mm. longis; squamis ovatis 2 $\frac{1}{2}$ mm. longis 1 $\frac{1}{4}$ mm. latis apice cuspidatis basi leviter contractis ad insertionem

1 mm. latis rotundatis dorso medio costatis, (cuspidibus margine minute aristato-hirtellatis). Utriculus ovoideo-fusiformis $2\frac{1}{2}$ mm. longus 1 mm. latus vel angustior apice plus minus attenuatus basi acuto-obtusus, nuculam et partem basilem styli includens trigonus, antice planus, postice elevato-convexus non costatus, latere costatus inter costas multinervosus, sub microscopio minute hirtellatus ore bidentatus. Achænia matura atro-fuscentia trigono-ovoidea, (angulis prominentibus sed obtusis), ecostata, $1\frac{1}{3}$ mm. longa circ. 1 mm. lata apice cupulis annuliformibus coronata, partibus conico-incrassatis styliorum superata, basi intra squamas brevissime stipitata, (stipitibus $\frac{1}{4}$ mm. longis, flavis), facie superne inferne subexcavata a medio elevata, sub microscopio minute elevato-punctata; styli basin conico-incrassati supra partem conicum 3-fidi, ramis fuscentibus.

HAB. Randaizan, leg. T. KAWAKAMI et U. MORI, 1908, Mart. (No. 3722).

Near *C. schistorhyncha*, *C. nexa*, and also *C. coreana* KOM. but differs from them by many points.

Carex bilateralis HAYATA sp. nov. Culmi trigoni ad angulos acutos scabri facie striati minute longitudinaliter maculati 25-30 cm. alti basi vaginati, partibus foliatis 3 cm. longis, partibus floriferis 10 cm. longis. Folia linearia basi culmi conferta circ. 8 cm. longa basin $3\frac{1}{2}$ mm. lata apice acuminata dorso medio costata margine plus minus recurva (supra costis impressis subtus elevatis), margine scabrida facie plus minus scabriuscula minute longitudinaliter maculata, vaginarum ore truncate, ligulis obsoletis vel brevissimis. Spicæ androgynæ racemosæ vel plus minus paniculatim dispositæ. Racemi 10 cm. longi 3 cm. lati, spicis ad nodos 2-3-4-fasciculatis, longe pedun-

culatis, bracteis inferioribus lanceolatis basi pedunculos vaginantibus, vaginis 7 mm. longis ore truncatis, laminis lineari-lanceolatis, bracteis superioribus vaginiformibus, laminis brevioribus gradatim obsolete, spicis inferioribus cylindraceis 2 cm. longis vel brevioribus 5 mm. latis longe pedunculatis, pedunculis $3\frac{1}{2}$ cm. longis vel brevioribus scaberulis. Spicæ androgynæ ad apicem spiculis masculinis; spiculis ♂: squamis ovatis $3\frac{1}{2}$ mm. longis $1\frac{1}{2}$ mm. latis ad basin $\frac{2}{3}$ mm. latis apice acutis vel acuminatis glabris dorso costatis; spiculis ♀: squamis inferioribus longioribus plus minus obtusis oblongis $4\frac{1}{2}$ mm. longis $1\frac{1}{2}$ mm. latis apice interdum truncato-obtusis a basi $1\frac{1}{4}$ mm. latis a dorso tenuiter costatis medio non coloratis ad apicem et marginemque rubro-coloratis squamis superioribus plus minus acutis minoribus. Utriculus fusiformis a facie compressus 4 mm. longus 1 mm. latus apice bidentatus attenuatus basi acuto-attenuatus a latere costatus ad costis scabrido-hirsutus facie sursum hispidulus deorsum glaber. Achænia præmatura obovoidea a facie compressa 1 mm. lata apice truncato-rotundata basi acuto-obtusa glaberrima; styli 4 mm. longi basi erecti vix incrassati, vel non incrassati, a basi usque ad apicem 2-fidi, ramis fusco-rubrescentibus hirtellatis.

HAB. in monte Morrison, leg. G. NAKAHARA, 1906.

Appears to be near *C. brunnea* THUNB., but differs from it in the shape of spikelets, utricles and nutlets.

Carex Boottiana HOOK. et ARN. Bot. Beech. Voy. p. 273; FORBES et HEMSL. Ind. Fl. Sin. III. p. 275.

HAB. Kōtōshō, leg. T. KAWAKAMI et U. MORI, 1908, Aprili. (No. 2421).

DISTRIB. LOO-choo, and Bonin Islands.

Carex chinensis RETZ.; BOOTT *Carex*, p. 13, t. 36; BENTH. Fl.

Hongk. p. 402 ; BÆCK. in Linnæa XLI. p. 231 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 280.

HAB. Kelung, leg. T. KAWAKAMI, 1907, Mart. (No. 4246); Fukki-kaku, leg. T. KAWAKAMI et Y. SHIMADA, 1908, Mart. (No. 4277).

DISTRIB. Fokien, Hupeh, Kwangtung, and Hongkong.

Carex Dumni HAYATA sp. nov. Culmi 100 cm. alti vel altiores tereto-trigoni (angulis obtusissimis), basi foliis conferti, a medio 1-2-foliati. Folia linearia 60 cm. longa culmo breviora 9 mm. lata utraque pagine et margine scabrida facie plana subtus distincte tenuiter costata inter costam et marginem multinervata supra distincte 3-costata inter costas 7-8-nervata supra sursum scaberrima, suberecta basi vaginiformia plus minus fuscentia, vaginis 7-8 cm. longis ore obliquis, ligulis obliquis 1 mm. longis integris fuscentibus. Spicæ androgynæ vel fœmineæ a medio sursum culmorum paniculato-dispositæ, ramis panicularum erectis inferioribus longioribus 20 cm. longis ad nodos 2-3-fasciculatis, fasciculis inferioribus a se 17 cm. remotis, superioribus minus remotis, ad nodos 1-foliatis, foliis ramos superantibus; spicis versus apicem ramorum paniculatim vel racemosim vel spicatim dispositis ad basin ramulorum bracteatis, bracteis vaginiformibus acutis 4 mm. longis; spicis subsessilibus vel pedunculatis, ad nodos ramulorum solitariis vel 2-3-fasciculatis obovato-cylindricis 2 cm.— $\frac{1}{2}$ cm. longis 2 mm. latis trigonis; squamis inferioribus sterilibus, superioribus mediocribusque fœmineis, rarissime squamis superioribus 1-2 masculinis, vel sterilibus, sursum prope apicem squamis masculinis 3-4 fertilibus, prope basin squamis sterilibus. Fl. ♂: squamis ovatis 5 mm. longis $2\frac{1}{2}$ mm. latis basi subvaginiformibus dorso costatis, costis ad apicem in aristam productis, margine eroso-integris; antheris linearibus apice appendiculatis, (appendiculis

membranaceis hyalinis antheram in latitudine æquantibus brevissimis 2-3-serrato-denticulatis), basi minute auriculato-sagittatis. Fl. ♀: squamis late ovatis, cum cuspidibus 5 mm. longis 2 mm. latis a basi $1\frac{1}{2}$ mm. latis plus minus rhachillam amplectantibus apice recto-acutis dorso versus apicem costatis (costis infra apicem in aristam 1 mm. longam productis), margine sursum eroso-integris aristis minute hirtellatis. Utriculus oblongo-ovatus $4\frac{1}{4}$ mm. longus $1\frac{1}{2}$ mm. latus apice rostratus bidentatus basi obtusus bilateralis postice concavus antice convexus a latere costatus ad costis aristato-hirtellatus a facie plus minus minute pauceque hirtellatus. Achæmium trigono-oblongum a dorso compressum postice leviter concavum vel planum antice elevato-angulatum, (angulis obtusis), fusco-rubescens basi brevissime stipitatum, stylo deorsum plus minus sensim incrassato minute hirtellato a medio sursum rubro-glanduloso-punctato a medio sursum 3-fido, ramis brevissime punctato-hirtellatis.

HAB. Giran, Kentōzan, leg. T. KAWAKAMI et U. MORI, 1907, Juni. (No. 1350).

The present *Carex* comes near *C. Praini* and also *C. cryptostachys* BRONGN., but differs from them in having much elongate flower-scales.

Carex fulvo-rubescens HAYATA sp. nov. Culmi graciles glabri striati 34 cm. longi, partibus spiciferis 10 cm. longis, partibus foliatis 7 cm. longis. Folia basi vaginata, lamina linearia acuminata apice subteretia margine paullo revoluta circ. 10 cm. longa $3\frac{1}{2}$ mm. lata utrinque glabra margine scaberula, vaginis hyalinis 3-fusco-nervatis, ore truncatis, ligulis brevissimis integris; bracteis fulvo-rubescens inferioribus vaginiformibus, cum vaginis 2 cm. longis, laminis lineari-lanceolatis 9 mm. longis, (ore fisso

ad basin laminarum obtuso-obsagittiforme producto), bracteis superioribus minoribus, laminis in setam brevissimam reductis. Spicæ ♂ solitariae fulvo-rubescens terminales cylindricæ $3\frac{1}{2}$ cm. longæ $3\frac{1}{2}$ mm. latæ pedunculatæ, pedunculis $1\frac{1}{2}$ cm. longis, floribus $\frac{1}{2}$ -1 mm. a se remotis, squamis fulvo-rubescens obovato-oblongis valde imbricatis $5\frac{1}{2}$ mm.-6 mm. longis 2 mm. latis apice rotundato-acutis vel brevissime aristatis basi cuneato-obtusis basi hyalinis, filamentis 5 mm. longis, antheris linearibus breve apiculatis basi obtuse sagittatis 4 mm. longis. Spicæ ♀ fulvo-rubescens laterales cylindricæ 2- $3\frac{1}{2}$ cm. longæ 4 mm. latæ 4-5 secus rhachin sitæ, 2 cm. a se remotis, pedunculis $\frac{1}{2}$ - $1\frac{1}{2}$ cm. longis, floribus densiuscule dispositis, inferioribus floribus 3 mm. a se remotis. Fl. ♀: squamis ovatis quam ♂ minoribus et angustioribus $3\frac{1}{4}$ mm. longis $1\frac{1}{5}$ mm. latis acuminatis basi 1 mm. latis ad insertionem plus minus obliquis dorso apice plus minus carinato-aristatis. Utriculi lineari-fusiformes 5 mm. longi $\frac{1}{2}$ - $\frac{2}{3}$ mm. lati trigoni plus minus erecto-recurvi apice stylis erectis coronati, (stylis utriculum in longitudine æquantibus), apice 2-dentati a medio sursum rubro-colorati, facie plani dorso obtuso-angulati latere prominente costati ad costas hirsuti cæterum glabri, stipitibus infra utriculum plus minus productis. Achænia elongato-ovata $1\frac{1}{2}$ mm. longa $\frac{1}{2}$ mm. lata trigona 3-costata, (costis prominentibus), facie plana, dorso angulata glabra flava, stipitibus $1\frac{1}{2}$ mm. longis erectis, stylis 6 mm. longis a basi plus minus incrassatis fuscentibus a medio sursum 3-fidis, ramis filiformibus hirsutis.

HAB. Taitō: Sumegan, leg. T. KAWAKAMI et U. MORI, 1908, Jan. (No. 4563).

The present *Carex* appears to be near *C. manciiformis* FRANCH. but differs from it in the shape of scales and utricles.

Carex Kawakamii HAYATA sp. nov. Culmi ascendentes 7 cm. longi acuto-trigoni sub-alati ad angulos scabriusculi basi foliati. Folia tenuia erecto-recurvata sursum patentia 8-9 cm. longa culmos superantia 2-2½ mm. lata utraque pagine et ad costas marginemque glabra subtus distincte costata apice acuminata basi vaginiformia (vaginis demum explicatis 2 cm. longis prope marginem hyalinis). Spicæ pauci-floratæ 3-4 alternatim dispositæ, terminales ♂, reliquæ ♀, sub quoque spica unibracteata, bracteis inferioribus longioribus spicas 3-4-plo superantibus, spicis brevissime pedunculatis. Spicæ ♂: cylindricæ 1 cm. longæ 1 mm. latæ paucifloratæ; squamis oblongis 5 mm. longis 2 mm. latis apice acutis minutissime hirtellis a basi contractis ad insertionem 1 mm. latis dorso costatis. Spicæ ♀ spicis ♂ latiores paucifloratæ, squamis dimidium squamas ♂ æquantibus cuspidato-ovatis 2½ mm. longis 1¼ mm. latis dorso costatis costis apice in cuspidem productis glabris. Utriculus valde exsertus squamas circ. 2-plo in longitudine æquans ovoideo-fusiformis 5 mm. longus 1¾ mm. latus sub-trigonus antice elevato-convexus postice subplanus apice rostratus basi acutus apice 2-dentatus glaber non punctatus a latere tenuiter costatus inter costas 2-nervatus. Achæmium ovoideo 1¾ mm. longum 1 mm. latum vel latius apice rotundatum basi acutum subtrigonum, (angulis obtusis), flavo-rubescens; stylus basi oblique erectus haud incrassatus supra medium 3-fidus, ramis reflexis hirtellatis.

HAB. in monte Morrison, (No. 2385).

Near *C. pseudo-japonica* HAYATA, but differs from it in having nearly erect styles and not punctate utricles.

Carex ligata BOOTH var **γ formosensis** (LÉV. et VAN.) KÜKENTH. in ENGL. Pfl.-reich IV.-20, Cyp.-Caricoid. p. 474.

Carex longispicata HAYATA sp. nov. Culmi 100 cm. alti vel altiores (basi foliis confertis instructi?) gracillimi acute triquetri glabri a facie striati ad angulos acuti vel sub alati facie $1\frac{1}{4}$ mm. lati. Folia caulina 50-60 cm. longa culmo breviora 4 mm. lata basi distincte tenuiter contracta, supra costis impressis, utraque latere castæ prominente 1 (?)-nervata, inter nervas multi-nervulosa utraque glabra. Spicæ ♂ terminales, androgynæ laterales, 4-5 racemosim alternatim dispositæ. Racemi 12 cm. longi, spicis ad nodos solitariis longe pedunculatis, bracteis longis spicas in longitudine superantibus, infimis longissimis 20 cm. longis 3 mm. latis basi brevissime vaginiformibus. Spicæ ♂ cylindricæ 4-5 cm. longæ $1\frac{1}{2}$ mm. latæ pedunculatæ, pedunculis 1-3 cm. longis. Spicæ androgynæ, (partibus ♀ inferioribus partes superiores ♂ in longitudine 5-10-plo æquantibus, partibus masculinis interdum obsoletis), a se $1\frac{1}{2}$ cm.— $4\frac{1}{2}$ cm. remotæ, pedunculis 1-3 cm. longis. Fl. ♂ : squamis obovato-oblongis 3 mm. longis $1\frac{2}{3}$ mm. latis apice rotundato-truncatis ad summum extremitatem cuspidatis, (cuspidibus $\frac{1}{4}$ mm. longis), dorso costatis (costis apice in cuspides productis), longitudinaliter castaneo-striato-maculatis glabris. Fl. ♀ : squamæ quam iis ♂ breviores obovatæ cum cuspidibus $2\frac{1}{2}$ mm. longæ $1\frac{1}{4}$ mm. latæ sursum margine eroso-integræ dorso costatæ, (costis ad apicem in cuspidem 1 mm. longam productis), cuspidibus minute paucissime hirtellatis. Utriculus oblongus $2\frac{1}{3}$ mm. longus $1\frac{1}{3}$ mm. latus utraque acutus apice plus minus rostratus a dorso valde compressus facie leviter concavus dorso costato-convexus a latere costatus, (costis obtusis), rubescens minute muricatus dense punctatus. Achæmium sub maturitate globosum $1\frac{1}{2}$ mm. in diametro a dorso compressum a latere costatum antice posticeque convexum glabrum fusco-rubescens basi plus minus brevissime stipitato-attenuatum; stylo medio sensim paullo incrassato basi sensim paullo contracto, infra

medium reflexo tunc erecto supra medium 2-fido, ramis erectis hirtellatis.

HAB. Giran : Kentōzan, leg. T. KAWAKAMI et U. MORI, 1906, Juni. (No. 1367).

Near *C. brumnea* THUNB., but differs from it in having much longer spikes and much compressed nutlets.

Carex morrisonicola HAYATA sp. nov. *Carex* sp. HAYATA Fl. Mont. Formos. p. 232. Culmi 6-8 cm. longi firmi scabridi apice 2-3 spicas gerentes. Folia 5-7 cm. longa 2 mm. lata culmo breviora firma subtus carinata glaucescentia apice sæpe circinnato-curvata basi vaginiformia, vaginis 15 mm. longis. Spicæ 2-3; terminalis masculina teres 7 mm. longa 1 mm. lata sæpe basi attenuata, squamis ovatis basi truncatis apice acutis 6 mm. longis, 2-3 mm. latis subtrinerviis, nervis castaneis; reliquæ fœmineæ sessiles paucifloræ 8-9 mm. longæ, squamis late ovatis acuminatis late 1-nerviis, nervo producto castaneo, partibus marginalibus hyalinis. Utriculus 2-costus ad costas minute denticulatus ovatus rostratus ore obscure bidentatus glaber. Achænium apice contractum triquetrum 3-costatum, styli basi conico-crassati. Stigma 3-fidum.

HAB. in monte Morrison, ad 13000 ped. alt.; leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2383).

The present *Carex* is very small in its habit and the floriferous culm has a very few spikes on its top. Short branches are sometimes seen at the basal portion of the culms.

Carex Nakaharai HAYATA sp. nov. Culmi gracillimi circ. 50 cm. longi acute trigoni a facie 1 mm. lati ad angulos et faciem glabri basi foliis longe vaginatis 5-6, ad medium culmi 1-foliati, vel non-foliati, (partibus spiciferis circ. 16 cm.

longis). Alabastrum ascendens multiseriatim squamatum, squamis inferioribus late ovatis, superioribus angustioribus, fusco-purpurascentibus. Folia linearia cum vaginis 35 cm. longa quam culmo breviora 3 mm. lata pallidiora, subtus leviter elevato-costata glabra supra et margine scabrida, supra obscure multinervata, costis non conspicuis, vaginis stramineis, ore oblique truncatis. Spicæ androgynæ tenuissimæ longe vel breve pedunculatæ, racemose vel paniculate dispositæ, gracillimæ, $1\frac{1}{2}$ cm.-3 cm. longæ 1 mm. latæ vel angustiores erectæ, ad nodos 3-4-5-fasciculatæ, fasciculis inferioribus a se 5-10 cm. remotis, superioribus minus remotis, ad nodos 1-bracteata, bracteis inferioribus longioribus spicas valde superantibus basi vaginosis, superioribus brevioribus spicas in longitudine subæquantibus. Spicæ sursum ♂, deorsum ♀; partibus ♂ brevissimis 2-3 mm. longis, partibus ♀ longioribus, $1\frac{1}{2}$ -2 cm. longis. Fl. ♂: squamis basi valde amplexicaulibus circ. vaginosis, $2\frac{1}{2}$ mm. longis, apice obtuso-acutis, non costatis, filamentis brevioribus, antheris linearibus $1\frac{1}{2}$ mm. longis. Fl. ♀; floribus a se $\frac{2}{3}$ - $\frac{1}{2}$ mm. remotis, squamis late ovatis 2 mm. longis $1\frac{1}{3}$ mm. latis, rhachillam amplexantibus. Utriculus bilateralis fusiformis 3 mm. longus 1 mm. latus vel angustior glaber utrinque attenuatus antice leviter convexus postice subconcavus latere tenuiter costatus apice bidentatus. Achæ-nium bilaterale a dorso compressum fusco-rubescens obovato-oblongum vel oblongum $1\frac{1}{2}$ mm. longum 1 mm. latum vel angustior apice rotundatum basi obtusum a latere albo-costatum glabrum postice subplanum, antice convexus, ad summum brevissime rostratum, (rostro cum stylo articulado), basi stipitatum, (stipite cum utriculo connato, infra achæ-nium articulado); stylus basi constrictus supra basin sensim paullo incrassatus, supra medium 2-fidus.

HAB. Arizan, leg. G. NAKAHARA, 1906, Nov.

Near *C. brunnea* THUNB. and *C. longicruris* NEES, but differs from both in the shape of nutlets, and especially from the latter, in having utricles with entire margins and quite glabrous scales.

Carex orthostemon HAYATA sp. nov. Culmi ascendentes vel decumbentes 13 cm. longi costato-striati basi foliati glabri apice spiciferi, partibus spiciferis 4-5 cm. longis. Folia linearia acuminata descendendo-recurvata patentia, lamina 15 cm. longis culmos in longitudine superantia 4 mm. lata facie plus minus plicata margine integerrima utraque pagine scaberula subglabra subtus elevato-costata, ligulis brevissimis integris. Spicæ semper geminatae, altera masculina, altera foeminea, geminis semper 2, altero terminali, altero laterali, bracteis secundatim dispositis a se 3-3½ cm. remotis paralleliter et simpliciter recurvatis apice descendentibus, inferioribus longioribus cum vaginis 10 cm. longis spicas valde excedentibus, basi vaginiformibus, vaginis 1 cm. longis ore truncatis, bracteis superioribus brevioribus. Spicæ masculinae breve, foemineae longe, pedunculatae; spicæ ♀ cylindricae 1½ cm. longae 1½ mm. latae, spicas ♂ in longitudine 1⅔-plo superantes, pedunculis ½ cm. longis. Spicæ ♂: cylindricae 1 cm. longae, quam ♀ breviores, ¾ mm. latae, floribus a se 1 mm. remotis, squamis arcte imbricatis vaginosis 3 mm. longis ½ mm. in sectione, ore obliquis eroso-integris apice rotundato-obtusis, dorso obscure costatis. Stamina 3, erecta cum filamentis 4 mm. longa, filamentis validiusculis 2 mm. longis complanatis 1-nerviis ⅓ mm. latis, antheris basifixis linearibus rectis filamentum in longitudine subaequantibus vel paullo brevioribus linearibus apice truncato-obtusis vel plus minus emarginatis

longe exsertis. Spicae ♀: cylindricae, squamis late ovatis 3 mm. longis circ. 2 mm. latis apice aristato-cuspidatis sub cuspide emarginatis vel acutis basi $1\frac{1}{4}$ mm. latis rhachin involventibus, (cuspidibus $\frac{1}{2}$ mm. longis margine minute aristato-serrulatis), dorso obscure costatis, (rhachillis subalatis, alis scabridis). Utriculus elongato-oblongus sub-bilateralis, plus minus trigonus facie sub-planus dorso convexus latere costatus 3 mm. longus $\frac{2}{3}$ mm. latus apice obscure 2-dentatus. Achænia præmatura cylindrica $1\frac{1}{3}$ mm. longa apice leviter contracta ad styliorum basem incrassatam abeuntia. Styli basi incrassati validiusculi erecti, (partibus incrassatis $1\frac{1}{2}$ mm. longis elongato-ovoideis minute glanduloso-cristato-punctatis), apice tri-fidi, ramis tenuibus $1\frac{1}{2}$ mm. longis gracilibus minute papilloso-hirtellatis.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3603).

Near *C. tristachya* THUNB., but differs from it by the shape of the utricles and styles; also near *C. breviculmis*, from which this differs in many points.

Carex orthostemon HAYATA var. **cupulifera** HAYATA n. v. Ut typicæ. Achænia matura ovoidea vel oblonga glabra trigona $2\frac{1}{4}$ mm. longa $1\frac{1}{4}$ mm. lata 3-costata, (costis prominentibus), apice constricta, infra basin styliorum cupulis coronata, obovata; stylis basi conico-incrassatis, ad extremitatem constrictis, plus minus minuto tenuissime glanduloso-punctatis.

HAB. Randaizan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7061 et 7058); in monte Morrison, leg. T. KAWAKAMI et U. MORI, (No. 1846).

It seems to me that the shape of the basal portion of styles are some times extremely variable, according to the stage

of development. The cups at the base of the styles are never seen in an earlier stage. The present variety differs from the type not only by the presence of the cups, but also by the less glandular base of the style.

Carex pseudo-flicina HAYATA sp. nov. Culmi trigoni graciles 40 cm. alti a basi ramosi vel eramosi subglabri, facie 1 mm. lati vel latiores, basi foliis confertis, (fasciculos foliorum basi squamatis, squamis atropurpureis ovatis elongato-ovatis apice obtusis). Folia culmo æquilonga 40 cm. longa 5 mm. lata tenuia membranacea plana suberecta subtus distincte tenuiter costata glabra, supra costis inconspicuis, multinervata plus minus scaberula apice acuminata basi vaginosa, vaginis 4-5 cm. longis tenuissime membranaceis purpureis, ligulis tenuibus 1 mm. longis oblique sitis. Paniculæ terminales vel laterales, 15 cm. longæ 4 cm. latæ, ramis inferioribus solitariis vel geminatis 10 cm. longis vel brevioribus ramulis sursum alternatim remote sitis 2 cm. longis, bracteis inferioribus longioribus quam ramo longioribus basi vaginosis, bracteis superioribus angustioribus, rarius filiformibus. Spicæ sessiles superiore simplices inferiore compositæ a se 3 mm.-5 mm. remotæ, generaliter 1 cm. longæ 1 mm. latæ a rhachi patentés, androgynæ, (superiore fl. masculinis, inferiore fœmineis), (partibus ♀ partes ♂ 3-5-plo in longitudine superantibus) circ. 1 cm. longæ vel longiores vel breviores, floribus a se $\frac{1}{2}$ mm. remotis, rhachillis densiuscule hirsutis. Fl. ♂: squamæ ovato-lanceolatae $2\frac{1}{2}$ mm. longæ rubro-purpurascens prope basin non coloratæ utraque glabræ margine integræ ciliolata vel haud ciliolata, antheris linearibus utrinque cellulis minutis clavatis coronatis. Fl. ♀: squamæ triangulares ovatae 1-1 $\frac{1}{2}$ mm. longæ $\frac{2}{3}$ mm. latæ rubro-purpurascens cuspidato-obtusæ vel

cuspidato-acutæ basi latissimæ, extus aristato-hirtellatæ. Utriculus trigono-ovoideo-fusiformis $2\frac{1}{2}$ -3 mm. longus $\frac{3}{4}$ mm. latus apice rostratus (rostris $1-1\frac{1}{2}$ mm. longis) basi obtusus glaber antice planus postice elevato-angulatus latere 2-costatus inter costas 4-6-nervatus flavescens versus rostrum fuscens. Achæmium trigono-ovoideum glabrum castaneum 3-costatum, (angulis acutis), obtusum infra apicem valde constrictum supra constrictionem cum stylo articulatum basi plus minus in stipitem brevissimum productum, stylo basi gradatim incrassato supra basin 3-fido.

HAB. Arizan, leg. T. KAWAKAMI et U. MORI, 1908, Mart. (No. 3707); Randaizan, (No. 7067).

Very near *C. cruciata* WAHL. and also *C. filicina*, but differs from the former in the shape of nutlets, and from the latter in having narrower bracts, much looser inflorescence and very much slender spikes.

Carex pseudo-japonica HAYATA sp. nov. Culmi 10 cm. longi acuto-trigoni facie plus minus sulcati vel plani, partibus spiciferis 3 cm. longis, basi foliis confertis. Folia culmos 2-plo in longitudine superantia suberecta vel erecto-patentia cum vaginis 15 cm. longa $2-2\frac{1}{2}$ mm. lata acuminata subtus elevato-costata utraque pagine et margine glabra. Spicæ ♂ terminales, ♀ laterales 3-4 alternatim dispositæ, ad nodos solitariæ a se 2-1 cm. remotis, subsessilia vel breve pedunculatæ, sub quoque 1-bracteata, bracteis inferioribus longioribus 6 cm. longis, basi brevissime vaginosis vel non vaginosis amplexicaulibus. Spicæ ♂ terminales cylindricæ, subsessiles $2-2\frac{1}{2}$ cm. longæ $1-1\frac{1}{2}$ mm. latæ, squamis dense adpresso-imbricatis oblongis $3\frac{1}{2}$ mm. longis $1\frac{1}{2}$ mm. latis apice rhomboideo-acutis basi plus minus angustatis ad insertionem $\frac{1}{2}$ mm. latis dorso obscure costatis apice aristato-acutis filamentis

a basi distinctis crispatis floribus a se $\frac{1}{2}$ mm. remotis. Spicæ ♀ laterales breve pedunculatæ vel superiore sessiles cylindricæ $1\frac{1}{2}$ -2 cm. longæ 3-4 mm. latæ dense floratæ, floribus a se $\frac{1}{3}$ mm. remotis, squamis $2\frac{1}{4}$ mm. longis 1 mm. latis ovatis apice cuspidatis basi plus minus contractis $\frac{2}{3}$ mm. latis ad insertionem sinuatis dorso obscure costatis. Utriculus ovato-fusiformis 3 mm. longus 1 mm. latus apice rostratus bidentatus basi breve attenuato-obtusum glaber minute-maculato-punctatus antice prominente convexus postice subplanus vel paullo convexus latere costatus. Achænia trigono-ovoidea, (angulis obtusis non costatis), plus minus obliqua apice obtusa basi acuta glabra rubescentia. Styli basi plus minus incrassati, (sed non conici), a basi reflexi supra basin recurvato-erecti basi flavescens supra basin fusco-rubescens supra medium 3-fidi, ramis filiformibus hirtellatis.

HAB. in monte MORRISON, leg. T. KAWAKAMI et U. MORI, 1906, Nov. (No. 2298).

Very near *C. japonica* THUNB., but differs from it by the nearly sessile spikes. There is a very similar specimen at Kew, collected by Dr. A. HENRY, which is named *C. japonica* THUNB. by C. B. CLARKE.

Carex reflexistyla HAYATA sp. nov. Culmi circ. 30 cm. longi folio breviores, inferiore foliis cæspitosis, basi, squamis fusco-purpurascensibus 5-7 cm. longis involucrati, graciles triquetri ad angulos scabridi facie striati, partibus spiciferis 11 cm. longis. Folia basin culmi conferta basi erecta supra basin subito recurvato-patentia linearia 36-40 cm. longa culmos in longitudine superantia 6 mm. lata utrinque glabra subtus prominente costata arcte nervata, nervis inter costas et margines 7-8, ad costas et margines scabrida, basi fuscentia, vaginosa, vaginis circ. 5 cm.

longis erectis, partibus marginalibus hyalinis, ligulis brevissimis. Spicæ majores pauciores, terminales masculinæ, laterales androgynæ, ad nodos solitariae; spicæ ♂ longe pedunculatæ cylindraceæ $3\frac{1}{2}$ cm. longæ 7 mm. latæ. Spicæ androgynæ cylindricæ 4 cm. longæ, partibus superioribus masculinis angustioribus, inferioribus fœmineis partem masculinam 3-plo in longitudine superantibus $2\frac{1}{2}$ cm. longis 9 mm. latis, bracteis inferioribus spicas longe superantibus 13 cm. longis, partibus vaginosis 2 cm. longis, basi fuscentibus. Fl. ♂: squamis elliptico-quadrangularibus $4\frac{1}{2}$ mm. longis $2\frac{1}{2}$ mm. latis apice longe cuspidatis, (cuspidibus $5\frac{1}{2}$ mm. longis $\frac{1}{3}$ mm. latis margine minute dentato-serrulatis), dorso trinervatis, nervis ad apicem cuspidis attingentibus, squamis superioribus angustioribus, filamentis elongatis filiformibus crispatis, antheris linearibus 4 mm. longis apice acuto-apiculatis basi obtusis. Fl. ♀: squamis generaliter elliptico-quadrangularibus 5 mm. longis $2\frac{1}{2}$ mm. latis apice longe cuspidatis, (cuspidibus 8 mm. longis margine minute dentato-serrulatis). Utriculus ovoideo-fusiformis apice rostratus 2-dentatus basi obtusus 6 mm. longus 2 mm. latus glaber apice ad marginem oris paucidentatus. Achænia matura rubra trigono-ovoidea, 2 mm. longa $1\frac{1}{2}$ mm. lata, antice elevato-convexa postice subplana ad angulos costata ad costas medio acute emarginata, basi stipitata, stipitibus reflexis circ. 1 mm. longis; stylus basi duplicato-recurvatus a basi subito recurvus supra basin abrupte erecto-flexus medio rectus plus minus incrassatus, supra partem incrassatam 3-fidus, ramis filiformibus 6 mm. longis fusco-rubrescentibus hirtellatis.

HAB. Kōtōshō, leg. T. KAWAKAMI et U. MORI, 1907, Aprili. (No. 2421).

Near *C. longirostris* BOOTT, (*Carex* t. 73), but differs from it in having much larger spikes and reflexed stalks at the base of the nutlets.

Carex Sasakii HAYATA sp. nov. Culmi altiōres? sursum 1-2-foliati acute triquetri glabri ad angulos acuti vel subalati a facie 4 mm. lati. Folia versus apicem culmi linearia circ. 60 cm. longa culmos valde excedentia 1 cm. lata utraque glabra subtus distincte et tenuiter costata, supra costis impressis, utraque latere 1-nervata, inter costas nervos et margines multinervulosa, subtus pallidiora, basi breve vaginosa, vaginis 5-7 mm. longis ad nodos plus minus ventricosis obliquis, ligulis brevissimis obliquis. Racemi plus minus ramosi circ. 15 cm. longi, sub quoque ramo 1-bracteati, bracteis longissimis racemum valde superantibus, ramis inferiore cum rhachibus a basi usque ad supra medium connatis superiore liberis, spicis breve pedunculatis vel subsessilibus erecto-descendentibus. Spicæ terminales ♂ gracillimæ, cylindrico-filiformes, 6 cm. longæ $1\frac{1}{2}$ mm.—2 mm. latæ, breve pedunculatæ; reliquæ androgynæ vel fœmineæ, validiusculæ, cylindricæ, 8 cm. longæ 6-7 mm. latæ floribus patentibus, partibus superioribus ♂ brevibus vel obsoletis, rarius ad utraque extremitatem ♂, medio ♀. Fl. ♂: squamæ elongato-oblongæ, vel oblongo-lanceolatæ. 4-5 mm. longæ 1 mm. latæ, dorso costatæ, apice in aristam productæ, (aristis $1\frac{1}{2}$ mm. longis minute hirtellatis), arcte imbricatæ, filamentis tenuissimis crispatis albis, antheris linearibus $2\frac{1}{3}$ mm. longis $\frac{1}{4}$ mm. latis rubescentibus apice apiculatis basi breve obtuso-sagittatis. Fl. ♀: squamæ elongato-ovatae 3 mm. longæ acuminatæ $1\frac{1}{4}$ mm. latæ dorso costatæ, (costis viridibus ad apicem in acumen productis, acuminibus plus minus minute hirtellatis), margine integræ, basi contractæ $\frac{1}{4}$ mm. latæ. Utriculus pallidus, plus minus patens, antice recurvus ovoideus, $3\frac{1}{4}$ mm. longus 1 mm. latus vel latior, apice rostratus, (rostris brevibus leviter recurvatis), basi obtusus, latere costatus, glaber apice breve bidentatus. Achænium triquetro-ovoideum oblongum vel obovoideum utrinque acutum,

antice planum, postice angulato-elevatum, $1\frac{1}{2}$ mm. longum 1 mm. latum, flavescens glabrum, stylo haud incrassato, postice reflexo, a medio 3-fido, ramis fusco-rubrescentibus minute hirtellatis.

HAB. Nantō : Musha, leg. T. KAWAKAMI et U. MORI, 1908, Mart. (No. 3749).

Near *C. kiyotensis* CLARKE and also *C. nemostachys* STEUD., but differs from both in the shape of nutlets.

Carex Shimadai HAYATA sp. nov. Culmi 70-80 cm. alti, folium excedentes, gracillimi basi foliis confertis, supra basin usque ad apicem non foliati, triquetri, a facie $\frac{2}{3}$ mm. lati. Folia angustissima, linearia 60 cm. longa 3 mm. lata, plicato-teretia, recto-recurvata, sub recta, subtus obscure costata, costis inconspicuis, supra multinervata, ad nervos et margines scaberula, basi vaginosa, vaginis 6-25 cm. longis in longitudine mutabilibus, ligulis circ. obsoletis. Spicæ racemose 3-4-dispositæ, racemis 25 cm. longis, spicis ad nodos solitariis longe vel breve pedunculatis a se 5-8 cm. remotis ad nodos 1-bracteatis, bracteis longe vaginosis, vaginis 2-3 $\frac{1}{2}$ cm. longis ore obliquis, laminis cuspidatis 1 cm. longis vel superiore obsoletis. Spicæ ♂ terminales longe cylindricæ, 9 cm. longæ 3 mm. latæ. Spicæ ♀ laterales cylindricæ 5 cm. longæ, pedunculis 3-6 cm. longis. Fl. ♂ : squamæ oblongo-angustatæ 7 mm. longæ, 2 $\frac{1}{4}$ mm. latæ, apice acutæ basi sensim angustatæ basi $\frac{3}{4}$ mm. latæ, castaneo-fuscentes, dorso medio costatæ, costis planis flavescentibus prope apicem evanescentibus. Fl. ♀ : squamæ late ovatæ squamis ♂ multo breviores, 4 mm. longæ 3 mm. latæ apice brevissime cuspidatæ castaneo-fuscentes, ad basin et marginem non coloratæ, haud costatæ. Utriculus oblongo-lanceolatus 5 $\frac{1}{2}$ mm. longus, 1 $\frac{1}{2}$ mm. latus apice attenuatus

suberectus 2-dentatus basi plus minus breve stipitatus postice planus antice convexus latere costatus, ad costas hirtellatus, facie glaber multinervulosus. Achænium sub maturitate castaneum, trigonum 3-costatum, (præmaturum elongato-obovoideum 2 mm. longum 1 mm. latum apice rotundatum) abrupte in apiculum brevissimum truncatum productum, cum stylo articulatam, basi angustatum in stipitem 1 mm. longum productum, glabrum flavescens antice anguloso-convexum postice planum, stylo basi plus minus sensim incrassato supra basi 3-fido, ramis fusco-rubescens filiformibus hirtellatis.

HAB. Tōyen: Bakei, leg. T. KAWAKAMI et U. MORI, 1907, Mart. (No. 2699).

Near *C. foraminata* CLARKE, but differs from it in having glabrous beaked utricles; also near *C. Morrowii*, from which this is distinguishable by the very slender leaves and many other points.

Carex Shimadai HAYATA var. **longibracteata** HAYATA. n. v. Culmi 40-50 alti erecti gracillimi triquetri a facie $\frac{3}{4}$ mm. lati glabri, partibus spiciferis 10 cm. longis. Folia ut typicæ. Spicæ terminales ♂, typicis angustiores 7 cm. longæ $2\frac{1}{2}$ mm. latæ, bracteis typicis longioribus. Fl. ♂: squamæ rhombico-lanceolatæ 6 mm. longæ 2 mm. latæ apice cuneato-acuminatæ basi angustatæ castaneo-fuscentes basi et margine hyalinæ medio vix costatæ, costis flavescentibus prope apicem evanescentibus. Fl. ♀: squamæ late ovato-quinquangulares, $3\frac{1}{2}$ mm. longæ 2 mm. latæ apice acuto-cuspidatæ basi $1\frac{1}{3}$ mm. latæ margine minutissime ciliolatæ castaneo-fuscentes, dorso medio basi areolis cuspidiformibus instructæ, (areolis basi $1\frac{1}{3}$ mm. latis sursum subito attenuatis prope apicem squamæ evanescentibus). Utriculus ut typicæ. Achænium

maturum trigono-fusifforme apice truncatum vel cupulis parvulis coronatum basi attenuatum in stipitem 1 mm. longum productum glabrum flavescens, stylo basi plus minus conico-incrassato, (interdum partibus conicis inconspicuis) supra basin 3-fido.

HAB. Shinkō: Rahoo, leg. T. KAWAKAMI et U. MORI, 1908, Feb. (No. 5086).

The present variety differs from the type in having much longer bracts, acuter scales of male and female flowers and in the shape of the nutlets; but in other respects they are very similar. Further study will prove that the variety is a mere form of the type.

Carex sociata BOOTT *Carex* IV. p. 200; FORBES et HEMSL. Ind. Fl. Sin. III. p. 311.

HAB. Kwashōtō, leg. T. KAWAKAMI et G. NAKAHARA, Feb. 1906, (No. 1024); Tōyen, Goryō, leg. T. KAWAKAMI et U. MORI, 1907, Mart. (No. 2671).

DISTRIB. Loo-choo islands.

Carex transalpina HAYATA sp. nov. Rhizoma? Folia fasciculorum 20-30 cm. longa 2 mm. lata culmo florigero paullo breviora basi vaginata, vaginis 2-3 cm. longis, oribus truncatis, supra et margine scabrida. Culmi florigeri graciles 30 cm. longi 3-4 foliati, foliis superioribus basi vaginatis, laminis spica æquilongis. Spicæ 3-4 remote dispositæ; terminalis masculina elongata pedunculata 3 cm. longa 2 mm. lata, squamis obovatis vel late cuneatis marginatis, marginibus badio-fuscis; reliquæ fœmineæ elongatæ 2 cm. longæ spica masculina latiores breve pedunculatæ erectæ, floribus remotis, squamis ovatis marginatis acutis basi truncatis. Utriculus 2-carinatus multinervius pubescens compressus apice rostratus distincte 2-dentatus, stigma 3-fidum. Achænium

trigonum 3-costatum glabrum apice leviter in collum brevissimum coronatum.

HAB. in monte Morrison, ad 9000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2380).

I am informed by the Rev. KUEKENTHAL that this *Carex* have some resemblance to *C. Makinoensis* FRANCH.

Gramineæ.

Paspalum LINN.

Paspalum conjugatum BERG.; TRIN. Sp. Gram. Icon. t. 102; KUNTH Enum. (1833) I. p. 51; HOOK. f. Fl. Brit. Ind. VII. p. 11; RENDLE in FORBES et HEMSL. Ind. Fl. Sin. III. p. 319.

HAB. Bonin, leg. T. KAWAKAMI, Aug. 1907.

DISTRIB. Widely spreads in the tropics, probably a native of the New World.

Eriochloa II. B. et K.

Eriochloa polystachya II. B. et K.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 320; MATSUM. et HAYATA Enum. Pl. Formos. p. 498.

HAB. Taitō, Mabukutsu, leg. T. KAWAKAMI, 1907, Aug. (No. 5611).

DISTRIB. Tropics of the Old World and Brazil.

Isachne R. BR.

Isachne debilis RENDLE in FORBES et HEMSL. Ind. Fl. Sin. III. p. 322.

HAB.

DISTRIB. An endemic plant.

Panicum LINN.

Panicum brevifolium LINN. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 328 ; MATSUM. et HAYATA, Enum. Pl. Formos. p. 501.

HAB. Taitō, Makwa, leg. T. KAWAKAMI, 1906, (No. 1457).

Panicum barbivaginale HAYATA sp. nov. Culmi basi procumbentes sursum erecti 20 cm. alti teretes striati 1 mm. lati tota longitudine foliosi, (foliis alternatis a se $1\frac{1}{2}$ cm. remotis), glabri. Folia basi vaginosa, laminis cordatis $1\frac{1}{2}$ cm. longis 12 mm. latis acutis basi cordatis, costis inconspicuis, circ. 10-nervatis, inter nervos 3-nervulatis, utrinque glabris, margine a medio deorsum ciliatis basi culmos perfecte amplectantibus, a culmo angulo 90° divaricatis, vaginis 5 mm. longis cylindricis intus glabris extus dense barbatis, (barbis 2 mm. longis), ab ore usque ad basin fissis, margine (altero ciliatis, altero haud ciliatis) ore ad insertionem laminarum ciliato-barbato. Paniculae terminales elongato-ovatae pedunculatae vel sessiles 4 cm. longae 2 cm. latae, ramis rectis patentibus, mediocribus longioribus 2 cm. longis recto-ascendentibus, spiculis secus rachin ramulorum distichiter descendenter dispositis. Spiculae ovoideae, 1 mm. longae pedicellatae, pedicellis $\frac{1}{2}$ -2 mm. longis gracilibus glabris apice infra articulationem incrassatis gluma subaequilongis. Gl. I. glabra obovata 1 mm. longa apice obtusa vel rotundata basi $\frac{1}{4}$ mm. lata 1-nervata decidua ; gl. II. gluma I. conformis longior $1\frac{1}{5}$ mm. longa acuta 1-nervata glabra decidua ; gl. III. ovata triangulari-obtusa circ. 1 mm. longa gl. II. brevior extus hirsuta, (pilis recurvis patentibus), margine vix ciliata ; gl. IV. gluma III. conformis, sed prope marginem vix hirsuta, margine haud ciliata. Achænia tereti-oblonga plus minus

obliqua, $\frac{2}{3}$ mm. longa $\frac{3}{8}$ mm. lata rubro-purpurascens glumis III. et IV. persistentibus inclusa.

HAB. Tōyen, leg. T. KAWAKAMI et Y. SHIMADA, 1907, Oct. (No. 5681).

Panicum paspaloides HAYATA sp. nov. Culmi basi repentes prostrati ad nodos radicanes (internodiis 7-8 cm. longis), sursum ascendentes ad nodos foliati ramuliferi supra spicigeri ad totam longitudinem glabri tereto-tetragoni, partibus ascendentibus 40-50 cm. longis, basi 2 mm. in sectione, sursum graciles $\frac{3}{4}$ mm. in sectione. Folia ad nodos alternatim disposita a se 8 cm. remota, cum vaginis circ. 19 cm. longa, laminis angustatis lanceolatis 15 cm. longis 1 cm. latis apice acuminatis membranaceo-coriaceis basi leviter contractis supra parcissime hirsutis vel subglabris, subtus glabris vel subglabris, ad marginem scabridis, prope basin longe ciliatis, vaginis 4 mm. longis explicato 8 mm. latis ab ore usque ad basin fissis margine altero sursum ciliatis altero non ciliatis integris, ligulis ciliiformibus, ciliis dense sitis 1 mm. longis, vaginis intus glabris extus prope medium hirsutis prope margines glabris, alabastrum foliorum includentibus. Paniculae 10 cm. longae 6 cm. latae, ramis simplicibus spiciformibus patentibus alternatis a se 1-3 cm. remotis, (utraque latere rhachis 2), spicis sessilibus 5-4 cm. longis 2 mm. latis, spiculis secus rhachin unilateraliter subdistichiter dispositis, rhachibus spicarum a dorso complanatis 1 mm. latis, postice (supra) convexis, antice (subtus) prominente costatis secus costis spiculas alternatas gerentibus, (spiculis a se 1-2 mm. remotis a latere approximatis), rhachibus ad latus et costam subalatis, ad marginem alarum brevissime dentato-ciliolatis. Spiculae oblongo-obovoideae a dorso complanatae 4 mm. longae $1\frac{1}{2}$ mm. latae apice acutae basi angustatae, ad basin

$\frac{2}{3}$ mm. lata. Gl. I. a facie posteriore spiculæ sita, latissime globosa 2 mm. longa 3 mm. lata apice obtusa basi leviter contracta $1\frac{1}{2}$ mm. lata 10-nervata hyalina basin spiculæ involvens; gl. II. a facie anteriore sita oblongo-obovata 4 mm. longa $2\frac{1}{3}$ mm. lata glumam I. 2-plo superans apice acuta basi contracta a basi 1 mm. lata 7-nervata sursum viride colorata ad marginem plicata spiculam plus minus involvens; gl. III. gluma II. conformis, sed vix minor $3\frac{1}{2}$ mm. longa ad marginem sursum plus minus plicata 5-nervata glabra paleam hyalinam 2 mm. longam includens; gluma terminalis oblonga 3 mm. longa $1\frac{1}{2}$ mm. lata concava margine plus minus recurvata indurata, nervis inconspicuis; palea gluma terminali conformis $2\frac{1}{2}$ mm. longa apice rotundata concava margine recurvata.

HAB. Garanbi, leg. T. KAWAKAMI, 1904, Oct.

Panicum prostratum LAM.; FORBES. et HEMSL. Ind. Fl. Sin. III. p. 332; MATSUM. et HAYATA Enum. Pl. Formos. p. 505.

HAB. Takaw, leg. G. NAKAHARA, 1905; T. KAWAKAMI, 1907, Juli. (No. 5011).

Panicum sarmentosum ROXB.; FORBES. et HEMSL. Ind. Fl. Sin. III. p. 333; HAYATA in Tōkyō Bot. Mag. XXI. p. 52.

HAB. Takaw, leg. G. NAKAHARA, Sept. 1905, (No. 643).

Panicum? semialatum KTH. in Herb. Kew.

HAB. Randaizan, leg. T. KAWAKAMI, 1908, (No. 7055).

Compared with a specimen so named at Kew.

~ **Panicum submontanum** HAYATA sp. nov. Culmi ultra 60 cm. longi 2 mm. lati ramosi foliosi tereto-tetragoni a latere plus minus sulcati glaberrimi plus minus flexuosi (internodiis 6 cm. longis). Folia radicalia ignota. Folia caulina lanceolata membranacea, laminis lanceolatis 21 cm. longis 12 mm. latis acu-

minatis basin valde contractis 1 mm. latis supra tenuiter brevissime pubescentibus subtus brevissime villosopubescentibus medio distincte costatis margine scaberrimis, vaginis 5 cm. longis 4 mm. latis margine plus minus ciliolatis, ore dentato-ciliato, intus glabris extus pubescentibus. Paniculæ terminales 14 cm. longæ 2 cm. latæ, ramis inferioribus longioribus $6\frac{1}{2}$ cm. longis oppositis vel alternis a se circ. 2 cm. remotis gracilibus ramulosis, ramulis 3 cm. longis gracilibus ramulosis. Rhaches panicularum teretes pubescentes. Spiculæ ad apicem ramulorum apicalium geminatim sitæ pedicellatæ, pedicello altero longiore 2 mm. longo, altero brevior 1 mm. longo, apice cum spiculis articulatis, spiculis obovoideis 2 mm. longis $\frac{2}{3}$ mm. latis. Glumæ demum minus arcte imbricatæ; gl. I. ovata $1\frac{1}{2}$ mm. longa 1 mm. lata utrinque obtusa 3-nervata margine paucissime ciliata; gl. II. ovata $1\frac{2}{3}$ mm. longa $1\frac{1}{2}$ mm. lata spiculam amplectans, obtuso-acute basi contracta $\frac{1}{2}$ mm. lata margine ciliata 5-nervata; gl. III. $1\frac{1}{2}$ mm. longa, paleam sterilem amplectans; gl. IV. ovata $1\frac{1}{3}$ mm. longa, paleam fertilem amplectans.

HAB. Taitō: Harōye, leg. T. KAWAKAMI et Z. KOBAYASHI, 1907, Oct. (No. 6019).

Panicum trypheron SCHULT.; Hook. f. Fl. Brit. Ind. VII. p. 47; FORBES et HEMSL. Ind. Fl. Sin. III. p. 333.

HAB. Pachina, 1896.

DISTRIB. China, India, Malaya, Tropical Africa.

Arundinella RADDI.

Arundinella hispida HACK. var. **humilis** (ex Herb. FAURIEI).

DISTRIB. Formosa, leg. U. FAURIE.

Thuarea PERS.

Thuarea sarmentosa PERS. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 340 ; HAYATA in Tōkyō Bot. Mag. XXI. p. 50.

DISTRIB. Hongkong, Ceylon, Cochinchina, Malaya, North Australia, Pacific Islands.

Perotis AIT.

Perotis latifolia AIT. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 343 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 516.

HAB. Takaw, leg. G. NAKAHARA, Sept. 1905, (No. 646).

Miscanthus ANDERSS.

Miscanthus transmorrisonensis HAYATA sp. nov. Culmi ultra 60 cm. longi tota longitudine foliati teretes glabri sursum fusco-colorati. Folia radicalia ignota, caulina linearia cum vaginis circ. 35 cm. longa suberecta, laminis subplicatis 28 mm. longis 5 mm. latis, supra glabris plano- et lato-costatis, subtus elevato-costatis subglabris margine scaberrimis basi plus minus constrictis prope basi longe barbatis, barbibus 6 mm. longis, (ligulis 1 mm. longis 4 mm. latis membranaceis), vaginis 6 cm. longis explicato 8 mm. latis margine sursum ciliato-barbatis intus glabris nitidis extus glabris sursum parcissime pubescentibus. Paniculae obovatae 18 cm. longae 8 cm. latae, ramis subsimplicibus spiciformibus, spicibus 5-10 cm. longis subsessilibus vel breve pedunculatis, inferiore ad nodos 2-3-fasciculatis, (internodiis 1-3 cm. longis), superiore solitariis. Rhachis panicularum semiteretes vel trigonae fuscentes

rhachibus spicarum gracilibus $\frac{1}{4}$ mm. latis subtriquetris ad angulos scabridis; spiculis geminatis, (altero breve pedicellato, pedicello 1 mm. longo basi barbato, barbis $1\frac{1}{4}$ mm. longis, altero longe pedicellato, pedicello 3 mm. longo scaberulo) geminis a se 4 mm. remotis; spiculis oblongo-cylindricis $3\frac{1}{4}$ mm. longis 1 mm. latis apice attenuatis basi obtusis barbatis, barbis rubris 3-4-mm. longis. Gl. I. oblonga $3\frac{1}{2}$ mm. longa 1 mm. lata 3-nervata apice plus minus bi-dentata vel integra margine sursum ciliolata deorsum integra; gl. II. oblongo-obovata 3 mm. longa $1\frac{1}{2}$ mm. lata apice plicato-cuspidato-acuta margine sursum longe ciliata deorsum non ciliata prope apicem plus minus purpurascens; gl. III. hyalina oblonga $2\frac{1}{2}$ mm. longa 1 mm. lata margine sursum leviter plicata ciliata; gl. IV. hyalina ovata $2\frac{1}{2}$ mm. longa $\frac{2}{3}$ mm. lata apice acuminata ad aristam 7 mm. longam abeuns margine ciliata 1-nervata, aristis basi rubescentibus.

HAB. Randaizan, leg. B. HAYATA et U. MORI, (Nos. 1826 et 7065).

Near *M. sinensis* var. *formosanus* HACK., but differs from it in having nearly glabrous sheath of the leaves and much less branched panicles.

Saccharum LINN.

Saccharum Narenga HAM., FORBES et HEMSL. Ind. Fl. Sin. III. p. 349; MATSUM. et HAYATA Enum. Pl. Formos. p. 519.

HAB. Nantō: Horisha, leg. T. KAWAKAMI et U. MORI, 1906, Nov. (No. 2379).

Spodiopogon TRIN.

Spodiopogon formosanus RENDLE ! in FORBES et HEMSL. Ind. Fl. Sin. III. p. 351.

HAB. Taitō : Daironkōsha, leg. T. KAWAKAMI et U. MORI, 1906, Nov. (No. 2366).

Eremochloa BUSE.

Eremochloa ophiuroides HACK.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 363 ; HAYATA in Tōkyō Bot. Mag. XXI. p. 50.

HAB. Biyōritsu, leg. T. KAWAKAMI, (No. 7157).

Erianthus MICH.

Erianthus pollinioides RENDLE ! in FORBES et HEMSL. Ind. Fl. Sin. III. p. 350 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 520.

HAB. Daikanaihō, leg. Y. SHIMADA, 1904. (No. 152).

Alopecurus LINN.

Alopecurus agrestis LINN. ; BENTH. Fl. Hongk. p. 407 ; Hook. f. Fl. Brit. Ind. VII. p. 239 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 385 ; HAYATA in Tōkyō Bot. Mag. XXI. p. 55.

Agrostis LINN.

Agrostis alba LINN. ; Hook. f. Fl. Brit. Ind. VII. p. 254 ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 389.

HAB. Randaizan, (No. 7068).

DISTRIB. Japan, Himalaya, Central Asia, Europe.

Agrostis perennans TUCK.; MIQ. in Ann. Mus. Bot. Lugd. Bat. II. p. 277; FRANCH. et SAVAT. ENUM. Pl. Jap. p. 166; FORBES et HEMSL. Ind. Fl. Sin. III. p. 390.

HAB. Randaizan, leg. T. KAWAKAMI, (No. 7054).

DISTRIB. Japan, China, Corea, eastern United States.

Chloris SWARTZ.

Chloris barbata Sw.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 403; MATSUM. et HAYATA ENUM. Pl. Formos. p. 537.

HAB. Takaw, leg. G. NAKAHARA, (No. 635).

Chloris incompleta ROTH.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 404; MATSUM. et HAYATA ENUM. Pl. Formos. p. 538.

HAB. Banchōryō : Shinyishi, leg. G. NAKAHARA, Oct. 1905, (No. 600).

Phragmites TRIN.

Phragmites communis TRIN.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 409; MATSUM. et HAYATA ENUM. Pl. Formos. p.

HAB. Shintiku, leg. Y. SHIMADA, (No. 5760).

Eragrostis BEAUV.

Eragrostis elongata JACQ.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 413; MATSUM. et HAYATA ENUM. Pl. Formos. p. 542.

HAB. Taitō, Saikōwa, leg. T. KAWAKAMI, (No. 478).

Eragrostis formosana HAYATA in Tōkyō Bot. Mag. XXI. p. 53.
HAB. Nankokei, leg. G. NAKAHARA, (No. 208).

Eragrostis major HOST ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 416 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 543.
HAB. Taitō : Hakuhakusha, leg. T. KAWAKAMI, (No. 1479).

Festuca LINN.

Festuca ovina LINN. var. **vulgaris** KOCH. form. **purpurascens**.
Folia validiora, arcuata, latiora, breviora, 7 cm. longa ; glumæ plus minus purpurascens.

HAB. in monte MORRISON.

Lepturus R. BR.

Lepturus repens R. BR. ; FORBES et HEMSL. Ind. Fl. Sin. III. p. 433 ; MATSUM. et HAYATA Enum. Pl. Formos. p. 548.

HAB. Shohobo, leg. G. NAKAHARA, Oct. 1906, (No. 628) ; Pratas, leg. T. KAWAKAMI, 1908, Juni.

Arundinaria MICHX.

✓ **Arundinaria naibunensis** HAYATA sp. nov. Culmi ignoti. Rami ut videntur graciles, subteretes a facie ramificationum obscure plano-sulcati, in speciminibus nostris 3 mm. in diametro, (internodiis 10 cm. longis), ad nodos plus minus tumidi duplicato-annulati, (annulis a se 2 mm. remotis, annulis inferioribus distinctis superioribus obscuris), supra nodos plus minus tumidi, ramulis ad nodos fasciculatis gracilibus basi perulatis, perulis triangularibus vel lanceolato-triangularibus 4 mm.—2 cm. longis. Folia lanceolata 8 cm. longa 19 mm. lata apice acuminata basi obtusa ad extremitatem breve attenuata, (partibus attenuatis

1½ mm. longis 1 mm. latis), utraque pagine scaberula margine scabrida, subtus subglauca distincte costata inter costas et margines 3-nervata inter nervos tenuissime 6-nervulosa, supra minute nervulosa costis et nervis inconspicuis, vaginis 6 em. longis cylindræis, ab ore usque ad basin fissis explicato 6 mm. latis intus nitidis extus glabris multo et prominente nervatis ad orem barbatis, barbibus 3 mm. longis, ligulis barbiformibus. Spiculæ simplices remote floratæ a latere compressæ 1-6-floratæ elongato-oblongæ 2½ cm. longæ 4 mm. latæ interdum breviores pedicellatæ ad nodos ramulorum 3-4-fasciculatæ, uno pedicellorum longissimo, reliquis brevioribus, gracillimis crispatis ascendentibus rarius pendulis. Gl. I. et II. vacuæ ovatæ vel elongato-oblongæ 5 mm.-10 mm. longæ 2 mm. latæ stramineæ, floribus 3-6, a se 2 mm. remotis, rhachillis flexuosis complanatis glabris; fl. gl. oblonga 12 mm. longa explicato 5 mm. lata 9-nervata, (nervis viridibus), margine integra plus minus ciliolata apice acuta basi paleam amplectans; palea elongato-oblonga 11 mm. longa explicato 5 mm. lata apice truncata dentata medio 2-nervata, (nervis a se 1½ mm. remotis), margine secus nervos plicata, inter nervos 4-nervulata, inter nervos et margines 2-nervulata, margine hyalina, tenuissima non ciliata, basi genitalia amplectans; lodiculæ 3, 2-majoribus ovatis apice obtusis 1½ mm. longis 1 mm. latis basi ½ mm. latis margine ciliolatis hyalinis, 1-minore. Stamina 3, antheris linearibus 8 mm. longis $\frac{8}{10}$ mm. latis apice obsagittatis, lobis acutis, basi 2-lobatis, lobis obtusis 1½ mm. longis. Ovarium ovoideum $\frac{2}{3}$ mm. longum leviter compressum, stylo a basi 2-fido, ramis sursum plumosis.

HAБ. Kōshūn : Naibun, leg. G. NAKAHARA, 1907, Feb.

A very distinct species of the genus. I have not seen any specimen like this at Kew.

Cryptogamiæ.

Selaginellaceæ.

Selaginella SPRING.

Selaginella atroviridis SPRING ; MATSUM. et HAYATA Enum. Pl. Formos. p. 552.

HAB. Randaizan, leg. B. HAYATA et U. MORI, 1908, Aug. (No. 7083) ; Suichōriu, leg. C. OWATARI.

Selaginella caulescens SPRING ; MATSUM. et HAYATA Enum. Pl. Formos. p. 552.

HAB. Suichōrū, leg. C. OWATARI.

Selaginella flabellata SPRING ; MATSUM. et HAYATA Enum. Pl. Formos. p. 553.

HAB. in monte Taichū, leg. Y. TASHIRO, (A. 27) ; Pachina, leg. S. NAGASAWA.

Selaginella leptophylla BAKER ; MATSUM. et HAYATA Enum. Pl. Formos. p. 553.

HAB. Shinkō, leg. T. KAWAKAMI.

Selaginella morrisonensis HAYATA sp. nov. Caulis basi procumbens sursum ascendens 10-15 cm. longus, foliis dorsiventraliter dispositis, glaber subteres, ramis et ramulis alternatim patentibus. Folia 4-seriatim dorsiventraliter disposita, dorsalia (caulis) alterna sessilia ovata 2 mm. longa 1 mm. lata ad insertionem 1-2 mm. a se remota apice cuspidata basi leviter cordata plus minus obliqua, latere exteriori angustata,

margine integra, sursum paucissime mucronato-ciliolata, latere interiore latiora margine mucronato-vel aristato-ciliolata; folia dorsalia (ramuli) minora cum cuspidibus 1 mm. longa, apice longe aristato-cuspidata, cæterum ut folii caulini; folia ventralia (caulis) alternatim disposita, folium dorsalem in longitudine $\frac{2}{3}$ -plo æquantia, elliptico-ovata, 3 mm. longa, $1\frac{2}{3}$ mm. lata, obscure costata, apice obtusa basi plus minus cordata, margine minute brevissime aristato-ciliolata, latere exteriori angustiora basi cordata, latere interiore latiora basi rotundata; folia ventralia (ramuli) iis caulibus conformia sed minora $1\frac{1}{2}$ mm. longa. Spicæ 1-2-3 mm. longæ, tetragonæ, $1\frac{1}{2}$ mm. latæ, bracteis dorsalibus viridibus cuspidato-triangularibus $1\frac{1}{4}$ mm. longis $\frac{2}{3}$ mm. latis apice cuspidatis plus minus interiore recurvis basi cordatis margine aristato-ciliolatis, basi obliquis latere interiore latioribus viridibus, latere exteriori hyalinis non coloratis, medio prominente carinatis, bracteis ventralibus iis dorsalibus conformibus sed non coloratis, macrosporangium amplectantibus. Microsporæ globosæ apice plus minus pyramidales, papilloso-tuberculatæ rubescentes. Macrosporæ flavescens globosæ apice plus minus pyramidales papilloso-tuberculatæ.

HAB. Ganzan, leg. S. NAGASAWA, 1905, Oct. (No. 685).

Lycopodiaceæ.

Lycopodium LINN.

Lycopodium tereticaule HAYATA sp. nov. Caulis pendulus 20-25 cm. longus teres cum foliis cylindricis $3\frac{1}{2}$ mm. latus dichotome ramosus, ad totam longitudinem foliosus, glaber, inter folia plus minus sulcatus. Folia spiraliter 1-2 seriatim disposita crassiuscula $1\frac{1}{2}$ mm. longa cuspidiformia angustata $1\frac{1}{2}$ mm. longa,

a basi latissima $\frac{1}{2}$ mm. lata apice obtusa a basi ascendente sursum interiore recurva a se 1 mm. remota. Sporophyllæ non visæ.

HAB. Goshizan, leg. T. KAWAKAMI et U. MORI, 1906, Juni. (No. 1407).

There is nothing like this at Kew. I think this must be a species not yet described.

Lycopodium formosanum W. HERTER in Herb. Kew.

I have seen a specimen of this species at Kew. It is not yet represented at Tōkyō.

Lycopodium Phlegmaria LINN.; BAKER Fern-Allies p. 22.

Lycopodium filiforme HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 555, (non ROXB.)

Lycopodium verticillatum var. *filiforme* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 555, (non SW.)

HAB. Kōshūn, leg. T. KAWAKAMI.

Lycopodium pinifolium BLUME; BAKER Fern-Allies p. 21.

HAB. Botanposha, leg. G. NAKAHARA, 1906.

DISTRIB. Java, Borneo, and New Guinea.

Lycopodium taxifolium SW.; BAKER Fern-Allies p. 16.

HAB. Formosa.

DISTRIB. Tropical America.

Lycopodium subdistichum MAKINO in Tōkyō Bot. Mag. XII. p. 37; MATSUM. et HAYATA Enum. Pl. Formos. p. 556.

HAB. Manchōsha, leg. G. NAKAHARA, (No. 787).

DISTRIB. Southern parts of Japan.

Ophioglossaceæ.

Botrychium Sw.

Botrychium ternatum Sw. ; HAYATA in Tōkyō Bot. Mag. XXIII
p. 2.

DISTRIB. Japan and Himalaya.

Polypodiaceæ.

Acrophorus PRESL.

Acrophorus stipellatus (WALL.) MOORE ; HAYATA in Tōkyō Bot.
Mag. XXIII. p. 4.

HAB. Randaizan, leg. B. HAYATA et U. MORI, 1908 Aug.

DISTRIB. Monotypic genus. India, Malaya.

OBSERV. Stipites 45 cm. longi, 5 mm. in diametro, stramineo-rubrescentes, basi dense, sursum parce, squamati, cæterum glabri, subnitentes, cicatricibus V-formibus squamarum notati, basi teretes medio semiteretes, squamis inferioribus triangulari-ovatis, a basi latissimis 1-2 cm. longis, tenuissimis hyalinis. Frondes late triangulares stipitem in longitudine paullo superantes, 55 cm. longæ, 60 cm. latæ, apice acutæ basi truncatæ, pinnis infimis longissimis, partibus infimis quadripinnatis, inferioribus tripinnatis, superioribus bipinnatis, sursum simpliciter pinnatis, pinnis oppositis utraque latere circ. 18, inferiore circ. 11 cm. a se remotis, sessilibus transverse divaricatis, plus minus ascendento-arcuatis, pinnis infimis ovato-triangularibus apice acuminatis basi obtusis 35 cm. longis, 23 cm. latis, latere inferiore quam latere superiore latioribus, pinnulis utraque latere 18 inferiore 4 cm. a se remotis, pinnulis I.

infimis brevioribus, inferioribus longissimis 14 cm. longis 6 cm. latis, pinnulis II. angustatis, inferiore 3 cm. longis 13 mm. latis obtusis, pinnulis III. utraque latere 8 inferiore 5 mm. a se remotis obovatis vel elongato-quadrangularibus 8 mm. longis $4\frac{1}{4}$ mm. latis apice truncatis basi cuneato-acutis obliquis latere superiore latioribus dentato-incisis, dentibus obtusis ascendentibus utraque latere 4, (pinnulis III. prope apicem pinnularum II. obovatis subintegris). Rhaches frondium glabræ, semiteretes, supra sursum tenuissime sulcatæ ad nodos pubescentes, subtus convexæ ad nodos haud pubescentes; rhaches pinnarum semiteretes supra sulcatæ subglabræ, vel basi parcissime pubescentes; rhaches pinnularum I. subsimiles, plus minus pubescentes; rhaches pinnularum II. supra sulcatæ, plus minus pubescentes subalatae; paginæ herbaceæ membranaceæ, exsiccato fusco-rubescentes, supra parce pilis erecto-patentibus dispersæ, subtus subglabræ, ad venas et venulas parcissime pilis brevissime dispersæ; venis flexuosis, venulis plus minus ramosis interdum apice furcatis, ramis liberis apice plus minus oblongo-incrassatis, partibus incrassatis utraque, præsertim supra, elevatis, prope marginem evanescentibus, venulis ultra receptaculum leviter productis, partibus productis $\frac{1}{4}$ mm. longis clavatis ecoloratis, venulis a ramificatione usque ad insertionem receptaculorum distincte fuscentibus elevatis. Sori prope apicem venularum dorsaliter siti, subglobosi, $\frac{1}{2}$ mm. in diametro a margine $\frac{1}{2}$ -1 mm. remoti. Indusium globosum valde concavum subcupuli forme ad insertionem truncatum plus minus contractum a pagina pinnularum transverse patens, margine inflexum erosum.

The present form is a little different from that of the type.

Dryopteris ADANSON.

Dryopteris anastomosans HAYATA sp. nov. Stipes? Frondes

rhomboideo-triangularis, 60 cm. longæ, totiusque latæ, inferiore bipinnatæ, superiore pinnatæ, pinnis infimis longissimis 40 cm. longis, a rhachibus angulo 50° divergentibus, elongato-triangularibus, vel angustato-lanceolatis, basi latissimis 21 cm. latis, sursum pinnatifidis, deorsum pinnatis, pinnulis lanceolatis 14 cm. longis 2 cm. latis sursum acuminatis apice obtusis a se 4 cm. remotis margine lobulatis, pinnulis versus apicem pinnarum gradatim in lobos abeuntibus; pinnis superioribus pinnatifidis, apice in pinnam lobulatam abeuntibus; pinnulis pinnarum inferiorum margine lobulatis, sursum subintegris lineari-acuminatis, basi latere superiore acutis, latere inferiore decurrentibus, lobulis obtusis triangularibus, a costis 4 mm. remotis (i.e. a sinibus inter lobulos usque ad costas 4 mm.); rhaches frondium circ. semiteretes, supra profunde 3-sulcatæ minute muricato-pubescentes, vel subglabræ, subtus convexæ, haud sulcatæ, stramineo-rubescens; rhaches pinnarum et venis pinnularum minute pubescentes; paginæ glabræ, membranaceæ, ad marginem nervo marginatæ subtus pallidiora, supra glabræ ad soros prominente elevatæ venis anastomosantibus, areolis copiosis, venulis liberis 2-3. Sori ad totam paginam dispersi depresso-globosi, 2 mm. in diametro, ad apicem venularum liberarum terminales. Indusium orbiculare, cordatum.

HAB. Randaizan, leg. T. KAWAKAMI et U. MORI, Aug. 1908, (No. 7136).

Near *D. giganteum*, but differs from it in the shape of the pinnae. It should better be referred to *Aspidium* on account of its having anastomosing veins (see p. 449).

Dryopteris Beddomei (BAK.) O. Ktze.; HAYATA in Tōkyō Bot. Mag. XXIII. p. 4.

DISTRIB. South China, India, South Ceylon, Philippines.

Dryopteris brunnea C. CHRISTENSEN ; HAYATA in Tōkyō Bot. Mag. XXIII. p. 4.

Dryopteris Clarkei (BAKER) O. KTZE ; C. CHRISTENSEN Ind. Fil. p. 258.

Nephrodium Clarkei BAKER.

HAB. in monte Morrison, 10000 ped. alt., leg. T. KAWAKAMI, (No. 1824).

DISTRIB. Sikkim.

Dryopteris dissecta (DESV.) O. KTZE. ; C. CHRISTENSEN, Ind. Fil. p. 262.

HAB. Murimuribussha, leg. K. MIYAKE, 1899 ; Kako, leg. G. NAKAHARA, (No. 221).

DISTRIB. North India, Malaisia, Polynesia, Madagascar.

Dryopteris distans (METT.)

HAB. Botansha, (No. 895).

Dryopteris Filix-mas var. **serrato-dentata** BEDD.

HAB. in monte Morrison, 12000 ped. alt., (No. 2503).

Dryopteris formosana (CHRIST) C. CHRISTENSEN Ind. Fil. p. 266.

Dryopteris Kawakamii HAYATA sp. nov. Stipites erecti 14 cm. longi, dorso (supra) 3-sulcati, stramineo-rubescens, squamati, (squamis copiosis imbricatis in magnitudine variabilibus linearicuspidatis acuminatis fusco-stramineis 8-9 mm. longis 1 mm. latis, interdum basi cordatis), etiamque pilis crispatis dense obtecti. Frondes lanceolatae in ambitu, 50 cm. longae, 15 cm. latae, apice acuminatae basi obtusae, bipinnatae, pinnis lateralibus angustolanceolatis sessilibus, superioribus a rhachibus angulo 90° patentibus,

inferioribus et infimis reflexis, pinnis infra medium frondis longissimis 10 cm. longis 2 cm. latis apice acuminato-linearibus a medio usque ad basin æquilatis, pinnis infimis brevissimis reflexis angulo 150° a rhachibus patentibus $2\frac{1}{2}$ cm. longis 1 cm. latis, pinnis utraque latere frondium 30, a se $1-1\frac{1}{2}$ cm. remotis; rhaches supra sulcatæ pilosæ squamatae, rhachillæ supra sulcatæ dense rubro-hirsutæ subtus paucissime pilosæ, squamis lanceolatis 1-2 mm. longis basi ventricosis instructis; pinnulæ ad medium pinnarum late lineares 1 cm. longæ 3 mm. latæ sessiles æquilatæ, obtuse dentatæ, (dentibus utraque latere 3-4-5 plus minus ascendentibus vel transversis obscuris), supra densiuscule subtus parcissime strigoso-pilosæ, (pilis rigidis crispatis 1 mm. longis), margine plus minus revolutæ, (venulis liberis), sub quoque dente 1-soriferæ, rarius 2-soriferæ. Sori depresso-orbiculares, 1 mm. in diametro, receptaculis a margine $\frac{1}{2}$ mm. remotis, indusiis generaliter obsoletis rarius late orbicularibus cordatis.

HAB. Randaisan, leg. U. MORI, 1908, Aug. (No. 7134).

Near *D. Filix-mas* SCHOTT, but differs from it in the position of sori which are very near the margin.

Dryopteris lasiocarpa HAYATA sp. nov. Stipites glabri stramineo-flavescentes, 15 cm. longi, supra profunde 1-sulcati, subtus convexi, 6 mm. lati. Frondes herbaceæ, hirsutæ, ovatæ, 67 cm. longæ 35 cm. latæ, apice caudato-acuminatæ basi obtusæ, bipinnatæ, pinnis pinnatis a medio deorsum æquilongis 23 cm. longis ovato-acuminatis patentibus a rhachibus angulo 70° divariatis, pinnis a medio sursum gradatim brevioribus in pinnas pinnatifidas vel lobulatas abeuntibus; pinna terminali caudato-acuminato; pinnis inferioribus lanceolato-ovato-acuminatis 23 cm. longis 3 cm. latis suboppositis a se 6-7 cm. remotis pinnatis,

pinnulis lanceolatis, pinnulo infra medium longissimo 5 cm. longo sessili acuminato pinnatifido; segmentis a rhache $\frac{1}{2}$ mm. remotis (i.e. a sinibus inter dentes usque ad costas $\frac{1}{2}$ mm.) angustatis 9 mm. longis $3\frac{1}{2}$ mm. latis obtusis dentatis, (dentibus acutis ascendentibus), sursum pinnularum acuminatis, acuminibus obtusis basi dentatis prope apicem integris. Rhaches frondium subtereto-complanatæ, supra 2-sulcatæ, inter sulcos elevatæ, dense hirsutæ, stramineo-flavescentes, subtus glabræ; rhaches pinnarum complanatæ, leviter 2-sulcatæ, medio dense hirsutæ, sursum partibus decurrentibus pinnularum alatæ, supra brevissime parcissime aristato-strigosæ, subtus glabræ; pagnæ supra ad venas nervosque pubescentes, subglabræ, subtus pilosæ, pilis patentibus 1 mm. longis, venis et venulis omnibus liberis. Sori ad lobos pinnularum secus venas utraque latere intra venas et margines 4-3, ad venulas dorsales suborbiculares $\frac{2}{3}$ mm. in diametro. Indusium late cordatum, margine longe ciliatum.

HAB. Kōtōshō, leg. G. NAKAHARA, Feb. 1906, (No. 994).

Dryopteris (*Aspidium*) **leucostipes** (BAKER) C. CHRISTENSEN Ind. Fil. p. 274; CHRIST in Bull. Herb. Boiss. II.-4, (1904), p. 615.

HAB. in sylvis Kelung, leg. U. FAURIE, 1903.

DISTRIB. An endemic plant.

Dryopteris subexaltata C. CHRISTENSEN Ind. Fil. p. 295.

OBSERV. Stipites cæspitosi, 20 cm. longi, graciles medio 1 mm. lati, ad basin dense squamati, (squamis stramineo-rubrescentibus lineari-lanceolatis 8 mm. longis), supra subglabri vel parcissime squamati, basi rubro-purpureo-fuscentes, a medio sursum straminei, plus minus complanati, supra sulcati, subtus convexi, plus minus purpurascens. Frondes

herbaceo-membranaceæ ovatæ 20 cm. longæ, 13 cm. latæ, remote bi-pinnatæ, sed sursum simpliciter pinnatæ, pinnis utraque latere 11 subrectis plus minus ascendento-recurvatis a rhachibus frondium angulo 60° divaricatis, petiolatis, (petiolis $\frac{1}{2}$ -1 cm. longis); pinnis inferioribus rectis ascendentibus longissimis 11 cm. longis a se 4 cm. remotis ovatis 4 cm. latis apice acuminatis (acuminibus linearibus serratis) remote pinnatis, pinnulis inferioribus obtuse lanceolatis 2 cm. longis 1 cm. latis apice obtusis vel acutis basi cuneatis inferioribus a se 1 cm. remotis margine dentato-lobatis, (lobis utraque latere 4 elongato quadrangularibus apice truncatis margine plus minus obscure aristato-serrulatis vel integris); rhaches frondium complanatæ supra et latere sulcatæ, subtus convexæ; rhaches pinnarum subalatae; venulis apice furcatis, ramulis prope marginem evanescentibus apice plus minus clavatis. Sori sub quoque lobo pinnularum prope costas generaliter 1, vel ad lobos inferioribus 2-3, ad ramulos superiores venularum furcatarum dorsales, (novelli indusiis subhypogynis perfecte inclusi). Indusium unilateraliter apertiens, reniforme-cordatum $\frac{3}{4}$ mm. latum, $\frac{2}{3}$ mm. longum. Indusium ante apertiens sacciforme, reniforme, depressum, supra minute et brevissime glanduloso-hirtellum (pilis glandulosis brevissimis globulis capitatis), subtus nudum, sorum perfecte includens.

HAB. Nagotake, Liukiu, leg. S. TANAKA et Y. TASHIRO, (No. 201); Haneshiyama, leg. G. NAKAHARA.

DISTRIB. Formosa.

The indusium of the present fern is, when opened, reniformed or slightly cordate. It is attached at the end of the cordate notch, to the axis of the receptacle on a branch of a veinlet. It reminds me of the sori of *Dryopteris Maximowiczii* O. Ktze. The indusium is, before opening, like a cushion-formed sac which

completely includes a sorus in itself. It is densely covered with very short glandulous hairs on the upper side of the outer surface, but it is quite hairless on the lower side of the same surface. It is quite hairless inside. It should be referred to a special section together with *Dryopteris Maximowiczii* which has a very peculiar sorus different from that of other species of the genus. My thanks are due to Mr. S. KODAMA who has kindly examined the plant at my request.

Dryopteris rufinervis HAYATA sp. nov. Stipites? Frondes ovato-lanceolata ut videntur verisimiliter ultra 150 cm. longæ 80 cm. latæ bipinnatæ, (sed pinnis infimis cum una pinnula pinnata); pinnis inferioribus lanceolatis in ambitu, subsessilibus, 45 cm. longis, 23 cm. latis a basi 18 cm. latis, apice acuminatis, utraque latere pinnulis 15-16, a se 3-4 cm. remotis, pinnulis mediocribus angustato-lanceolatis 12 cm. longis 3 cm. latis apice cuspidato-acuminatis, (cuspidibus linearibus), basi circ. æquilatis pinnatifidis (lobis elliptico-angustatis a medio usque ad basin æquilongis 1 cm. longis 7 mm. latis ascendento-patentibus apice obtusis basi æquilatis, margine crenato serratis, serris obtusis, sinibus inter lobos angustis obtusis 2 mm. latis apice a rhachibus 3 mm. remotis); partibus apicalium pinnularum et pinnarum margine lobulatis, sursum serratis; pinnis infimis oblique triangularibus in ambitu 45 cm. longis 30 cm. latis basi latere superiore 10 cm. latis, latere inferiore 25 cm. latis, pinnulis latere superiore 15-17, latere inferiore paucioribus 13-15, pinnulis infimis (latere superiore) a rhachibus frondium 3 cm. remotis, iis mediocribus conformibus æquilongis; pinnulis (latere inferiore) iis latere superiore generaliter longioribus, ias in longitudine $2\frac{1}{2}$ -plo æquantibus, præsertim pinnulo infimo longissimo a rhachibus frondium 8 cm. remoto 25 cm. longo 12 cm. lato pinnato, pinnulis

angustato-lanceolatis. Rhaches frondium semiteretes 4-5 mm. latae supra concavae vel medio sulcato-elevatae, muricato-pubescentes, subtus convexae, subglabrae, vel plus minus muricatae; rhaches pinnarum tereto-complanatae, $2\frac{1}{2}$ mm. latae, supra 3-sulcatae, stramineo-fuscentes, brevissime pubescentes subtus subglabrae convexae, costae pinnularum supra elevatae subplanae subtus planae sed distincte rufo-coloratae; venis et venulis supra plus minus elevatis subtus planis sed distinctis parcissime minute squamatis; arcolis costalibus latissime triangularibus 7 mm. longis 1 mm. latis. Sori prope marginem 1-seriatim dispositi, a margine 1 mm. remoti, depresso-globosi 1 mm. in diametro. Indusium cordatum.

ИЛБ. Чиōран, leg. G. НАКАХАРА, Aug. 1905, (No. 274).

Near *Nephrodium Leuceanum*, Нк. but differs from it in the shape of the fronds. It should better be referred to *Aspidium*, on account of its having anastomosing veins (see p. 449).

Dryopteris todagensis CHRIST. ? HAYATA in Tōkyō Bot. Mag. XXIII. p. 25.

Dryopteris parasitica O. Ktze ? HAYATA in Tōkyō Bot. Mag. XXIII. p. 25.

Dryopteris (§ *Phegopteris*) **remota** HAYATA sp. nov. Stipites tenues 18 cm. longi 1 mm. in diametro glabri, nitentes subteretes supra profunde sulcati straminei. Frondes stipite breviores, ambitu triangulares apice acuminatae basi latissimae 12 cm. longae a basi 16 cm. latae apice pinnatae medio bipinnatae infime tripinnatae pinnis remotissime oppositis, a rhachibus angulo 70° divaricatis, inferioribus 3 cm. a se remotis, infimis longissimis a basi sursum gradatim brevioribus; pinnis infimis elongato-triangularibus 8 cm. longis a basi $3\frac{1}{2}$ cm. latis petiolatis, (petiolis 13 mm. longis),

obliquis, latere inferiore quam latere superiore latioribus, pinnulis I. inferioribus pinnatis a se circ. 1 cm. remotis superioribus pinnatifidis versus summum lobulatis, pinnulis I. infimis latere inferiore pinnarum 23 mm. longis 1 cm. latis sessilibus basi pinnatis medio pinnatifidis sursum lobulatis, (segmentis infimis angustato-quadranguralibus 6 mm. longis $1\frac{1}{2}$ mm. latis apice obtusis basi plus minus contractis vel ad rhachin adnatis divaricatis margine undulato-integris, undis utraque latere 3-4. Rhaches frondium semiteretes glabræ tenuissimæ supra sulcatæ subtus convexæ; rhaches pinnarum supra leviter sulcatæ glabræ; venis centralibus segmentorum infimorum, et venulis flexuosis, venulis simplicibus ad sinus undorum attingentibus, utrinque planis, sed distinctis, glabris; paginae membranacæ, utraque glabræ. Sori globosi circ. $\frac{3}{4}$ mm. in diametro ad quoque venulas dorsaliter siti utraque latere venarum 1-seriatim 3-4 dispositi; receptaculum prope apicem venularum lineare. Indusium non visum, verisimiliter obsoletum.

HAB. in monte Morrison, leg. G. NAKAHARA, 1905, Oct.

Near. *Nephrodium Dryopteris* but differs from it in the arrangement of the pinnae.

Dryopteris (*Nephrodium*) **sparsa** O. KTZE; C. CHRISTENSEN Ind. Fil. p. 273.

Nephrodium sparsum DON.

HAB. Tamsui, HANCOCK, in Herb. Kew.

DISTRIB. South China, India, North Ceylon, Malesia, Mauritius.

Dryopteris spinulosa O. KTZE var. **morrisonensis** HAYATA n. v. Stipites 13 cm. longi straminei basi fuscentes basi dilatati 4 mm. lati sursum 1 mm. lati squamis inferioribus latissimis tenuibus rubescentibus subhyalinis ovato-lanceolatis 1 cm. longis 4 mm. latis apice acuminatis basi truncatis vel rotundatis minute elevato-

reticulatis margine subintegris intus saccato-concavis, superioribus minoribus paucis. Frondes ovatae vel elongato-ovatae herbaceo-membraceae 17 cm. longae 11 cm. latae apice acutae basi obtusae bipinnatae, partibus infimis subtripinnatis; pinnis infimis longissimis 6 cm. longis 4 cm. latis oblique triangularibus, latere inferiore latiore $2\frac{1}{2}$ cm. lato infima latere superiore angustiore $1\frac{1}{2}$ cm. lato, pinnula superiore (latere superiore) a rhachibus frondium 2 mm. remota, pinnula infima inferiore (latere inferiore) a rhachibus frondium 7 mm. remota; pinnis mediocribus angustatis $4\frac{1}{2}$ cm. longis basi 2 cm. latis a basi sursum gradatim angustioribus, apice obtusis pinnatis, pinnulis elongato-quadrangularibus inferioribus 1 cm. longis 5 mm. latis a basi latissimis ima basi contractis, subsessilibus margine inciso-dentatis, (dentibus utraque latere 4-5, ascendentibus quadrangularibus, apice acutis paucissime serratis serris utraque latere dentium 1-2, acutis); pinnis generaliter a rhachibus frondium angulo 70° divaricatis, rectis vel plus minus recurvis. Rhaches frondium supra tenuissime 2-sulcatae vel 1-sulcatae inferiore $1\frac{1}{2}$ mm. latae squamatae, superiore nudae subcomplanatae, subtus convexae glabrae nudae; rhaches pinnarum et pinnularum sulcatae, squamatae vel subnudae vel nudae glabrae complanatae; paginae utraque glabrae, venis et venulis simplicibus liberis. Sori ad basin quoque dentium 1, globosi 1 mm. in diametro latere ramorum superiorum venularum furcatarum dispositi. Indusium cordatum margine brevissime crosso-denticulato-ciliolatum.

HAB. in monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. MORI, 1906, Oct. (No. 2500).

Very near *Nephrodium dilatatum* and also *N. Copelandi* CHRIST., but differs from both by the lobes of the pinnae.

Dryopteris Yabei HAYATA sp. nov. Stipites rubescentes 30 cm. longi basi squamati, (squamis linearibus nigricantibus 1-1½ cm. longis vel brevioribus rubescentibus), supra bisulcati, basi 4 mm. lati ad totam longitudinem parcissime muricati. Frons ovata in circumscriptione 45 cm. longa 30 cm. lata apice cuspidata basi obtusa, subglabra coriacea bipinnata, partibus infimis rarius subtripinnatis, pinnis mediocribus angustato-lanceolatis 15 cm. longis basi latissimis 5 cm. latis apice acuminatis plus minus petiolatis, pinnis infimis conformibus longioribus latissimis, pinnis utraque latere frondis 15-16 inferioribus 5 cm. a se remotis, pinnis basi pinnatis sursum pinnatifidis, (segmentis falcato-recurvis apice acutis mediocribus 1½ cm. longis 4 mm. latis a basi contractis vel plus minus dilatatis margine obscure dentatis vel distincte dentatis); pagina supra viridis subtus pallidissime plus minus rubescens, utraque glabra. Rhachis frondis supra bi-tri-sulcata, piloso-squamata, squamis densiusculis rubris, subtus convexa, minute parcissime muricata; rhachis pinnarum complanata, supra plano-sulcata glabra subtus elevata squamata, venis et venulis liberis. Sori secus venas loborum pinnarum vel pinnularum sub quoque dente siti, a apice dentium 2 mm. remotis, vel sursum ad sinus dentium siti. Indusium persistens orbiculari-cordatum 1½ mm. in diametro rubrum margine paucissime erosociliolatum.

HAB. Kushaku et Shintengai, leg. K. MIYAKE, 1899.

Near *Nephrodium acutum* Hook., but differs from it by the shape of the lowest pinna.

Aspidium SWARTZ.

Aspidium hokutense HAYATA sp. nov. Rhizoma repens squamatum, squamis fuscente-nigricantibus dense obtectum. Stipites

stramineo-rufescentes 30 cm. longi, basi fuscentes parce squamati, (squamis rubro-nigricantibus lanceolatis acuminatis 2-3-4 mm. longis 1- $\frac{1}{2}$ mm. latis), a basi usque ad medium purpurascens sursum subglabri basi anguloso-teretes 1 $\frac{1}{2}$ -2 mm. in diametro, supra 1-2-sulcati subtus convexi. Frondes profunde-cordatæ in ambitu, 20 cm. longæ totiusque latæ, trifoliolatæ, tenuissime membranacæ, subglabræ, foliolo terminali hastato 3-lobato apice acuto basi truncato, 16 cm. longo, 13 cm. lato, petiolato 4 cm. longo; lobo terminali elongato-triangulari apice acuto basi latissimo 13 cm. longo, 7 cm. lato, margine sursum undulato, deorsum grosse dentato, (dentibus obtusis, ascendente-triangularibus 1 cm. longis totiusque latis), lobis lateralibus lobum terminalem in longitudine $\frac{1}{2}$ -plo æquantibus elongato-triangularibus 7 cm. longis 2 $\frac{1}{2}$ cm. latis sursum acuminatis apice obtusis, basi latissimis margine subintegris apice sursum ascendente-recurvatis; foliolo terminali pinninervio, venis basilaribus (=nervis loborum lateralium) oppositis 11 cm. longis, a costa angulo 60° divaricatis, venis primariis lateralibus lobi terminalis utraque latere 16, inferioribus 4-5 cm. longis, a se 1 $\frac{1}{2}$ cm. remotis, recto-ascendentibus, ad apicem dentium attingentibus, a costa angulo 50° divergentibus; foliolis lateralibus oblique hastatis, (breve petiolulatis, petiolulis 5 mm. longis, a rhachibus frondium angulo 60° divaricatis), 14 cm. longis 10 cm. latis, apice acuminatis, basi cordato-truncatis, inæqualiter tri-lobatis, lobo terminali elongato-triangulari 12 cm. longo 4 cm. lato a medio usque ad basin æquilato, sursum sensim angustato, acuminato, apice obtuso, ascendente-recurvato, margine subintegro, sed latere inferiore deorsum irregulariter grosse obscureque dentato vel repandato, lobo laterali latere superiore minore obscuro inconspicuo brevissimo obtuso vel circ. obsoleto, lobo laterali latere inferiore majore

conspicuo ovato-triangulari 6 cm. longo $2\frac{1}{2}$ cm. lato sursum acuminato apice obtuso basi latissimo sursum ascendente-recurvato a lobo terminali angulo 90° divaricato margine integro; nervis venisque ut lobi terminalis; rhachis frondium tetragono-teretes, supra sulcatae latere planae subtus convexae parcissime pubescentes; costae foliorum supra planis dense brevissime hirsutae subtus parcissime minute piloso-squamatae minute parce maculatae, venis et venulis utraque plus minus elevatis distinctis, venulis inter venas reticulatis areolis venulis liberis plus minus ramosis. Sori marginales 1-2-3-seriatim dispositi, ad venulas liberarum dorsales, globosi 1 mm. in diametro. Indusium profunde cordatum 1 mm. in diametro, margine longe ciliolatum.

HAB. Hokuto, leg. G. NAKAHARA, Dec. 1906.

Very near *A. trifoliatum*, but differs from it in the position of sori which are nearly limited towards the margin.

Aspidium melanocaulon BLUME; C. CHRISTENSEN Ind. Fil. p. 82.

Nephrodium melanocaulon BAKER.

HAB. Liukiu, Hanechiyama, leg. G. NAKAHARA, Aprili.

DISTRIB. South China, Tonkin, Malesia, Philippines, N. Guinea.

Aspidium subtriphylum HOOK.; HAYATA in Tōkyō Bot. Mag. XXII. p. 25.

Polystichum ROTH.

Polystichum falcatum DIELS var. **caryotideum** (WALL.); HAYATA in Tōkyō Bot. Mag. XXIII. p. 25.

Polystichum stenophyllum CHRIST in Bull. Soc. Bot. France LII. Mém. I. p. 27.

Polystichum nitakayamense HAYATA in Tōkyō Bot. Mag. XXI. p. 14; et Fl. Mont. Formos. p. 243, t. 41.

DISTRIB. East Tibet, China.

Polystichum transmorrisonense HAYATA sp. nov. Stipites stramineo-rubescens 25 cm. longi supra bisulcati semiteretes subtus convexi basi fuscentes dense squamati, (squamis lanceolato-subulatis, 5 mm. longis basi latissimis 1-1½ mm. latis fuscentibus), etiamque plus minus parcissime strigosi. Frondes ovato-lanceolatae 30 cm. longae 10 cm. latae, apice obtusae, vel acutae, basi truncatae, a medio deorsum aequilatae, sursum gradatim angustatae, bipinnatae, pinnis utraque latere 20, inferioribus a se 2-3 cm. remotis, pinnis infimis pinna mediocri conformibus aequilongis vel paullo brevioribus, pinnis medioeribus a rhachibus transverse patentibus vel paullo descendentibus angusto-lanceolatis 5 cm. longis 14 mm. latis apice acuminatis basi aequilatis sessilibus apice lobulatis sursum pinnatifidis caeterum pinnatis; pinnulis utraque latere 12-14 inferioribus a se 2 mm. vel 1 mm. remotis angusto-quadrangularibus inferioribus 7 mm. longis 3 mm. latis apice obtusis vel rotundatis basi aequilatis margine plus minus revolutis lobulato-dentatis, (dentibus brevissimis semiglobosis utraque latere 4). Rhaches frondium supra bi-sulcatae 1½-2 mm. latae dense pilosae etiamque squamatae subtus convexae, squamis lanceolatis 4 mm. longis 1 mm. latis fuscentibus; rhaches pinnarum complanatae supra elevatae subsulcatae, utraque latere sulcorum densissime minute hirsutae subtus plus minus elevatae parcissime hirsutae etiamque squamatae, (squamis lanceolatis basi cordato-dilatatis 2½ mm. longis ad basin ½ mm. latis apice acuminato-linearibus). Paginae supra ad venas et venulas parcissime hirsutae, pilis plus minus crispato-recurvis ⅔ mm. longis rubris, subtus ad venas et venulas

parcissime brevissime hirtellæ, pilis albis brevissimis $\frac{1}{4}$ mm. longis. Sori sub quoque dente pinnularum 1, utraque latere costæ 3-4, rotundati, 1 mm. in diametro, ad apicem venularum terminales. Indusium persistens cordatum, margine eroso-integrum.

HAB. in Montibus Centralibus.

Near *D. Kawakamii*, but differs from it in having somewhat scaly and curled hairs on the fronds, and in the transversely spreading and sometimes descending pinnæ. *D. Kawakamii* has very rigid and straight hairs on the fronds, and its pinnæ are more or less ascending. The present plant should better be referred to *Dryopteris* on account of its habit and texture. (See p. 449).

Polystichum dimorphophyllum* HAYATA sp. nov. *Aspidium dimorphophyllum* T. Irō (in sched.) in Hërb. Tōkyō. Rhizoma repens densissima squamatum, (squamis stramineo rubescentibus basi lanceolatis 1 cm. longis apice linearibus). Stipites 18 cm. longi complanati basi 3 mm. lati apice $1\frac{1}{2}$ mm. lati supra late sulcati subtus convexi parcissime squamati straminei. Frondes (steriles) coriaceæ rhombeo-triangulares apice acuminatæ 20 cm. longæ basi latissimæ 14 cm. latæ, partibus infimis tri-pinnatis, inferioribus mediocribus nec non superioribus bi-pinnatis, prope apicem simpliciter pinnatis, pinnis utraque latere frondium 12, inferioribus $3\frac{1}{2}$ cm. a se remotis ; pinnis infimis longissimis 10 cm. longis lanceolatis 4 cm. latis a rhachibus frondium angulo 40° divaricatis subrectis vel ascendento-rucurvatis apice acuminatis basi obtusis, breve petiolatis inferiore bipinnatis superiore simpliciter pinnatis prope apicem pinnatifidis ; pinnulis I. infimis lanceolatis 4 cm. longis $1\frac{1}{2}$

* It is provisionally named *Aspidium dimorphophyllum* by Dr. T. Irō in a label of the specimen in the Herbarium at Tōkyō, which species, however, has never been described. As the name *dimorphophyllum* is etymologically incorrect, I have ventured here to describe the plant as *P. dimorphophyllum*, referring it to the genus *Polystichum*.

cm. latis apice acuminatis basin obtusis, pinnulis II. infimis oblique ovatis latere superiore majoribus 11 mm. longis 6 mm. latis apice aristatis basi cuneato-attenuatis brevissime petiolulatis margine 3-4-5-serrulatis, serrulis aristatis; rhaches frondium complanatae supra sulcatae (etiamque) a latere sulcatae subtus convexae; rhaches pinnarum complanatae supra sulcatae sursum subalatae, subtus parvissime squamatae. Frondes (fertiles) lanceolatae vel ovatae in ambitu, apice lineari-acuminatae basi obtusae, partibus inferioribus tripinnatis, superioribus bi-pinnatis, versus apicem simpliciter pinnatis, pinnis utraque latere 12 inferioribus 5 cm. a se remotis, longissimis 9 mm. longis remote pinnatis circ. linearibus, pinnulis I. linearibus; pinnulis II. ovatis acutis basi attenuatis 7 mm. longis 3 mm. latis margine 3-4-dentato-lobatis, lobis ascenduntibus acutis ad totam laminam soriferis cum soris reflexis. Sori sub quoque lobo circ. 1, interdum 2, prope costas siti, globosi, 2 mm. in diametro, a se approximati, totam paginam occupantes. Indusium globosum basi profunde cordatum 2 mm. in diametro.

HAB. Liukiu: Nagodake, Aprili. 1907, leg. G. NAKAHARA.

The present plant is very remarkable for its dimorphous fronds. It is very near *Polystichum apiifolium* (Sw.) C. CHRISTENSEN, but differs from it by the much contracted fertile fronds. This and its congener are so different from any other species of the genus, that it is much desirable to have a subgenus for them.

Gymnopteris PRESL.

Gymnopteris contaminans BEDD.; HAYATA in Tōkyō Bot. Mag. XXIII. p. 26.

Dipteris REINWARDT.

Dipteris conjugata REINW.; C. CHRISTENSEN Ind. Fil. p. 242.

HAB. Shōtōkaku, leg. K. MIYAKE, 1897.

DISTRIB. Asia, Tropical Polynesia.

Oleandra CAV.

Oleandra Wallichii PRESL. ; C. CHRISTENSEN Ind. Fil. p. 467.

HAB. Randaisan, leg. U. MORI, Aug. 1908, (No. 7135).

DISTRIB. North India.

Davallia SM.

Davallia (§ *Eudavallia*) **formosana** HAYATA sp. nov. Stipites triquetro-teretes, supra late sulcati, etiamque utraque latere sulcorum tenuiter sulcati, subtus triangulari-convexi, glabri, stramineo-rubescens. Frondes late rhomboideo-triangulares 50 cm. longæ 60 cm. latæ apice acutæ basi obtusæ, remote tri-pinnatæ, sursum remote bipinnatæ, pinnis utraque latere 10, inferioribus a se 9-10 cm. remotis, a rhachibus angulo 60° divaricatis, rectis, sursum ascendentibus recurvis, infimis longissimis ovato-rhomboideis petiolatis (petiolis 3 cm. longis) cum petiolis 37 cm. longis 17 cm. latis apice acuminatis basi acutis obliquis latere superiore 11 cm. lato, latere inferiore 6 cm. lato, pinnulis I. utraque latere 16, inferiore a se 4 cm. remotis, infimis longissimis acuminato-ovatis 12½ cm. longis 5 cm. latis apice lineari-acuminatis basi rotundatis, pinnulis II. utraque latere circ. 8, inferioribus a se 1½ cm. remotis, infimis longissimis 4 cm. longis 13 mm. latis acuminato-ovatis petiolulatis (petiolulis 3 mm. longis), profunde pinnatifidis, (pinnulis II. sursum simpliciter dentatis), segmentis utraque latere 5-6, inferioribus 5 mm. a se remotis, infimis longissimis 12 mm. longis elongato-ovatis apice obtusis basi cuneato-attenuatis obliquis, (latere superiore quam inferiore latiore), margine inciso-dentatis, (dentibus utraque latere

5-6 approximatis ascendento-recurvis inferioribus 2-3 mm. longis, 1-1½ mm. latis apice obtusis interdum margine 1-2-serrulatis), sub dente inferiore 1-3-soriferis. Rhaches frondium supra late sulcatae, utraque latere sulcorum etiamque tenuissime sulcatae, glabrae, inferiore 2½ mm. latae; rhaches pinnarum supra sulcatae, subtus convexae, glabrae; rhaches pinnularum subcomplanatae, supra sulcatae, leviter alatae; paginae utraque glabrae, membranaceae supra soris (subtus) elevato-tuberculatae: venis et venulis supra elevatis, subtus haud elevatis, sed distincte conspicuis. Sori sub quoque dente 1-vel 2-3, ad apicem venularum siti, a margine plus minus remoti, generaliter ½ mm.-1½ mm. remoti. Indusium elongato-quadrangulare, ad basin et latus paginae adnatum, apice liberum, ambitu U-forme, basi rotundato-truncatum, apice ore abrupte truncatum, ⅔ mm. longum, ½ mm. latum, ore integrum.

HAB. Taichū, Kashigatani, leg. G. NAKAHARA, Feb. 1907.

Davallia parvipinnula HAYATA sp. nov. *D. Clarkei* HAYATA in Tōkyō Bot. Mag. XXIII. p. 27.

Stipites 14 cm. longi glabri stramineo-rubescens basi plus minus purpurascens, subteretes (supra) profunde 1-sulcati, sursum 2-3-sulcati glabri haud squamati, basi parce squamati, squamis elongato-triangularibus tenuibus leviter rubescentibus margine crosis apice obtusis. Frondes triangulares 19 cm. longae, a basi 20 cm. latae, pinnis utraque latere 15, infimis 3-pinnatis 10 cm. longis, inferioribus bi-pinnatis 6-7-8 cm. longis, a se 3-4 cm. remotis, superioribus brevioribus simpliciter pinnatis 3-4 cm. longis, a se 1-2 cm. remotis, sursum minoribus 3 mm.-1 cm. longis, a se 3 mm. remotis; pinnis infimis sessilibus lanceolato-ovatis 10 cm. longis 4½ cm. latis, latere inferiore latiore, 2½ cm. lato; pinnulis I. infimis brevioribus, (inferioribus longioribus sessilibus angustato-

quadrangularibus a se 1-2 cm. remotis pinnatis); pinnulis II. ovatis inferioribus 6 mm. longis obtusis angustatis remote profundeque pinnatifidis, segmentis angustissimis remotis cochlearibus bicornutis, cum cornibus 1-3 mm. longis $1\frac{1}{4}$ mm. latis basi stipitatis, (cornibus exterioribus longioribus, interioribus brevioribus) sinibus inter cornua rotundatis; rhaches frondium supra leviter tenuissime bisulcatæ, subtus convexæ, utrinque glabræ; rhaches pinnarum subcomplanatæ supra plus minus sulcatæ, subalatae; paginae membranaceæ utraque glabræ. Sori ad sinus furcæ venularum, vel interdum ad angulos venularum flexarum ad centrum segmentorum pinnularum II. siti, solitarii. Indusium semiglobosum $\frac{2}{3}$ mm. latum $\frac{1}{2}$ mm. longum basi leviter cordatum vel truncatum.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, (No. 1823).

Near *D. Clarkei*, but differs from it in having cordate indusia.

Davallia subalpina HAYATA sp. nov. Rhizoma repens, incrassatum, subteres, 4 mm. in diametro, dense squamatum, squamis imbricatis fulvo-rubrescentibus cuspidatò-triangularibus vel elongatò-triangularibus 5-6 mm. longis a basi $2-2\frac{1}{2}$ mm. latis. Stipites basi squamati, sed supra basin subito nudi, subglabri, 25 cm. longi, $2\frac{1}{2}$ mm. in diametro, subteretes, facie (supra) profunde sulcati, stramineo-rubrescentes. Frondes ovatæ, vel late ovatæ, 35 cm. longæ, 31 cm. latæ, apice acutæ basi obtusæ, a medio deorsum tri-pinnatæ, sursum bi-pinnatæ. versus apicem pinnatæ, pinnis remotis utraque latere 12, inferiore 7 cm. a se remotis, sessilibus, infimis brevioribus, inferioribus longioribus lanceolatis 17 cm. longis 7 cm. latis apice acuminatis basi obtuso-truncatis remote pinnatis, pinnulis I. utraque latere 16 inferioribus a se 17 mm. remotis longissimis (infimis brevioribus) lanceolatis, 4 cm. longis, 18mm. latis, brevissime

petiolulatis (petiolulis 1 mm. longis), remote etiamque pinnatis, pinnulis II. utraque latere 8 inferiore 5 mm. a se remotis oblique elongato-quadrangularibus inferioribus 8 mm. longis 4 mm. latis brevissime petiolulatis pinnatifidis, segmentis latere superiore 3-4 patentibus oblique ovatis apice furcato-lobatis basi attenuatis 3 mm. longis 2 mm. latis, lobis exterioribus longioribus $1\frac{1}{2}$ mm. longis acutis, interioribus brevioribus 1 mm. longis acutis, ad centrum segmentorum soriferis; segmentis latere inferiore 1-2 acuto-ascendentibus lineari-ovatis $3\frac{1}{2}$ mm. longis $\frac{3}{4}$ mm. latis apice subacutis simplicibus haud soriferis; paginae membranaceae, utrinque glabrae; rhaches frondium subcomplanatae supra late sulcatae, utraque latere sulcorum etiamque tenuissime sulcatae subglabrae inferiore $1\frac{1}{2}$ mm. latae, subtus convexae plus minus costatae ad ramificationem squamatae; rhaches pinnarum complanatae supra leviter sulcatae glabrae subtus convexae sursum plus minus alatae inferiore $\frac{2}{3}$ mm. latae; rhaches pinnularum complanatae sulcatae, $\frac{1}{2}$ mm. latae; venulae latere superiore pinnularum II. a medio furcatae, ad sinus furcae soriferae, ramis venularum prope apicem loborum evanescentibus. Sori circ. semiglobosi $\frac{1}{2}$ mm. lati. Indusium semiglobosum vel depresso-ovato-globosum, margine integrum, apice rotundatum basi leviter contractum truncatum, $\frac{2}{3}$ mm. latum, $\frac{1}{2}$ mm. longum, ecoloratum.

HAB. in Arizan, leg. G. NAKAHARA, 1906, Nov.

Near *D. affinis* HOOK et *D. charophylla* WALL, but differs from both in the venation of the fronds.

Microlepia PRESL.

Microlepia obtusiloba HAYATA in Tōkyō Bot. Mag. XXIII. p. 27.

Microlepidia quadripinnata HAYATA sp. nov. Stipites 28 cm. longi, basi pilosissimi, (pilis crispatis depressis densis), etiamque basi squamati, (squamis nigricantibus lanceolatis $4\frac{1}{2}$ mm. longis $1\frac{1}{2}$ mm. latis apice cuspidatis basi rotundatis extus glabris sub lente intus dense pilosis vel glabris), basi fuscentes, a medio sursum stramineo-flavescentes, subnitidi, supra sulcati, subteretes. Frondes late rhomboideo-triangulares, 32 cm. longæ, 40 cm. latæ, apice acutæ, vel acuminatæ, basi acutæ vel obtusæ, hirsutæ, herbaceæ, partibus infimis quadri-pinnatis, inferioribus tri-pinnatis, superioribus bi-pinnatis, sursum simpliciter pinnatis, pinnis utraque latere rhachis frondis 18, plus minus alternis, inferioribus circ. 6-7 cm. a se remotis subrectis apice ascendente-recurvatis a rhachibus angulo 60° divaricatis, pinnis infimis lati triangularibus oppositis 22 cm. longis 20 cm. latis, latere inferiore latiore 12 cm. latis, petiolatis, (petiolis 2-3 cm. longis), pinnulis I. utraque latere 16 inferioribus 4 cm. a se remotis, infimis elongato-triangularibus 13 cm. longis 6 cm. latis apice acuminatis petiolulatis, (petiolulis 1 cm. longis), remote pinnatis; pinnulis II. utraque latere 15, inferioribus a se 1-2 cm. remotis, infimis longissimis triangulari-lanceolatis $4\frac{1}{2}$ cm. longis 2 cm. latis remote pinnatis; pinnulis III. utraque latere 6, inferioribus a se 7 mm. remotis, oblique ovatis apice obtusis basi oblique cuneatis subsessilibus 1 cm. longis 8 mm. latis, etiamque pinnatis vel pinnatifidis, segmentis inferioribus obliquis obovatis apice obtusis basi cuneato-attenuatis 4 mm. longis 2 mm. latis pauci-dentatis, (dentibus utraque latere 2-3), segmentis superioribus obovatis obliquis sub-unilateralibus dentatis vel integris; rhaches frondium complanatæ semi-teretes supra sulcatæ, ad utrinque latus sulcorum dense hirsutæ cæterum glabræ, subtus convexæ, glabræ, stramineæ; rhaches pinnarum supra leviter sulcatæ, vel elevatae, sursum sub-

alatae, supra dense hirsutae, subtus glabrae; rhaches pinnularum I. II. et III. complanatae, supra densissime hirtellae subtus glabrae, venis et venulis utrinque hirsutis; paginae secus venas et venulas utraque hirsutae, venulis apice furcatis, ramis superioribus brevioribus apice soriferis, ramis inferioribus longioribus non soriferis, interdum venulis simplicibus soriferis, vel sterilibus, ramis prope apicem evanescentibus. Sori sub quoque dente segmentorum vel venularum III. 1, a apice dentium $\frac{1}{2}$ -1 mm. remoti, ad apicem ramorum venularum terminales. Indusium late cordatum $\frac{1}{2}$ mm. latum margine ciliatum.

HAB. Nantō: Mushazan, leg. T. KAWAKAMI et U. MORI, 1906, Aug. (No. 2390).

Very near *M. hirsuta* but differs from it by the much thinner texture and quadri-pinnate fronds.

Monachosorum KUNZE.

Monachosorum subdigitatum KUHN; HAYATA in Tōkyō Bot. Mag. XXIII. p. 28.

Diplazium Sw.

Diplazium Kawakamii HAYATA sp. nov. Stipites 55 cm. longi, complanato-tetragoni, 4-sulcati, a basi 7 mm. lati, fuscentes, tota longitudine dense piloso-squamati, (squamis linearibus incrassatis sub-teretibus, plus minus complanatis, basi muricatis, fuscentibus, plus minus crispatis, 3-4 mm. longis, patento-reflexis, vel depresso-reflexis). Frondes late ovatae, 87 cm. longae, 60 cm. latae, apice acutae, basi obtusae, tripinnatae, superiore bi-pinnatae, pinnis lanceolatis utraque latere 10, a rhachibus frondium angulo 40-60° divaricatis inferioribus 40-45 cm. longis, a se 13-17 cm. remotis,

pinnis juxta-infimis longissimis 45 cm. longis 17 cm. latis apice acuminatis obtusis longe vel breve petiolatis, (petiolis 3-4 cm. longis), remote pinnatis, pinnulis I. utraque latere 20 inferioribus 5 cm. a se remotis ovato-lanceolatis 10 cm. longis 33 mm. latis apice acuminatis, (acuminibus linearibus) basi obtusis breve petiolulatis, (petiolulis 3 mm. longis), etiamque pinnatis, pinnulis II. utraque latere 18 inferioribus a se 8 mm. remotis lanceolatis 1½ cm. longis 6 mm. latis apice obtusis basi obtusis prope basin latissimis basi constrictis 2 mm. latis latere inferiore plus minus decurrentibus margine truncato-dentatis, (dentibus utraque latere 8 infimis longissimis obtusis interdum paucissime serratis 3 mm. longis 2 mm. latis apice truncatis ascendentibus); pinnulis I. apice attenuato-acuminatis dentatolobulatis, lobis vel dentibus truncatis ascendentibus; rhaches frondium complanato-tetragonæ, supra et subtus late leviter sulcatae, vel simpliciter concavae, a basi 4 mm. latae, inferiore dense superiore paucissime squamatae, (squamis fuscentibus filiformibus patento-reflexis); rhaches pinnarum complanatae subtetragonæ supra sulcatae utraque latere sulcorum elevato-alatae subtus convexae stramineae subglabrae; rhaches pinnularum complanatae supra sulcatae subtus elevatae a latere alatae, etiamque secus sulcos utrinque latere prominente verticaliterque alatae (alis secus sulcos hac atque illac interruptis ¾ mm. latis; paginae exsiccato supra fuscentes, glabrae, subtus plus minus pallidiores subglabrae, venis et venulis supra impressis subtus leviter elevatis. Sori juxta costam sub quoque dente 1, ad venulas unilaterales, sed ad basin venularum bilaterales oblongi prominentes 1½ mm. longi ¾ mm. lati utrinque obtusi.

HAB. Tōzan, leg. T. KAWAKAMI et G. NAKAHARA, 1906.

Somewhat near *D. divisissimum* CHRIST, but differs from it by the the lobes of the pinnae.

Diplazium Morii HAYATA sp. nov. Stipites 46 cm. longi a basi 4 mm. lati, fulvo-straminei, basi fuscentes, subteretes, a latere complanati, supra profunde 1-sulcati, utraque latere sulcorum 1-striati, (striis tenuissimis distinctis fusco-coloratis), parcissime squamati, squamis tenuissimis fulvo-fuscentibus lanceolatis 2-3 mm. longis. Frondes rhomboideo-trianguulares, 55 cm. longæ, 50 cm. latæ, apice acutæ, basi obtusæ, a medio deorsum bi-pinnatæ, a medio sursum simpliciter pinnatæ, pinnis utraque latere 11, inferioribus 12 cm. a se remotis, a rhachibus frondium angulo 60° divaricatis; infimis longissimis elongato-ovato-triangularibus 29 cm. longis 11 cm. latis apice abrupte acuminatis (acuminibus linearibus) basi truncatis latissimis 11 cm. latis, petiolatis, (petiolis 2-3 cm. longis), partibus superioribus pinnatifidis, a medio inferiore pinnatis, pinnulis utraque latere 8, inferioribus 2 cm. a se remotis, a rhachibus angulo 90° divaricatis, vel inferioribus reflexis, mediocribus elongato-quadrangularibus apice caudato-acuminatis, basi sessilibus truncatis, latissimis, 6 cm. longis, a basi 2 cm. latis, margine dentato-pinnatifidis, lobis utrinque latere 12, inferioribus 6 mm. longis 4 mm. latis apice truncatis a se approximatis margine denticulatis vel subintegris plus minus ascendentes vel circ. transverse divaricatis; pinnulis apice denticulatis acuminatis. Rhaches frondium tetragonæ, (angulis obtusis,) glabræ, a latere compressæ, supra profunde sulcatæ, utraque latere prope sulcorum tenuiter distincte 1-striatæ, subtus plus minus convexæ glabræ, latere basi 2½ mm. latæ; rhaches pinnarum iis frondium conformes, sed latere etiamque supra sulcatæ; venis et venulis utraque plus minus elevatis; paginae utraque

glabræ exsiccato supra pallido-fuscentes subtus plus minus pallidiores herbaceæ secus costas pinnularum prominente verticaliter 2-alatæ, (alis hæc atque illæ interruptis) venulis simplicibus vel a medio furcatis liberis ad apicem denticulorum attingentibus. Sori ad basin venularum prope costas generaliter uni-lateraliter, sed interdum bilateraliter, siti, lineares 3-4 mm. longi, $\frac{2}{3}$ mm. lati.

HAB. Randaizan, leg. T. KAWAKAMI et U. MORI, 1908. Aug.

Near *D. leptophyllum* BAKER, *D. esculentum* and also *D. giganteum*, but differs from them by the lobes of the pinnae. Also very like *D. Meyenianum* PR. from which this is distinguishable by the much larger lobes of the pinnae.

Diplaziopsis C. CHR.

Diplaziopsis javanica C. CHRISTENSEN Ind. Fil. p. 227.

Allantodia javanica BEDD.; MATSUM. et HAYATA Enum. Pl. Formos. p. 601.

HAB. Randaizan, leg. U. MORI, 1908.

Asplenium LINN.

Asplenium laserpitiifolium LAM. var. **morrisonene** HAYATA in Tôkyô Bot. Mag. XXIII. p. 29.

Asplenium resectum SM. var. **rahaense** HAYATA n. v. Stipites 30 cm. longi 3 mm. lati, basi valde complanati, late sulcati, paucissime pubescentes, supra basin glabri, purpureo-nigricantes, nudi. Frondes cuneiformes vel elongato-triangulares, 30 cm. longæ,

stipitem in longitudine æquantes, 16 cm. latæ, pinnatæ, prope apicem lobulatæ, apice acuminatæ, basi latissimæ et truncatæ, pinnis (infirmis longissimis) utraque latere 27, inferioribus 13 mm. a se remotis, a rhachibus frondium angulo 70° divaricatis subrectis, sed sensim paullo versus apicem ascendento-recurvis, subsessilibus vel brevissime petiolatis, infirmis angustatis 9 cm. longis 16 mm. latis plus minus ascendento-falcatis vel subrectis, medioeribus $6\frac{1}{2}$ cm. longis 13 mm. latis subrectis vel ascendento-recurvatis a basi usque ad prope apicem æquilatis apice obtusis basi valde obliquis (latere superiore latiore basi truncato rhachi frondis parallelo, vel subparallelo recto integro, margine superiore duplicato-serratis) (latere inferiore angusto, margine inferiore duplicato-serrato basi acuto, prope basin acuto basi a rhachi frondis 1 cm. remoto,) Trondes apice acuminatæ, lobulatæ, lobis obovatis simplicibus vel pauci-serratis, Rhaches frondium complanatæ supra sulcatæ, (sulco fusco-stramineo), subtus convexæ, nitidæ, purpureo-nigricantes; costis et venis pinnarum subtus plus minus purpurascente coloratis, supra ecoloratis, venis parallelis angulo 40 a costis divaricatis (inferioribus 2 mm. a se remotis), furcatis, ramis superioribus soriferis; paginæ herbaceo-membranaceæ, supra viridissimæ, subtus paullo pallidior vel concolores. Sori utraque latere costæ 1-seriatim. dispositi, lineares, ad ramos superiores venularum furcatarum latere superiore uni-laterales, rarius ad ramos venularum bi-laterales. Indusium lunulato-lineare 7 mm. longum 1 mm. latum.

HAB. Rahao, leg. K. MIYAKE, Oct. 1899; Randaizan, leg. B. HAYATA et U. MORI, 1908, Oct.

The present plant was provisionally named *A. rahaense* by Mr. Y. YABE, but the species was not been described by him, nor was

it published. While working here at Kew, I have examined the plant and found that it comes very near to *A. resectum*, from which it can not be regarded as specifically different. I have, therefore, thought it better to describe it myself, as representing a variety of the same species.

Asplenium tozanense HAYATA sp. nov. Rhizoma ascendens, sub-erectum, gemmis turbulenter revolutis, squamis dense obtectis squamis lanceolatis basi latissimis 3 mm. longis 1 mm. latis vel longioribus fulvo-rubrescentibus. Stipites cæspitosi erecti graciles 18 cm. longi stramineo-flavescentes, basi fusconigricantes semiteretes, supra late sulcate, 1 mm. lati, subtus convexi, plus minus nitidi, tennes, a basi usque ad medium paucissime squamati, (squamis minoribus), sursum nudi. Frondes tennes, herbaceæ, virides, lanceolatae, vel oblongo-triangulares, plus minus falcato-recurvatae, vel rectae, stipitem in longitudine æquantes, apice acuminatae, basi truncatae, latissimae, vel a medio usque ad basin æquilatae, a medio sursum sensim angustatae, a medio deorsum bipinnatae sursum simpliciter pinnatae, prope apicem pinnatifidae, pinnis utraque latere circ. 20, inferioribus 3 cm. longis, a se $1\frac{1}{2}$ cm. remotis, superioribus ascendentibus, mediocribus horizontaliter patentibus, inferioribus reflexo-patientibus, infimis angulo 120° a rhachi divaricatis, pinnis alternis, mediocribus elongato-triangularibus 3 cm. longis 11 mm. latis petiolatis (petiolis $1\frac{1}{2}$ mm. longis) basi remote pinnatis apice pinnatifidis, pinnulis inferioribus oblique obovatis 7-8 mm. longis 4 mm. latis apice obtusis basi breve attenuatis vel cuneato-acutis utraque latere 3-4-dentatis, dentibus obtusis vel acutis; pinnulis utraque latere 8-9, inferioribus 3 mm. a se remotis apice pinnatifidis, lobis serriformibus ascendentibus. Rhaches frondium complanatae, supra sulcatae, subtus convexae, subglabrae vel parcissime pubescentes, sursum subala-

tæ, $\frac{1}{2}$ mm. latæ, rectæ; rhaches pinnarum complanatæ, tenuissimæ, alatæ, $\frac{1}{2}$ mm. latæ, (medio costis supra planis subtus prominentibus) supra utraque latere costarum elevato-striatæ, ad striam remote pilis aristatis dispersæ, pilis plus minus recurvis a latere complanatis, 1 mm. longis, $\frac{1}{4}$ mm. a basi latis; paginæ supra parcissime aristatopilosæ, (pilis 1 mm. longis, $\frac{1}{4}$ mm. a basi latis, complanatis, patentibus), subtus glaberrimæ, venis simplicibus vel furcatis, venulis simplicibus liberis apice prope pinnularum apicem evanescentibus. Sori utrinque latere costarum pinnularum 2-3-4, arcte prope costas dispositi, elongato-oblongi, ad basin venularum latere superiore laterales. Indusium elliptico-oblongum $1\frac{3}{4}$ mm. longum, $\frac{3}{4}$ mm. latum, marginibus liberis crosis, unilateraliter venula adnatum.

HAB. Tōzan, leg. G. NAKAHARA, 1907.

Near *A. varians*, but differs from it in the shape of the pinnae and pennules.

Athyrium ROTH.

Athyrium oppositipennum HAYATA sp. nov. Stipites 10 cm. longi, subglabri, plus minus minute muricati, supra tenuissime bisulcati. Frondes ambitu lanceolatæ, membranaceæ graciles 19 cm. longæ, 8 cm. latæ, apice acutæ, basi obtusæ, 1-2-pinnatæ, pinnis horizontaliter transverse patentibus utraque latere 14, inferioribus a se 2 cm. remotis, juxta-infimis longissimis lanceolatis, $5\frac{1}{2}$ cm. longis, 1 cm. latis, a basi usque ad medium incurvo ascendentibus sursum recurvis descendentibus; pinnis versus apicem frondis simplicibus brevioribus in lobos apicales abeuntibus; pinnis mediocribus basi pinnatis a medio sursum pinnatifidis vel ad totam longitudinem pinnatifidis, vel sursum dentato-pinnatifidis apice dentatis; pinnulis vel segmentis

pinnarum basilarium angustis 7 mm. longis 2 mm. latis apice obtusis basi plus minus contractis supra basin latissimis margine revoluto-dentatis (dentibus utraque latere 5-6 transverse patentodescendentibus rotundatis vel obtusis). Rhaches frondium supra tenuiter bisulcatae, vel profunde 1-sulcatae, brevissime pubescentes, subtus paucissime squamatae vel haud squamatae, brevissime pubescentes, deorsum prope insertionem pinnæ glandulis oblongis $\frac{1}{2}$ -1 mm. longis instructae; rhaches pinnarum complanatae, supra sulcatae, subalatae, basi squamatae; paginae utrinque glabrae, venis et venulis supra impressis, subtus elevatis omnibus liberis. Sori lunulati, ad venulas laterales, ad paginam pinularum basilarium inter rhachin et marginem utraque latere costæ 1-seriatim 7-dispositi. Indusium lunulato-semiglobosum, medio recurvum 1 mm. longum, $\frac{1}{2}$ mm. latum.

HAB. in monte Morrison, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1863).

Near *Asplenium prolixum*, but differs from it in the shape of the pinnæ.

Blechnum LINN.

Blechnum Hancockii HANCE; MATSUM. et HAYATA Enum. Pl. Formos. p. 608.

HAB. Randaizan, leg. U. MORI, 1908, Aug. (No. 7133).

Pellaea LINK.

Pellaea Fauriei CHRIST? MATSUM. et HAYATA Enum. Pl. Formos. p. 611.

Pteris cheilanthoides HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 619.

Cryptogramma R. BR.

Cryptogramma Brunoniana WALL. ; HAYATA in Tōkyō Bot. Mag. XXIII. p. 32.

Plagiogyria KUNZE.

Plagiogyria euphlebia METT. ; C. CHRISTENSEN Ind. Fil. p. 495.
HAB.. Taitō : Bunshiseki, leg. T. KAWAKAMI et U. MORI, 1906,
Dec. (No. 2351).

DISTRIB. Japan, China, North India, Tropical Australia.

Plagiogyria Hayateana MAKINO in Tōkyō Bot. Mag. XX p. 245.
Plagiogyria Matsumureana HAYATA Fl. Mont. Formos. p. 244.
(non MAKINO).

Pteris LINN.

Pteris flavicaulis HAYATA sp. nov. Stipites 30 cm. longi subtetragoni supra sulcati angustati subtus latiores, a latere late sulcati, glabri, basi paucissime vel haud squamati, flavescens. Frondes membranaceae, utraque glabrae, pallido-flavescens ovato-lanceolatae, 57 cm. longae, a basi latissimae 34 cm. latae, apice acuminatae, basi obtusae, pinnatae, pinnis utraque latere 14 inferioribus 6 cm. a se remotis a rhachibus frondium 40-50' divaricatis, subrectis vel plus minus ascendente-recurvatis inferioribus aequilongis 29 cm. longis, infimis a latere inferiore cum pinnulis 1 instructis, pinnula a pinna infima angulo 40° divaricata, quam pinna infima brevior, cum pinna mediocri conformi; pinnis mediocribus breve petiolatis (petiolis 5 mm. longis) elongato-

lanceolatis 17 cm. longis $3\frac{1}{2}$ cm. latis a basi 3 cm. latis apice acuminato-caudatis (caudis 3 cm. longis 2-3 mm. latis obtusis) basi truncatis latere superiore angustioribus latere inferiore latioribus pinnatifidis, segmentis linearibus utraque latere 25 inferioribus a se 4 mm. remotis (a latere inferiore pinnarum) transverse patentibus plus minus ascendente-recurvatis, 23 mm. longis $2\frac{1}{2}$ mm. latis, apice obtusis basi abrupte dilatis sinibus inter segmenta latis rotundatis; rhaches inter segmenta opposita 3 mm. latae. Rhaches frondium tetragonae supra profunde sulcatae a latere late sulcatae, glabrae, inferiore $1\frac{1}{2}$ mm. latae; costae pinnarum elevato-2-striatae, subtus prominentes, venis et venulis utrinque tenuiter elevatis; areolis costalibus inter venas laterales 1, linearibus 6 mm. longis 1 mm. latae; venulis liberis a medio furcatis, ramis ad marginem segmentorum attingentibus. Sori ad totam marginem frondium marginales. Indusium $\frac{1}{2}$ mm. latum.

Shinyeshō, leg. G. NAKAHARA, Oct. 1905, (No. 583).

Pteris longipinna HAYATA sp. nov. Stipites 40 cm. longi, subteretes, plus minus complanati, basi 2 mm. lati, vel latiores, supra profunde bi-sulcati straminei, basi stramineo-rubescetes, basi squamati, (squamis lanceolato-lineari-acuminatis $\frac{1}{3}$ -1 cm. longis 1 mm. latis) supra basin nudi, ad totam longitudinem minute muricato-scabri. Frondes ambitu flabellato-globosae, 30 cm. longae totiusque latae, stipitem in longitudine æquantes, pinnatae, pinnis inferioribus longioribus, superioribus brevioribus, superrimis brevissimis, (etaque) in ambitu apice perfecte truncatae, pinnis utraque latere 5 oppositis inferioribus a se 4 cm. remotis, pinnis 1 vel 2 inferioribus furcato-bifidis longissimis frondem in longitudine æquantibus ascendentibus arcuatis sursum pinna terminali parallelis, pinnis infimis sessilibus linearibus basi obliquis (latere superiore brevissime acuto

sessili, latere inferiore acuminato infracto a rhachi 5 mm. remoto), juxta basin furcatim fissis, segmentis superioribus longioribus segmenta inferiora $\frac{3}{2}$ -plo in longitudine æquantibus linearibus 30 cm. longis 8 mm. latis apice acutissimis (acuminibus linearibus tenuissimis arcuato-recurvis); pinnis mediocribus simplicibus linearibus apice acutissimis basi latere superiore angulato-acutis, basi latere inferiore decurrentibus; pinnis superioribus basi latere inferiore valde decurrentibus, partibus decurrentibus $1\frac{1}{2}$ cm. longis; paginae utraque glabræ margine repandato-subintegre tenuiter membranacæ, costis supra leviter subtus prominenter elevatis, venis basi vel medio bi-furcatis parallelis. Indusium marginale 1 mm. latum.

HAB. in monte MORRISON, leg. T. KAWAKAMI et U. MORI, 1906. Oct. (No. 1875).

Near *P. longipes* DOX., but differs from it in having much longer pinnae.

Pteris morrisonicola HAYATA in Tōkyō Bot. Mag. XXIII. p. 33.

Coniogramme FÉE.

Coniogramme fraxinea DIELS; C. CHRISTENSEN Ind. Fil. p. 185.

DISTRIB. Asia: Japan, China; Australia, Polynesia, tropical Africa.

Coniogramme japonica DIELS; C. CHRISTENSEN Ind. Fil. p. 185.

DISTRIB. Japan.

Polypodium LINN.

Polypodium cucullatum NEES; HAYATA in Tōkyō Bot. Mag. XXIII. p. 77.

Polypodium quasidivaricatum HAYATA n. n. *Polypodium divaricatum* HAYATA in Tōkyō Bot. Mag. XXIII. p. 78, (non FOURN.)

Polypodium Engleri LUERSS. ; C. CHRISTENSEN Ind. Fil. p. 525.
 HAB. Randaizan, leg. T. KAWAKAMI, (No. 7079).
 DISTRIB. Japan.

Polypodium Hancockii BAKER ; MATSUM. et HAYATA Enum. Pl. Formos. p. 631.

HAB. Kussaku, leg. G. NAKAHARA.

Polypodium Engleri LUERSS. var **hypoleucum** HAYATA n. v. Rhizoma repens $2\frac{1}{2}$ mm. in diametro dense squamatum, squamis tenuibus semi-hyalinis (primum rubro-fulvescentibus demum ferrugineis), acuminato-ovato-lanceolatis 4 mm. longis 1 mm. latis basi peltatis, partibus infra insertionem 1 mm. longis rotundatis, squamis ad apicem alabastrorum frondium acuminato-linearibus 6 mm. longis $\frac{3}{4}$ mm. latis a basi peltatis, partibus infra insertionem 3-lobatis $\frac{1}{3}$ mm. longis. Stipites basi squamati supra basin subito nudi glabri straminei vel plus minus purpurascens subteretes facie sulcati 7 cm. longi 1 mm. in diametro. Frondes lineari-lanceolatae 22 cm. longae 2 cm. latae apice acuminatae basi obtusae plus minus attenuatae chartaceo-membranaceae margine repandato-undulatae, undulis 7 mm. latis, costis purpurascens vel stramineis, supra planis distincte conspicuis, subtus elevato-prominentibus, venis distinctis exsiccato indico-coloratis tenuibus subrectis a costa angulo 50° divaricatis ad sinum undularum vix attingentibus apice ramosis prope marginem evanescentibus a se 5 mm. remotis, venulis inter venas costa parallelis reticulatis, areolam formantibus, (areolis oblique quadrangularibus 2-3 mm. longis totiusque latis venulis liberis apice ramosis ramis recurvis

apice incrassatis); paginæ supra virides subtus glaucæ interdum purpureo-albicantes, a medio sursum frondium soriferæ. Sori inter venas singulariter siti, a costa 3-4 mm. remoti a margine 7 mm. remoti, globosi 2 mm. in diametro.

HAB. Kashigatani, leg. G. NAKAHARA, Feb. 1907.

The present *Polypodium* comes near *P. Engleri*, but differs from it in the veinlets spreading from the midrib in a much acuter angle. Also near *P. arenarium* BAKER and *P. Schrittpinianum* ANNIT, but differs from the former in having broader fronds which are much acuter on both ends, and in the sori which are limited on the upper parts of the fronds, and from the latter, in having acuter and larger fronds of a different texture.

Polypodium Kawakamii HAYATA in Tōkyō Bot. Mag. XXIII. p. 77.

Polypodium Lehmanni METT.; HAYATA in Tōkyō Bot. Mag. XXIII. p. 79.

Polypodium morrisonense HAYATA in Tōkyō Bot. Mag. XXIII. p. 78.

Polypodium palmatum BLUME?; HAYATA in Tōkyō Bot. Mag. XXIII. p. 79.

Polypodium quasipinnatum HAYATA n.n. *Polypodium pinnatum* HAYATA in Tōkyō Bot. Mag. XXIII. p. 80, (non POIR.).

Polypodium subauriculatum BLUME; HAYATA in Tōkyō Bot. Mag. XXIII. p. 80,

Polypodium taiwanianum HAYATA in Tōkyō Bot. Mag. XXIII. p. 80.

Polypodium trichomanoides Sw. ; C. CHRISTENSEN Ind. Fil.
p. 571.

HAB. Formosa, Arizan, leg. S. KUSANO.

DISTRIB. Japan, Tropical America.

Niphobolus KAULF.

Niphobolus fissus BLUME ; HAYATA in Tokyō Bot. Mag. XXIII.
p. 34.

Supplements and Corrections.

Acer rubescens HAYATA Materials for a Flora of Formosa p. 66.

The species is very different from *A. insularis* MAKINO, so far as I can ascertain in examining MAKINO's species in the Tokyo-Herbarium, although I have not yet seen his type.

Acer Tutcheri DUTHIE in Kew Bull. (1908), p. 16.

The type does not exist in Formosa.

Rubus fasciculatus DUTHIE in Ann. Bot. Gard. Calc. IX. p. 39.

Rubus conduplicatus DUTHIE (perhaps an unpublished species).

(I am very much indebted to Mr. S. T. DUNN for the above references).

Tashiroa okinawensis MATSUM. mentioned in the present work, p. 114, is not identical with MATSUMURA's type, although they bear great resemblance in external appearance.

Vaccinium japonicum MIQ. var. **lasiostemon** HAYATA n. n.

Vaccinium japonicum MIQ. var. *ciliare* HAYATA Materials for a Flora of Formosa p. 168, (non MATSUM.). After completing this work, I have once more examined the specimen with Mr. S. KOMATSU, and found that it differs a little from the variety *ciliare* which has a distinctly ciliated pedicel and thinly hairy stamens. The pedicels of the present plant are quite or nearly glabrous and the stamens are much more barbate. It may be referred to *V. japonicum* MIQ., but should be regarded as representing another variety of the same species. In this, Mr. S. KOMATSU concurs.

Ficus Awkeotsang MAKINO in Tōkyō Bot. Mag. XVIII. p. 151.

Ficus Hanceana MAXIM. in M \acute{e} l. Biol. XI. p. 341; MAKINO in Tōkyō Bot. Mag. XVIII. p. 154.

Carex Warburgiana KÜKENTH. in Bull. Herb. Boiss. 2. sér. V. (1905) p. 1162, et in ENGL. Pf.-reich, Caricoideæ p. 564.

Hab. Formosa : Kananin, (WARBURG n. 10890, fide KÜKENTHAL)

Carex chrysolepis FRANCH. et SAV. ; KÜKENTHAL in ENGL. Pf.-reich, Caricoideæ p. 564.

Hab. Formosa : Sintiam (WARBURG n. 9280, fide KÜKENTHAL).

Aspidium anastomosans HAYATA n. n. *Dryopteris anastomosans* HAYATA Materials for a Flora of Formosa p. 414.

Aspidium rufinerve HAYATA n. n. *Dryopteris rufinervis* HAYATA Materials for a Flora of Formosa p. 420.

Dryopteris morrisonensis HAYATA n. n. = *Dryopteris spinulosa* O. KTZE var. *morrisonensis* HAYATA Materials for a Flora of Formosa p. 422.

Dryopteris oppositipenna HAYATA n. n. = *Athyrium oppositipennum* HAYATA Materials for a Flora of Formosa p. 441.

Diplazium Morii HAYATA Materials for a Flora of Formosa p. 437 = **Diplazium Dœderleinii** MAKINO = *Asplenium Dœderleinii* LUERSS.

Aspidium aristatum Sw. var. *subdimorphum* CHRIST Herb. Boiss. (1896) p. 669.

After completing this manuscript, my attention has been called by Mr. T. MAKINO to CHRIST's variety *subdimorphum* which is mentioned in the paper above cited with following note : " La plante Japonaise montre quelquefois un léger penchant ver le

dimorphisme, vu que les frondes fertiles ont des segments bien plus courts et plus obtus que les steriles. J'ai une plante identique du continent voisin : Sud de la Chine, c. O. WARBURG." So far as I can judge from the note given above, **Polystichum dimorphophyllum** HAYATA mentioned in the present work p. 428, is not to be referable to CHRIST's variety, for the former has entirely dimorphic fronds while the latter looks like a mere form of *P. (Aspidium) aristatum* which sometimes shows the slightest tendency towards dimorphism. In this, Mr. S. KODAMA concurs. So far as I am aware, the description of CHRIST's variety has never been published.

Athyrium tozanense HAYATA = *Asplenium tozanense* HAYATA Materials for a Flora of Formosa p. 440. After finishing this manuscript, I have, by the suggestion of Mr. T. NAKAI, once more examined the sori of the fern, and have found that there are some indusia which are reflexed backwards at the apex, or on the middle. It should, therefore, be properly referred to *Athyrium*.

Dryopteris quadripinnata HAYATA = *Microlepia quadripinnata* HAYATA Materials for a Flora of Formosa, p. 434. As is suggested by Mr. T. NAKAI, the indusia of the fern are cordate, affixed to the receptacles and quite free on the margin. It should, therefore, be properly transferred to *Dryopteris* from *Microlepia* to which it was erroneously referred.

ERRATA.

- P. 3, foot note, for 1), read 2).
 „ „ for 2), read 1).
 P. 4, line 5 from bottom, for *Allphyllus* read *Allophyllus*.
 P. 10, line 9 from top, after DIELS', omit the commas.
 P. 11, line 15 from bottom, after Aroideæ, put in and.
 P. 14, line 13 from bottom, for *panisulata*, read *paniculata*.
 P. 18, line 13 from bottom, after *paniculata*, put in semicolon.
 P. 21, line 9 from bottom, for **arisanensis** read **arisanense**.
 P. 23, line 13, for repundata, read repandata.
 P. 25, line 9 from top, after ternatis, instead of the commas put in periods.
 P. 27, line 1 from top, for longis, read longæ.
 „ line 2 from top, for latis, read latæ.
 P. 47, line 14 from top, for *sasanqua*, read *Sasanqua*.
 P. 55, line 2 from top, after *Hancema*, omit the commas.
 P. 58, line 9 from bottom, for ongis, read longis.
 P. 87, line 9 from bottom, for *exerocarpa*, read *xerocarpa*.
 P. 88, line 8 from top, for acutis, read acuta.
 P. 101, line 11 from top, for ada xillas, read ad axillas.
 P. 115, line 4 from top, after Kew, put in commas.
 P. 122, line 9 from top, for are, read is.
 P. 134, line 4 from bottom, after *dilatatum*, for is, read are.
 „ line 7 from bottom, after leaves, omit the a.
 P. 169, line 9, after nor, omit is.
 P. 303, line 13 from bottom, for pubescentibus, read pubescentes.
 „ line 1 from bottom, for a latere, read lateralibus.
 P. 310, line 8 from top, for japanese, read Japanese.
 P. 311, line 14 from bottom, after this is, put in an a.
 P. 332, line 4 from bottom, for **Europhia**, read **Eulophia**.
 P. 390, line 1 from bottom, for are, read is.
 P. 414, line 6 from bottom, for subcupuli, read subcupuli-

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All communications relating to this Journal should be addressed to the
Director of the College of Science.

The Errantiate Polychæta of Japan.

By

Akira Izuka,

Rigakushi, Rigakuhakushi,

Prof. of Zoology, Imperial Peers' College, Tokyo.

With plates I—XXIV.

Introduction.

Up to the present our knowledge of Japanese Polychæta has been limited to the following four sources :

1870. E. GRUBE. Neue Anneliden aus Japan.

1879. E. v. MARENZELLER. Südjapanische Anneliden.

1885. W. C. McINTOSH. Challenger Report.

1903. J. P. MOORE. Polychæta from Japan, Kamtschatka and Bering Sea.

Limiting our attention to the Polychæta Errantia alone, the number of species belonging to that group and made known by the above mentioned authors from the Japanese waters, amounts to seventy-four in all. Of this number, eighteen species are those that have been previously known from other parts of the world, while the rest (fifty-six) were described as new. From among the latter must be deducted the two, viz., *Eunice congesta* MARENZ. and *Glycera decipiens* MARENZ., which in my opinion are

indubitably synonymous with the older species *E. indica* KINBERG and *G. goesi* MGR. respectively and which therefore have to be added among the former.

My own researches have revealed fifty more species not recorded before from Japan. Of these thirty-two seem to be new to science.

Thus, there are in all one hundred twenty-four species to the Errantiate Polychæte fauna of Japan as at present known. These are referable to fourteen families and forty-five genera. Now, in this paper I propose to describe and to comment upon all the aforesaid 124 species, though in a few cases of deep-sea forms collected by the "Challenger" and the "Albatross," and reported upon by W. C. MCINTOSH and J. P. MOORE respectively, I have as yet failed to acquire specimens myself and have thus been compelled to take recourse to merely making extracts from the original descriptions.

The Polychæta Sedentaria will be dealt with in a separate contribution. So likewise the pelagic forms belonging to the families Alciopidæ and Tomopteridæ, of both which families not a single species have yet become known from the Japanese waters.

The material, upon which my own studies were based, have been brought together mostly from within the littoral zone of the main islands of Japan. A small part of them was obtained by dredging at moderate depths (down to about 30 fathoms), and a yet smaller part was taken from stones, sponges, etc., brought up by the "long-line" from depths running down to about 450 fathoms in the Bays of Sagami and Suruga. Most extensive and thorough collecting was done by myself in Misaki and neighbourhood, during my repeated sojourns during a period of several

years in the Marine Laboratory of the Science College. Collecting was also done by me at a number of other places, viz., Suruga and Izu (1897), Isé and Shima (1898), Hokkaido and the northern parts of Honshiu (summer of 1899), Bōshiu and Shimosa (winter of 1899), coasts of the Inland Sea (1900), Shikoku (spring of 1901), Japan Sea coast (summer of 1903), Kojima Gulf (winter of 1906) and Hitachi (winter of 1908).

Further, there stood at my disposal small collections made by the late Prof. K. MITSUKURI during his collecting trip to Kyushiu and Okinawa (1901), by Prof. S. WATASE in Namerikawa on the Japan Sea coast (1905), and by Prof. I. IJIMA in Sakhalin (1905).

Here I wish to fulfil the pleasant duty of returning my thanks to all those who in one way or another rendered me aid in the course of my investigations. I am under special obligation to Profs. I. IJIMA, K. MITSUKURI and S. WATASÉ for the many acts of sympathies and courtesies shown towards me. To Prof. W. C. McINTOSH (St. Andrews), Prof. EHLERS (Göttingen), Dr. W. WOODWORTH (Cambridge, Mass.), Dr. C. CROSSLAND (Suez) and to a number of other specialists in foreign countries, I am indebted for sending me specimens or their work which were useful to my studies. Further I should not here forget to mention with gratitude the name of Mr. K. AOKI, collector of the Misaki Marine Laboratory, who expended for me no small labor in the acquirement of deep-sea Polychaeta.

Distribution of Errantiate Polychaeta in Japan.

Of the 124 species of Errantiate Polychaeta known from the Japanese waters, 84 are limited to those waters, while the remaining 40 species are found also in other parts of the world.

Of the said 40 species, 3 are cosmopolitan, while 4 belong to southern, 8 to tropical, 25 to northern (including 6 arctic) forms.*

The 4 southern forms are those that occur in the south of Australia, in Kerguelen Island, and in the south Atlantic Ocean.

Among the 25 northern and arctic species, there are 9 that are found along the Pacific, but not on the Atlantic, coast of North America, though 5 out of that number are found on the north European coast. The remaining 16 are those that are known to occur in the Mediterranean Sea and on the coast of western Europe, including England, Iceland as well as Greenland. Again, 6 of the number are those that occur also on the east coast of North America.

Of the 8 tropical forms, 6 are found in the Philippines and in the Indian Ocean, 4 of them extending their range to Zanzibar and the British East Africa. The remaining 2 tropical forms are those that have hitherto been discovered only in the Philippine Islands. The wide range of distribution of these tropical forms may easily be accounted for by the course taken by ocean currents in different seasons along the coasts of the Philippines, India and Africa. Indeed, I am strongly inclined to believe that, with future advance of our knowledge, many more species will have to be added to the list of those that are common to the Japanese waters and the regions indicated.

For an insight into the specific distribution of Polychaeta on the coasts of Japan, the reader is referred to the table given at the end of this chapter. In that table the localities are arranged in the order which, beginning at the southern part of the Japan Sea side, goes up northwards on that side as far as Sakhalin and

* For names of the species see the table at the end of this chapter.

then down southwards again from the Kuriles along the Pacific coasts of Hokkaido, Honshiu, Shikoku and Kyushiu.

A few observations on the facts embodied in the table will here be in place.

1). *Glycera capitata*, *Nereis dyamusi* and *N. ezoensis* are limited to the north of Oga peninsula on the Japan Sea side, while *Laetmatonice japonica* and *Nereis oxyroda* do not extend farther north than the same peninsula.

2). *Chloeia flava* occurs on both the Japan Sea and the Pacific Ocean side, but does not extend northward beyond Oga peninsula and Kinkwasan Island; on the other hand it extends as far south as the Philippines and Indian Ocean.

3). *Nereis pelagica*, *N. ezoensis* and *Harmothoë yendoï* occur along the Pacific coast of the Hokkaido and of the Kuriles. With the exception of the first, they do not come down south beyond Kinkwasan Island.

4). *Nereis japonica* is found in Sakhalin in the north, and extends southward down to Shima, occurring in all the intermediate provinces. It is present in the Inland Sea also.

5). *Harmothoë imbricata* is very widely distributed, occurring in all the coastal regions of Japan, from Sakhalin and Kuriles in the north to Chikuzen and Satsuma in the southernmost parts of Kyushiu. *Polynoë gymnonota* has also a wide distribution, being known from Sakhalin in the north to as far south as Shikoku.

6). *Polynoë vexillaria*, *P. clava*, *Aphrodita australis*, *Glycera tessellata*, *Nereis Dumerilii*, *N. cylindrata*, *N. cultrifera*, *Ceratocephale osawai*, *Nereis microdonta*, *Eunice kobeensis*, *Diopatra sugokai*, *Eumida caeca* and *Carobia castanea* are limited to the Pacific Ocean side. Amongst them, *Polynoë vexillaria* extends northward beyond Kinkwasan Island, while all the others are not known to occur

beyond that island. The southern limit of *Nereis mictodonta*, *N. cultrifera*, *N. cylindrata*, *Polynoë clava*, *P. vexillaria* and *Ceratocephale osawai* seems to be Kyushiu Island.

Thus, numerous species of the Polychaeta cease to occur farther south than Satsuma, so that the southern end of Kyushiu may be considered to constitute an important boundary line in regard to their distribution.

On the Pacific Ocean side, many of the warm-sea forms cease to occur in the region north of Kinkwasan Island, while the cold-sea forms seldom extend southward beyond the same island; hence Kinkwasan Island may be taken as the limit between the two. On the Japan Sea side, Prov. Uzen seems to be the northern limit of warm-sea forms, while Prov. Oshima in the Hokkaido or Prov. Mutsu at the northern end of Honshiu appears to be the southern limit of cold sea forms.

Accordingly, in regard to the distribution of marine annelids, the littoral zone of Japan may be roughly divided into the following sections and subsections :

Sect. A. Japan Sea side.

Subsect. 1. From Prov. Chikuzen in Kyushiu to Oga peninsula in the north of Honshiu.

„ 2. From Oga peninsula to Sakhalin.

Sect. B. Pacific Ocean side.

Subsect. 1. From the Kuriles to Kinkwasan Island in Prov. Rikuzen.

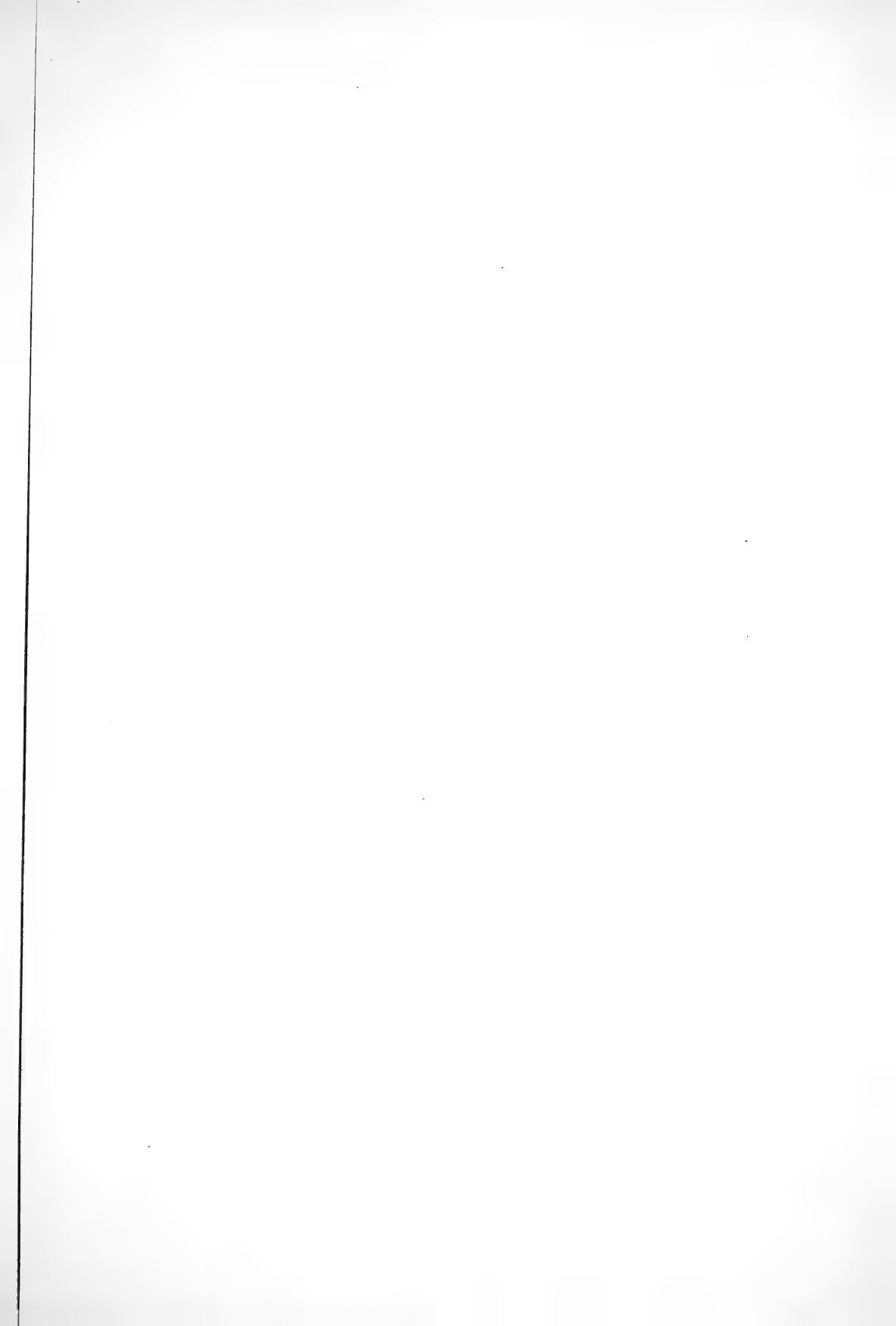
„ 2. From Kinkwasan Island to the southern end of Kyushiu.

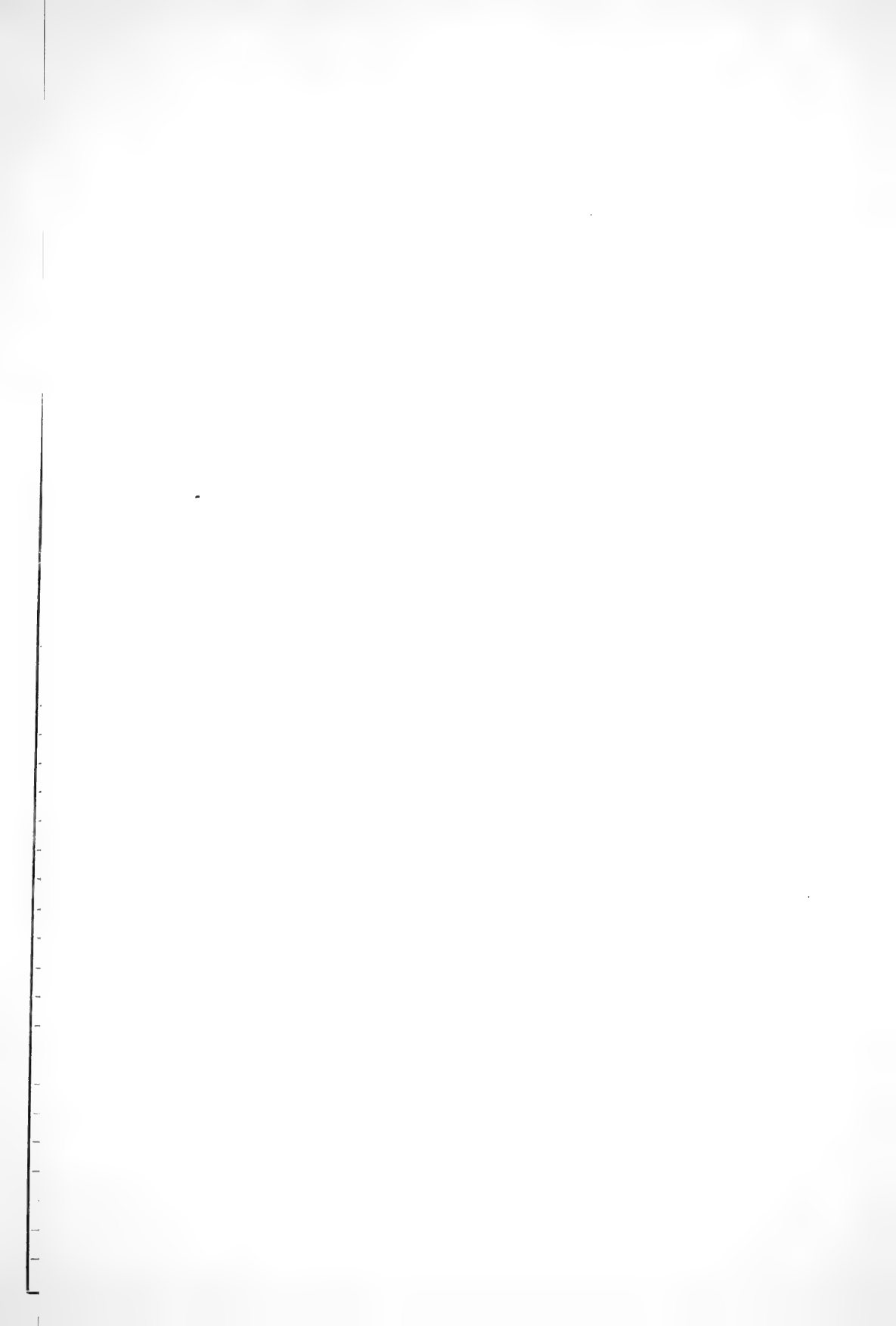
„ 3. From the southern end of Kyushiu to Formosa.

It will be seen that the above sections and subsections of the littoral zone of Japan stands in relation to the distribution of ocean currents, both warm and cold, that sweep along the coasts of Japan.









Systematic.

Family **Polynoidae.**

Body flattened, with nearly parallel sides; usually short, more rarely elongate. Prostomium with 2—3 tentacles and 4 eyes. Peristomium with long dorsal and ventral cirri; ventral cirri of the next following segment also elongate. Pharynx excertile; jaws present. Elytra usually in 12—18 pairs, sometimes numerous; their surface more or less papillose, sometimes fringed with long processes along the outer border. Colouring of elytra characteristic to most species, though liable to considerable variation in some cases. Nephridia open ventrally on papilla near base of parapodia. Bristles unjointed, generally strong, of a bright golden colour.

Key to the genera found in Japan.

- a'*. Tentacles 3.
 - b'*. Anterior tip of prostomial lobes produced to form basal joints of the paired tentacles.
 - c'*. Dorsal bristles usually present; ventral bristles numerous
 *Polynoë*.
 - c''*. Dorsal bristles absent; ventral bristles sparsely present
 *Polynoëlla*.
 - b''*. Prostomium prolonged anteriorly into two acuminate or rounded peaks.
 - c'*. Both dorsal and ventral bristles serrated for a considerable portion of their exposed length. *Harmothoë*.
 - c''*. Bristles colourless and quite transparent; the dorsal slightly curved, the ventral with rows of close set spines

- in addition to a half-ring of comb-like teeth supported
 on a slight shoulder *Scalissetosus*.
a''. Tentacles 2, their basal joints formed by the anterior tips of
 prostomium *Iphione*.

Genus *Polynoë* Savigny.

Prostomium bilobed; anterior tip of the lobes produced to form basal joint to lateral tentacle on the same level as the basal joint of median tentacle. Dorsal ramus of parapodia decidedly smaller than ventral ramus, often minute, bearing bristles more slender than ventral bristles and which are sometimes very minute and few in number or are sometimes even wanting. Ventral ramus much larger and longer bearing a moderate number of bristles which are stouter and usually longer than those of dorsal ramus. Both dorsal and ventral rami not prolonged into a finger-like process beyond insertion of the bristles. Elytra from 12 to over 50 pairs in number. Body sometimes excessively long; segments 26 to 100 or more.

Polynoë gymnonota Marenz.

Pl. III, figs. 1—4.

1879. *Polynoë* (*Lepidonotus*) *gymnonotus*, Marenzeller, Südjav. Annel. I, p. 4, Taf. I, fig. 3.
 1885. *Lepidonotus gymnonotus*, McIntosh, "Challenger" Annel. p. 64, pl. X, fig. 4.

This is one of the most common species of the genus in the Japanese waters, occurring almost everywhere under stones between tide-marks and also at some depth under water.

A large example consisting of 27 segments may measure 44 mm. in length and 16 mm. in breadth. Body thick, measuring about 7 mm. in height at about the 15th segment.

Dorsum of a bluish gray colour, with two or three reddish, parallel, transverse lines running near and along the posterior margin of segments; but these lines do not extend laterally to parapodial bases.

Ventral surface lighter in colour and of a somewhat yellowish tint.

Prostomium (pl. III, fig. 1) appears elongate on account of the fact that lateral tentacles are direct continuations of its anterior border. The median furrow does not reach to the posterior border of prostomium. Eyes of the anterior pair lie near lateral margin in the broadest part of prostomium; the nuchal collar encroaches much upon the latter, so as to almost cover the posterior pair of eyes, which are only partially seen on the dorsum as indicated by the dotted lines in the figure.

Median tentacle does not reach to tip of subtentacles; its basal region is much encroached upon by the base of lateral tentacles; the style smooth with a distinct subterminal bulb and a terminal filament. A similar feature is shown by all other tentacles and tentacular cirri, which are likewise smooth throughout. Subtentacles large and thick, showing a well marked inferior ridge; they are largely exposed on each side of the base of lateral tentacles. Tentacular cirri, with very long cirriphore, are thrust considerably outward.

Dorsal cirri extend laterally a little beyond the bundles of ventral bristles. Each of them with a distinct subterminal bulb, and a pale terminal filament.

Elytra in 12 pairs, borne on segments 2, 4, 5, and so forth on every alternate segment down to segment 23 inclusive. The elytron is of a dull lead gray colour, with an oval white spot over the point of attachment. Its surface is minutely papillose when seen

under the microscope, but is smooth to the naked eye, with the exception of the posterior part, which is studded on the surface with very distinct, though low, pale, conical papillae, and thus presents a somewhat pustulated appearance. There is no trace of cilia on edges. In some specimens the elytra are chestnut-brown in colour, excepting the white spot already mentioned.

Dorsal ramus of parapodium feebly developed, bearing a series of pale yellowish, slender, outwardly directed bristles (fig. 2) with fine serration, and also a group of short, curved and serrated bristles (fig. 3), directed posteriorly and laterally. Ventral bristles (fig. 4) horny yellow in colour, directed laterally and somewhat posteriorly.

First ventral cirrus nearly equal in length to ventral tentacular cirrus; it is situated on a distinct cirriphore. The cirri of other parapodia are of a conical form, tapering to thin end; they are short, scarcely reaching to tip of ventral rami. They show each a brownish band in the middle of their length.

Ventral (nephridial) papillae commence to occur on the 7th parapodium, each with an aperture at the bulbous end.

The bases of anal cirri unite behind the anus, which is thus situated on the dorsum opposite the penultimate parapodia.

Proboscis, when fully protruded, reaches a length about equal to that of the anterior 8 parapodiated segments taken together. It is provided with 2 strong jaws and 13 marginal papillae on both dorsal and ventral lips.

Habitat :—Tomo Harbour in Prov. Bingo (!); Sanbongi in Prov. Sanuki (Mr. K. SATO); Gulf of Agu in Prov. Shima (!); Kanazawa in Prov. Musashi (!); Misaki in Prov. Sagami (!); Azamushi, at the head of Aomori Gulf (!); Sakhalin (Prof. I. LJIMA).

Polynoë ijimai n. sp.

Pl. III, figs. 5—6.

This form approaches *Polynoë gymnonota* Marenz. very closely, but careful examination reveals points of difference sufficiently warranting its specific distinction.

The general colour of body is much lighter than in the species referred to, while the parallel transverse lines occurring near the posterior border of segments are of a light brownish colour instead of being reddish.

Prostomium almost white, with two pairs of deep brown eyes; tentacles, tentacular cirri and subtentacles are all of a purplish hue.

Ventral cirri much shorter than in *Polynoë gymnonota*; each with a very faint brownish band surrounding it at about the middle of its length.

Ventral bristles (fig. 5) are of a much lighter yellow in colour and are more slender, with the terminal portion more strongly curved than in *Polynoë gymnonota*.

As in that species the elytra are present in 12 pairs, but their colouration is quite different. While their anterior parts are almost white (fig. 6), the reddish brown coloured posterior parts show lighter coloured small spots scattered all over. The middle parts show some irregularly distributed brownish pigment spots, and the point of attachment is indicated only by an ill-defined oval white spot, which in one part is in direct continuation with the white area.

Two examples of this new species were collected and preserved in formalin by Prof. I. IJIMA in Sakhalin in the summer of 1906.

The larger specimen, from Chepissani, measures 42 mm. in length and 15 mm. in maximum breadth at the 15th segment; the smaller one, from Lake Bousset, measures 30 mm. in length and 11 mm. in breadth. Both specimens consist of 27 segments.

Habitat :—Lake Bousset and off Chepissani, 7—8 fathoms, in Sakhalin (Prof. I. IJIMA).

Polynoë squamata (L.).

Pl. III, figs. 7—9.

1766. *Aphrodita squamata*, Linn. Syst. Nat., 12th edit., p. 1084.
 1765. „ „ Baster. Opusc., subsec. ii, 2, p. 66, tab vi, f. 5, A, B, C, D.
 1766. *Aphrodita squamata*, Pallas. Misc. Zool., p. 91, tab. vii, f. 14 a—d.
 1768. „ „ *Aphrodita squamata*, Pennant. Brit. Zool., iv, tab. xxiii, f. 26.
 1776. *Aphrodita punctata*, O. F. Müller. Prod. Zool. Dan., p. 218, n. 2642.
 1789. *Aphrodita punctata*, Abildgaard. Zool. Dan., iii, p. 25, tab. xevi, f. 1—4.
 1800. Die gedüpfeltē Aphrodite, O. F. Müller. Naturges einiger Wurm-Arten, p. 170, tab. xiii.
 1816–1830. *Aphrodita squamata*, Cuvier. Dict. des Sc. Nat., ii, p. 283.
 1820. *Polynoë squamata*, Savigny. Syst. Annel, p. 22.
 1828. *Eumolpe squamata*, Brainville. Dict. des Sc. Nat., lviii, p. 458, pl. ix, f. 2.
 1834. *Polynoë squamata*, Aud. et M-Ed. Annél., p. 80, tab. i, f. 10—16.
 1839. „ „ Johnston. Ann. Nat Hist., ii, p. 432, tab. xxii, fig. 1.
 1840. *Polynoë squamata*, Grube. Actin. Echinod. u. Wür., p. 87.
 1843. *Lepidonote punctata*, Oersted. Annul. Danic. Conspect., p. 12, f. 2, 5, 39, 41, 47, 48.
 „ *Lepidonotus squamatus*, H. Rathke. Beiträge z. Faun. Norweg., 149.

1851. *Polynoë squamata*, Maitland. *Fauna Belg.* p. 213.
- 1855.? *Lepidonote armadillo*, Leidy. *Mar. Invert. Rh. Is. and N. J.*,
p. 16, pl. ii, f. 54.
1858. *Lepidonotus squamatus*, Kinberg. *Freg. Eugen. Resa*, p. 13,
tab. iv, f. 15.
1860. *Polynoë squamata*, Sars. *Vid.-Selsk., Forhandl. for 1860*, p. 4
(sep. copy).
1865. *Lepidonotus squamatus*, Johnston. *Cat. Brit. Mus.*, p. 109, pl.
viii, f. 1.
- „ *Lepidonotus squamatus*, Malnegreu. *Nord. Hafs. Ann.*, p. 56.
- „ *Polynoë dasypus*, De Quatrefages. *Hist. Ann.*, i, p. 266.
1873. *Lepidonotus squamatus*, Willemoes-Suhm. *Zeit. f. Wiss. Zool.*,
xxiii, p. 347.
- „ *Lepidonotus squamatus*, Verrill. *Invert. An. Vin. S., Rept. U. S.*
Fish., i, p. 581, pl. x, f. 40, 41.
1874. *Lepidonotus squamatus*, Möbius. *Untersuchung. d. Ostsee*, p. 112.
- „ „ „ McIntosh. *Ann. Nat. Hist.*, April, 1874,
p. 261.
1875. *Lepidonotus squamatus*, McIntosh. *Invert. and Fishes St. And.*,
p. 115.
1877. *Lepidonotus squamatus*, Huxley. *Mar. Invert.*, p. 227.
1879. „ *squamata*, Webster. *Annel. Chaet. Virgin.*, p. 4.
- „ „ *squamatus*, Tauber. *Ann. Danic.*, p. 79.
1883. „ „ Levinseu. *Nord. Annulat.*, p. 194.
1884. „ „ Webster and Benedict. *Ann. Mass.*, p.
699.
- „ *Polynoë squamata*, A. G. Bourne. *Trans. Linn. Soc., Zool.*, ii,
p. 349, etc.
1886. *Lepidonotus squamatus*, Harvey-Gibson. *Verm. Liverp.*, p. 150.
1888. *Polynoë squamata*, De Saint-Joseph. *Ann. d. Sc. Nat. (7)*, v,
p. 151.
1890. *Lepidonotus squamatus*, Malaquin. *Ann. Boulon.*, p. 15.
1896. *Polynoë squamata*, H. F. Johnson. *Pacific Ann.*, p. 166.

1900. *Lepidonotus squamatus*, McIntosh. Brit. Ann. ii, p. 274. pl. xxv, fig. 1.

The largest example of this species in my hand, the one collected by Prof. I. IJIMA in Chepissani, Sakhalin, comprises 27 segments and measures 28 mm. in length, while the breadth is 5.5 mm. without, and 10 mm. with, the parapodia and setae.

An example from Yodomi in Sagami Bay, measures only 14 mm. in length and 3.0 mm. in breadth exclusive of parapodia and bristles.

Prostomium broadly ovate, bounded posteriorly by the fold of nuchal plate, and anteriorly running into the bases of median and lateral tentacles. It is smooth, iridescent, of a purplish pink colour, with a longitudinal median furrow, and bearing four black eyes on dorso-lateral margins. The first pair of eyes somewhat in front of the middle of prostomium; the second, slightly smaller pair nearer to the posterior border of same. Lateral tentacles longer than cephalic lobe; median tentacle considerably longer than lateral; all tentacles having a bulbous and deeply pigmented region below pale terminal filament. The tentacular cirri are similar in structure to, but more slender than, the tentacles. All these organs, as also the subtentacles, are smooth.

The cirriphore of tentacular cirri bears, on the inner edge, a tuft of 6 or 7 slightly curved and tapering spinous bristle, which are directed forwards.

Elytra in 12 pairs, borne on the segments 2, 4, 5, 7 and so forth on every alternate segment down to segment 23 inclusive. They are ovate and reniform, studded with brownish chitinous bosses (fig. 7) and densely ciliated on the outer and posterior margin. The under surface is smooth and iridescent, and shows a pear-shaped scar where it was detached from the

elytrophore. All the elytra overlap considerably, entirely covering the dorsum.

Dorsal bristles long, tapering, and finely serrated (fig. 8); they are generally covered with fine mud and parasitic growths.

Ventral bristles (fig. 9) in general of a golden hue, stout, with a short series of spikes on the distal, slightly thickened part of the shaft below apex.

Nephridial papillae commence to occur from the 8th parapodium.

Habitat:—Lake Bousset and Chepissani in Sakhalin, 7—8 fathoms (Prof. I. IJIMA); Azamushi, in the head of Aomori Gulf (!); Gulf of Agu in Prov. Shima, 9—10 fathoms (!); Sunosaki in Boshu (!); Matsuwa near Misaki (!); Yodomi in Sagami Bay, 40 fathoms.

Polynoë clava (Montag.).

Pl. III, figs. 10—11.

1808. *Aphrodita clava*, Montag. Trans. Linn. Soc., ix, p. 108, pl. vii, f. 3.
1824. *Lepidonotus clavatus*, Leach. Supp. Ency. Brit., i, p. 452.
1826. *Polynoë scutellata*, Risso. Hist. nat. Europ. mérid., iv, p. 414.
1829. *Eumolpe squamata*, D. Chiaje. Mem. sulla Storia, iv, p. 155, tab. Ivii, f. 8, 17.
1836. *Halithaea clava*, Templeton. Lond. Mag. Nat. Hist., ix, p. 234.
1860. *Polynoë clypeata*, Grube. Arch. f. Naturges., Bd. xxvi, p. 71, taf. iii, f. 1.
1861. *Polynoë clypeata*, Grube. Ausflug n. Trieste, p. 138, taf. iii, f. 1.
1865. *Lepidonotus clava*, Johnston. Cat. Brit. Mus., p. 111, pl. iv, f. 5, 6.
- „ *Polynoë modesta*, De Quatrefages. Hist. Nat. Annel., i, p. 243.
1867. *Lepidonotus clava*, Malmgren. Ann. Polych., p. 130.

1870. *Polynoë grubiana*, Claparède. Suppl. Annel. Chétop., 9 (373), pl. i, f. 2.
1875. *Lepidonotus clava*, Marenzeller. Sitzb. der K. Akad., 1 Abth., Juli-Heft, p. 1.
1876. *Lepidonotus clava*, McIntosh. Trans. Z. S, ix, p. 374.
1881. *Polynoë clava*, Langerhans. Canar. Annel., Nova Acta, 42, iii, p. 108.
1884. *Polynoë clava*, A. G. Bourne. Trans. Linn. Soc. Zool., ii, pp 347-356, pls. xxiv-xxvi.
- „ *Lepidonotus clava*, Carus. Faun. Medit., p. 202.
1885. *Polynoë grubiana*, Jourdan. Zool. Anz., viii, p. 128, f. 1, 2.
1887. „ „ Jourdan. Arch. Zool. Expér., v, pp. 115-120, pl. iv, f. 11, 12, 16, 17.
1898. *Lepidonotus clava*, De Saint-Joseph. Ann. d. Sc. nat., 8 sér., v. p. 225.
1900. *Lepidonotus clava*, McIntosh. Brit. Annel. ii, p. 280, pl. XXVI, fig. 1.

Body, consisting of 28 segments, 18—23 mm. in length; the breadth 2.8—3.0 mm. without, and 6.0—6.5 mm. with, parapodia and bristles.

Dorsum of a dull brownish hue, speckled with white; elytra with dark mottling. Ventral surface pale, with some dark tints about the mouth and on the sides of the posteriormost region of body. The nephridial papillae in the posterior half of the body have the column dark and the tip whitish.

Prostomium similar in outline to that of *Polynoë squamata*; bounded posteriorly by nuchal collar. The larger anterior eyes are in front of the middle of prostomium. The broad basal region of the median tentacle is anteriorly more distinctly separated from the base of lateral tentacles than in *P. squamata*; median and lateral tentacles thicker, and the bulbous region below tip

marked by a more distinct blackish band. Subtentacles somewhat filiform at tip, and provided with five rows of minute papillae.

On the dorsum of the basal joint of tentacular cirrus are a single large spine and a minute tuft of tapering, serrated bristles.

Elytra in 12 pairs, borne on same segments as in *P. squamata*. They are all more or less circular in outline (fig. 10), and do not quite cover the dorsum, but leave bare rhomboidal spaces on same. They are of a more flexible nature than in the species referred to, and are moreover provided with only minute tubercles with the exception of the first four pairs, which show both large and minute tubercles.

Dorsal bristles shorter, thicker, less tapering but more curved than in *P. squamata*, though similar in structure.

Ventral bristles (fig. 11) with shorter, curved or falcate tip, having less rows of spikes as compared with *P. squamata*.

Nephridial papillae commence to occur from the 8th segment, and continue to the last parapodiated segment.

A marked difference between *P. squamata* and *P. clara* consists in the fact that whereas in the former species the body and the last parapodia are of a diminutive size, the same in the latter species are comparatively large.

Habitat:—Jogashima, near Misaki (!); Shimizu Harbour in Prov. Suruga (!).

Polynoë sagamiana n. sp.

Pl. IV, figs. 11—15.

Body elongate, measuring 24 mm. in length, the maximum breadth on the ventral surface of 10th segment 3.5 mm. without, and 7.0 mm. with, parapodia and bristles.

Prostomium (fig. 11) much wider than long, its widest part

with lateral prominences lies nearer to the posterior than to the anterior border ; and on these lateral prominences are situated the larger anterior eyes. Posterior eyes of about half the diameter of the anterior, situated on the postero-lateral border of prostomium ; invisible from above, being covered over by nuchal fold. Both pairs of eyes somewhat elliptical and black.

Ceratophore of median tentacle much larger than lateral tentacular ceratophores, which are prolongations of the prostomium. Style of median tentacle twice as long as those of lateral tentacles, gradually tapering from the broad base to the small subterminal bulb, after which it again tapers to form the short terminal filament. Style of lateral tentacles similarly built as that of the median, but shorter. All the tentacles are smooth ; their colour nearly white with a reddish brown ring around the base of style, and also around the proximal region of the subterminal enlargement. Subtentacles stout, their tip extending a short distance beyond that of the terminal filament of lateral tentacles, gradually tapering from base to tip ; the entire organ nearly white. Tentacular cirri similar in form and colour to those of lateral tentacles, but with longer style.

There are 26 segments to the body, which is smooth on both dorsal and ventral surfaces. Neural depression well marked, slightly wider in about the anterior $\frac{1}{4}$ of its length than in the posterior parts. Nephridial papillae commence from the 9th segment and continue to exist posteriorly to the 24th segment ; the first one is very small.

Elytra in 12 pairs, borne on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21 and 23. They are rather small, leaving a median longitudinal portion of the back exposed, thin and semi-transparent, generally oval (fig. 12), with the attachment indicated by a brown-

ish pigment spot and situated nearer to lateral than to mesian border; quite without papillae or hairs on margin. Each elytron, in addition to the brownish spot already alluded to, with minute white spots scattered over its surface, and with three round pigment patches. These pigment patches are arranged along the longer axis of elytra, i.e., in a line making an angle of about 30° with the long axis of body, and of which the middle is larger than the other two.

Typical parapodium (fig. 13) short; dorsal ramus represented by a conical protuberance, with an aciculum and about 17 short setose bristles (fig. 14), of which the distal half of the exposed portion is finely serrated, while the proximal half possesses transverse rows of fine hairs. Ventral ramus conical and truncated; its distal end divided into pro- and post-setal lobes; the former slightly longer than the latter. Ventral bristles (fig. 15) about 25 in number, long, with a subterminal enlargement and a terminal hook; the former provided with 7 rows of transverse hairs.

Ceratophore of dorsal cirrus reaches to about the tip of dorsal ramus; its style long, provided with a brownish red subterminal bulb and a long terminal filament, which takes up about $\frac{1}{3}$ the length of the entire style.

Ventral cirrus simple and slender, its tip reaching to base of the bristles.

Habitat:—Sagami Bay, about 156 fathoms (Mr. K. Aoki).

Polynoë chitoniformis (Moore).

1903. *Lepidonotus chitoniformis*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 405, pl. xxiii, figs. 10—11.

Since I have not been able to examine this species myself, I will give the following extract from MOORE'S description.

Body short and broad, regularly elliptical in outline, measuring 37 mm. in length, 15 mm. in breadth, and 6 mm. in height. It consists of 26 segments.

Prostomium approximately quadrate, its anterior and lateral margins slightly convex, the posterior concave. Eyes of anterior pair about twice as large as those of posterior pair. Median tentacular ceratophore about $\frac{2}{3}$ as long as prostomium; style 4 times the length of prostomium, with subterminal bulb followed by a terminal filament of about equal length. Lateral tentacles similar in form to the median, but only about $\frac{2}{3}$ as long; the ceratophore only $\frac{1}{2}$ as long as that of the median tentacle. Tentacular cirri similar in form, the dorsal equalling the median tentacle in length, the ventral somewhat shorter. Subtentacles about as long as the median tentacle, rather stout, densely ciliated.

Nephridial papillae from the 4th to the 26th segment inclusive.

Prominent dorsal papillae occur on all segments from the 2nd to the 20th inclusive, being median on the 2nd and on 15th to 20th segments, but in double submedian series on 3rd to 14th segments inclusive. Branchial filaments occur on every segment from 3rd to 24th inclusive, except on the 23rd, the last elytra bearing segment. On elytra-bearing segments the branchial filaments are disposed as follows: One arises from the antero-external and another one from the postero-external margin of elytophore. The former is unbranched; the latter is longer, and on typical somites divides into a short medial and a long lateral branch. On each parapodium there are 2 dorsal, 5 or 6 anterior, and 4 or 5 posterior filaments, the most external one in each case being bifid. Essentially the same arrangement obtains on cirri-bearing somites, but the filaments are here more numerous, longer and sometimes even trifid. There are usually 5

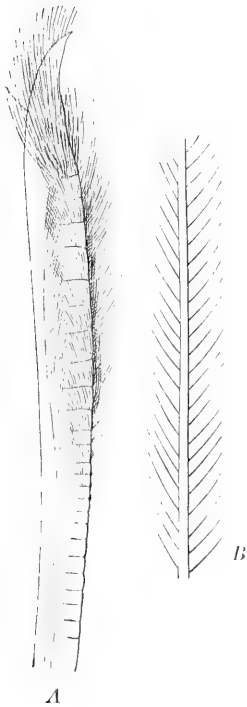
dorsal parapodial filaments, of which the one at the base of cirrus as well as the most external on the anterior and posterior faces of parapodia, are usually trifid.

Parapodia stout, with ventral ramus of a somewhat compressed, obliquely truncated, conical form; dorsal ramus represented by a rather prominent short tubercle on the anterior dorsal face of parapodium near the base. Dorsal cirri very long, their tip reaching quite beyond the setae line; of exactly the same shape and colour as tentacular cirri, but with a prominent bilobed glandular swelling at base of each.

Dorsal bristles very numerous, delicate, capillary, with fine but distinct processes of a length 3 to 4 times the diameter of the stem. Ventral bristles slightly curved, with the tip smooth and strongly hooked, bearded toward the end.

Elytra in 12 pairs borne on segments 2, 4, 5, 7 and so forth, on every alternate segment to the 23rd inclusive. They are large, generally bean-shaped, strongly imbricate and decussate.

Cilia form a strong marginal fringe on more than $\frac{3}{4}$ the circumference of elytra, only the covered anterior portion being free of them. Papillae cover the entire upper surface of elytra.



A. Middle ventral bristle of *Polynoë chitoniformis*. 130/1.
B. Portion of a dorsal bristle of same. 586/1. [After J. P. Moore].

Habitat: — Sagami Bay, 63 fathoms (“Albatross”); Totomi Sea, 49 fathoms (“Albatross”).

Polynoë branchifera (Moore).

1903. *Lepidonotus branchiferus*, Moore. Pros. Acad. Nat. Sc. Philad. Vol. LV, p. 409; pl. xxiii, figs. 7-9.

The main characters of this species may be summarized as follows :

Body short, broad, elliptical, somewhat depressed, measuring 26.5 mm. in length, 14 mm. between tips of bristles, 11 mm. between lateral margins of elytra. Number of segments 26.

Prostomium decidedly wider than long, its lateral margin with prominent preocular protuberances, making this region the broadest part of body; the anterior pair of eyes much larger and more prominent than the posterior. Median tentacle with stout basal piece slightly shorter than prostomium, style about 4 times the length of prostomium and with a subterminal enlargement and a short terminal filament. Lateral tentacles with ceratophores less than $\frac{1}{2}$ the length of that of median tentacle, continuous with frontal processes of prostomium. Subtentacles with very broad, widely separated base, fully one half of which projects beyond the sides of prostomium.

Dorsal tentacular cirrus similar in form to the median tentacle, but with a longer filament and a slightly shorter style.

Nephridial papillae visible so far forward as the 4th segment, but the first three are very small, the others being exactly as in *P. chitoniformis*. Dorsal tubercles likewise as in that species.

Branchiae arranged in the same manner as in *P. chitoniformis*, but are larger and more conspicuous though simpler in structure and less in number. All branchiae rather long and slender; totally

unbranched. None on the dorsum of parapodium.

Both dorsal and ventral bristles similar in their arrangement to those of *P. chitoniformis*, leaving the entire bearded parts of ventral bristles exposed when seen from above; each bristle slender, softer and more densely provided with longer lateral processes. The latter are somewhat stouter, with a less number of hair rows.

Elytra resemble those of the species in comparison in their number, arrangement, form and even in the character of their papillae and cilia, the chief difference lying in the larger size of the granules and the strong tendency of the papillae to become spinous.

Habitat :—Sagami Bay, 31—43 fathoms (“Albatross”).



A. Middle ventral bristle of *Polynoë branchifera*. 130/1.
B. A portion from the middle of a dorsal bristle of same. 586/1. [After J. P. Moore].

Polynoë caelora (Moore).

1903. *Lepidonotus caelorus*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 412, pl. xxiii, fig. 12.

This is another species of which I have as yet failed to secure specimens. The characters of this species as given by MOORE, may be briefly stated as follows:

Body short and compact, but much more slender than either of the two foregoing species. The largest specimen was 25 mm. long and 8 mm. wide as measured transversely from tip to tip of

bristles. Number of segments 26. Ventral surface smooth, with nephridial papillae in segments 8-25.

Prostomium slightly wider than long, though the continuation of the peaks into the bases of lateral tentacles gives it a somewhat elongate appearance. Posterior pair of eyes near the hind end of prostomial lateral surface; each of them deep black, circular. Anterior pair of eyes larger, elliptical or crescentic, black, situated on the widest part of prostomium. Total length of median tentacle about 5 times that of prostomium, $\frac{1}{6}$ of the length being made up by the basal piece and $\frac{5}{12}$ of same by the filamentous tip; style with a slight subterminal enlargement. Lateral tentacles vary considerably in length, but are longer and decidedly more slender, and the filiform tip longer than the median; subterminal enlargement scarcely developed. Subtentacles about 3 times the length of prostomium, thickened basally, tapering toward the end, which bears a very short terminal filament.

In typical parapodium (10th), the ventral ramus is large, nearly truncate or slightly angulate at the point where the deep brown aciculum protrudes; ventral margin horizontal; dorsal margin sloping with a slight curve to the elytophore. The dorsal ramus a mere lobe on the antero-dorsal face of ventral ramus, supported by a slender aciculum.

Dorsal bristles forming a large diverging tuft, but their tip scarcely extending beyond the end of ventral ramus, of a pale hay colour, capillary, bipinnate, with alternating lateral processes. Ventral bristles arranged in 3 supra-acicular and 5 subacicular horizontal rows, amber-coloured, relatively slender, with unusually long and smooth tip, which, with exception of the dorsalmost bristle, exceeds the spinous portion in length; 4 transverse rows of spikes on the ventralmost bristle, 9 on the dorsalmost.

Elytra in 12 pairs borne on segments 2, 3, 4, 6, 8, 10, 12, 14, 16, 18, 21 and 24. They are strongly imbricated, membranous but tough, firmly attached. They are generally of an elongate pyriform shape, posteriorly more ovate, attached at a point behind the middle; with exception of a narrow smooth area at the anterior end, the entire dorsal surface is thickly beset with papillae of various configuration, viz., those of a conical shape, those of a similar shape but with a few jagged points on apex, those of a somewhat club-like shape, and those of a globular shape. A fringe of long and strong cilia lines the posterior external margin of typical elytra, and nearly encircles the first elytron; longest cilia with a length equal to about $\frac{1}{6}$ or $\frac{1}{7}$ the elytron.



Middle ventral bristle
of *P. caelora* 332/1.
[After J. P. Moore].

Habitat:—Sagami Bay, 153 fathoms; Suruga Bay, 63—75 fathoms (“Albatross”).

Polynoë pleiopsis Marenzeller.

Pl. XII, figs. 12—14.

1879. *Polynoë pleiopsis*, Marenzeller. Südjav. Annel. p. 6.

The body, with 30 parapodiated segments, measures about 30 mm. in length and 5 mm. in breadth excluding the bristles, and tapers toward both anterior and posterior ends.

Colour of body grayish yellow, with 4 whitish elevated lines on the dorsum of segments.

Prostomium as long as broad, with a median shallow groove

and with somewhat convex lateral margins. Ceratophores of lateral tentacles a little longer than half the length of prostomium proper, but a little shorter than the broad massive ceratophore of median tentacle. Anterior eyes placed in the middle of the lateral margin of prostomium; smaller posterior eyes near the posterior border of same and nearer to the median line than the anterior ones. Median tentacle a little longer than twice the length of prostomium, and like the lateral ones provided with a black subterminal bulb and a terminal filament. Lateral tentacles longer than prostomium or half the length of median tentacle. Subtentacles thick, densely covered with conical papillae, not so long as the median tentacle, but twice as long as prostomium.

Dorsal tentacular cirri longer than lateral tentacles, but shorter than the median; similar in colour and structure to the tentacles. Tentacles, tentacular cirri and dorsal cirri are all entirely smooth.

Dorsal cirrus with the tip extending a little beyond that of bristles; ventral cirrus reaching to about the base of ventral bundle of bristles.

Dorsal bristles light yellowish, in length equal to about $\frac{1}{4}$ that of ventral bristles, tapering gradually from base to tip, finely serrated. Ventral bristles dark yellow, about 17 in number, with 7—10 series of spikes.

Nephridial papillae may be found from the 8th segment.

Elytra in 15 pairs borne on segments 2, 4, 5, 7 23, 25, 27, 29; entirely covering the dorsum. They are roundish in the anterior segments, oval more posteriorly, and finally kidney-shaped. Their dorsal surface appears granular; the anterior covered parts as well as the inner margin hyaline; colour of the remaining parts grayish with numerous patches of dark pigments,

with a deep black spot on the inner side of the whitish scar at the attachment to clytrophore. Outer and posterior margins with numerous long filiform papillae. The papillae on the upper surface are of three kinds; the first and the smallest kind is conical and about as high as broad; the second, found along the posterior border of clytron, is long and cylindrical with numerous large spines; the third consists of very large forms densely covered with very small spines, but there are several intermediate forms between the second and the third kind.

Habitat:—Yenoshima (Marenzeller); Sagami Bay (!).

Polynoë vexillaria (Moore).

Pl. I, fig. 2; Pl. III, figs. 12—14.

1903. *Lepidonotus* (*Hylosynda*) *vexillarius*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 415.

A large specimen, consisting of 37 segments, of which 35 are setigerous, measures 42.0 mm. in length, 4.5 mm. in maximum breadth of body at about the 10th segment, 7.5 mm. including the parapodia and 10.0 mm. between tips of bristles.

Frostomium slightly wider than long. Eyes circular; anterior pair larger than the posterior, situated close to lateral margins at widest part of prostomium; posterior eyes on postero-lateral curvature of same.

Ceratophore of median tentacle about $\frac{2}{3}$ as long as prostomium, white with a very conspicuous, circular, light-brown spot nearly covering the dorsum of the basal half; style scarcely 3 times as long as prostomium, with a subterminal bulb and a delicate terminal filament which makes up distal $\frac{1}{5}$ of the entire length; dark-brownish at base, distally gradually fading into

white, with a deep brown, sharply defined ring on the basal half of subterminal bulb, the remaining half of it and the terminal filament being white.

Lateral tentacular ceratophore only $\frac{2}{3}$ as long and a little more than $\frac{1}{2}$ as thick as median ceratophore; style twice the length of prostomium, the terminal filament making up nearly $\frac{1}{2}$ of the length; ceratophore dark brown, contrasting strongly with the colourless prostomium, with a very narrow white terminal ring; styles coloured as that of median tentacle. Subtentacles reach to base of terminal filament of median tentacle. their bases broad, mostly concealed above by tentacular ceratophores, tapering rapidly and ending in a short filament; pale brown throughout.

Tentacular cirri with styles similar to those of median tentacle in form and colour, but with longer filament; the dorsal exceeds the ventral by the length of its filament and equals the median tentacle in length.

Body smooth. Nephridial papillae commence to occur from the 8th segment in full grown specimens. The parapodium of 2nd segment is, as usual, shorter and its ventral cirrus longer than that of the others, but is peculiar in the fact that it is widely separated from the 3rd and projects forward on sides of mouth.

Typical parapodium moderately developed, with short, thick, obtuse ventral ramus and fairly well-developed dorsal ramus; ventral aciculum especially stout, the ventral ramus slightly angulated at the point of its emergence. Dorsal cirri with slight subterminal enlargement and delicate terminal filament; each dorsal cirrus marked at about the middle with a blackish brown ring, so long as to reach just beyond tip of ventral bristles. Toward the posterior end of body they become more slender and lose the subterminal enlargement; the

last three cirri diminish rapidly in length, and are carried horizontally, behind, together with the pair of anal cirri, which, though the largest of all, are otherwise similarly formed and have a basal brown ring in addition to the middle one.

Elytra in 18 pairs, borne on segments 2, 4, 5, 7, 25, 27, 28, 30, 31, 33; the point of attachment lies a little caudad of the middle of the long axis and somewhat toward the antero-external border. A dense fringe of cilia extends for over $\frac{1}{2}$ the lateral margin of each elytron, principally along that part which projects freely on the sides; entire dorsal surface of elytron thickly covered with small angulated or prismatic papillae, which are very densely aggregated in a narrow zone contiguous to the ciliated margin of elytron.

Dorsal bristles colourless, in two groups; the anterior group of about 6, very short and stout bristles with short smooth tip and strongly serrated convex margin (Pl. III, fig. 12); the posterior group more ventrally situated, consisting of more numerous, relatively slender, pointed, straight or slightly curved, pinnate bristles about 4 times longer, and with short fine processes (fig. 13). Ventral bristles (fig. 14) about 25 in number, stout, slightly bent, the simple smooth terminal portion nearly as long as the serrated portion; teeth of the terminal row very large and prominent, followed by 5—8 rows of smaller ones diminishing in size toward the base.

Proboscis equal in length to the eight anteriormost segments taken together, provided with 9 papillae on each lip.

Habitat:—Jogashima near Misaki, 5—6 fathoms (!); Choshi in Prov. Shimosa (!); Ariaké Bay in Prov. Hyuga (Prof. K. MITSUKURI); Azamushi at the head of Aomori Gulf (!); and Totomi Sea, 34 fathoms ("Albatross").

Remarks: I have obtained this species in abundance between tide-marks and also in depths down to about 6 fathoms at Misaki and vicinity.

The breeding season extends from March to April in Misaki. In mature females the colour of body approaches deep greenish black, while in males it is generally reddish brown. The dorsum of the body is marked with a brown spot on every segment, but sometimes these spots begin to fade away from about the 13th segment posteriorly. The colour in living specimens obtained in Aomori Gulf tends to a yellowish brown.

Polynoë semierma Moore.

1903. *Polynoë semierma*, Moore. Proc. Acad. Nat. Sc. Philad. Vol LV. p. 402, Pl. xxiii, fig. 2.

This species was described by J. P. MOORE from a specimen with imperfectly preserved prostomium and with all appendages lost except one palpus (subtentacle). I have not obtained a specimen that could be identified with this species, so that I extract the following characters from MOORE'S description.

Left palpus 4 times as long as width of prostomium, slender, gradually tapering. Eyes very small, circular; the anterior situated laterally in about middle of the lateral side of prostomium; the posterior on dorsal side near posterior margin of prostomium. Protruded proboscis with jaws as usual; papillae on it not preserved.

Parapodia long and slender; ventral ramus conical, terminally divided into pre-anal post-setal lobes, the former larger than the latter; both prolonged dorsally; ventral surface of the ramus studded with short-stalked, large, spherical papillae. Dorsal ramus

a small slender process. Dorsal cirri with small ceratophore and long slender style which anteriorly reaches considerably beyond, but posteriorly fall short of, tip of bristles. Ventral cirri short, less than $\frac{1}{5}$ the dorsal in length.

Elytra in 25 pairs; borne on segments 2, 4, 5, 7, 21, 23, 26, 29, 32, 34 and after that on every third segment to segment 61; small, leaving a large part of dorsum exposed, with central attachment, quite smooth; mesial half reddish brown, lateral half unpigmented.



Middle ventral bristle
of *P. semierma*. 332/1.
[After J. P. Moore].

Without dorsal bristles. Ventral bristles of the dorsalmost row or two with shaft scarcely half as thick as other ventral bristles, their ends much prolonged and provided with transverse rows of fine hairs quite to the simple tip. Other ventral bristles of usual form; distal ones with simple tip and as many as 14 combs; middle and ventral ones with a more or less prominent accessory tooth at tip; ventralmost ones with shorter enlarged ends, with as few as 8 combs.

Habitat:—Sagami Bay, 153 fathoms (“Albatross”).

Polynoë microsetosa n. sp.

Pl. IV, figs. 6—10.

This is a long, slender species. The single specimen on hand measures as follows: total length 41 mm.; maximum breadth of body, as measured on the ventral side of the 15th segment, 3 mm.;

width between ends of parapodia of the same segment, 4.5 mm.; same between ends of lateral bristles of ditto, 6 mm.

Prostomium (Pl. IV, fig. 6) as broad as long, the maximum breadth about equal to the distance between its posterior border and anterior end of lateral tentacular ceratophore. Eyes black, round; anterior pair on lateral prostomial prominences; posterior pair smaller, on postero-lateral borders of prostomium. Median tentacle with ceratophore longer than that of lateral tentacles; its style about $2\frac{1}{2}$ times as long as the greatest breadth of prostomium; the subterminal bulb and the slender terminal filament together make up nearly $\frac{2}{3}$ of the entire length of the style. Lateral tentacle short, with ceratophore directly continuous with prostomium; its style reaching with tip to base of the subterminal bulb of median tentacle. Both tentacles smooth, of a brownish general colour, deepest at base of the subterminal bulb which for the rest is colourless; a dark brownish ring around base of the terminal filament of median tentacle.

Subtentacles long and slender, gradually tapering from base distally; with a short terminal filament, which reaches nearly to tip of median tentacle.

Tentacular cirri similar in form and colour to tentacles; dorsal tentacular cirri nearly as long as median tentacle; ventral tentacular cirri shorter.

Body consists of 66 segments, exclusive of pygidium; smooth on both dorsal and ventral surfaces. Nephridial papillae commence to occur from the 8th segment and continue to occur down to the 62nd segment. Ventral surface of body of a light pinkish colour anteriorly, with faint metallic iridescence; posteriorly of a pale colour. Dorsum light brownish anteriorly and pale posteriorly.

Elytra in 37 pairs borne on segments 2, 4, 5, 7 29, 30,

32, 34, 44, 45, 46, 48, 50, 51, 53, 54, 56, 57, 58, 60, 62, 63, 64; all of a more or less elliptical shape. In the anterior parts they imbricate so as to cover the dorsum entirely; in the middle parts they leave on the latter rhomboidal spaces bare between them; and in the posterior parts they leave a median longitudinal streak continuously uncovered. Dorsal surface as well as margin of elytra quite smooth; the former mottled with brown (fig. 7); the attachment indicated by a small elliptical white spot, quite laterally situated.

Typical parapodium (fig. 8) long; dorsal ramus represented by a small conical papilla with an aciculum, provided with one (rarely two) minute and sharply pointed bristle with 12 rows of subterminal spikes (fig. 9). Ventral ramus somewhat conical, slanting ventrally; its end divided into pro- and post-setal lobes, of which the former is longer than the latter. Ventral bristles (fig. 10) about 10 in number, with smooth, comparatively long terminal portion, and with 2 accessory spurs in addition to 9 combs.

Dorsal cirrus with distinct cirriphore, extending beyond tip of bristles; the style gradually tapering distally to subterminal bulb, the basal half of which is brown, and which again tapers into terminal filament. Brown pigment of dorsal cirri becomes lighter and lighter posteriorly on body, finally to become completely lost.

Ventral cirrus with short cirriphore, extending slightly beyond ventral base of ventral bristles. The first ventral cirrus is peculiar in that it is directed straight forward along side of mouth and is of the same form and colour as lateral tentacles, though shorter.

Habitat :—Misaki (!).

Polynoë longissima n. sp.

Pl. I, fig. 1 ; Pl. IV, figs. 1—5.

Body extremely elongate, measuring 93 mm. in length, 3 mm. in maximum breadth on the ventral surface of 15th segment and 7 mm. between ends of parapodia.

Prostomium (Pl. IV, fig. 1) boldly hexagonal, slightly wider than long, with one side forming the posterior border and with two opposite lateral corners forming prominences on which are situated the anterior eyes. The posterior eyes are smaller and are situated near the postero-lateral corners. Both pairs of eyes black and circular. Ceratophore of median tentacle is slightly larger than that of lateral tentacle; the style with a slight basal enlargement, beyond which it gradually tapers, and again enlarges to form a subterminal bulb, which bears a delicate terminal filament of about $\frac{1}{6}$ the length of the entire style; colour of the style in living specimens pink white with a light brown ring on the distal half of the subterminal bulb; the ceratophore also with brownish pigment.

Lateral tentacles slightly shorter than the median; their styles without basal enlargement; the ceratophores and styles same in colour as the median tentacle. Subtentacles extend a little beyond terminal filament of the median tentacle, gradually broadening for the first $\frac{1}{4}$ of their length and then gradually tapering to the end; colour light yellowish with a light brownish subterminal ring.

Tentacular cirri with styles similar to those of lateral tentacles in form and colour, but with longer styles. Dorsal tentacular cirrus slightly exceeds the ventral in length.

There exist 129 somites, exclusive of the pygidium. Body

smooth on both dorsal and ventral surfaces ; neural depression well marked, being slightly wider in about the anterior $\frac{1}{5}$ than in the following $\frac{4}{5}$ of its entire length. Nephridial apertures commence to appear from 18th segment, their positions being indicated by small light brownish spots ; from 34th segment short but distinct white nephridial papillae are observed, increasing in their length posteriorly, at the same time the pigment spots at their base becoming dark brownish.

The ventral surface is light-pinkish anteriorly, and light-brownish posteriorly, with deep brown pigments at bases of nephridial papillae as already noted. The dorsum brownish, with a lighter coloured band along the posterior margin of every segment ; in the middle of that band a dark brown spot.

Elytra in 46 pairs occurring on segments 2, 4, 5, 7, and then on alternate segments down to 23, and then again on segments 26, 29, 32 and 34, and after that on every third segment down to segment 124. They are small, leaving a large portion of the back exposed ; delicate, translucent, nearly circular ; with nearly central attachment, which appears as a white round area ; quite destitute of any papillae or hairs ; of a brown colour, lighter laterally and deeper mesiad.

Typical parapodium (fig. 2) long, its dorsal ramus represented by a conical papilla with tip of superior aciculum in it. There exists no trace of dorsal bristles. The ventral ramus is somewhat conical, its distal end divided into pro- and post-setal lobes, the former slightly longer than the latter. Dorsal cirrus borne on a comparatively large ceratophore of a similar structure as tentacular cirri, its tip extending beyond that of ventral bristles. Ventral cirrus short, less than $\frac{1}{4}$ the length of the dorsal, thick basally and slender terminally, with a short ceratophore.

Ventral bristles in 3 groups: The superior group consisting of about 3 setose bristles (fig. 3), which project beyond the others, each provided with numerous short combs. The middle group, consisting of about 24 stout bristles (fig. 4), each with bifurcate tip and an accessory spur in addition to 7 combs. The inferior group consists of about 5 bristles (fig. 5) smaller than those of the middle group, each with rounded tip, a very small spur, and relatively long combs.

Habitat:—Nagai, Prov. Sagami, in the tubes of *Thelepus japonicus* Marenz. (!); Misaki (!); Choshi in Prov. Shimosa (!); Kanazawa in Prov. Musashi (!); Yenoura in Prov. Suruga (!); Tomo Harbour, Prov. Bingo (!); Sanbongi in Prov. Sanuki (Mr. K. SATO); Sakurajima in Prov. Satsuma (Prof. MITSUKURI).

Polynoë ocellata McIntosh.

1885. *Polynoë ocellata*, McIntosh. "Challenger" Annel. p. 126. pl. xii, fig. 3; pl. xiii_A, figs. 18, 19.

This form was dredged off Kobé by the "Challenger," from a depth of 50 fathoms. Its main characters, extracted from McIntosh's description, are as follows:—

Body elongate, reaching 60 mm. in length, with breadth (inclusive of bristles) of about 2.5 mm. Dorsum of a dull yellowish colour, tinted with olive. Ventrally, the anterior fifth pale, thereafter a blackish pigment-spot occurs at base of each parapodium.

Prostomium wider than long; a large round eye on each side a short distance in front of the lateral prominence, and a smaller one at the posterior border of prostomium. Median tentacle not so long as subtentacles, tapering from base to subterminal

bulb, ending with terminal filament of a considerable length. Lateral tentacles shorter and more slender than the median, and the subterminal bulb less prominent than in the latter. Subtentacles fairly developed, gradually tapering toward the tip, which abruptly becomes filiform. Tentacular cirri resemble the tentacles.

Dorsal cirri with a distinct subterminal bulb in the anterior segments, but soon lose this, and the organs assume a simple filiform character. Ventral cirri short and subulate, the tip extending a little beyond base of bristles. Nephridial papilla well developed, its base indicated by a pigment-speck in the greater part of body.

The number of elytra is upwards of 50 pairs. In the typical forms there is a large ovoid, blackish, or dark olive pigment-spot on the inner side of the surface of attachment; the latter is characterized by the presence of a very distinct ring of the same colour. Moreover, a series of very distinct whitish specks occur all over the greater part of the surface. There are a very few, minute, clavate papillae on the outer part of elytra. Margin of elytra perfectly smooth.



A. Tip of a strong bristles from the 50th parapodium of *P. ocellata*. 800/1.
 B. Tip of an average ventral bristle from the 20th parapodium of same. 800/1.
 [After W. C. McIntosh.]

The central region of the dorsum is left uncovered throughout the greater part of its extent.

In about the 20th parapodium the dorsal ramus is represented by a conical papilla, containing an aciculum; dorsal bristles absent. The ventral ramus is pointed superiorly and obliquely slants off inferiorly, containing a large aciculum. Bristles in two dense groups; the dorsal or smaller group consisting of slender forms with elongated spinous tip, ending in a slightly hooked point; the ventral group consists of bristles, the tip of which shows a short terminal hook with a spur beneath and a series of relatively long spinous rows (Woodcut B.).

In the 50th parapodium the general structure remains the same; and between the two groups of bristles in the ventral ramus, there occur two especially strong bristles (Woodcut A), which have shafts 4 or 5 times thicker than an ordinary bristle.

Habitat:—Off Kobé, Japan, 50 fathoms (“Challenger”).

Polynoë carinata Moore.

1903. *Hylosynda carinata*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 417, pl. xxiii, figs. 16, 17.

J. P. MOORE'S description of this species is based on a fragmentary specimen consisting of prostomium and 26 anterior segments. Length of the fragment 26 mm. and breadth including the bristles at 10th segment 10.5 mm. The principal characters, as embodied in his description, are as follows:—

Prostomium very short, twice as wide as long; anterior margin with a deep median sulcus, on each side of which the broadly rounded prostomial lobes pass directly into base of lateral tentacles; lateral margin strongly convex; posterior margin nearly straight.

Eye of anterior pair at about middle of lateral faces; that of posterior pair, about $\frac{1}{2}$ the diameter of the anterior, on the postero-lateral curvature of prostomium. Median tentacular ceratophore about equal in length to prostomium; style about $4\frac{1}{2}$ times the length of prostomium, with slightly enlarged subterminal bulb and short terminal filament. Colour of median tentacle coffee brown, except terminal filament and distal parts of subterminal bulb which are white. Ceratophore of lateral tentacle $\frac{2}{3}$ the length of median



A. Dorsal bristle of *P. curvirostris*, 332/1.

B. Middle ventral bristle of same 332/1.

[After J. P. Moore.]

ceratophore, of same shape and colour; style similar to median style but more slender. Subtentacle a trifle longer than lateral tentacle, its base stout, its terminal half rather slender with very short terminal filament. Dorsal ramus of parapodia small but prominent, bearing a few setae. Dorsal cirrus very prominent, with cirriphore erect and curved laterally; like tentacles in form and colour. Ventral cirrus arises from low cirriphore about opposite dorsal ramus.

Elytra of anterior position delicate, membranous, with smooth and non-ciliated margin

Dorsal bristles (3 or 4 in number) slightly curved and tapering, but not sharp-pointed; the outer with transverse rows of serrulae (A). Ventral bristles (B) of pale amber-colour; tip bifid, the longer terminal process curved; ventral spur straight, large and continuous with distalmost comb; transverse combs 12-17.

Habitat :—Suruga Bay, 60–70 fathoms (“ Albatross ”).

Polynoë magnacornuta Moore.

1903. *Hylosynda magnacornuta* Moore. Proc. Acad. Nat. Sc. Philad.
Vol. LV, p. 419, pl. xxiii, fig. 18.

J. P. MOORE'S type is the only specimen as yet obtained of this species. It consisted of prostomium and 26 anterior segments. I take the following from his description :

Prostomium about $1\frac{1}{2}$ times as long as broad ; both anterior margins divided by a median dorsal groove, but this disappears on vertex ; anterior lobes broadly rounded, continuous with bases of lateral tentacles. Eyes widely separated, small, black ; those of anterior pair lateral in position and nearer anterior than posterior prostomial margin ; those of posterior pair smaller, quite dorsal in position, separated from prostomial posterior border by about twice their diameter and from each other by about 7 times their diameter. Tentacular styles all lost, their ceratophores small ; lateral tentacle arises without definite demarcation from anterior prostomial lobes ; base of all tentacles deep chocolate brown in sharp contrast to colourless prostomium. Subtentacles very large, about 6 times the length of prostomium and in their thickest part more than $\frac{1}{2}$ the width of same ; their base constricted at the point of origin beneath prostomium ; gradually thickening in the first $\frac{1}{4}$ of their length, after that tapering to the long slender tip.

Tentacular cirri lost.

Nephridial papillae begin on 5th segment.

Parapodia long, slender, tapering with a gentle curve to the slightly bilobed tip. Ventral ramus divided by a vertical cleft

into two plates; anterior plate the larger, containing the outer end of a rather strongly curved aciculum. Dorsal ramus rudimentary, nipple-like, without bristles but with a slender aciculum. Ventral bristles perfectly colourless, delicate; their end somewhat abruptly enlarged, slightly curved and tapering to bifid tip, of which the last terminal process is the larger and is slightly hooked; proximad from the 2nd terminal process there are 9—14 transverse combs, the teeth of which are distally minute but proximally grow in length, exceeding the width of the bristle.

Habitat:—Sagami Bay, 153 fathoms (“Albatross”).

Genus *Polynoëlla* McIntosh.

Body short, of a somewhat elliptical shape, massive though soft. Distinguished by large smooth elytra, by short tentacles and subtentacles, by the large size and paucity of ventral bristles, and by the absence of dorsal bristles.

Middle ventral
bristle of *P. magna-*
cornuta 110/1.
[After J. P. Moore].

Polynoëlla levisetosa McIntosh.

1885. *Polynoëlla levisetosa*, McIntosh. “Challenger” Annel. p. 128, Pl. XI, fig. 4; Pl. XV, fig. 3; Pl. XVI, fig. 4; Pl. XVIII, fig. 6; Pl. XIX, fig. 8; Pl. XXI, fig. 7; Pl. XXII, fig. 6.

In the absence of my own observations on the species I make an extract from the original describer's description.

Body (including protruded proboscis) about 18 mm. in length, and 11 mm. in breadth including parapodia and setae.

Prostomium wider than long, with 4 eyes, the smaller pair

lying at the posterior border and nearer each other than the anterior pair, each of which occupies the lateral prominence at about the middle of prostomium. A well-marked median groove divides the broad prostomium into two lateral halves. Median tentacle small, subulate; lateral tentacles somewhat shorter, but the ceratophore slightly longer than that of the median tentacle. Subtentacles small, situated inferiorly, and external to lateral tentacle, shorter than the median tentacle, smooth, nearly cylindrical except at the blunt conical extremity, which has a few brownish pigment just above the distal narrowing.

Tentacular and dorsal cirri simple, smooth, filiform. Cirriphore or dorsal cirri greatly enlarged, forming a tumid mass. Ventral cirri very short, subulate, not reaching tip of parapodium.

Proboscis with 9 papillæ on each lip. Two elongate papillæ on each side at about the middle of protruded proboscis. Jaws amber-coloured, slender, sharp.

Elytra in 12 pairs, pale, rather thick, friable, without any cilia or processes, beautifully though not regularly reticulated, the margin alone granular.

Parapodia in about 23 pairs, their fleshy part largely developed. Dorsal ramus a soft, conical and minutely granular elevation, wholly devoid of bristles.

Ventral ramus much developed, forming a long, slightly tapering process with bifid tip; bearing one or two long, stiff, light amber-coloured bristles.

Tip of most bristles slightly bent from injury, thence proximally the bristle gradually thickens to



Ventral bristle of
Polynoëlla levisetosa
[After McIntosh.]
90/1.

the ill-defined shoulder, after which the shaft is cylindrical, lacking all processes.

Habitat:—A single specimen trawled at station 235, "south of Yedo in Japan," 565 fathoms ("Challenger").

Genus *Harmothoë* Kinberg.

Prostomium bilobed, prolonged in front into two acuminate or rounded peaks. Lateral tentacles inserted below the level of the median. Both rami of parapodia prolonged into a finger-like process beyond the insertion of bristles. Dorsal bristles as strong as or stronger than ventral bristles, never very short and often longer than the latter. Both dorsal and ventral bristles serrated for a considerable part of their exposed length. Body never very long; segments not exceeding forty in number; elytra in 12–16 pairs.

Harmothoë imbricata (L.)

Pl. V, figs. 1—4; Pl. VI, fig. 1.

1766. *Aphrodita lepidota*, Pallas. *Miscell. Zool.*, p. 94. Tab. 7, fig. 15; Tab. 8, f. 1, 2.
- „ *Aphrodita imbricata*, L. *Syst. Nat.*, twelfth edit., Vol. i, p. 1084.
1768. *Aphrodita violacea*, Ström. *Kongel. Norsk. Vidensk. Selskabs. Skrifter*. Del iv, p. 366.
1776. *Aphrodita cirrata*, O. F. Müll. *Prod. Zool. Dan.*, p. 218, n. 2644.
- „ „ *violacea*, idem. *Ibid.*, p. 218, n. 2645.
- „ „ *lepidota*, idem. *Ibid.*, p. 218, n. 2643.
- „ *Die flache Aphrodita*, Martini. *Allgem. Geschichte der Natur*, iii, p. 132.
- „ *Aphrodita imbricata* (Ziegelrücken Aphrodite), Martini. *Ibid.*, iii, p. 151.
1780. *Aphrodita violacea*, Fabricius, O. *Fauna Grönl.*, p. 308, n. 290, Tab. 1, fig. 7.

1792. *Aphrodita violacea*, Brugnière. *Encycl. Méthod.*, vers. i, p. 89.
1800. Die flache Aphrodite, O. F. Müll. *Naturges. einiger Würm-Arten*, p. 180, Tab. 14, figs. 1-5.
1820. *Polynoë cirrata*, Savigny. *Syst. des Annel.*, 26.
1828. *Eumolpe cirrata*, De Blainville. *Dict. Sc. Nat.*, vol. lvii, p. 459.
1830. *Aphrodita cirrata*, Bosc. *Hist. des Vers.*, 169, 2nd edit., 183.
1834. *Polynoë cirrata*, Aud. et Edwards. *Annél.*, p. 86.
1840. „ „ Johnston. *Ann. Nat. Hist.*, ii, p. 434. Tab. 22, f. 2.
1843. *Lepidonotus cirratus*, Oersted. *Grönl., Ann. Dors.*, p. 14, f. 1, 5, 6, 11, 14, 15.
- „ *Lepidonotus cirratus*, idem. *Annel. Dan. Consp.*, p. 13, fig. 43.
- „ *Polynoë cirrata*, Rathke. *Fauna Norweg.*, 150.
1851. „ „ Maitland. *Fauna Belg.*, 214.
1853. *Aphrodita varians*, Dalyell. *Pow. Creat.*, ii, 168, pl. xxiv, f. 11, 12.
1854. *Polynoë cirrata*, Thompson. *Fauna, Irland*, 173.
1865. „ „ De Quatrefages. *Annel.*, i, p. 232.
- „ *Lepidonotus cirrosus*, idem. *Ibid.*, i, p. 261. (?)
- „ *Polynoë cirratus*, Johnston. *Cat. Brit. Mus.*, 114, pl. viii, fig. 2.
- „ *Harmothoë imbricata*, Malmgren. *Nord. Hafs.-Annul.*, p. 66. Tab. ix., fig. 8.
1867. *Harmothoë imbricata*, idem. *Ann. Polychæt. Spets.* p. 154. (sep. copy. p. 9.).
1871. *Harmothoë imbricata*, Ehlers. *Sitzb. phys.-med. Soc. Erlangen*, Heft 3, p. 77.
- „ *Harmothoë imbricata*, Sars. *Nyt. Mag. f. Naturvid.*, 19, p. 203.
- „ „ „ idem. *Bid. Christ. Fauna*, iii, p. 3.
- „ *Polynoë cirrata*, Möbins. *Jahresb. Com.*, 1871, p. 111.
1873. *Polynoë cirrata*, Kupffer. *Jahresb., Com.*, 1871, p. 150.
1874. „ „ Möbius. *Die Zweite deutsche Nordpolarfahrt*, 1869. p. 253.

1874. *Harmothoë imbricata*, Malmgren, Göteborgs Kongl. Vet. och Vitt. Samhallets Handl., Häftet 14, p. 74.
1875. *Harmothoë imbricata*, Ehlers. Annel. "Porcupine," 1869, op. cit., p. 32.
- „ *Harmothoë imbricata*, McIntosh. Invert. and Fishes, St., A., p. 116.
- „ *Polynoë cirrata*, Mobius. Jahresb. Com., 1872, p. 166.
1876. *Harmothoë imbricata*, McIntosh. Trans. Z. S., ix, p. 398.
1877. „ „ Hansen. Nyt. Mag. f. Naturvid., 24.
1878. „ „ Leuz. Jahresb. Com., 1874-6, Anhang., p. 12.
1879. *Harmothoë imbricata*, Marenzeller. Süd-japan. Annel. Denkschr. d. Kaiserl. Akad. Wiss. Wien, xli, p. 17, Tab. ii, f. 1. (sep. copy p. 9).
- „ *Harmothoë imbricata*, Tauber. Ann. Danic., 80.
- „ *Polynoë imbricata*, Théel. Kongl. sv. Vet. Akad. Handl., Bd. xvi, 3, p. 9.
1881. *Polynoë cirrata*, Horst. Nederland. Archiv. Zool., 1881, Suppl. Bd. i, p. 5.
- „ *Polynoë cirrata*, Felsener. Bull. Soc. Roy. Malacol. Belg., xiv. p. LXXXIX.
1883. *Harmothoë imbricata*, Levinsen. Nord. Annulat., 194.
- „ *Polynoë imbricata*, L. Wirén. Chætop. "Vega" Exped., etc., p. 389.
1884. *Polynoë cirrata*, Carns. Fauna Médit., i, 201.
- „ *Harmothoë imbricata*, Webster and Benedict. Ann. Mass., 701.
1886. „ „ Harvey Gibson. Verm. Liverp., 149.
1888. „ „ De St. Joseph. Ann. Sc. Nat. 1888, p. 161, pl. vii, f. 21.
1889. *Harmothoë imbricata*, Trauttsch. Jenaische Zeit. f. Nat., xxiv, p. 66, and Arch. f. Naturg. 55 Jahr, Bd. i, Heft 2, p. 136, pl. vii, f. 1.
1890. *Harmothoë imbricata*, Malaquin. Ann. Boulon., 21.

1891. *Polynoë* (*Harmothoë*) *imbricata*, Hornell. *Polychaet*, Liverpool Dist., p. 231, pl. xiii, f. 2.
1896. *Harmothoë imbricata*, Michaëlsen. *Polych. Fauna*, p. 11.
- „ *Polynoë* (*Harmothoë*) *imbricata*, Roule. *Camp. d. 'Caud.'* 443.
1897. *Harmothoë imbricata*, H. P. Johnson. *Pacific Annel.*, Califor. Acad. Sc., p. 181. pl. vii, f. 37.
1898. *Harmothoë imbricata*, Michaëlsen. *Grönl. Annel.*, p. 121.
1900. „ „ McIntosh. *Brit. Annel.*, pl. ii. p. 314.
1903. „ „ Moore. *Proc. Acad. Nat. Sc. Philad.*, vol. LV, p. 402.

Body elongate-ovate, posteriorly more distinctly narrowed than anteriorly. It measures 24 mm. in length and the breadth 4 mm. without, and 9 mm. with, parapodia and bristles. Number of body segments generally 39, exceptionally 1 or 2 less.

Prostomium (Pl. V, fig. 1) exhibits as usual two pairs of eyes; those of the anterior pair are situated laterally and under the anterior peaks, so that they are invisible from the dorsal side, while those of the posterior pair are situated near the posterolateral margin. Median tentacle is long, while the lateral ones are short and scarcely reach half the length of the former. Each tentacle, both median and lateral, consists of a basal region and of a terminal style, which exhibits a distinct swelling, the subterminal bulb, before terminating in the filiform end. The style is provided with sparsely distributed, clavate papillæ (Pl. V, fig. 2), except in the filiform end which is smooth. Subtentacles are elongate and tapering, and are beset with rows of somewhat truncate clavate papillæ. Tentacular as well as dorsal cirri agree with the median tentacle in form, and are in possession of a considerable number of clavate papillæ. Dorsal tentacular cirri are about equal in length to the median tentacle, while the

ventral ones are somewhat shorter than the latter. Dorsal cirri extend laterally and somewhat posteriorly beyond tips of ventral bristles.

Elytra in 15 pairs borne on segments 2, 4, 5, 7..... 21, 23, 26, 29, 32. The anteriormost pair of elytra, which are of a rounded outline, are generally dull-white in colour, so that they stand in prominent contrast with the general dark colouration caused by irregular accumulations of pigments, thus giving to the animal a very bizarre appearance as if it had a pair of large dull-white eyes.

The remaining elytra are ovate-reniform or obliquely ovate in shape. Their posterior as well as lateral margins are fringed with fine papillae.

The dorsal ramus of parapodium is but feebly developed and bears a series of yellowish bristles (Pl. V, fig. 3) with rather distinct spinous rows and a well-marked smooth part at the free end. The ventral bristles (Pl. V, fig. 4) are light yellow in colour, with rows of long spikes and bifurcated terminal hooks. The ventral cirrus scarcely reaches in length to tip of ventral parapodial ramus. Nephridial papillae commence to occur on the 7th parapodium.

Proboscis long, reaching a length about equal to that of the anterior 10 setigerous segments taken together, and provided with 2 strong jaws and 9 papillae on each lip.

Habitat :—Misaki (!); Yenoshima in Prov. Suruga (!); Sagami Bay, 42 fathoms ("Golden Hind"); Totomi Sea, 65 fathoms and 12--13 fathoms ("Albatross"); Kanazawa in Prov. Musashi (!); Tatoku in Prov. Shima (!); Naruto in Prov. Awa (!); Sumoto in Prov. Awaji; Sakurajima in Prov. Satsuma (Prof. K. MITSUKURI); Shikanoshima in Prov. Chikuzen; Gulf of Miyazu in Prov. Tan-

go (!); Shiokubi in Prov. Oshima, Hokkaido (Mr. N. YANAGI); Tretia Padi, Chepissani and Lake Bousset in Sakhalin (Prof. I. IJIMA).

Remarks:—This species occurs all along the eastern and western coasts of Japan from Sakhalin to Kyushiu. I have found no marked difference in size according to the latitudes. Thus a southern example (from Kyushiu) measured 27 mm. in length and 4 mm. in breadth, while a northern example brought back by Prof. I. IJIMA from Tretia Padi (Sakhalin) measured 30 mm. and 4 mm. respectively. An example from the Gulf of Miyazu (Japan Sea) measured 20 mm. in length and 3 mm. in breadth. The largest specimen obtained near the Misaki Marine Laboratory was 27 mm. long and 4 mm. broad.

In the Gulf of Miyazu, where, as on the Japan Sea coast generally, the ebb and flow of tide is not considerable, the species can be collected from among algae or from stones brought up from a depth of a metre or two. In Misaki it occurs abundantly under stones and among the eel-grass, algae, etc., near the low water mark.

The species is very active and restless when disturbed, and when taken on hand, it wriggles about violently, shedding off the elytra and frequently even breaking up into fragments. It is a rather difficult matter to keep the worm alive in confinement. Under circumstances it swims making an undulatory motion with the body, but soon sinks to the bottom.

In the months of March and April are commonly met with individuals with masses of eggs under elytra. The eggs are of a slightly pinkish colour and are agglutinated together by a transparent mucous secretion, so that they do not readily fall off. In Pl. VI, fig. 1 is shown a female specimen which was obtained in

Misaki, on April 2nd, 1905, and was kept alive in a vessel for a few days. It carried a mass of embryos under the elytra, from the 8th posteriorly to the penultimate segment. On April 4th some of the embryos began to swim about freely in the vessel, leaving the shelter of the mother. At first the free-swimming embryos were in an early trochophore stage, exhibiting a weakly developed ring of cilia, but soon this developed into the characteristic state that enabled the larvae to swim about very actively.

Harmothoë yendoi n. sp.

Pl. V, figs. 5—8.

An unique specimen of this species was obtained by Mr. K. YENDO in July 1903, at Shimushu, Kurile Is. It was found on *Arthro bifidus* that was brought up from a depth of 4 fathoms.

On careful examination the specimen was found to differ from the foregoing species in some important characters, though there existed a general agreement in the features of bristles, in the peculiar position of anterior eyes, and in the relative lengths of tentacles and subtentacles.

Compared with typical *H. imbricata*, the prostomium (fig. 5) is more angular and the posterior pair of eyes placed at a more mesiad position. The basal portions of the median tentacle and of tentacular cirri are quite stout in proportion to their slender styles; the swellings or bulbs at the base of their terminal filiform portions are very slight; the ends of subtentacles are greatly attenuated and thus form filiform terminal pieces like those of the tentacles or tentacular cirri.

The dorsal cirrus is of a similar length as that of *H. im-*

bricata, but the pigment band at the base of the distal swelling, as also another faint band situated above that swelling, is black. The transition of the swelling to the terminal filament is abrupt, presenting an appearance as if there existed an articulation at the boundary (fig. 6).

The tentacles and cirri are all entirely smooth.

The dorsal (fig. 7) and ventral (fig. 8) bristles closely resemble those of *H. imbricata*.

The 15 pairs of elytra are all similarly coloured and destitute of marginal fringes.

Habitat :—Shimushu Is., one of the Kuriles, 4 fathoms (Mr. K. YENDO).

Harmothoë lamellifera (Marenz.).

Pl. V, figs. 9—11.

1879. Polynoë (? Lanilla) lamellifera, Marenzeller. Süd-jap. Annel., p. 7 ;
Tab. I, fig. 5.

Several examples of this species were obtained at different times in Misaki and vicinity.

The largest specimen in my hand measures 46 mm. in length, and 12 mm. in breadth including bristles and parapodia ; it consists of 40 segments. The smallest one, consisting of 39 segments, is 30 mm. long and 9 mm. wide.

On the posterior border of each segment, just at the base of each parapodium, there exists a small semicircular lamella directed postero-laterally. This lamella lies posterior and internal to the small ventral (or nephridial) papilla, and extends a little beyond the anterior margin of the succeeding segment.

The colour of body in living specimens is grayish yellow,

which colour changes in alcohol into a straw yellow or a slightly reddish yellow. In a specimen obtained from a muddy shore, the margin of elytra, the pear-shaped process upon them, and the tips of dorsal bristles are all tinted black.

Prostomium (fig. 9) roundly hexagonal, strongly arched, and divided into two lateral halves by a median furrow. Its length is about equal to the breadth. The anterior border is deeply notched by the insertion of the basal joint of the median tentacle. The anterior larger eyes are placed in the middle of lateral margins, and the posterior smaller eyes at a little distance from the posterior margin. Median tentacle nearly 3 times as long as prostomium; the lateral ones about as long as or a little longer than same. All these tentacles provided with round-tipped cylindrical papillae of a deep brownish colour. Subtentacles about 4 times the length of prostomium, and covered with very short papillae. The dorsal pair of tentacular cirri is about equal in length to the median tentacle, while the ventral pair is somewhat shorter than same. All tentacular cirri are papillated like the tentacles themselves. The basal piece of tentacular cirri has one or two bristles.

Parapodium somewhat longer than half the breadth of the segment to which it belongs; the dorsal ramus has, on its inferior border, a finger-like process, in which the aciculum is inserted; the ventral ramus has, on its superior border, a similar process, from which the bristles arise. Dorsal cirri long and slender, almost colourless, and papillated like the tentacles.

Elytra in 15 pairs, borne on segments 2, 4, 5, 7..... 23, 26, 29, 32. They are generally oval in shape, but the two anteriormost pairs are small and of a somewhat circular outline. They are as usual imbricated and cover the dorsal surface of the

body as well as the prostomium, leaving only a few posterior segments uncovered. The lateral and posterior half of elytra is beset with pear-shaped papillae of a dark colour. These papillae are distinctly observable with the naked eye; with the aid of the microscope one sees in addition numerous small conical papillae arranged in rows that run antero-posteriorly but diverge somewhat as they approach the posterior margin of elytron. The lateral and posterior margins of all elytra are provided with somewhat long and filiform papillae.

The dorsal ramus of parapodia bears a large bundle of strong bristles (fig. 10) of a brownish dark colour. The bristles of the ventral ramus are about 40 in number; they are all of a pale yellow colour. They are smallest in ventralmost position (fig. 11, a) and increase gradually in size dorsally (b); those in the upper part of the group are of a form with bifurcated tip (c), while a few in dorsalmost position are of a form with finely tapering end (d).

The first ventral cirrus is about equal in length to the median tentacle, while those of other parapodia are conical with finely tapering end and do not reach the tip of the ventral parapodial ramus they belong to.

Nephridial papillae are observed from the 6th or the 7th segment posteriorly.

Anal cirri long, being about equal in length to that of the posterior 11 segments taken together.

The breeding season of this species in Misaki extends from August to September.

Habitat :—Off Nagai, north of Misaki (!); Yenoshima; Misaki (!)

Harmothoë yokohamiensis (McIntosh).

1885. *Lagisca yokohamiensis*, McIntosh. "Challenger" Annel., p. 89, Pl. XIa, figs. 12, 13.

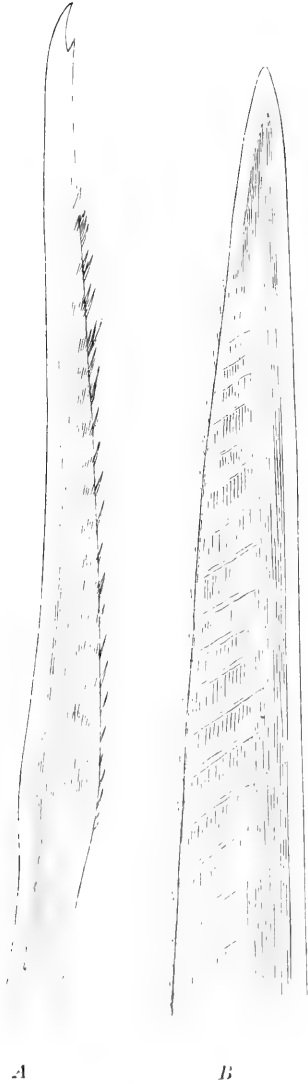
I have not been able to secure a specimen of this species.

Prof. McINTOSH'S description of the species, based on a dried specimen, may be summarised as follows:

Elytra and dorsum mottled all over with dark brownish pigment, the prostomium being especially dark. Tentacles as well as tentacular and dorsal cirri have numerous and somewhat long cilia, each with slightly bulbous tip. The elytra are studded all over with small spines, their posterior and outer borders showing numerous and rather long cilia.

Both dorsal and ventral bristles are of a pale straw yellow colour. Dorsal ramus of parapodium bears a series of bristles with a smooth, sharp point. The serrated rows are distinct, though the spines are not long.

Ventral bristles have bifid tip and well-marked spinous rows. The secondary process forms an acute angle with the long axis of the hook on the tip; the smooth portion be-



A. Dorsal bristle of *H. yokohamiensis*
350/1.
B. Ventral bristle of same. 210/1.
[After McIntosh.]

tween the latter and the commencement of the hispid rows is long.

According to McINTOSH, this species somewhat approaches *Harmothoë lamellifera*, but should differ from it in the absence of pear-shaped processes on elytra, which are also apparently less minutely spinous. Further, the dorsal bristles in *H. lamellifera* do not show so long a smooth region at the tip, and the secondary process or spur of the inferior series should show a different angle.

Habitat :—Dredged off Yokohama, Japan, in 5 to 50 fathoms (“Challenger”).

Harmothoë yedoensis (McIntosh).

Pl. XII, figs. 15—16.

1885. *Eunoa yedoensis*, McIntosh. “Challenger” Annel., p. 75, Pl. XV, fig. 4.

Body small and rather elongate, 13 mm. long and 3 mm. broad, comprising 39 setigerous segments.

Prostomium furnished with four very distinct eyes, two of which are placed wide apart at its posterior border, while those of the anterior pair are longer and are situated slightly in front of the lateral prominence. The latter are fully seen only from the side. Paired tentacles rather thick at base but tapering at end. Subtentacles short, with filiform tip. Dorsal cirri somewhat slender; their tip long and filiform. Ventral papilla a well-marked cylindrical process.

Elytra occur in 15 pairs on segments 2, 4, 5, 7 21, 23, 26, 29, 32. They are covered all over with numerous, rather distinct, nearly cylindrical papillae, and show on the posterior parts of their surface and along the edge a somewhat dense growth of cilia, longest and most abundant along the outer border. Toward the inner posterior border of elytra the papillae become shorter, more sparse and clavate in shape.

Dorsal bristles long and translucent, with a notably extended smooth section at tip (fig. 15); the serrated region beneath the smooth section comprises about 10 spiny rows.

Ventral bristles also translucent, with rather short and broad tip bent simply in a hook-like manner (fig. 16). The serration of the edge is fine.

Habitat:—Sagami Bay, about 313 fathoms (Mr. K. AOKI); “a little south of Yedo, Japan” (St. 232), 345 fathoms (“Challenger”).

Harmothoë holothuricola n. sp.

Pl. VI, figs, 2—7.

A single specimen discovered on the under surface of a Holothurian collected in the Uraga Channel, on September 28th, 1903, depth about 257 fathoms.

Body consisting of 39 segments, measures 27 mm. in length, 3.5 mm. in maximum breadth at about the 10th segment, and 9 mm. including the bristles. The general colour, in the alcoholic specimen, is light brownish, the bristles being yellowish brown.

Prostomium (fig. 2) broader than long, divided into two lateral halves by a median anterior notch; the anterior margin of each lobe broadly rounded; eyes in two pairs, black, crescent-like in outline; anterior eyes placed a little in front of the middle of the lateral border; posterior eyes close to the postero-lateral corner of prostomium.

Tentacular ceratophores, arising from below the anterior border of prostomium, are of a somewhat truncate conical form, the median being twice as long as the lateral. Median tentacular style long and slender, about $2\frac{1}{2}$ times as long as prostomium; and lateral tentacular styles slightly shorter than prostomium. Subtentacles

large, gradually tapering toward tip, $5\frac{1}{2}$ times as long as prostomium. All these organs are smooth.

Tentacular cirri slender, their tip nearly reaching to that of median tentacle, cirriphore with two short setose bristles.

Parapodium (fig. 4) long, somewhat conical; the dorsal ramus attached to the dorso-anterior side of ventral ramus, the lateral side of which slants down ventrally. Ventral cirrus short, arising near the ventro-lateral angle of ventral ramus, and extending a short distance beyond the angle just mentioned. Dorsal cirriphore large; it arises from the dorsal border of parapodium just opposite the root of ventral cirrus, and reaches to tip of parapodium; the style long, tapering to tip, and about three times as long as ventral cirrus; its surface sparsely papillated. Above the origin of dorsal cirrus and on cirriferous parapodium, there exists a large protuberance, about twice as broad as dorsal cirriphore. The dorsal and ventral rami have each on tip a sharp conical process into which the aciculum enters.

Elytra in 16 pairs, borne on segments 2, 4, 5, 7 21, 23, 26, 29, 32, 35. They are rather small and leave a median longitudinal part of the dorsum uncovered; generally of an elongate shape with convex posterior and concave anterior border (fig. 3); only those of the anteriormost two pairs are of a roundish outline. Each elytron provided with cilia on the lateral margin; the surface covered with short and small papillae, which are especially densely crowded in the posterior parts.

Dorsal bristles (fig. 5) strong, slightly curved, provided with dense rows of spikes. Superior ventral bristles (fig. 6) with about 15 rows of spikes below the smooth and hooked tip; inferior ventral bristles (fig. 7) much smaller, with about 10 rows of spikes below the hooked tip.

Habitat:—On a Holothurian, obtained in the Uruga Channel, depth about 257 fathoms (Prof. MITSUKURI).

Harmothoe sinagawaensis n. sp.

Pl. VI, figs. 8—12.

A single example obtained near Shinagawa, measuring 23 mm. in length, and 4 mm. in breadth (11 mm. including the bristles). It consists of 38 segments.

The body is pinkish yellow, which colour, after preservation in alcohol, changed into a straw yellow.

Prostomium broader than long; its anterior margin divided into two lateral, evenly rounded, lobes. Anterior eyes large, provided with a distinct lens, situated on lateral sides of ocular lobes. Posterior eyes placed at the postero-lateral corner of prostomium, about $\frac{2}{3}$ the diameter of the anterior. Lateral tentacular ceratophores short and stout, shorter than broad; styles also short, tapering to a fine point; total length of the tentacle about equal to that of prostomium.

Median tentacular ceratophore smaller than the lateral; its style slender, extending somewhat beyond tip of the latter. Subtentacles large, $2\frac{1}{2}$ times as long as prostomium, tapering gradually to a fine point.

Dorsal tentacular cirri slender, 3 times as long as the breadth of prostomium; the style occupies about $\frac{1}{6}$ of the entire length. Ventral tentacular cirri shorter than the dorsal. All these organs are smooth.

Parapodium (fig. 8) long, divided into a large ventral and a small dorsal ramus; the former provided on the anterior side with two long, conical processes, of which the dorsal is slightly

longer than the ventral; the latter, arising from mid-dorsal border of the former, is short and is provided with a short, conical process on the ventro-lateral margin. Ventral cirrus short and smooth, arising just opposite dorsal ramus and reaching to about the ventro-lateral angle of ventral ramus, Dorsal cirrus very long, slender, smooth, arising a little distance from the base of dorsal ramus; length of the cirriphore about equal to that of dorsal ramus; style slightly pigmented near tip, extending far beyond tip of ventral bristles.

The length of dorsal cirrus increases from the 3rd segment posteriorly to the last cirriferous segment, in which it reaches a length more than twice that of the 3rd dorsal cirrus. Anal cirri are of about the same length as the last dorsal cirri.

Elytra in 16 pairs, borne on segments 2, 4, 5, 7..... 21, 23, 26, 29, 32, 35. They are generally oval, their inner margins just meeting in the anterior parts of dorsum, but slightly overlapping in the posterior parts; provided with neither cilia nor papillæ.

Superior dorsal bristles somewhat rod-like, distally slightly tapering, with rounded tip (fig. 9). Inferior dorsal bristles slender, tapering to fine point, serrated (fig. 10). Superior ventral bristles, somewhat similar to the last, but more stout, and more strongly serrated, provided with slightly curved terminal hook (fig. 11). Inferior ventral bristles shorter and stouter than superior ventral (fig. 12). All these bristles are of a light yellowish-brown tint.

Nephridial papillæ occur from the 7th segment posteriorly to the 34th segment.

A large mass of eggs are borne under elytra at the end of March.

Habitat :—Near Shinagawa, in the Gulf of Tokyo (!).

Genus *Scalisetosus* McIntosh.

Anterior border of prostomium smoothly rounded. Eyes placed close together on each side, the two groups being widely separated from each other and placed far back on prostomium. Subtentacles smooth. Proboscis somewhat thin. Body of moderate length. Scales cover dorsum in front, but posteriorly leave the central part bare. Bristles colourless and transparent; dorsal bristles slightly curved, some or all of them bearing very distinct spines. Ventral bristles slender, elongate, with close spinous rows and with hooked and bifid tip.

Scalisetosus pacificus n. sp.

Pl. VII, figs. 1—7.

The following description is based on a single specimen from which some of the elytra had become detached. At the posterior end is a small regenerating part, but the form of this region, especially the structure of its parapodia, indicates that the worm is practically in normal length.

The body, consisting of 33 segments besides the small regenerating part of a slightly shorter length than the last two normal segments taken together, measures 16 mm. in length, 3 mm. in maximum breadth and 7 mm. including parapodia and bristles in about the 12th segment, whence the body tapers very gradually toward the posterior end, but more rapidly toward the anterior.

Dorsum pale yellowish anteriorly, which colour gradually fades

posteriorly and changes into a pale white in about the 20th segment. Ventral surface pale white, smooth; nephridial papillae small, present from the 9th segment posteriorly.

Prostomium (Pl. VII, fig. 1) broader than long; anterior peaks distinct, diverging antero-laterally; the dorsal groove narrows posteriorly and can be traced to about the middle of prostomium. Ceratophore of median tentacle short and broad, the style being detached. Ceratophores of paired tentacles arise from below that of the median; slender, distally tapering; the styles also slender, about $1\frac{1}{2}$ times as broad as prostomium. Subtentacles stout, long, distally gradually tapering, about $2\frac{1}{2}$ times as broad as prostomium. All these organs are smooth. Eyes in 2 pairs, brownish yellow in colour; those of anterior pair slightly larger than those of the posterior. The eyes are not observable in dorsal aspect; their positions are shown in Pl. VII, fig. 2.

Tentacular cirri slender; dorsal style a little longer, but ventral style shorter than paired tentacular styles.

Parapodium (fig. 3) large; bristles long and transparent. Ventral ramus broadly conical, much larger than dorsal ramus; its tip vertically divided into two plates, a narrower and longer anterior and a broader and shorter posterior. Ventral cirrus slender, gradually tapering toward tip, which extends slightly beyond distal end of ventralmost bristles. Dorsal cirrus as well as its cirriphore large, the latter occupying about $\frac{1}{3}$ the height of parapodium; style about $4\frac{1}{2}$ times the length of ventral cirrus. Acicula straight, one in each parapodial ramus.

Ventral bristles arranged in a vertical series which spreads out laterally in a fan-like manner, indistinctly separated into a superior and an inferior group. Bristles of the superior group slender, very long, slightly enlarged below the slender, tapering,

finely serrulate, and distinctly bifid tip; in the region of the enlargement is a half ring of long, fine, comb-like teeth supported on a slight shoulder (fig. 6). Inferior ventral bristles (fig. 7.) provided with shorter, stouter and more strongly hooked and undivided tip.

Dorsal bristles arranged in an obliquely fan-shaped series; they are shorter than the ventral, slightly curved; the more dorsally situated bristles (fig. 4) are slender, slightly curved, thorn-like, without any teeth; the inferiorly situated dorsal bristles are stronger, and provided with a tooth below tip (fig. 5).

Both dorsal and ventral bristles are colourless and beautifully transparent.

Elytra in 15 pairs, borne on segments: 2, 4, 5, 7 19, 21, 23, 26, 29, 32. All are in symmetrical pairs, excentrically attached and can be easily detached. They are thin, transparent and colourless, having neither cilia nor papillæ.

Habitat:—South of Jogashima in Sagami Sea, about 313 fathoms (MR. K. AOKI.)

Scalisetosus formosus Moore.

Pl. XII, figs. 17—19.

1903. *Scalisetosus formosus*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 403.

Body slender, tapering very slightly toward the posterior end; length 24—30 mm., consisting of 57—70 segments; maximum width 2.—3.2 mm. without, and 4.5—6 mm. with, parapodia.

Prostomium about as broad as long, marked for its entire length by a median dorsal groove which widens anteriorly into a broad and deep cleft separating the rounded frontal peaks;

narrowest part of prostomium at the posterior border, anterior to which the lateral borders diverge. The prostomium swells abruptly at about the middle into prominent rounded lobes bearing the anterior pair of eyes. Ceratophores of tentacles nearly spherical; style of median tentacle lost; lateral tentacles very short and thick, ovate pyriform and slightly pointed, scarcely longer than their ceratophore, their breadth equal to half their length. Subtentacles slender, about $2\frac{3}{4}$ times as long as prostomium. Eyes very large, but lightly pigmented; the anterior pair situated on the ocular lobes, the posterior slightly more caudad and mesiad and nearly in contact with the anterior.

Of tentacular cirri, the ventral ones alone remained; about $\frac{1}{2}$ as long as subtentacles.

Ventral surface smooth. No visible nephridial papillæ.

Parapodia large and prominent; ventral ramus much larger than dorsal ramus, broad, flat, leaf-like, its lateral margin broadly rounded, the ventral margin convex and the dorsal margin concave; at the end splitting into two very thin vertical plates. Dorsal ramus a rounded lobe arising from about the middle of the anterior side of the dorsum of ventral ramus. Dorsal cirriphores remarkably large; styles scarcely reaching beyond tip of ventral ramus. Ventral cirri with short globular cirriphore; style thickened basally but with filiform distal end, their tip just reaching the inferiormost ventral bristle.

Dorsal bristles few in number and irregularly arranged; they are slender, rather strongly curved, pointed, with transverse rows of exceedingly fine teeth along the convex border (fig. 17). Ventral bristles arranged in a single vertical series which spreads out in a fan-like manner, slender, very long, somewhat enlarged and bent below the thin, tapering, very finely serrulate, and

slightly hooked undivided end; in the region of the thickening occurs a half-ring of long, fine, comb-like teeth supported on a slight shoulder (fig. 19). Ventralmost bristle with shorter, stouter and more strongly hooked tip (fig. 18).

Elytrophores prominent, nearly cylindrical; the median space of back scarcely exceeding their diameter in width.

Elytra occurs on segments 2, 4, 5, and then on alternate segments down to 21, then on 22, 24, 27, 30, 31 and again on alternating segments down to the posterior end. The first is nearly circular, the last somewhat triangular, all the others broadly ovate with a slightly excentric postero-lateral attachment. All elytra thin, smooth, colourless and translucent; without cilia or papillæ.

Habitat:—Sagami Bay, 31 fathoms ("Albatross"); Off Yenoura in Prov. Suruga, about 90 fathoms (MR. K. AOKI).

Genus *Iphione* Kinberg.

Prostomium very distinct, with 2 tentacles and 4 eyes. Peristomium indistinct, with 2 pairs of tentacular cirri. Parapodium apparently uniramous, bearing superiorly a thick tuft of hairs and inferiorly unjointed strong setæ. Elytra alternate with dorsal cirri. Proboscis with 2 pairs of jaws.

Iphione hirotai n. sp.

Pl. VII, figs. 8—15.

Body consisting of 29 segments, short and broad; length 14 mm.; breadth in about the middle of body 9 mm. including parapodia and setæ, and 5 mm. excluding same; thickness in the same region about 3 mm.

Dorsum entirely covered by elytra of a brown colour in alcoholic specimens. Ventral surface yellowish white, setæ appearing yellowish. Nephridial papillæ begin to appear from 7th segment.

Prostomium (fig. 8) about twice as broad as long, consisting of two, nearly circular, lateral halves, each with a pair of small but distinct black eyes situated near postero-lateral margin; the antero-lateral eye larger than the mesian posterior.

Ceratophore of paired tentacles directly continuous with prostomium; very long, being about $1\frac{1}{2}$ times as long as prostomium, broadened at distal end in a shoulder-like manner; purple at base, lighter coloured toward distal end. Style of the tentacle slender, pale white, only a little longer than the ceratophore. Subtentacles large, tapering toward tip, about $1\frac{1}{2}$ times as long as total length of paired tentacle.

Tentacular cirri about equal in length to paired tentacle; dorsal style slightly longer than the ventral.

Elytra in 13 pairs, borne on segments 2, 4, 5, 7.....21, 23, 25; deeply imbricate, covering prostomium as well as entire dorsal surface. Elytron of first pair somewhat triangular, areolate, provided with spinigerous processes in antero-lateral parts. That of second pair convex posteriorly and with deep notch on anterior border for accommodation of the elyrophore of the first pair. Those of third pair (fig. 9) and succeeding pairs somewhat elongate, with anterior concave and posterior convex border, areolated, provided with spinigerous processes in postero-lateral parts (fig. 10), without cilia on margin; secondary areolation (fig. 11) distinctly observable under the microscope. Elytral attachment large, oblong, postero-lateral in position,

Anus dorsal, bordered by the last pair of elytra.

Typical parapodium (figs. 12, 13) apparently uniramous, its distal half nearly cylindrical, broadest at base, antero-posteriorly compressed. Ventral cirrus arises from mid-ventral border of parapodium, provided with indistinct basal joint, about half as long as ventral setae. Dorsal cirrus arises nearer to body than to origin of ventral cirrus, reaches to about the tip of ventral setae tuft; the cirriphore provided with a leaf-like appendage on dorsal side; the style with indistinct subterminal bulb; the terminal filament short. Dorsal ramus of parapodium represented by a thick tuft of hair-like setae, with finely pinnate terminal portion (fig. 14). Ventral setae strong, yellowish, with terminal undivided hook about 23 rows of fine and densely arranged spikes (fig. 15) below tip.

Proboscis large, muscular, about twice as long as broad, with 9 tooth-like and long papillae on both dorsal and ventral lips. Jaws in two pairs, dark-brownish in colour.

Habitat:—Eboshi Iwa, in Chichijima (Peel Island), one of the Bonin Islands (Mr. S. HIROTA).

Family **Acoetidae.**

Prostomium without facial tubercle. Tentacles 3, or none. Subtentacles long, tapering. Body elongate, flattened. Elytra numerous. Elytra-bearing segments alternating with those bearing cirri. Proboscis protrusible, with numerous papillae on the lips; the median dorsal and ventral papilla tentaculiform.

Key to the genera found in Japan.

- a'*. Ommatophore distinct; tentacles 3 *Panthalis*.
a''. Ommatophore indistinct; tentacles absent *Restio*.

Genus *Panthalis* Kinberg.

Elytra smooth, flat, rounded or campanulate; covering the anterior parts of dorsum, but leaving the rest of latter bare along the middle. Parapodium with a dorsal process in front, a trilobed median and a small ventral process. Dorsal setae brush-like at the tip (bipennato-penicillate, Kinberg); median setae spinous on one side, terminating in a long whip (aristate, Kbg.); ventral setae thinly tapering, spinous with curved tip (subulato-serrate, Kbg.).

Panthalis mitsukurii Izuka.

Pl. VIII, figs. 7—9.

1904. *Panthalis mitsukurii*, Izuka. Annot. Zool. Jap. Vol. V, p. 23, Pl. I, figs. 1-8.

All the five specimens of this species hitherto obtained are more or less incomplete in that they lack the posterior parts, though always preserving the head end. They come from a considerable depth in the Sagami Bay and the adjacent waters. The largest specimen from south of Boshu, consisting of the prostomium and succeeding 120 segments, measures 525 mm. in length; maximum breadth 44 mm. including setae and parapodia, and without these 29 mm. Breadth of the 120th segment 30 mm. with, and 11 mm. without, setae and parapodia. Maximum thickness 28 mm. The one that obtained in the Sagami Bay, June 1900, 100 fathoms is the smallest fragment of all; it has the proboscis completely protruded. Length of the specimen, 170 mm., with 73 segments, Maximum breadth including setae and parapodia, in the region of about the 18th segment, is 24 mm.; without them it is 14 mm. in the same region. Measured in the same way, the breadth of the hindmost segment is 22 mm. and 9 mm. respectively. Maximum thickness, 16 mm.

Dorsal surface of body reddish brown, fading laterally into pale-white in the middle of parapodium. Both the anterior and the posterior aspects of the latter are colourless. Posteriorly from about the 50th segment the colour of the dorsum becomes gradually lighter. Ventral surface pale brownish, with exception of a pale median longitudinal band.

Prostomium (Pl. VIII, fig. 7) not well distinguishable from the comparatively large ommatophores, which are pointed anteriorly and slightly laterally. Both the cephalic lobe and the ommatophores are of a brownish black colour. The tip of each ommatophore shows a whitish round lenticular area. Median tentacle small, being only about $\frac{1}{3}$ the length of prostomium; it arises close to the posterior boundary of the latter. Lateral tentacles nearly black in colour except the whitish boss at the end of each. Subtentacles prolonged beyond the front end of prostomium about as much as it is long. Their colour is brownish black at base, gradually fading into light brown towards the tip; this ground colour is interrupted by four black bands, which form incomplete rings open on the dorsal side.

Tentacular cirrus on each side consists of a cirriphore bearing two styles, of which the anterior is the shorter.

Parapodium of the shape of a truncated cone, flattened antero-posteriorly. Dorsal cirrus, consisting of a cirriphore and a short style, not longer than the longest of the branchial tubercles, which are distributed over the dorsal surface of the parapodium. Ventral cirrus, provided with a cirriphore, of such a length that its tip reaches nearly but not quite the distal end of the parapodium. Another isolated papilla is found in the lower part of the parapodium, on both the anterior and the posterior surfaces. The parapodium shows on the dorsal side, a low protuberance, representing the remnant of the dorsal ramus.

Bipennato-penicillate setae (fig. 9) are found only in the upper half of the truncated end of parapodium; serrulate setae occur numerously in the lower part of the same; spine-like setae, light yellowish brown in colour, are strong and have no terminal appendage (fig. 8), and are arranged in a row upon the end surface of the parapodium. Aciculum, one in each parapodium, is situated about one-third way up the vertical height of this. A tuft of long and soft hairs of a golden yellow colour arises from the upper half of the parapodium end. They are very long sometimes reaching to a length of 40 mm. or more.

Elytra are borne on the segments 2, 4, 5, 7, 9 &c. on every alternate segment down to the posterior end of the specimens. The first elytra are large and elliptical in shape; they meet in the median line; the second ones roundish in shape, and smaller than the first, being only about half as large. On the 11th segment the median zone of the dorsal surface left uncovered by its elytra is about twice as wide as the diameter of the elytra themselves.

Proboscis strikingly large and strongly muscular. Each of its dorsal and ventral lips is provided in the middle with a long papilla of a bluish-white colour. The edge of each lip is lined with a row of tooth-like papillae. Jaws two pairs, a dorsal and a ventral. Each jaw provided with a row of 17 small teeth in addition to the very strong apical fang.

Habitat:—Sagami Bay, depth unknown; Uraga channel, 70 fathoms (Mr. A. OWSTON); Sagami Bay, 100 fathoms; South of Boshu, depth unknown.

Panthalis jogasimae n. sp.

Pl. II, fig. 6; Pl. VIII, figs. 1—6.

The following description of this new species is based on an

unique specimen dredged in Sagami Bay, 290 fathoms, on Aug. 17th, 1903.

Body consists of 86 segments; length 95 mm.; maximum breadth including parapodia and setae, in the region of about the 20th segment, 8 mm.; same in exclusion of parapodia 5 mm.; maximum thickness 4 mm.

In the specimen which is preserved in alcohol, the dorsal surface in the anterior one-eighth of the body is brownish, distinctly marked off laterally from light yellowish parapodia; and in this part of the dorsum there are seen very fine transverse striations, which obscure the demarkation lines between segments. Posteriorly the colour changes into light yellowish-brown and finally into light-yellow near the posterior end of body, showing however a brownish median line traceable nearly to the posterior-most end, indicating the course of the dorsal median blood vessel.

The ventral surface is pale yellowish. In the median line of this side there runs a brownish longitudinal band marking the course of the ventral nerve chain. The band shows a slight constriction at each intersegmental position. Moreover, the band is somewhat broadens anteriorly, and terminates abruptly just behind the mouth.

Prostomium (Pl. VIII, fig. 1) taken together with the ommatophores about $\frac{1}{6}$ as long as the subtentacles. The ommatophores are anterior prolongations of the prostomium, bearing on tip the large round eye of a deep black colour. Lateral tentacles nearly equal in length to the prostomium without ommatophore. On the dorsal surface of each ommatophore there is seen a small black spot, the posterior eye. In the postero-lateral parts of the prostomium, there are visible, through the integument, irregular pigment patches of a brownish black colour. Median tentacle projects a little beyond

the tip of the lateral tentacles, arising from about the middle part of the dorsal surface of prostomium.

Tentacular cirri nearly $1\frac{1}{2}$ times as long as the median tentacle, and both the dorsal and the ventral cirri are about the same in length. The peduncle of tentacular cirri bears some number of fine capillary bristles.

Parapodium (fig. 2) somewhat conical, flattened antero-posteriorly, as broad as long; dorsal ramus shorter than the ventral. Dorsal cirrus, with broad base and finely pointed tip, arising from about the middle of the dorsal border of parapodium and extending a little beyond the tip of dorsal ramus, but not reaching to the tip of ventral ramus. Ventral cirrus short, about half as long as the dorsal. Aciculae 2, the ventral one pointing laterally towards the middle of ventral ramus, and the dorsal pointing towards the inferior border of dorsal ramus.

Setae of the ventral series are of the serrulate kind (fig. 3), about 12 in number; the middle series consisting of about 8 spine-like setae (fig. 4), each having a whip-like terminal process of hairy nature; and the dorsal series consists of 6 or 7 penicillate setae (fig. 5). Hair-like setae (fig. 6), 1 or 2 in number, occur on the inferior border of dorsal ramus, only observable by minute examination. The tomentose bristles or the silken threads, which occur commonly in the parapodia of this group of annelids are not found in this species.

Elytra in 43 pairs, borne on segments 2, 4, 5, 7, and so on, on every alternate one down to the penultimate (85th) segment; and among them the anteriorly placed elytra being reversely imbricated. Elytra campanulate, and smooth. The posteriormost pair of which is considerably small as compared with the rest of them (fig. 1).

Proboscis (fig. 1), in its protruded state equals in length to the anterior-most 18 segments taken together, and its maximum breadth about $\frac{1}{2}$ of the length; each of the dorsal and the ventral lip is provided, on the median line, with a slender papilla in addition to a row of 7 tooth-like stout papillae, of which the lateralmost one being much smaller than the others; the ventral median papilla is about $\frac{1}{5}$ as long as the dorsal. Jaws two pairs, each being furnished with a strong apical fang and a row of 6 or 7 small teeth on the cutting edge.

The tube in which this annelid lives consists of a very fine thread-like substance coated with a layer of grayish fine mud of about 5 mm. in thickness.

Habitat:—Koto-line Mera just out, in Sagami Bay, 290 fathoms.

Genus *Restio* Moore.

Both median and lateral tentacles entirely absent; palpi well developed; ommatophores wanting or completely coalesced with the sides of the prostomium, so that the eyes are sessile; peristomial palpi without setae.

Restio aenus Moore.

1903. *Restio aenus*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 423; Pl. XXIV, figs. 21-24.

This species was described by MOORE from an anterior piece consisting of prostomium and 41 segments, and measuring 35 mm. in length, and 5.2 mm. in breadth. I have not obtained a specimen that could be identified with this species, so that I extract the following characters from MOORE's description:—

Prostomium slightly wider than long, broadly bilobate anteriorly

where a slightly median sinus divides it into two broadly rounded lobes from which the sides slope caudad to somewhat narrower, straight posterior border. Anterior pair of eyes very large, black, situated on the anterior face of prostomium close to the lateral angles. The posterior having a diameter of only $\frac{1}{3}$ the anterior, black, circular. Median and lateral tentacles absent; palpi lost.

Tentacular cirri lost.

The six parapodia following the peristomium are broad and very short; the next (of 8th segment) is decidedly longer, and from this on to 24th they continue to increase gradually in length.

On segments 9th to 20th the dorsal ramus of the parapodium forms a rather conspicuous broad flap, which passes down the dorsal half of the anterior face of the parapodium, and from behind which the capillary bristles arise. Dorsal angle of the ventral ramus prominent and rounded; the ventral angle enveloped by the lower end of the postsetal fold. The dorsal ramus becomes gradually reduced in size; by 25th it is a mere dorsal papilla.

At least 12 pairs of elytophores are present on the segments: 2, 4, 5 and every alternate segment to 23 inclusive.

Four kinds of bristles occur on

typical segment (10th). The first kind colourless, long, slender,



A. Stout ventral bristle. 332/1.
B. Slender ventral bristle. 332/1.
C. Capillary bristle. 332/1.

[After J. P. Moore].

curved and tapering (woodcut *C.*), bears opposite pairs of slender awn-like spines, and have slightly enlarged bases; these are arranged in a single vertical row which extends nearly half-way down the anterior face of the parapodium. Behind these is a second vertical row, of stouter colourless bristles (woodcut *B.*), slightly enlarged subterminally and then tapering and fringed. A third vertical row contains bristles of two kinds. Five or six pale yellow, short, stout bristles occupy the dorsal end of the bundle in more anterior, and the middle in more posterior segments; they present a subterminal enlargement, and a peculiarly roughened slightly hooked tip continued into a hairy filiform appendage and guarded by a dense brush of very stiff hairs (woodcut *A.*). Ventral to these in anterior, and both ventral and dorsal in posterior, segments is a group of colourless more slender bristles, with broad lace-shaped ends and transverse row of fine hairs.

Habitat :—Suruga Bay, 63–75 fathoms (“Albatross”).

Family **Aphroditidae.**

Body short, oval and depressed; the particularly strong dorsal setae are directed upwards and backwards so as to protect the elytra. Ventral setae are also strong. They are all unjointed. Prostomium with, usually 2 pairs of eyes, a single median tentacle, under which is a papillose facial tubercle. No lateral tentacles; subtentacles 2. Peristomium setigerous, with long tentacular cirri. The jaws are represented merely by thickened prominences.

Key to the genera found in Japan.

- a.* Eyes sessile; dorsum covered with thick felt; ventral bristles simple *Aphrodita*.

a''. Eyes pedunculate; dorsum covered with thin felt; ventral bristles semi-pinnate *Laetmatonice*.

Genus *Aphrodita* L.

Eyes sessile; the fifteen pairs of elytra are concealed by a thick felt of matted simple hairs; ventral setae simple, not barbed or toothed.

Aphrodita japonica Marenz.

Pl. IX, figs. 1—3.

1897. *Aphrodita japonica*, Marenzeller. Süd-jap. Annel. I, p. 3, Taf. I, fig. 2.

1903. *Aphrodita japonica*, Moore. Proc. Acad. Nat. Sci. Philad. Vol. LV, p. 420.

Of the four examples placed at my disposal, the largest measures 78 mm. in length, and 30 mm. in breadth including parapodia, consisting of 42 parapodiated segments; and the smallest 28 mm. in length, 14th in breadth, with 36 segments; dorso-ventral thickness 20 mm. and 9 mm. respectively.

Dorsum entirely covered by a thick felt of darkgray colour; and among which the strong dorsal setae are almost hidden.

Elytra in 15 pairs, hidden beneath the dorsal felt, and they are imbricated in the median line. Outer and hinder parts of elytra provided with short rounded papillae.

Dorsal surface of body very finely granulated, and the ventral surface also provided with granules.

Prostomium ovate; its greatest width, which lies nearer to the anterior border than to the posterior, about equal to the length, and posteriorly it tapers to a width of about one-third of the maximum. Two minute but distinct eyes on each side, of which

the anterior is a little larger, are placed just anterior to the greatest width of prostomium, and separated by a wide median interspace. Frontal tubercle wart-like, shorter than the prostomium, and broader dorsally and strongly compressed ventrally. Median tentacle has a total length of about $1\frac{1}{3}$ the length of the prostomium, and its ceratophore occupies $\frac{1}{6}$ or more of the whole length. Paired subtentacles, more than $4\frac{1}{2}$ times the length of the prostomium, are provided with hair-like sensory papillae, which are seen only by a great magnification.

Dorsal pair of tentacular cirri, $2\frac{1}{2}$ times shorter than the paired subtentacles, and the ventral pair, a little shorter than the dorsal.

Lateral bundles of setae have metallic iridescence; and the large dorsal setae (fig. 1) are soft, and dark brown colour at the base, and light yellowish at the tip, with bronzed iridescence.

Of the three groups of ventral setae (figs. 2, 3), the dorsal group contains 2, the middle 3—6, and the ventral 8—13 setae.

Ventral cirri are not at all in equal length, and that of the second parapodiated segment is a little longer than the followings. Dorsal cirri, arising from strongly dilated base, are very long, being $2\frac{1}{2}$ times longer than the ventral ramus of the parapodium.

Habitat:—Off Misaki in Prov. Sagami, 56 fathoms (!); Bay of Aomori (!); Sagami Bay 153 fathoms ("Albatross"); Suruga Bay 45 fathoms ("Albatross"); Marenzeller's specimens were collected by Dr. A. RORETZ, in south Japan.

Aphrodita australis Baird.

Pl. IX, figs. 4—6.

1865. *Aphrodita australis*, Baird. Journ. Linn. Soc. London, Vol. VIII, p. 176.

1885. *Aphrodita australis*, McIntosh. "Challenger" Annel. p. 34.
1903. " " Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV,
p. 423.

A large example at my hand measures 47 mm. in length, 20 mm. in transverse diameter at the widest part, consisting of 42 segments, and with 15 pairs of elytra. The posterior region of body, which as usual in the group is distinctly narrowed, bearing a proportionally larger number of segments.

Dorsal felt extremely tough and dense, and coated with grayish mud. The long and abundant lateral hairs give the worm a woolly aspect, and their colour is of delicate green.

Prostomium roundish, having a front a short blunt conical tentacle, immediately behind which are 2 pairs of eyes, the anterior pair being wider apart than the posterior. They are small but distinct black points, entirely sessile.

A series of light bronz-coloured great setae (or spines) are found projecting outwards amongst the hairs. The tips of these setae do not taper much, but end in somewhat broad points (fig. 4), which are covered with minute chitinous spikes, so that the surface is rasp-like. The inner tufts of setae, which curve round and backward amongst the felt of the dorsum, are broad at the base but tapers to slender tip, also marked by slight roughness or points. The ventral setae anteriorly are for the most part (fig. 5) dart-shaped, but in some the tip is entire (fig. 6).

Dorsal cirri long and finely tapered toward the tip, which is slightly clavate.

Habitat :—Nakano-yodomi, in Sagami Bay, 78 fathoms; Golden Hind Expedition station 35, 42 fathoms (Sagami Bay); Sagami Bay, 501–749 fathoms and 120–265 fathoms ("Albatross"); West off Jogashima in Prov. Sagami (Mr. K. AOKI).

Aphrotida watasei n. sp.

Pl. I, fig. 5 ; Pl. IX, fig. 16.

Of the two examples procured by Prof. S. WATASE, at Namerikawa, the larger, consisting of 38 parapodiated segments, measures 70 mm. in length, and 36 mm. in maximum breadth including parapodia ; and the smaller 55 mm. in length, 28 mm. in breadth, with 34 segments. Dorso-ventral thickness 15 mm. and 13 mm. respectively.

Dorsal surface of body entirely covered by a thick, dusky brown felt, loaded with mud and sand particles.

Prostomium roundish, the length almost equal to the breadth ; the maximum width lies nearer to the anterior than to the posterior margin. A transverse ridge is found along the antero-dorsal margin of prostomium, and from the mid anterior portion of this ridge arises a median tentacle, which consists of a long, slender style and a ceratophore of about $\frac{1}{3}$ the length of the style. Frontal tubercle short and laterally compressed, as usual, and placed between the paired subtentacles, which are comparatively large reaching about 5 times the length of the median tentacle. Eyes invisible.

Dorsal setae (or spines) brownish black in colour, having metallic iridescence, are almost hidden among the felt, and a series of bundles of the lateral hairs are loaded with mud, so as to appear like the fringes on the sides of the body. Ventral setae may be divided into three groups the setae in the superior group amount to 4 ; those in the middle to 7 ; and those in the inferior to 9. Unfortunately almost all the tips of setae were broken, but in that which was not injured has a curved tips as shown in Pl. IX, fig. 16.

The dorsal surface of body, under the clytra is coarsely granulated. The ventral surface of body as well as of the parapodia are dusky, being coated with fine mud; and on the sides of parapodia there are found sharp-pointed, conical papillae of pale colour.

Length of the dorsal pair of tentacular cirri are about twice that of the ventrals. Ventral cirrus, arising from about the middle portion of the ventral border of ventral parapodial ramus, reaches to the base of the inferior group of ventral setae.

Habitat:—Namerikawa in Prov. Ettyu. (Collected by Prof. S. WATASE, on May 20th, 1904).

Genus *Laetmatonice* Kinberg.

Eyes on short peduncles placed near the anterior border of prostomium, dorsum covered with felt. Spines of the elytra-bearing parapodia glochidiate, other parapodia with lateral bundles of stout bristles and a tuft of hair-like bristles. Bristles of the ventral ramus semi-pinnate. Nephridia opening externally by a papilla directed upwards between the parapodia.

Laetmatonice aphroditoides McIntosh.

Pl. IX, figs. 11—13.

1885. *Laetmatonice aphroditoides*, McIntosh. "Challenger" Annel. p. 51.

The large specimen from Ōshima in Prov. Izu measures 22 mm. in length, 14 mm. in maximum breadth excluding the bristles; and consists of 39 segments, with 16 pairs of elytra.

Body somewhat broadly ovoid, and the posterior end is

peculiarly attenuated. To the naked eye the dorsal covering appears to be composed of mucilaginous substance and sand; but microscopically this layer is made up of a vast series of fine hairs with hooked tips (fig. 11) similar to those of *Aphrodita*, though the hair as a whole is much more slender.

Ventral surface of body covered with numerous minute, globular papillae.

Prostomium prominent and rounded, with a little conical papilla anteriorly in place of a median tentacle. Ocular peduncles are rather small, with no trace of pigment. On the median anterior portion of prostomium, there observed a smooth tongue-shaped process, which from its concavity superiorly is spoon-like; posteriorly is a very deep pit on each side of the nuchal ridge of prostomium. Moreover, after removal of the first elytra a somewhat triangular thin lamella, with a point in front, projects forward beyond the ocular peduncles and partly shades the side of prostomium.

Ventral cirrus subulate and short; posteriorly, however, it becomes elongated.

Great dorsal spines, forming a conspicuous fringe to the sides of the body, have a lustrous brown colour, and their tips are simple throughout (fig. 12). Ventral bristles (fig. 13) lean towards the structure seen in *Aphrodita*, and it is easy to conceive the passage from the densely spinous ventral tips of such as *Lactmatonice japonica* to the hairy condition of this species.

Anteriormost 8 or 9 pairs of parapodia differ from the succeeding in having a series of minutely serrated bristles, along with one or more stout sharp-headed brownish spines.

The absence of the long median prostomial and the lateral tentacles is diagnostic; the long subtentacles, however, present,

It quite differs from *Aphrodita* in the absence of the iridescent hairs composing the felt, and in the characters of the dorsal spines.

Habitat :—Near Ōshima in Prov. Izu, 235 fathoms ; Yenoura in Prov. Suruga, 470 fathoms (Mr. K. AOKI) ; “South of Yedo,” 565 fathoms (“Challenger”).

Laetmatonice japonica McIntosh.

Pl. I, fig. 4 ; Pl. IX, figs. 14—15.

1885. *Laetmatonice japonica*, McIntosh. “Challenger” Annel. p. 50.

1903. „ „ Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 420.

The single specimen dredged at St. 232 (South of Japan) by “Challenger,” and described by McINTOSH, measured about 30 mm. in length and 18 mm in breadth, with 36 segments ; and the followings are the number of body segments and measurements occurring respectively in the three specimens collected by us from three different localities :

Locality.	Length.	Bredth.	No. of Segments.
Sagami Bay.	16 mm.	6 mm.	32
Misaki.	28 mm.	11 mm.	34
Uzen.	13 mm.	5 mm.	32

Dorsum wholly covered with thin felt much impregnated with sand, which also invests the hairs on the sides ; thus the 15 pairs of pale smooth elytra are hidden.

Prostomium broad and rounded in front, narrow behind, and

posteriorly with a pit on each side of the nuchal ridge. Median tentacle long, being about 4 times as long as the prostomium, and $\frac{1}{4}$ of which constitutes the ceratophore. Subtentacles about 3 times as long as the median tentacle. Ocular peduncles large and globular, and though no distinct eyes are visible, a slight ring is present on the anterior convexity of the peduncle.

Dorsal spines of a dull brownish hue with metallic iridescence; the flattened shaft has very distinct prickles thinly scattered over it, while the tip gently tapers to a point, which has usually 2 or 3 recurved fangs on each side (fig. 14), but sometimes 3 on one side and 2 on the other.

Ventral setae (fig. 15) quite uniform throughout, each consisting of an angular and bristle-like shaft and of a terminal portion with somewhat long pinnæ which distally decrease in length; no spur present.

Ventral surface of body smooth to the naked eye, but when examined microscopically, shows a few somewhat clavate papillae.

The dorsal felt is somewhat friable and soft, the elongated hairs with hooked ends being enveloped in a gelatinous material loaded with sand-grains, diatoms, fragments of shells, &c.

Proboscis long, reaching, when fully protruded, to a length about equal to that of the 12 anteriormost setigerous segments taken together.

Habitat:—South of Japan, 345 fathoms ("Challenger"); Sagami Bay, 42 fathoms (Golden-Hind Expedition by Prof. I. UJIMA); West of Misaki, about 23 fathoms; Awazaki-line & 3rd Mera out in Sagami Bay, 240 fathoms; off Yugahana in Prov. Uzen, 78 fathoms; Sagami Bay, 153 fathoms ("Albatross").

Remarks:—In the living specimen procured on April 5th,

1902, from a depth of about 23 fathoms, west of the Misaki Marine Laboratory, the elytra appeared to be translucent and slightly yellowish in colour on splitting up the dorsal felt.

The worm, when disturbed, has the habit of curling up now ventrally and then dorsally. When it is left quiet, the elytra are alternately up-lifted and depressed.

Laetmatonice producta Gr.

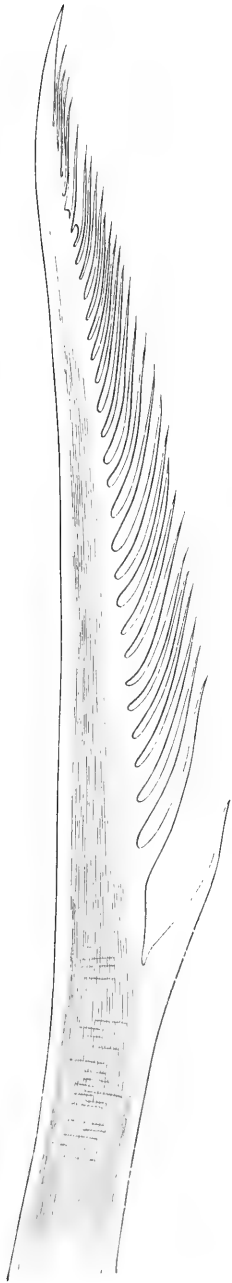
1877. *Laetmatonice producta*, Grube. Monatsber. d. Akad. z. Berlin, August. 1877, p. 512.
1885. *Laetmonice producta*, McIntosh. "Challenger" Annel., p. 39, Pl. IV, figs. 1—8.
1903. *Laetmatonice producta*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 420.

In the absence of my own observations on the species, the following extract is made from McINTOSH'S description.

Body broadly fusiform, measuring about 100 mm. in length, and about 50 mm. in breadth including setae and parapodia. Number of segments 47.

Prostomium somewhat triangular, with a slender elongated median tentacle, to the tip of which is attached a pear-shaped process by the narrowed end. Eyes small, on prominent peduncles. Subtentacles separated at their base by a frontal tubercle, smooth and glistening to the naked eye, but under the microscope their whole surface is seen to be covered with pointed cuticular papillae. Behind the ocular peduncles a multi-lobate process occurs, extending laterally and then anteriorly along the outer border of the peduncles.

A typical spine-bearing segment (19th) bears dorsally a series of boldly curved, dull golden setae, which are rather broad



Tip of fully developed ventral
setae of *Laet. producta*. [55/1.
[After W. C. McIntosh.]

and inferiorly flattened but taper to the simply pointed extremity, the greater part of the latter region being minutely nodulated. The next inferior group of bristles consists of a tuft of lustrous brown spines (setae glochidiae), about 22 mm. in length and slanting backward. The recurved fangs of the spines are usually in 5 opposite, or nearly opposite, pairs.

Ventral setae (see the accompanying woodcut) have lustrous brown shafts, each of which has a long and curved hook at the distal end, followed after an interval by a series of chitinous processes arranged in a pectinate manner.

Elytra in 20 pairs, borne on segments 2, 4, 5, 7, 9 and every alternate segment down to 25 and 28, then on every third segment down to 45, entirely covering the dorsum. They are smooth, parchment-like and slightly iridescent, showing under the microscope granular rows radiating from the attached portion. No dorsal felt exists.

Dorsal cirri long and smooth, tapering from base to tip, and each with a distal pear-shaped process

Ventral cirri short, subulate, their tip scarcely reaching the base of inferior setae. Ventral surface of body as well as sides of parapodia with brownish cuticular warts.

Habitat :—Sagami Bay, 153 fathoms. (“ Albatross ”).

Laetmatonice producta Gr. var. *benthaliana* McIntosh.

Pl. IX, figs. 7—10.

1885. *Laetmatonice producta* var. *benthaliana*, McIntosh. “Challenger”
Annal., p. 45, Pl. VIII, figs. 4, 5 ; Pl. IV, fig. 12.

1903. *Laetmatonice producta* var. *benthaliana*, Moore. Proc. Acad.
Nat. Sc. Philad., Vol. LV, p. 420.

Body, consisting of 40 segments, measures 48 mm. in length and 15 mm. in breadth.

Prostomium somewhat triangular ; median tentacle, slender and elongated, with peculiar enlargement on tip. Lateral regions of prostomium very prominent. Ocular peduncles globular ; eyes indistinct. Elytra in 16 pairs (McINTOSH says the number of elytra varies from 15 to 18 pairs), borne on same segments as in typical *Laetmatonice producta*. They are more delicate than in the typical species, exhibiting under the microscope a finely granular condition with radiating lines. No dorsal felt exists.

Dorsal spines considerably larger than in the typical species, and while the shafts are large and flattened, the terminal portions are relatively small, presenting a distinct curve in certain views. Number of fangs in the terminal portion varies, but is mostly 3 or 4 (fig. 7). Slender bristles from the inner dorsal tuft overlapping the elytra are represented in Pl. IX., figs. 8—9 ; longitudinal striae are very distinctly marked in these bristles, and numerous chitinous prickles surround the shaft.

Ventral setae (fig. 10) brownish in colour; the shaft slightly dilates upwards and towards the spur, whence the thickness diminishes to the tip. Pinnæ of the terminal portion gradually increase in length from the base to apex.

The arrangement of cirri seems to be the same as in the typical species. Nothing is of more diagnostic value than the condition of the ventral cirrus, which forms a very minute filiform process about the middle of the greatly elongated parapodium.

Anus situated on a prominent button-like elevation in the middle line at the posterior extremity. It is covered by the last pair of elytra.

Habitat:—Numa in Sagami Bay, about 258 fathoms; Suruga Bay, 26 fathoms ("Albatross"); Totomi Sea, 34 fathoms ("Albatross"); North Japan, 81 fathoms ("Albatross").

Family **Sigalionidae.**

Body long and narrow; elytra and cirriform gills on alternate segments in anterior parts down to the 26th segment; more posteriorly the gills coexist with elytra on every segment. Prostomium rounded, often with a nuchal collar posteriorly. No facial tubercle. Median tentacle, when present, generally long and with etenidia at the sides of base. Lateral tentacles fused with base of tentacular cirri, only the tips emerging. Eyes four, occasionally only two, or absent. Subtentacles long, attenuate and smooth, with buccal etenidia at base. Dorsal bristles spinous and tapering. Ventral bristles compound.

Key to the genera.

- a.* Median tentacle absent. *Sigalion.*
a''. Median tentacle short, without ceratophore.

<i>b'</i> .	Compound bristles spinigerous	<i>Leanira</i> .
<i>b''</i> .	„ „ falcigerous	<i>Thalenessa</i> .
<i>a'''</i> .	Median tentacle long, with ceratophore.	
<i>b'</i> .	Compound bristles spinigerous	<i>Sthenolepis</i> .
<i>b''</i> .	„ „ falcigerous	<i>Sthenelais</i> .

Genus *Thalenessa* (Baird), char. emend. McIntosh.

Prostomium with four large eyes and three tentacles; of the latter the median is very short. Elytra leaving the dorsum uncovered anteriorly, furnished with ramose papillae on margin. Parapodia with lamellar processes on tip; ventral bristles falcigerous and much stronger than in either *Sthenelais* or *Sigalion*. The ventral cirrus is also longer. It approaches *Leanira* in the structure of the prostomium.

Thalenessa oculata McIntosh.

Pl. X, figs. 1—2.

1885. *Thalenessa oculata*, McIntosh. "Challenger" Annel., p. 142; Pl. XXI, figs. 1, 2; Pl. XXIII, fig. 12; Pl. XXV, fig. 3; Pl. XIII A, figs. 11, 12.

1903. *Thalenessa oculata*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 426.

Body measures about 55 mm. in length, and with the bristles 6.5 mm. in breadth.

The eyes are very large and are situated close together on each side, though widely separated transversely. That of the anterior pair is the larger, and shows a pale area or "lens" of a considerable size. Prostomium provided with a pair of short tentacles with somewhat blunt end, and behind it with a median tentacle of nearly the same

length and with similarly blunt tip. All the tentacles narrowed at the articulation near base.

Elytra thin, not covering the dorsum anteriorly, considerably smaller than those usually seen in that region in other species of the group. The first elytron is small, rounded; its surface and margin smooth. The second elytron has along its outer border 5 or 6 digitate processes, some of the stems being undivided, others bifid or trifid. The elytra increase in size after the third, and their outer margin is furnished with well-marked papillae. In shape they are irregularly quadrate with straight outer margin. The papillae are in a single row, and commence to exist at the anterior angle in the form of a process or two with tip split into three long digits; in the succeeding papillae the digits reach four or five in number, and toward the posterior border they again diminish in number to three, and finally become a simple process.

Parapodium (in the anterior third of body) has superiorly a branchial process, two ciliated cups on the dorsum, and a process in the inner angle under the branchia; the dorsal ramus bears serrated setae (fig. 2). Ventral ramus of parapodium bears a group of bifid setae arranged in three series, those of the upper and lower series having longer tip than in the middle. Some bristles of the lower series in the anterior third of the body show two segments in the terminal portion. The middle series of bristles present a few spinous rows below tip of shaft; the terminal bifid piece moderately elongated.

Ventral cirrus somewhat long, its slightly bulbous tip extending considerably beyond the setigerous lobe. There are several small papillae in front of and behind the pedicle for elytra, and one papilla on the ventral margin of the parapodium on the inner side of cirrus.

Habitat :—Sagami Bay 31–150 fathoms (“Albatross”); Shikanojima in Prov. Chikuzen; Misaki in Prov. Sagami.

Genus *Sthenolepis* Willey.

Both the genera *Thalenessa* and *Leanira* are characterised by the presence of a very small tentaculum impar growing directly from prostomium without a ceratophore. The compound bristles of the former belong to a variety of falcigerous type with bidentate appendages; those of the latter are spinigerous.

Whereas, *Sthenelais* and *Sthenolepis* are both characterised by the presence of a long tentaculum impar borne upon ceratophore which is provided with a pair of spatulate appendages. The compound bristles of *Sthenelais* are falcigerous like those of *Thalenessa*, while those of *Sthenolepis* are spinigerous as in *Leanira*.

Sthenolepis japonica (McIntosh).

Pl. X, figs. 3–7.

1885. *Leanira japonica* McIntosh. “Challenger” Annel., p. 154. Pl. XXII, fig. 3; Pl. XIV_A, figs. 1, 2.
 1905. *Sthenolepis japonica*, Willey. Ceylon Pearl Oyster Fisheries. Suppl. Report. XXX, p. 259, Pl. II, fig. 49.

Body 40–55 mm. long and 3.0–3.5 mm. (bristles incl.) broad.

Prostomium relatively large, and pale reddish-brown for the greater part. Two very conspicuous, round, black eyes situated near front of prostomium just behind tentacle; a pale band behind each eye. Another pair of much smaller eyes on anterior surface of snout beneath tentacle; the pigment mass somewhat crescentic in shape, probably owing to the presence of a lenticular structure;

with the concavity turned forward and downward. Tentacle tapering, with a spatulate appendage on each side of its ceratophore. Subtentacles moderately long, smooth, tapering to fine end.

Parapodium superiorly with a well-developed branchial process. Dorsal ramus of parapodium with the usual slender, serrated bristles (Pl. X, fig. 5), of which the upper are distinctly spinous, and the lower less distinctly so. Several long cuticular papillae present around base of dorsal bristle-tuft.

In the anterior parts of body the ventral group of bristles occasionally presents superiorly a single bristle provided with whorls of spikes (fig. 6). Rest of ventral bristles translucent (fig. 7); their canaliculated end moderately long, with well-defined markings. Inferior bristles with shorter terminal piece. Tip of ventral cirrus reaches to base of the bristles. Ventral ramus of parapodium also with numerous, somewhat translucent papillae around base of bristle-tufts.

Habitat:—Off Kōbē, 8–50 fathoms (“Challenger”); Misaki (Moroiso) in Prov. Sagami, 6 fathoms (!).

Sthenolepis areolata (McIntosh).

Pl. X, fig. 8.

1885. *Leanira areolata* McIntosh. “Challenger” Annel., p. 151. Pl. XXI, fig. 3; Pl. XXV, figs. 8, 9; Pl. XIII A, fig. 1.

Body 153 mm. in length, and its width at the broadest anterior part 9 mm.

Prostomium eyeless; tentacle attached to a somewhat conical ceratophore which arises from the front of prostomium. On each side of the ceratophore is a small spatulate process.

Subtentacles (palpi) long, smooth and thinly tapering.

The first elytron is small, rounded and quite smooth. Elytra rapidly increase in size posteriorly, and almost cover the dorsum in the anterior parts of body. They are soft, whitish, slightly translucent; those in the anterior third of the body are quite smooth on both surface and margin. Posterior to the anterior third of body, the fold on the outer margin of elytron presents a series of simple and very slightly tapering papillae, but these are usually invisible to the naked eye. Minute examination shows that the outer border in anterior elytra is very prettily marked with regularly arranged areolae.

The second parapodium (which carries the first elytra) puts on the character of the posterior to a greater or less extent. The dorsal ramus has a group of very long papillae (about five in number). Only the bristles nearest the body are distinctly serrated. Ventral ramus has bristles with the usual canaliculated tip, though these are more slender than those which follow.

The third parapodium bears a long and characteristic cirrus, which stretches forward considerably beyond tip of the first parapodium in a straight line. The cirrus is an elongated, smooth, tapering process, and has a globular enlargement at base on the external side.

In fully developed parapodia the ventral bristles are long, as represented in Pl. X, fig. 8.

A well marked branchia, richly ciliated inferiorly, occurs on every parapodium, and bears ventrally at base a diverticulum-like process. Ciliated pads occur one under the branchia, a second long and a third broadly clavate or fan-shaped one on the dorsum of parapodium.

Habitat:—"South of Yedo," 345 fathoms ("Challenger"); Sagami Bay, 153 fathoms ("Albatross"); Yahagi-line, in Sagami Bay, 260 fathoms.

Genus *Sthenelais* Kinberg.

Prostomium rounded anteriorly with a nuchal collar. A pair of ctenidia at base (ceratophores) of median tentacle; lateral tentacles fused with first parapodium; tentacular cirri more or less separate. Subtentacles long, subulate, smooth, springing from ventral surface of prostomium, but fusing with the first pair of parapodia. A pair of ctenidia at base of the first pair of parapodia. Elytra covering dorsum, fringed. Dorsal and ventral divisions of parapodium of equal length.

A well-developed branchial process on every parapodium. Dorsal setae long, stiff, finely tapering, and spinous. Upper ventral bristles with simple tip, boldly spinous; next to them are middle ventral compound bristles, at first with terminal-piece of three segments, then with same of one joint; and finally there come lower ventral compound bristles with from one to four joints. All the compound bristles are provided with bidentate tip.

Sthenelais boa (Johnston).

Pl. X, figs. 9—16.

1833. *Sigalion boa*, Johnston. Lond. Mag. Nat. Hist., VI, p. 322, fig. 42.
 1843. „ *Idunae*, H. Rathke. Nova Act. Acad. Caesar. Nat. Cur., XX, 150. Tab. IX, fig. 1-8.
 1851. *Sigalion Idunae*, Grube. Fam. Annel., p. 38.
 „ „ *boa*, Williams. Rept. Brit. Assoc., 1851, p. 201.
 „ „ *Idunae*, Sars. Nyt. Mag. Natur., XI, 3, p. 254.
 1865. „ „ *Malmgren*. Nord. Hafs.-Ann., p. 86.
 „ *Sthenelais Idunae* and *S. boa*, De Quatrefages. Ann., I, p. 276.
 1865. *Sigalion boa*, Johnston. Cat. Brit. Mus., 124, pl. 13, fig. 6.
 1867. „ „ *Parfitt*. Annel. Devon., p. 19.

1873. *Sthenelais Idunae*, Sars. *Bid. Christ. Faun.*, p. 14.
 „ *Sigalion Idunae*, Willemoes-Suhm. *Zeit. f. Wiss. Zool.*, XXII,
 p. 347.
1875. *Sigalion Idunae*, Ehlers. *Annel. "Porcupine,"* 1869, p. 18.
1876. *Sthenelais boa*, McIntosh. *Trans. Zool. Soc.*, IX, p. 390.
1880. *Sthenelais Idunae*, Langerhans. *Zeit. f. Wiss. Zool.*, XXXIII,
 p. 276. *Taf. XIV*, fig. 6.
1883. *Sigalion Idunae*, Levinsen. *Nord. Annul.*, p. 199.
1884. „ „ *Carus. Faun. Medit.*, p. 205.
1888. *Sthenelais Idunae*. *De St.-Joseph. Ann. d. Sc. Nat.* (7), V, p.
 187, *Pl. VIII*, fig. 55.
1890. *Sigalion Idunae*, Malaquin. *Ann. Boulon.*, p. 23.
1900. *Sthenelais boa*, McIntosh. *Brit. Annel.*, pt. II, p. 408.

Body elongate, little tapering anteriorly, gradually diminishing in breadth posteriorly, measuring 75 mm. in length, 6 mm. in maximum breadth including parapodia and bristles. It is rounded dorsally and flattened ventrally, and greyish or bluish-green, the latter colour characterising the iridescent ventral surface.

Prostomium broadly ovate, bounded by a nuchal collar posteriorly. Median ridge passes in front into the broad ceratophore of median tentacle, which is subulate. Two flap-like organs (ctenidia) occur on each side, the anterior the longer. Two eyes on each side, the larger anterior pair partly hidden by the ctenidia. The posterior pair are on the dorsum a little behind bases of the ctenidia. A truncate papillae on each side of the prostomium posteriorly. Prostomium fixed to the massive parts of first parapodia, which bear externally two tapering cirri of considerable length (fig. 9). To the inner side of the ventral cirrus of the first pair of parapodia is attached a sickle-shaped blunt appendage (ctenidium). A short subulate cirrus exists superiorly on the inner side of bristle-tuft. A long subulate and

smooth subtentacle springs from the middle of the ventral face of the basal process of first parapodium. The first parapodium carries a double series of long, tapering, slender, spinous bristles.

Elytra 156 pairs; mostly reniform (fig. 10), and with numerous minute papillae, while the outer border bears a series of large simple papillae. A well-developed branchial process exists above each parapodium. On the dorsal ridge beneath it are three T-shaped ctenidia.

Dorsal bristles (fig. 13) long, somewhat stiff, finely tapering, spinous from a little above base to apex. Upper set of ventral bristles (fig. 14) with simple tip, boldly spinous; below them some with tapering bifid end-piece of about three joints, the end of shaft having a few rows of spines (fig. 15). The main part of ventral ramus has stout bristles with bevelled end to shaft, and with a short-beaked end-piece of one segment (fig. 16). Near the ventral edge the ventral ramus has more slender bristles with a few rows of spines on the slightly expanded distal region of shaft and an end-piece of from one to four joints. There occur a group of long papillae on the anterior edge of dorsal ramus, one similar papilla above the aciculum of ventral ramus, and a ciliated or papillose frill at base of lowest slender bristles. Ventral cirrus elongate, subulate, not reaching tip of parapodium.

Habitat :—Misaki in Prov. Sagami, July, 1907.

Family **Palmyridae.**

Parapodia provided with dorsal cirrus alternate with those which have none. Elytra absent.

Genus *Palmyra* Savigny.

Body sub-elongate ; prostomium small, with one tentacle and two eyes. Peristomium indistinct, without any appendage. First parapodia directed anteriorly, longer than prostomium, with 2 pairs of tentacular cirri. Other parapodia biramous, characterized by the presence of a bundle of large and flat setae recurved towards and covering the dorsum.

Palmyra aurifera Savigny ?

1885. *Palmyra aurifera* Savigny ? "Challenger" Annel., p. 53.

As I could not examine the specimen myself, the following extract is made from McINTOSH's description based on a single specimen dredged up by the "Challenger" at station 233A (near Kobé, Japan), from a depth of 50 fathoms :

Body slightly tapering at each end ; about 12 mm. in length and 4 mm. in breadth. Parapodia number 33 pairs.

Prostomium small ; eyes two, large and black, situated on a peduncle on each side. From the front of prostomium spring two long palpi, which taper to fine point.

Dorsal surface of body slightly convex, and furnished with golden coloured spines. Ventral surface flattened and papillose.

First parapodium is directed forward, and bears the usual tentacular cirri, of which the dorsal is the longer.

The dorsal ramus of fully developed parapodium carries remarkable spinose bristles of a conspicuously golden lustre. The bristle consists of a slender basal part and a larger, prominently serrated distal part. Immediately under the foregoing great spinose bristles are a series of fine, elongate, hair-like bristles with

extremely finely attenuated tip, which is provided with minute tubercles, which cause foreign matter of various kinds to adhere to it. Ventral bristles stout and somewhat fragile, and with bifid tip which terminates with a simple, slightly bent hook; with a short, strong spur at the base.

The first pair of clytra are borne on the third parapodium. The fourth parapodium is also clytrophorous. The succeeding clytra seem to occur mostly on alternate parapodia. Their number seems to be about fifteen; they completely cover the back.

McINTOSH remarks that in the original specimen of *Palmyra aurifera* described by Savigny* the scales seem to have been removed or overlooked.

Family **Eunicidae.**

Body mostly long, consisting of numerous segments; prostomium distinct, either without any appendage or with tentacles and palpi; mostly with eyes. First one or two segments lack parapodia, with or without tentacular cirri. Parapodia mostly uniramous, with compound and simple bristles or only with simple bristles. Two or four anal cirri under anal opening. The protrusible jaw-apparatus consists of many maxillary pieces and of two mandibles.

Key to the genera found in Japan.

- a'*. Parapodium uniramous, with bristles of several kinds.
- b'*. Lateral halves of maxillary apparatus have an unequal number of jaw-plates, there being one plate more on the left than on the right prostomium provided with tentacles.

* Savigny :—Syst. d. Annél., p. 16 (1820).

- c'*. Tentacles 7 : 5 long posterior and 2 short anterior tentacles.
d'. Tentacular cirri absent *Hyalinoecia*.
d''. With 2 tentacular cirri.
 e'. Gills pectinate or cirriform.
 f'. Anterior parapodia not carried forward to
 the ventral side of prostomium . . . *Onuphis*.
 f''. Anterior two pairs of parapodia prolonged
 and carried forward to the ventral side of
 prostomium *Paranorthia*.
 e''. Gills plume-like *Diopatra*.
e'. Tentacles 5 in all, gills distinctly present.
 d'. With 2 tentacular cirri *Eunice*.
 d''. Tentacular cirri absent *Marphysa*.
e'''. Tentacles 3 in all, gills absent *Lysidice*.
e''''. Tentacles 2 in all, gills branched *Coelobranchus*.
b''. Lateral halves of maxillary apparatus with same number of
 jaw-plates; prostomium without a true tentacle.
 c'. With gills *Ninoë*.
 c''. Without gills *Lumbriconereis*.
a''. Parapodium uniramous, with bristles of simple kind only.
b'. First pair of jaws with large terminal fang. All the 4 pairs
 of jaws similar. *Laranda*.
b''. First pair of jaws without large terminal fang. . *Notocirrus*.

Genus *Hyalinoecia* Malmgren.

Prostomium with 2 anterior short, thick, and 5 posterior long tentacles provided with ringed ceratophore. Peristomium simple; tentacular cirri absent. Eyes small, situated somewhat behind and exterior to the median tentacle. Branchiae cirriform, very rarely branched. Tube horny, rigid without foreign material,

Hyalinoecia tubicola (Müll.)

Pl. XI, figs. 1—4.

1766. *Nereis tubicola*, Müller. Zool. Dan. Prod. No. 2625.
 1820. *Leodice* „ Savigny. Syst. Annel., p. 52.
 1833. *Nereis* „ Aud. et M-Edw. Litt. d. la. France, II, p. 154.
 1845. *Onuphis* „ Johnston. Annel. Mag. Nat. Hist. XVI, p. 6.
 1865. *Northia* „ „ Cat. Brit. Worms, p. 136.
 1868. *Onuphis tubicola*, Ehlers. Die Borstenwürmer, p. 297.
 1867. *Hyalinoecia* „ Malmgren. Annul. Polychaeta, p. 67.
 1877. „ „ Grube. Familie Eunicea. 55. Jahresber. d. Schl. Gesell. f. vaterl. Cult., p. 91.
 1903. *Hyalinoecia tubicola*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV, p. 444.

Body slender, uniformly yellowish brown, faintly iridescent. Number of segments 128; length of body 95 mm.; breadth at 10th segment 5 mm. including parapodia.

Prostomium short, with 5 much elongate tentacles annulated at base; outer lateral tentacles shorter than other posterior tentacles by one half the length. Eyes 2, behind base of posterior tentacles. Peristomium without any appendage. Segments short, the length equal to about one-third of the breadth.

Parapodium uniramous, with 2 fascicles of bristles, each fascicle with an aciculum and lanceolate slender bristles; the terminal part of the bristles is bent aside from the line of shaft and is sharp-edged. Pectinate bristles with 11 similar teeth. Posterior hook 2-toothed with a small guard. Dorsal cirrus of anterior segments not projecting much beyond tip of parapodium, but longer on more posterior segments; ventral cirrus shorter than the dorsal. Anal segment with 2 anal cirri.

Branchiae simple, filiform.

The worm lives in a tube which has a remarkable resemblance to the barrel of a quill; horny, smooth and translucent. It is about 140 mm. in length and 8 mm. in diameter at the mouth; the upper part of the wall of tube is thinner than the lower. The tube is tough, and not easily cut with knife.

Habitat:—Suruga Bay and Totomi Sea, in 63—167 fathoms (“Albatross”). A specimen of unknown locality is found in the Museum of the Zoological Institute, Imp. Univ., Tokyo, among the collection from Sagami Bay.

Genus *Onuphis* Aud. et M-Edw.

Prostomium with 2 anterior short, thick, and 5 posterior long tentacles provided with ringed ceratophore. Eyes small, situated somewhat behind and between median and lateral tentacles. Peristomium simple, with 2 tentacular cirri. Branchiae comb-like, or simple. The tube consists of sand-grains, small stones and fragments of shells; sometimes flat and broad.

Onuphis conchylega Sars.

Pl. XI, figs. 5—7.

1850. *Onuphis conchylega*, Grube. Fam. Annel, p. 292.
 1865. *Northia* „ Johnston. Cat. Brit. Worms, p. 138.
 1877. *Onuphis* „ Grube. Familie Eunicea, 55. Jahresber. d. Schles. Gessell. f. vaterl. Cult., p. 90.

Body elongated, a little tapering towards each extremity, convex dorsally, more flattened on ventral surface which is furrowed as usual in the median line; yellowish brown in colour, with faint iridescent lines across sutures. It measures 55 mm. in length and 3.5 mm. in breadth at the 10th segment.

Prostomium small, with 2 lobe-like anterior, and 5 greatly but unequally elongated posterior tentacles (fig. 5). Eyes 2, situated laterally and near the posterior margin of prostomium. Tentacular cirri short, about $1\frac{1}{2}$ the length of peristomium.

Segments short, subequal, with a protuberant parapodium on each side. Each parapodium of the first and the second pair projects forwards on each side of prostomium; that of the former reaching a little beyond the front margin of prostomium. These two pairs of parapodia are armed each with about four strong simple bristles slightly curved at the apex, which is thick and not very acute. From the third pair on, the parapodia stretch out laterally, and are provided each with an elongate dorsal and a shorter ventral cirrus as well as with two small fascicles of bristles. These bristles are all simple, smooth, slender, but unequal, the shaft being obliquely bent. There is an aciculum in each fascicle, distinguished by its straight figure. There appear to be about 14 segments with parapodia thus furnished. Further posteriorly the character of body-segments changes; there the body becomes soft and the segments somewhat longer, these being internally filled with a glairy mucous and egg-like bodies that communicate a mottled appearance to the parts. The parapodia of this part of body are very small, and the bristles, although all simple, are of 4 kinds: 1st, the spines; 2nd, bristles with short, curved and sharply pointed tip (fig. 6); 3rd, bristles with more elongate tip; and 4th, the two bristles with strong shaft and forcipate apex (fig. 7) provided with guard.

The tube is flattened, formed of agglutinated fragments of shells and gravel.

Habitat:—Yodomi in Sagami Bay (!); Suruga Bay ("Albatross").

Onuphis macrobranchiata (McIntosh).

Pl. XII, figs. 1—3.

1885. *Nothria macrobranchiata*, McIntosh. "Challenger" Annel., p. 3201903. *Northia* ,, Moore. Proc. Acad. Nat. Sc. Philad.

Vol. LV, p. 445.

Body slightly narrowed in front, nearly uniformly broad for the greater part of its length, though tapering again at the posterior end. It measures 78mm. or more in length, and its widest part about 6mm. in breadth including parapodia.

Prostomium with moderately elongated tentacles; the median tentacle shorter than others in adjacent position. The base of external tentacles is carried farther forward than in *Onuphis conchylega*; the anterior tentacles are similar to those of *O. conchylega*; the 2 tentacular cirri about as long as in that species.

The first pair of parapodia are directed forward as in *O. conchylega*; with both dorsal and ventral cirri and a setigerous lobe.

The bristles (fig. 1) have somewhat abruptly curved tip; with hooked end, and with a broad, pointed process immediately beneath it. The guard extends considerably beyond the hooked end.

Branchiae begin to occur on 8th segment as a small process on each side; on the 9th they are well developed and long, but simple; they continue to be of the same shape nearly to the posterior end of body, and on the 2nd in front of preanal segment they still equal the parapodium in length. At the 20th parapodium the branchia is more than twice as long as the dorsal cirrus.

Maxillae are distinctly widened in the middle; the posterior appendages are slightly constricted behind maxillae, and then form broad plates without a posterior median notch. The great dental plates with 6 teeth behind the long anterior fang on the left, and 9 teeth on the right. The left unpaired plate with 11 teeth; and the paired lateral plates with 10 teeth each. A single rectangular accessory plate exists on each side. Mandibles with about 3 prominent teeth on the cutting edge.

This species occupies tubes of grayish mud, internally lined with the usual tough secretion and externally strengthened with pine needles, pieces of leaf-stalks, straws, sand-grains, fragments of Echinoderm-shells, and other structures.

Habitat:—"South of Yedo," 345 fathoms ("Challenger"); Sagami Bay, 100 fathoms ("Golden Hind"); Suruga Bay and Totomi Sea, 31—749 fathoms ("Albatross").

Onuphis willemoesii (McIntosh).

Pl. I, fig. 7.

1885. *Nothria willemoesii*, McIntosh. "Challenger" Annel., p. 322;
Pl. XLI, figs. 4—10.

Prostomium with median and lateral tentacles of a considerable length; of a pale buff colour.

The appearance of the postcephalic region of the dorsum resembles that of an *Eunice*, on account of the great development of the branchiae; but the ventral surface, especially its anterior parts, is at once diagnostic.

The first four pairs of parapodia are directed anteriorly along the ventro-lateral sides of the anterior part of body. Each setigerous lobe of these parapodia, i.e., from the first to the fourth,

bears a tuft of inconspicuous bristles which are directed downward rather than outward. The ventral cirri and setigerous lobes of the four pairs of parapodia diminish in size from before backward, but the dorsal cirri do not alter much. The latter are thick, knife-shaped processes of a moderate length. The setigerous lobe bears posteriorly an elongated conical process, which also diminishes in size from before backward. The ventral cirrus is somewhat conical, and ceases to exist outside of the region. Each setigerous lobe bears two or three stout acicula on the convex margin of the tuft, followed by a series of rather short bifid bristles, the terminal hook of these being a little longer than the one below it. The entire extremity is guarded.

The next region of the body commences at the fifth segment, and is characterised by the elongation of dorsal cirrus, and by the conversion of ventral cirrus into a flattened glandular scute. The first scute is the smallest, and from the second posteriorly the scutes rapidly increase in size, so that between the fourth and the tenth segment they attain maximum size, but again to diminish somewhat in size posteriorly.

The thirtieth parapodium shows a branchial process of two divisions, and the dorsal cirrus is very attenuate. At the fortieth parapodium the branchia has four lateral branches, and at the base it is thicker than the dorsal cirrus, which now appears as a small appendage of the branchia.

Dental apparatus brownish in colour. Anterior part of maxillae strongly curved, its posterior appendage short and broad with a median notch posteriorly. Both right and left great dental plate with 10 teeth each, the left unpaired plate with 9 teeth. The left lateral plate with 11 teeth, and the right with 12 teeth. Two accessory plates occur on each side.

The tube (Pl. I, fig. 7) of this species is one of the most remarkable. It is about 200 mm. long and 8 mm. thick, with one end strongly bent in a somewhat hook-like manner. It is firm and is coated externally with a greyish sandy mud and internally with a tough whitish secretion. The surface of the straight part of the tube is comparatively smooth, but the curved posterior part is furnished with numerous long and slightly bent elastic spines of a length 4 or 5 times the diameter of the tube. These spines are composed of a hyaline secretion in concentric layers.

Habitat :—Sagami Bay ; Gulf of Kagoshima in Prov. Satsuma.

Onuphis geophiliformis (Moore).

Pl. XI, figs. 8—9.

1903. *Northia geophiliformis*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LX, p. 445.

Body consisting of about 140 segments, measuring 23 mm. in length, 3 mm. in breadth including parapodia. It is slenderly elongated, depressed and slightly tapering posteriorly in the posterior three-fourths of its length.

Prostomium small, narrow, inconspicuous, closely united with peristomium. Eyes absent. Anterior tentacles prominent, rather slender, as long as prostomium in length. Palpi about twice the length of anterior tentacles and projecting almost horizontally outward from ventro-lateral sides of prostomium. Posterior tentacles large and conspicuous, with remarkably long annulated ceratophore, and, excepting the outer lateral tentacles, with long, slender, whip-like styles; median tentacle distinctly smaller than the inner laterals, its tip reaching to 8th segment, while the latter reach to 11th; the outer laterals short, reaching to 4th segment;

the length of its ceratophore equals, or even exceeds, that of the style. Tentacular cirri slender, reaching to tip of anterior tentacles.

The first 4 setigerous segments distinguished from the others by their greater length, as well as by the longer and more slender cirriform process of parapodia. The first segment is the longest of all, and in its anterior parts the widest; the succeeding three segments become successively shorter, thus gradually approaching typical form, which is short, wide and depressed with nearly flat dorsal and ventral surfaces. Anal segment somewhat funnel-like, with a pair of crowded, long, slender caudal cirri.

Branchia simple, appearing as a direct continuation of the base common to it and dorsal cirrus. It is erect and just reaches the middle line of back when best developed. Branchiae appear on 5th parapodium as a slender filament equalling the cirrus in length, but posteriorly they quickly increase to a considerably greater length, and then continue to exist without change except undergoing a slight decrease in size as far the 110th segment.

Hooked bristles are confined to the first three pairs of parapodia; their end with 3 processes, of which the terminal one is the longest; guard prolonged into an acute tip which reaches far beyond the body of the bristle (fig. 8). Slender setose bristles present in all parapodia. Pectinate bristles with slender stems and obliquely truncate, slightly curved terminal blades bearing about 16 delicate teeth. Posterior hooks, 2 in number, with longitudinally striated stem and bifid guarded tip (fig. 9).

Tube delicate, mucoid, covered with fine mud.

Habitat:—Yahagi line, about 290 fathoms, in Sagami Bay; "North of Sendai Bay," 62 fathoms ("Albatross"); Sagami Bay 175–191 fathoms ("Albatross").

Onuphis cirrobranchiata (Moore).

Pl. XII, figs. 4—6.

1903. *Onuphis cirrobranchiata*, Moore. Proc. Acad. Nat. Se. Philad. Vol. LV, p. 451.

Body consists of about 60 segments, measuring 42 mm. in length, 2.5 mm. in breadth excluding parapodia and 5.5 mm. including them at 10th segment.

Prostomium small, nearly semicircular in dorsal aspect. Eyes 2, reddish-brown; anterior tentacles rounded, $\frac{1}{2}$ the length of prostomium. Tentacles with short annulated ceratophores; styles enlarged at base; median tentacle the longest, reaching to 14th segment; the inner laterals reach to 11th, and the outer laterals to 4th segment.

Tentacular cirri scarcely reaching to anterior boundary of prostomium, and posteriorly to the middle of 3rd segment. The 3rd segment is nearly equal in length to prostomium and peristomium combined or to 4th and 5th segments combined; its anterior margin much wider than the posterior and projecting laterally beyond any other anterior segment. Remaining segments are all of about equal size except in the tapering posterior region.

Branchiae begin to appear from 13th or 14th segment usually as a single and rarely as two filaments. The number of filaments increases posteriorly, and by 18th or 20th segment it reaches to 5, which state is maintained to about the 35th; after that the filaments gradually decrease in number posteriorly, and in about the 57th segment they are entirely replaced by small branchial tubercles. The 59th, the last parapodiated segment, has neither branchial filaments nor tubercles.

Bristles in 4 kinds, of which two are coarse uncini. Compound uncini confined to anteriormost 4 parapodia; their appendix curved, bifid, the terminal process large and hooked, the accessory process much smaller, both included in a guard. From the 5th parapodium posteriorly, simple uncini replace the compound uncini just described. They are yellow, stout, nearly straight, subterminally slightly swollen, the end provided with two processes, of which the proximal is the larger; guard obliquely fan-shaped and striated; stem rather coarsely striated. Slender and pointed bristles occur in all parapodia except the first. The 4th kind of bristles begins to appear in the 2nd parapodium. They have a slender stem terminating with a delicate funnel-shaped enlargement with crenulated margin.

Habitat:—Sagami Bay, about 310 fathoms (Mr. K. AOKI); Suruga Bay, 167 fathoms (“Albatross”); Sagami Bay 153 fathoms (“Albatross”).

Onuphis holobranchiata Marenz.

Pl. XI, figs. 10—12.

1879. *Onuphis holobranchiata*, Marenzeller. Süd-jap. Annel. I., p. 24; Taf. IV, fig. 1.
1903. *Onuphis holobranchiata*, Crossland. Marine Fauna of Zanzibar and Brit. East Africa. Proc. Zool. Soc. London. Vol. II., p. 135.

The colouration of the living animal is characteristic. Fundamentally it is of a light flesh-tint ventrally and a light yellow-brown dorsally with metallic iridescence, but a small area in the middle of each segment is white. The dorsal surface, however, as far down as the 30th segment, is largely covered with markings of a rather dark purple-brown colour. These markings are most numerous and closely placed at the base of parapodia, with

the exception of the first 3 or 4. On either side of the white central marks are slender transverse lines, present in three pairs to each segment.

The body measures about 60 mm. in length, comprising about 120 segments, and 4 mm. in breadth excluding bristles and parapodia.

Prostomium colourless, but with a violet spot in the middle line. The median tentacle reaches to 7th segment; the inner lateral is a little shorter, its basal joint being, however, a little longer than that of the median tentacle. The basal joint of outer lateral tentacle is longer than that of the inner paired one; the styles nearly equal in length to the basal joint, stout, scarcely reaching $\frac{1}{2}$ the length of inner tentacle. The short and thick frontal tentacles about as long as the prostomium itself; the stouter palpi are somewhat longer. Eyes 2, situated outside the inner paired tentacle.

Peristomium 3 times as broad as long, with 2 tentacular cirri of about the length of the segment.

Each parapodium provided with a single branchial filament.

First 4 pairs of parapodia with a conical posterior and a small finger-like anterior lobe each, and also with a well-developed ventral cirrus. From the 5th parapodium posteriorly the ventral cirrus and the anterior lobe are not observed. The branchial filament increases in length posteriorly, so that in the 30th segment, the tips of branchiae on both sides of the body cross each other over the median line of the dorsal surface.

Bristles in 4 kinds; 1stly, the compound bristles with a large and a small teeth below the terminal fang (fig. 11.); 2ndly, the simple and guarded bristle; 3rdly, the fine pectinate bristle; and 4thly, a large hook with 2 large curved teeth (fig. 12).

Maxillary forceps are somewhat longer than their posterior processes. The great right and left dental plates have each 6 teeth. The left unpaired dental plate with 7 teeth; the paired lateral plates with 12 teeth on the right, and 4 large teeth on the left. An accessory plate on each side. The mandibular plates long, each with rather distinct parallel lines below the cutting edge which shows two shallow notches.

Habitat: Misaki (!); eastern shore of Yenoshima, Prov. Sagami (Dr. KOERBL.).

Genus *Paranorthia* Moore.

This genus differs from *Onuphis* (*Northia* Johnston) in having the two anterior pairs of parapodia prolonged and directed forward on the ventral side of prostomium, their bristles being coarse acicula like those of *Onuphis*.

Paranorthia brevicornuta Moore.

1903. *Paranorthia brevicornuta*, Moore. Proc. Acad. Nat. Sc. Philad. Vol. LV., p. 448; Pl. XXV, figs. 52—56.

In the absence of my own observations on this species, here is given an extract from MOORE'S original description.

Prostomium nearly round, eyes absent; tentacles all in the anterior half of prostomium. Anterior tentacles globoid; posterior tentacles with ceratophore.

The first two pairs of parapodia are enlarged and bent forward beneath the prostomium as in *Rhamphobrachium**, while the third pair is not similarly modified as in that genus. The first reaches the level of the anterior margin of prostomium, and

* Memoirs of the Museum of Comp. Zool. Harv. Coll. Vol. XV., p. 70.



- A. Compound bristle from 3rd. parapodium of *Paranorthia brevicornata*, 820/l.
 B. Compound bristle from 4th parapodium of same. 480/l.
 C. Pectinate bristle from 13th Parapodium. 480/l.
 D. Hook from 11th parapodium. 480/l.

[After J. P. Moore].

the second as far as the base of the median tentacle. The third and all succeeding parapodia are small and project straight forward.

Typical parapodium (the tenth) short, truncate; with a small anterior lobe, a tapering bent dorsal cirrus of about twice the length of the parapodium, and a small ventral cirrus.

Branchiae begin to occur on the 10th segment, on each side as a single thick filament arising from the dorsal side of the dorsal cirrus. The branchia is bifid on the 23rd segment, and thence backward stands out erect in two equal divisions twice as long as the cirrus.

The first two enlarged parapodia bear each 3 large bristles. Succeeding parapodia with compound, pectinate and capillary bristles. Compound bristles of two kinds: those with short strongly hooked and bifid tip having a guard, and those without guard and with the blade long straight or only slightly curved. Capillary bristles slender, tapering, very acutely pointed, with a narrow smooth-edged wing. Pectinate bristles with asymmetrical curved ends, provided with about 20 very fine teeth of equal length. Hooks slender, not exceeding the longer compound bristles in thickness, nearly straight, slightly enlarged below the tip, which is bifid and is provided with a broad guard.

Habitat :—Suruga Bay, 45 fathoms ("Albatross").

Genus *Diopatra* Aud. et M-Edw.

Prostomium with 2 anterior short and thick, and 5 posterior long, tentacles provided with ringed ceratophore. Eyes 2, situated between unpaired and paired middle tentacles. Peristomium simple, with 2 tentacular cirri. Branchiae plume-like. Tube consists of various material.

Diopatra sugokai n. sp.

Pl. I, fig. 6 ; Pl. XI, figs. 13—16.

Body consisting of about 300 segments, measuring 450 mm. in length, and 16 mm. in breadth including parapodia at about 30th segment.

Prostomium small but distinct, with 2 short anterior and 5 long posterior tentacles. The unpaired median tentacle is the longest, its tip reaching to the anterior margin of 9th segment, and its ceratophore taking up about $\frac{1}{5}$ of the entire tentacle length; the anterior short tentacles about equal in length to the median tentacular ceratophore. A pair of palpi stout. Eyes scarcely visible. Peristomium with 2 small tentacular cirri.

Branchiae plume-like; they begin to exist usually from the 4th and very rarely from the 5th segment. They attain their maximum length of 15 mm. on the 5th segment; after that they gradually diminish in length posteriorly and entirely disappear on about 70th segment. Anal segment with 2 short and 2 long anal cirri.

Colour of living animal reddish brown, the dorsal surface of the anterior portion of the body being tinted by deep bluish pigment and showing strong iridescence; the ventral surface of a light pink colour with yellowish shade, faintly iridescent.

Branchiae deep red, the filaments arranged in a spiral line around the stem.

Parapodium somewhat long, though not well-developed; directed antero-laterally in 2nd–4th segments, which have no branchiae; both dorsal and ventral cirrus long, with 2 kinds of strong curved bristles (fig. 15).

From the 4th segment posteriorly, in those segments which have branchiae, the parapodia are very small; both dorsal and ventral cirrus also diminished in size. Especially the ventral cirrus of the 6th and 7th parapodia is small, being represented by a mere protuberance.

Setose bristles almost straight (fig. 13), provided with wing; pectinate bristles with unequal sides and 9 teeth (fig. 14).

Dental apparatus tinted by deep brownish black pigment. Maxillary forceps moderately curved, the basal portion being large; from the middle on they taper gradually toward the tip. The left great dental plate with 10 teeth, and the right with 9. The left unpaired plate with 10 teeth. The left paired lateral plate with 4 teeth, and the right with 8 teeth. Mandibulae long, their anterior end widened and with calcareous mandibular plates, with irregularly denticulated cutting edge.

The tube (Pl. I, fig. 6), in which this annelid lives, is very characteristic. It consists of sandy grains, fragments of shells, leaves of various land plants, and pieces of algae cemented together by a secretion of the animal. The upper part of the tube exposed above the sandy flat, is composed of almost entire leaves of bamboos or trees and of other substances, so that the abode of the worm can be easily made out at a glance.

This animal is greatly used as bait, and is locally known under the name of “Sugokai”, or “Fukuroisomé”.

Habitat :—Hanéda, on the western coast of the Gulf of Tokyo (!) ; Misaki (!) ; Watanoha, on the northern coast of Matsu-shima Bay (!) ; Prov. Boshu (Mr. H. KUWANO).

Genus *Eunice* Cuvier.

Prostomium with 5 posterior tentacles, their ceratophore very short and never annulated ; anterior short tentacles absent. Eyes situated behind posterior tentacles. Two anteriormost segments without parapodia. Second segment provided with 2 tentacular cirri. Anal cirri 4. Branchiae comb-like, rarely simple throughout. Both halves of maxillary apparatus have an unequal number of jaw-plates, there being one plate more on the left than on the right.

Eunice aphroditois (Pallas).

Pl. II, fig. 2 ; Pl. XIII, figs. 1—6.

1788. *Nereis aphroditois*, Pallas. *Marina varia nova et rariore*. *Nova. Acta Acad. Sci. Imp.-Petropolitanae*. Tom. II., p. 229. Tav. V, f. 1—7.
1820. *Leodice gigantea*, Savigny. *Syst. Annel.*, p. 49.
1834. *Eunice gigantea*, M-Edward. *Le règne animal. Annel.*, pl. 10.
1850. „ *aphroditois*, Grube. *Fam. d. Annel.*, p. 292.
186. „ *gigantea*, Quatrefages. *Hist. d. Anneles*, p. 311.
1868. „ *aphroditois*, Ehlers. *Die Borstenwürmer*, p. 306.
1878. „ „ Grube. *Annulata Semperiana*, p. 146.
1885. „ „ McIntosh. “Challenger” *Annel.*, p. 282.

Body very large, measuring one metre or more in length and about 20 mm. in breadth at the widest region. Number of segments up to 430. In the anterior region of body the segments are highly arched dorsally, and gradually become low-arched toward the posterior end. The colour of the living animal is black with strong metallic iridescence, and usually the 6th and 7th segments are lighter coloured.

Prostomium with 5 smooth tentacles, the median being the longest and reaching to the anterior margin of 3rd segment; the inner laterals shorter, reaching to the anterior margin of 2nd segment; the outer laterals still slightly shorter. Eyes 2, each being situated between and a little behind the bases of the inner and outer lateral tentacles. Anterior margin of prostomium divided into 4 lobes, those of the inner pair being pear-shaped and constricted from the outer broad, ventro-laterally directed lobes.

The first segment almost 3 times as long as the next following, which is marked off from the first only in the dorsal aspect; the second segment provided with 2 short and smooth tentacular cirri.

Parapodium (fig. 3) with a smooth and slender dorsal, and a short and conical ventral, cirrus.

Bristles are of three kinds; the dorsal group consists of simple setose (fig. 4) and slender pectinate (fig. 5) bristles, while the ventral group is made up of stout compound bristles, of which the short and stout end-piece is provided with 2 teeth (fig. 6). Acicula black; usually 3, rarely 2, in each parapodium.

Branchiae pectinate, begin to occur on 8th—10th segment as a simple filament, but are soon divided, attaining maximum development on about 50th segment, where the branchial fila-

ments number as many as 30 on each side; then they remain in nearly the same structure (fig. 3) throughout the greater part of the body. Finally in a few posteriormost segments, the branchiae are reduced to simple protuberances.

Maxillae deep brownish black; the forceps gently curved, being 3 times as long as their posterior processes; the great dental plates with 4 teeth on the left, and 5 on the right; the left unpaired plate with 5 teeth; the paired lateral plates with 3 teeth on the left and 7 on the right. Two accessory lateral pieces are found on each side. The mandibles as long as the maxillary forceps and their posterior appendages taken together, rod-like, with white jaw-plates, the cutting edge of which is indistinctly serrated.

This annelid secretes a pale whitish mucous tube, in which it lives. Once I have kept it alive for more than 4 weeks in an aquarium at Misaki; it has secreted, in the course of one night, a pretty thick tube in which the body was entirely concealed.

Habitat:—West of Jōgashima, Misaki (!); Okinosé in Sagami Bay; West coast of Bōshiu; Ariaké-Ura in Prov. Hyuga.

Eunice indica Kinberg.

Pl. XIII, figs. 7—9.

1865. *Eunice indica*, Kinberg. *Annulata nova*, p. 562.

1879. „ *congesta*, Marenzeller. *Süd-jap. Annel*, p. 26, Taf. IV, fig. 2.

1904. „ *indica*, Crossland. *Marine Fauna Zanzibar*, p. 318.

The body measures about 90 mm. in length and about 4 mm. in breadth excluding parapodia. Number of segments up to 195. The whole body appears flattened; the broadest and flattest part

of body not far behind head, near the beginning of the branchiferous region, i.e., at about the 10th segment.

The general colour is a light brown; somewhat darker in intersegmental grooves.

Prostomium somewhat conical in shape, with a very small notch in its anterior border, deeply grooved below. Tentacles 5, all smooth; the median longest, equalling the anteriormost 6 segments in length; the inner laterals a little shorter; the outer laterals still shorter, equal to half the length of the median. Eyes 2, large, and of the form of a rounded triangle. Tentacular cirri remarkably long, extending beyond anterior border of the buccal segment, in some cases even beyond the front of prostomium.

Parapodia comparatively long and slender, with long bristles; dorsal and ventral cirri well developed (fig. 7), but not annulated.

Bristles are of 4 kinds; the long setose, and the pectinate bristles in the dorsal bundle; the compound bristles (fig. 8) with short, 2-toothed and guarded end-piece; the posterior hook (fig. 9) with a large subterminal tooth.

Large branchiae cover the anterior one-third of the body, commencing usually on 7th—10th segment, but very rarely on the 4th, and disappearing on 40th—50th segment. Maximum number of filaments 20.

The dental apparatus yellow in colour, characterized by the small size, delicacy and calcareous composition of its plates and by the asymmetry of the great dentals. The great dental plates with 9 teeth on the right, and 6 on the left; the unpaired left plate with 5 teeth; the paired lateral plates with 7 teeth on the right, and 6 on the left; two unequal accessory pieces on each side. The cutting edge of mandibles with 3 teeth on the left, and 2 on the right.

Habitat :—Gulf of Agu in Prov. Shima (!) ; Yenoshima in Prov. Sagami.

Eunice micropriou Marenzeller.

Pl. XIII, fig. 10.

1879. *Eunice micropriou*, Marenzeller. Südjav. Annel., p. 27, Taf. V, fig. 1.

Body consisting of 134—144 segments ; widest at about the 20th segment, where it measures 8 mm. including parapodia ; tapering toward both ends ; the breadth of peristomium equal to that of about the 140th segment ; length 140—165 mm.

Prostomium with 5 tentacles, the bases of which are covered by the anterior margin of the first segment. The median longest tentacle reaches to the 6th segment ; the inner laterals to the 5th ; the outer laterals a little shorter than the latter. Eyes 2, each placed behind the base of the outer lateral tentacle. All the tentacles faintly annulated.

The first segment long, being longer than the succeeding 3 segments taken together ; the second scarcely $\frac{1}{2}$ the length of the third or the first parapodiated segment, provided with 2 tentacular cirri, which extend a little beyond the anterior margin of the first segment.

Parapodium short, with 2 black acicula, which extend far beyond lateral margin of parapodium. Bristles in the dorsal bundle are of winged-setose and pectinate kinds ; the ventral bundle consists of compound bristles with short, stout, 2-hooked end-piece, having narrow guard (fig. 10). Dorsal cirrus long, broad-based and slightly annulated at wide intervals. Its length

equals $\frac{1}{2}$ the width of the body. Ventral cirrus short, conical, with broad base.

In posterior parapodium the ventral cirrus becomes much slender, and extends beyond tip of the parapodium.

Branchiae begin to appear on the 6th segment, each consisting of 3 filaments. The number of filaments increases to 8 on the 11th parapodium, and then again decreases posteriorly, becoming 6 on the 30th parapodium and 3 on about the 140th. They do not reach to the dorsal median line of body.

Maxillary forceps slender, their length being about 3 times that of the posterior processes. The great dental plates with 5 teeth on the right, and 6 on the left. The unpaired left plate with a small anterior and 4 large posterior teeth. The paired lateral plates with 7 teeth on the right, and 4 on the left. Two unequal sized accessory plates on each side of the latter.

The anterior broadened edge of the mandibles is irregularly serrated, the right with 3 teeth, and the left with 4. Mandibles of a light colour; their posterior elongated parts slender and black.

Habitat:—Sagami Bay (!); Misaki (!); Japan (MARENZELLER).

Eunice kubiensis McIntosh.

Pl. XIII, figs. 11—12.

1885. *Eunice kubiensis*, McIntosh. "Challenger" Annel, p. 278.

Body consisting of 60–75 segments, measures about 60 mm. in length and about 3.5 mm. in maximum breadth including parapodia.

Prostomium with deeply cleft anterior margin. Median

tentacles long, reaching to 10th or 11th segment, and annulated at wide intervals. Inner lateral tentacles about $\frac{2}{3}$ as long as the median, annulated at short intervals; the last feature more evident in the outer lateral tentacles.

Peristomium comparatively short. Tentacular cirri extend considerably beyond its anterior margin.

Branchiae are represented on each side by a minute process on the 3rd parapodium, and on the 10th by 6 filaments of a moderate length. On the 20th parapodium, the branchia has 8 filaments arising from a main stem at nearly equal distances. On the 30th parapodium there are 7 filaments, on the 40th 3; and finally on the 50th no branchia.

Setose bristles long, tapering to fine extremity, without distinct wing but with flattened and serrated tip. Compound bristles with a short terminal piece (fig. 12), the end of the shaft somewhat enlarged, serrated along the convex side of the curve. Posterior hook presents a single, large, strong fang with a curved terminal process.

Dental apparatus pale brownish, with several darker and lighter colored bands. Maxillae moderately arched; the left great dental plate with 7 teeth, the right with 8; the left lateral paired plate with 10 teeth, the left unpaired with 8, both sets of teeth being comparatively small; the right lateral plate with about 12 small teeth. An accessory plate on the side of each paired plate.

Habitat:—Kanagawa in Prov. Musashi; Misaki (!); “Off Kobé, 8–58 fathoms” (“Challenger”).

Eunice tibiana (Pourtales).

Pl. II, fig. 3.

1867. *Marphysa tibiana*, Pourtales. Bull. Mus. Comp. Zool. Harv. Coll., Vol. I, p. 108.

Body consisting of about 120 segments, measures about 40 mm. in length and 2 mm. in breadth including parapodia and at about the middle of body. Colour of body reddish, slightly iridescent.

Prostomium small, with 5 tentacles; median tentacle very long, reaching to about 24th segment when laid back along the body; inner lateral tentacles about $\frac{2}{3}$ the length of the median; outer laterals about $\frac{1}{4}$ the length of same. Eyes 2. Tentacular cirri 2, situated nearly dorsally, their tips extending slightly beyond the anterior margin of prostomium.

Parapodium short, with a long slender dorsal, and a short conical ventral, cirrus; anal cirri short.

Branchia almost rudimentary; in the shape of a small club-like appendage to the dorsal cirrus on 6th or 7th parapodium; on 13th parapodium elongated and 2-branched; on 30th parapodium 3-branched; and on about 120th parapodium reduced to a simple form.

Compound bristle with a small lancet-shaped, two-hooked and guarded end-piece. Tip of posterior hook bifurcated and guarded.

Maxillary forceps gently curved, with posterior appendages of a moderate length. The great dental plates with 8 teeth on the left and 9 on the right; left unpaired plate 10-toothed; lateral plates with 7 teeth on the left, and 11 teeth on the right. Man-

dibles large, broad, with white calcareous plates.

The tube, in which the worm lives, is characteristic (fig. 3). It is horny, dark brown, regularly wavy in form; at every bend there is a tubulated aperture directed backwards and with expanded fimbriated border.

Habitat :—Sagami Bay, 100 fathoms ("Golden Hind").

Eunice vittata (Delle Chiaje).

Pl. XII, figs. 7—9.

1829. *Nereis vittata*, D. Chiaje. Memorie, Vol. IV, p. 15.
 1868. *Eunice limosa*, Ehlers. Die Borstenwürmer, p. 348.
 1885. *Eunice vittata*, McIntosh. "Challenger" Annel., p. 275.
 1885. „ „ St. Joseph. Ann. Sc. Nat. Zool, Tom. V, p. 272.
 1903. „ „ Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 435.

Body highly arched dorsally, tapering much toward posterior end. Each segment with 2 brownish transverse bands. Number of segments about 85; length 40—45 mm.; breadth 2.5 mm.

Prostomium provided with 5 long and smooth filamentous tentacles; palpi 2.

The first segment twice as long as the second, which is provided with 2 smooth tentacular cirri; tip of these scarcely reaching to the anterior border of the first segment.

Parapodium with a slender smooth dorsal and a short conical ventral cirrus. Bristles in the dorsal fascicle are of pectinate and setose kinds; the ventral fascicle consisting of compound bristles, the two-hooked end-piece with minute hair-like spikes and the guard prolonged to form a conical tip (fig. 8),

Posterior hooks (fig. 9) 2 or 3 in number, 3-toothed, and provided with guard.

Branchiae confined to the anterior parts of body, being present on 5th-36th segments, much longer than dorsal cirrus, with long and slender filaments up to 12 in number.

Anal segment with 2 long slender dorsal and 2 short ventral anal cirri.

Great dental plates with 9 teeth on the left, and 10 on the right; the left unpaired plate with 7 teeth; the paired lateral plates with 6 teeth on the left, and 10 on the right.

Mandibles much tapering posteriorly (fig. 7); their cutting edge broad.

Habitat:—Tatokujima in Prov. Shima (!), Suruga Bay, 67-75 fathoms ("Albatross").

Eunice flavopieta n. sp.

Pl. XIV, figs. 1-5.

Body, consisting of 166 segments, measures 215 mm. in length and 6 mm. in breadth excluding parapodia, and 10 mm. including them, at the 10th segment where it is broadest. Breadth in the middle of body, 5.5 mm. including parapodia. It slightly tapers anteriorly to the 2nd segment, and very gradually toward posterior end. Dorsum highly arched and ventral surface almost flat, in the greater part of the body.

The colour in the living animal, both dorsally and ventrally, is a deep purple with light metallic iridescence, except the dorsal surface of the 6th (or the 4th parapodiated segment) and the 3 transversely arranged roundish spots on the dorsal surface of segments, all which parts are of a bright yellow colour. Some-

times the entire dorsal surface of the 7th segment is of a yellowish purple colour. Median yellow spots are found from the 5th segment, or the 3rd parapodiated segment, to nearly the posterior end of the body; lateral yellow spots seen in about the anterior $\frac{3}{4}$ of the body beginning from the 7th segment.

Prostomium small, bilobed, with 5 tentacles, of which the median is the longest and reaches to the 4th segment; the inner laterals reach to the 3rd segment, and the outer laterals to the 2nd. All the tentacles are faintly annulated. Each of the palpi consists of a small median and a large lateral part. Eyes 2, placed at base of the outer lateral tentacles.

The first segment large, longer than broad; the second dorsally separated by an indistinct transverse groove from the first, very short, provided with 2 small tentacular cirri, which are about equal in length to that of the 2 succeeding segments taken together.

Parapodium as long as high, with a short posterior and a long anterior lobe more rounded than the posterior. Dorsal cirrus long, slightly annulated, extending far beyond tip of parapodium; ventral cirrus bluntly conical, with large basal enlargement, reaching nearly to tip of the parapodium. The simple bristle (fig. 2) long and slender, with a very narrow wing at its basal parts only; the pectinate bristle (fig. 3) with 9 similar teeth; the compound bristle (fig. 4) stout and its shaft very slightly curved near tip, the end-piece with a large, nearly triangular tooth and a small, very sharp tooth below the fang, besides 6 small teeth between the terminal fang and the larger tooth. The posterior hook (fig. 5) 2-toothed, provided with a short guard.

Branchiae begin to occur on the 7th segment, each with 4 branchial filaments; on the 8th, the filaments suddenly increase

to 14 or 15 in number; on the 16th, to 18 or 19, which number is kept up to about the 50th segment; thence the number decreases posteriorly, there being 9 filaments on the 103rd segment, only one on the 150th, and none on the 196th.

The anal segment is provided with 2 rather long, and 2 very short, anal cirri.

Maxillary forceps slender and moderately curved, almost 3 times as long as their posterior appendage, which is constricted in the middle and has a median notch posteriorly. Great dental plates with 4 teeth on the left, and 5 on the right. Unpaired left plate with 6 teeth; curved lateral plates with 4 teeth on the left, and 9 on the right. Two accessory plates on each side, the inner large and black, the outer small and white. Mandibles diverge posteriorly; the anterior dental plates calcareous, and the cutting edge irregularly serrated.

Habitat:—Misaki (!); Ushibuka in Prov. Higo (Mr. S. TAKAHASHI).

Eunice mucronata Moore.

Pl. XIV, figs. 6—7.

1903. *Eunice mucronata*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 437.

Body measures 140 mm. or more in length and 4 mm. in breadth at the posterior end of the anterior fourth of the body. Number of segments about 125. Body as a whole somewhat depressed, most so in the branched region, strongly convex dorsally in the prebranched and caudal regions, but ventrally flattened throughout.

Prostomium slightly broader than long, the length about

equal to that of the first segment, anteriorly deeply bilobed. Eyes 2, large, purple, situated near the posterior margin of prostomium. Tentacles all long, slender, tapering, faintly annulated, the median reaching to the 13th segment, the inner laterals to the 11th, and the outer laterals to the 4th. Tentacular cirri long and slender, extending a little beyond the anterior margin of the 7th segment.

Two long anal cirri equal the 9 last segments in length.

Parapodium short, little tapering, truncate and somewhat bilobed; ventral cirrus with enlarged base, bearing small lobe-like terminal piece (fig. 6); dorsal cirrus slender, sufficiently long to reach the dorsal median line.

Bristles of three kinds, all slender, delicate and colourless. Firstly, compound bristles found in the ventral bundle; shaft curved, with an abruptly enlarged short end, serrated on one margin; the end-piece slender, elongated, with weakly hooked and faintly bidentate end, the margin finely serrated, the guard greatly prolonged into a mucronate tip equal in length to $\frac{1}{2}$ or more than $\frac{1}{2}$ that of the end-piece (fig. 7). Secondly, very slender, elongate, setose bristles. Thirdly pectinate bristles, terminating with 9 or 10 teeth, of which the 2 marginal ones are somewhat unequally prolonged. Posterior hooks with guarded, trifold tip.

Branchiae occur from the 5th to about the 36th segment; they appear on the 5th segment as a small process; they are elongate and simple on the 6th, become trifold on the 8th, and have 4-6 branches on the 9th, 7-9 branches on the 11th, 14 branches on the 18th or 19th, which last number is retained to about the 30th segment and then falls rapidly to 10, 7, 5 and none on successive segments.

Mandibles with white calcareous plates. Maxillae of the usual form, their posterior appendages only $\frac{1}{4}$ as long as the maxilla proper and scarcely exceeding in width the base of same.

Habitat :—Nakano-Yodomi, in Sagami Bay, about 80 fathoms ; Sagami Bay, 153 fathoms (“ Albatross ”).

Eunice medicina Moore.

Pl. XIV, fig. 8.

1903. *Eunice medicina*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 441.

Body consisting of 80-85 segments, measures 32-35 mm. in length and 1.5 mm. in breadth excluding parapodia.

Prostomium slightly longer than the first segment. Eyes 2, brown, situated near posterior margin of prostomium, directly below and in contact with base of inner lateral tentacles, not concealed by anterior margin of the first segment. Tentacles relatively short, very faintly annulated. The first segment about twice as long as the second ; tentacular cirri slender, reaching posteriorly to the middle of 4th segment.

The last 8 or 9 segments taper rapidly to the anal segment, which is slightly enlarged. The longer pair of anal cirri very slender, equalling 11 last segments in length ; and the shorter pair of anal cirri scarcely equal in length to the width of anal segment.

Parapodium (the 10th) roughly square in form ; ventral cirrus consists of an enlarged basin-shaped swollen basal region, the hollow of which looks ventro-laterad, and a thick, short, rounded terminal piece. Dorsal cirrus twice the length of the parapodium, the basal half slightly swollen, the terminal half slender.

Compound bristles with curved shaft, which thicken very gradually to the end and has finely denticulated convex margin in the thickest part; the end-piece a relatively slender blade, with finely serrated edge and with prominent terminal teeth; guard prolonged beyond the blade as a sharp spine about equal in length to the width of the blade. Setose bristles straight or gently curved, the terminal half very finely acuminate and the surface feebly granulate. Pectinate bristles with about 12, slender, straight teeth of even length and with one delicate prolonged marginal process. Posterior hook (fig. 8) stout, rather strongly curved and hooked, the principal beak-shaped process surmounted by an unequally bifid accessory process; guard wide, bilobed.

Branchiae pinnate, the stem not reaching the middle line of the back; the stiff erect branches, arising at regular intervals of about twice their own diameter, are subequal in length, shorter and more slender than dorsal cirrus. Branchiae appear on the 5th segment and continue to exist to about the 37th, the maximum number of branches in each branchia being 7.

Habitat:—West of Nijima in Prov. Izu; Sagami Bay, 63 fathoms, and Suruga Bay, 63–75 fathoms (“Albatross”).

Eunice gracilis Moore.

Pl. XII, figs. 10—11.

1903. *Eunice gracilis*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 440.

Body rather slender, very little depressed, with parapodia of unusually great length. It consists of about 110 segments, measuring about 50 mm. in total length and 4 mm. in breadth including parapodia.

Prostomium about equal in length to the first segment. Tentacles annulated, the constrictions becoming fainter toward the base; the median tentacle reaches to the 8th segment, the inner laterals to the 6th, and the outer laterals to the 3rd. Eyes wholly exposed, large, purplish brown.

The first segment rather short; tentacular cirri annulated, reaching anteriorly to about the centre of eye.

Of the 4 anal cirri, the two longer equal the 17 posterior segments in length, while the two shorter ones are of about $\frac{1}{5}$ the length of the longer cirri.

Branchiae resemble those of *E. mucronata*, but differ in that the terminal part of the stem, instead of bending dorsad parallel with the other filaments, makes an angle with the last branchial filament. Branchiae begin to exist on the 6th segment; the number of filaments in each increases to 10 on about the 22nd segment; they retain the same structure to the 30th, and after that the filaments gradually diminish in number posteriorly; no branchia from the 48th segment posteriorly.

Compound bristles colourless; terminal thickening of shaft short, but distinctly striated (Pl. XII, fig. 10); end-piece short; tip bifid; the teeth widely separated; guard very narrow. Setose bristles colourless, nearly straight, with minutely denticulated margin. Pectinate bristles colourless, gently widening toward the end, terminating with 7 or 8 teeth, one of the marginals being much prolonged and bent. Posterior hook pale yellow (fig. 11), terminating with an erect tooth and a larger hooked one; guard broad.

Posterior parts of mandibles broad and short, scarcely exceeding the jaw plate in length; the latter large, obliquely elongate ovate, with 3 ridges besides a prominent but rather

blunt terminal ridge. Maxillary forceps stout, strongly hooked, with short, broad, unstricted holders.

Habitat :—Sagami Bay, 100 fathoms (“Golden Hind”); Totomi Sea, 34 fathoms (“Albatross”).

Eunice quinquifida Moore.

Pl. XIII, figs. 13—16.

1903. *Eunice quinquifida*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 435.

Prostomium about twice as wide as long, very deeply cleft in front. Eyes 2, large, brown, in the usual position and largely concealed by the free anterior border of the first segment. Tentacles all irregularly annulated, rather short, tapering. The first segment very long, especially on the sides where its broad anterior lobe extends forwards considerably beyond the prostomium and forms a prominent fold that covers the prostomium on the dorsal side as far as the bases of tentacles. The second segment is very short, about $\frac{1}{5}$ as long as the first; tentacular cirri tapering, rather faintly annulated in the terminal half, reaching posteriorly to the 5th segment.

Body little depressed, strongly convex even in the branchiated region, with very strongly marked neural groove.

Parapodia similar in form to those of *E. mucronata*, but somewhat larger and more prominent. Dorsal cirrus relatively short.

Branchiae begin to appear on about the 8th segment as two or three filaments on each side, increasing to 5 on about the 19th segment, which number is maintained to the 35th or 37th segment, though occasionally increased up to 11; filaments reduced

to 2 on about the 50th. The branchiae are very different in appearance from those of *E. mucronata*.

Compound bristles rather stout, the terminal parts of the shaft thickened for a short distance, with marginal denticulation; end-piece short, the tip hooked and distinctly bifid. Setose bristles gently curved, with narrow denticulated wing. Pectinate bristles wide, with about 11 teeth, the marginal ones of which are subequally prolonged. Posterior hook rather strongly sigmoid, the tip hooked, bifid, with a guard.

Maxillary forceps slender, the posterior appendages small and without constriction. Mandibular holders slender, about $2\frac{1}{2}$ times as long as the calcareous plate; the latter roughly triangular.

Habitat:—Bonin Islands (Mr. S. HIROTA); Sagami Bay, 153 fathoms (“Albatross”).

Eunice northioides Moore.

Pl. XIII, figs. 17—18.

1903. *Eunice northioides*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 433.

Body very little depressed and of a nearly uniform diameter throughout the greater part of body; dorsum highly arched; ventral surface nearly flat, with a deep neural groove. Number of segments about 85; total length about 58 mm.; and breadth 3.5 mm. excluding parapodia.

Prostomium, in the alcoholic preserved specimen, strongly retracted within peristomial fold, concealed for about $\frac{1}{2}$ its total length. The total length of the prostomium is $1\frac{1}{2}$ times the first segment. Eyes 2, large, brown, below base of inner tentacles and behind that of outer lateral tentacles. Tentacles strongly

and nearly regularly annulated in the terminal parts, the constrictions becoming fainter toward the base.

The first segment with a wide free anterior fold above; its longest part not lateral, but ventral, owing to the unusually large size and prominence of mandibular lobes. Second segment longest dorsally, where its length equals $\frac{1}{3}$ that of the first; its cirri long, slender, annulated, reaching to tip of prostomium anteriorly and to middle of 6th segment posteriorly.

Parapodia essentially as in *E. quinquifida*; dorsal cirrus about as long as in that species, but more distinctly constricted at base. Compound bristles with shaft gradually thickened at the end for a distance considerably exceeding the length of the end-piece, which is 4–6 times as long as wide and is provided with two teeth; the terminal tooth slightly hooked, the subterminal tooth broad and straight; guard broad, not mucronate. Setose bristles rather strongly curved, tapering to an exceedingly acute point. Pectinate bristles with about 9 teeth on the expanded end; two marginal teeth being produced to unequal length. Posterior hooks with rather strongly sigmoid curvature and with bifid hooked end.

Branchiae slender and simple on 4th—10th segments, trifold on 11th—14th segments, quadrifid on from 15th to about 23rd segments; then again trifold to 27th segment, bifid on 28th—32nd segments, and finally simple to the last pair.

Maxillary forceps stout, strongly hooked and curved ventrally near the broad base, which is provided with a prominent tubercle for muscular attachment; the holder broad, not constricted. Mandibles prominent, the two halves freely movable on each other, the whitish calcareous pieces less than $\frac{1}{2}$ the length of the slender yellow carrier, strongly divergent, irregularly oval in form, with four teeth on cutting edge.

Habitat:—Suruga Bay, 65 fathoms (“Albatross”); Sagami Bay, 42 fathoms (“Golden Hind”).

Genus *Marphysa* Quatrefages.

Prostomium with 5 posterior tentacles; anterior short tentacles absent as in *Eunice*. Eyes situated externally to inner lateral tentacles. Tentacular cirri absent. Anal cirri 4. Branchiae semi-pectinate or simple. Maxillary apparatus as in *Eunice*.

Marphysa iwamusi n. sp.

Pl. I, fig. 8; Pl. XIV, figs. 11—16.

This is one of the most common littoral annelids in Japan.

The body measures 300–350 mm. in length, and 9–10 mm. in breadth in the widest parts at about 25th segment; tapering toward both ends. Segments up to 340 in number.

The anteriormost few segments are nearly circular in cross-section; posteriorly the segments become gradually flattened and wider, attaining maximum breadth at about 25th segment; thence toward the posterior extremity the breadth again very gradually reduces itself.

The colour of the living animal is dorsally uniformly reddish-brown, except the anteriormost parts, together with the head, which are of a reddish-purple brown colour with metallic iridescence. The ventral surface is usually of a lighter reddish brown colour than the dorsum.

Prostomium large, twice as broad as long and 2-lobed, anteriorly indented by a deep notch; a median groove extends from this notch posteriorly almost to base of the median tentacle. Ten-

tacles 5, the median longest and reaching to the 2nd parapodiated segment (or twice the length of prostomium); inner laterals shorter than the median tentacle; outer laterals still shorter, being $\frac{2}{3}$ the length of the median. A small ill-defined eye-spot can be made out between the bases of lateral tentacles on each side. The two succeeding segments have neither parapodia nor tentacular cirri; and their segmental junction is only indicated by a transverse groove on the dorsal side. The total length of these two segments equals that of the three next following segments; thence posteriorly the segments become gradually shorter, and in the 20th the breadth is more than 8 times the length.

Parapodium as usual with a rather long dorsal, and a short somewhat conical ventral, cirrus. Bristles well developed, and of 3 kinds: 1) slender, weakly sigmoid, setose bristle with a narrow wing; 2) compound bristle, with tip of the shaft greatly enlarged and with long, finely tapering blade; 3) pectinate bristle, with numerous short spikes guarded by a comparatively large tooth on each side.

Branchia begins to appear as a simple filament on 30th or 36th segment, but soon becomes branched, attaining maximum development with 4 or 5 filaments on about 80th segment; then it remains in the same condition to about the 200th; and more posteriorly it is reduced in size as well as in number of filaments; the posteriormost 15–20 segments without branchiae. Anal segment with 2 long and 2 very short anal cirri.

Maxillary forceps gently curved (fig. 15); great dental plates with 4 teeth on the left, and 5 on the right. An accessory piece on each side of the curved lateral plate.

Mandibles posteriorly divergent (fig. 16); their anterior broader ends with a pair of somewhat rhomboidal dental plates

on the ventral side. The colour of the dental apparatus is deep brownish black.

This annelid is found usually burrowing in tertiary rocks, but sometimes in sandy flats in the tubes of sabellid annelids. It is largely used as bait, and is known under the name of "Iwa-isomé" or "Iwamusi."

Habitat:—Oshoro in Prov. Shiribeshi (!); Gulf of Aomori (!); Matsushima Bay (!); Kamo Harbour in Prov. Uzen; Komegawaki in Prov. Echizen; Gulf of Miyazu in Prov. Tango (!); Isohama in Prov. Hitachi (!); Misaki (!); Yenoura in Prov. Suruga (!); Oma-yezaki in Prov. Totomi; Toba and Waku in Prov. Shima (!); Sumoto in Prov. Awaji; Yuki and Naruto in Prov. Awa (!); Onomichi in Prov. Bingo (!); Sakurajima in Prov. Satsuma; Pescadores Islands, Formosa (Mr. T. TADA).

Genus *Lysidice* Savigny.

Prostomium broader than long, with 3 small tentacles approximated behind at base. Eyes 2, at base of lateral tentacles; no tentacular cirri. Mouth armed as in *Eunice*. Parapodium uniramous. Anal segment with 4 very short anal cirri. Branchiae absent.

Lysidice collaris Grube.

Pl. XIV, figs. 9—10.

1877. *Lysidice collaris*, Grube. *Annulata Semperiana*, p. 166.

1879. „ „ Mareuzeller. *Süd-jap. Annel.*, p. 28.

The name "collaris" obviously refers to the white ring to be seen in living animals near the anterior end. The ground colour

is a bright yellowish-brown, deepest anteriorly and gradually dying out on about the 30th segment. Posteriorly the body is nearly colourless, unless the sexual products contained give it a pink colour.

The form of body is in life, as after preservation, flat below and strongly arched above throughout its entire length. Body, consisting of about 200 segments, measures about 95 mm. in length and 4 mm. in breadth including parapodia.

Prostomium broader than long, equal in length to peristomium, bilobed on the anterior margin, and with a median groove reaching from the indentation posteriorly to base of the unpaired median tentacle. The tentacles, though a little narrowed at their bases, have no distinct ceratophore; the middle one arises as a rule *in front* of the origin of the other two, though they all arise from nearly the same level. The form of eyes is characteristic; it varies from a narrow crescentic to a kidney or bean shape, never being oval.

Dorsal and ventral cirri extend as far as tip of the parapodium, or a little further in anterior parapodia.

Compound bristles colourless; shaft bent, its end distally broadened to twice the diameter of the proximal parts, finely denticulated near the distal end; the end-piece short, being nearly of the shape of an equilateral triangle, the end 2-toothed, and provided with a guard-like wing showing fine striation. The hooks always bear two distinct teeth, unless these be damaged by wear as it sometimes happens; seldom is their guard or winging preserved.

The mandibular plates are most characteristic in constitution and form, being usually calcareous and provided with special plates of a brown or black horny material. The number of teeth

on the left great dental plate varies from 3 to 5, though usually it bears, as does always the right, 4 teeth.

Habitat:—Misaki (!); Tatoku-jima in Prov. Shima (!); Yenoshima in Prov. Sagami (MARENZELLER).

Genus *Coelobranchus* n. g.

Prostomium with 2 tentacles. Eyes invisible. Two anterior-most segments lack parapodia. Tentacular cirri absent. Parapodium uniramous, with simple and compound bristles. Branchiae branched. Extensions of the alimentary canal enter into the cavities of branchial filaments. Anal cirri 2. Both halves of maxillary apparatus with an unequal number of jaw-plates.

Coelobranchus papillosus n. sp.

Pl. XV, figs. 1—7.

Body slender, tapering to both anterior and posterior ends; the branched gills, which cover almost entirely the dorsal surface of body, appear just like the dorsal cerata of an eolid mollusca.

The colour is almost white, except the gill filaments and the dorsal median line, both which are tinted with brown.

One of the largest female specimens is represented in fig. 1, Plate XV. It measures 120 mm. in length and 5 mm. in maximum breadth; the segments number 208. The male is generally smaller than the female, the former consisting of 150–180 and the latter of 165–210 segments.

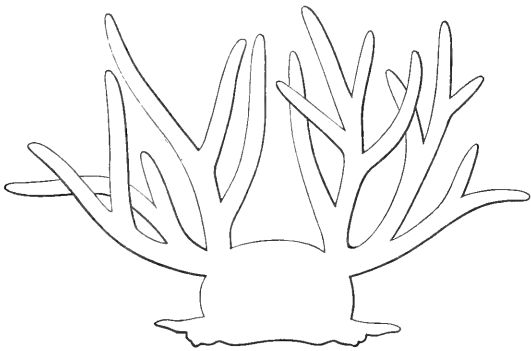
Prostomium nearly 3 times as broad as long, with convex and smooth anterior margin; provided with 2 small tentacles.

Peristomium, consisting of 2 similar segments, each of these

being of about equal length as the prostomium; with neither parapodia nor tentacular cirri.

Parapodium uniramous, with a comparatively large and conical dorsal cirrus, which extends far beyond tip of the bristles. The bristles arranged in a vertical row, grouped into 2 fascicles; the dorsal fascicle consisting of 5–7 simple bristles (fig. 4) with hooked tip, and the ventral consisting of 8–10 compound bristles (fig. 5). These have the shaft broadened toward the anterior end and terminate with short end-piece, which is hooked at end like the simple bristle.

The gills arise from the dorso-lateral border of segments apart from parapodia. They appear on the 3rd segment, each



A segment from the middle parts of *Coelobranchus papillosus*, showing gills. 8/1.

in the form of a simple filament; they begin to branch from the 10th or 11th segment. On 20–25th segments the gills show full development, dividing dichotomously into about 10 branches; they remain in nearly the same shape to the end of the anterior $\frac{4}{5}$ of the whole length of the body, after which they gradually decrease in size as well as in number of branches toward the posterior extremity, where a few last segments have no branchial filament. Anal segment with 2 short anal cirri.

In young specimens the number of filaments to each gill varies according to age; thus, in the annelid of about 30 mm. length, the gills are all simple; in that of about 60 mm. they are branched into 2–3 filaments; and in that of about 75 mm. into 4–5 filaments.

The jaw-apparatus is not well-developed. The maxillary forceps, having bifurcate tip and a lateral process in each, are about equal in length to their posterior appendage; paired dental plates of both sides with 2 teeth each; the unpaired left plate with a pointed tip only; the anteriormost paired jaw-pieces, which are light brown in colour, are rather broad plates. Mandibles black, rod-like, slender, posteriorly divergent, and each with a broad membranous wing, which meets with that of the other side in the median line.

The muscular pharynx occupies 3rd–8th segments. In typical segments the intestinal coeca enter into the cavities of branchial filaments, branching dichotomously like these (figs. 6 and 7). The body cavity as well as its extensions into branchial filaments are filled with reproductive elements (either eggs or spermatazoa).

Habitat:—This species was found creeping on the gills of *Macrocheira kaempferi* DE HAAN brought up from a depth of 300–350 fathoms in Sagami Bay.

Genus *Ninoë* Kinberg.

Prostomium conical with or without knob-like appendages; 2 anteriormost segments have no parapodia. A number of segments provided with branchiae. Bristles of two kinds. Jaw-plates in equal number on both sides.

Ninoë palmata Moore.

1903. *Ninoë palmata*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 456, Pl. XXVI, figs. 68–71.

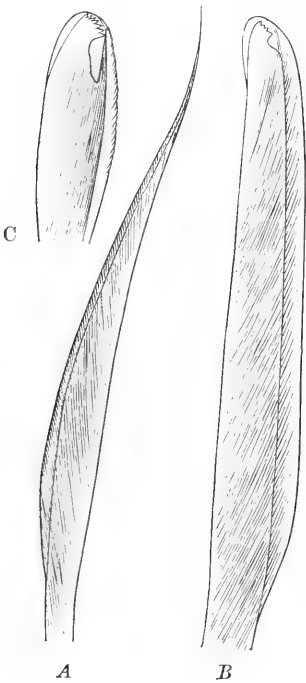
The main characters of this species, as given by MOORE, may be stated as follows:—

Prostomium depressedly conical with a rather acute apex ; length $1\frac{1}{4}$ times the breadth at base and about thrice the length of peristomium, one-third of its length dove-tailed into peristomium on the dorsal side, with fine lateral grooves from palpi to apex. No eyes visible. Palpi large. Peristomium ventrally produced into 3 lobes bounding the mouth laterally and posteriorly. Body round in cross-section.

The branchiae arise from the postsetal lobe of parapodium, appearing on the 5th segment and consisting of a cirrus-like

dorsal, and of a shorter and thicker ventral, process. On succeeding segments, there arise short thick branchial filaments from the dorsal side of the ventral process of branchia, numbering generally 4, but sometimes 3 or 5, which number persists to the 26th or the 27th segment. When best developed, the dorsalmost cirrus-like filament of branchia is about twice the length of the others and curves over the back ; the next one or two are separated, but the lowest 2 or 3 remain connected and diverge in a palmate manner. The dorsalmost filament suddenly disappears at about the 30th segment, while the others gradually undergo reduction.

Bristles of two simple kinds : bent lanceolate and hooked guarded bristles, which latter are modified in two



- A. Lanceolate bristle from the 90th segment of *Ninoë palmata*. 480/1.
 B. Hook from the 12th segment of same. 480/1.
 C. Hook from the 90th segment of same. 480/1.

[After J. P. Moore.]

ways towards the ends of the body. Anteriorly the tip of the hook shows about 5 short teeth, while posteriorly the bristles becomes stouter and more prominently hooked, the hook being 7 or 8 toothed.

Habitat :—Sendai Bay, 14–18 fathoms (“Albatross”).

Genus *Lumbriconereis* Blainville.

Prostomium exposed in the form of an obtuse lobe, without tentacles or with rudimentary tubercle-like tentacles. Eyes two or none. Mouth with 4 pairs of jaws, which are supported on a double stalk. Parapodium small, uniramous, with simple bristles; cirri none. Gills absent.

Lumbriconereis japonica Marenz.

Pl. XIV, figs. 17—18.

1879. *Lumbriconereis japonica*, Marenzeller. Südjav. Annel., p. 29.
 1885. “ ” McIntosh. “Challenger” Annel., p. 243.
 1903. “ ” Moore. Proc. Acad. Nat. Sc. Philad., Vol.
 LV, p. 454.

Body slender, anteriorly little tapering, and posteriorly gradually tapering in the posterior two-thirds of the body; the hind end with two longer dorsal, and two shorter ventral styles. The body measures about 130 mm. in length, and about 6 mm. in breadth at the widest region.

Prostomium bluntly conical, longer than broad; its length equalling the total length of the 2 non-parapodiated segments and the first parapodiated segment. At about the 35th segment

the breadth of segments is about 5 times the length, and at the 60th about 3 times the same.

Parapodium consists of a shorter rounded anterior and a longer and more conical posterior lobe, the tip of the latter pointing dorso-laterally. On the dorsal side of parapodium, near its base, is found a slight elevation, scarcely visible under a low magnifying power, and which contains about three very fine bristles.

In the 20th parapodium are found both simple and compound bristles; the former with broad wing, and the latter with distinct terminal teeth covered by a guard. Posterior hook rather slender-tipped, its terminal teeth small, with a distinct incurving of wing just below the large inferiormost tooth.

The dental apparatus is dark-brown or nearly black. The maxillary forceps about $1\frac{1}{2}$ times the length of their posterior appendages; their tip transparent as that of the teeth of dental plates. A band-like appendage is found on each side of the maxillary forceps. The great dental plates with long and thick teeth, 5 in the left and 6 in the right. The first lateral plate with 2 teeth and the second plate with only one tooth. An accessory small triangular plate is found on each side of the second lateral plate. The mandibles meet closely in the median line; their cutting edge with 4 coarse tooth-like processes. Just behind the cutting edge there is a brownish-pigmented part, to which converge concentrically arranged, forwardly concave striations.

Habitat :—Yahagi line, 290 fathoms, in Sagami Bay; “South of Japan” (“Challenger”); Yenoshima in Prov. Sagami; Suruga Bay, 100 fathoms (“Albatross”); Sagami Bay, 153 fathoms (“Albatross”).

Lumbriconereis heteropoda Marenz.

Pl. XIV, fig. 19.

1879. *Lumbriconereis heteropoda*, Marenzeller. Süd-jap. Annel., p. 30.

1885. " " " McIntosh. "Challenger" Annel., p. 255.

Body slightly tapering anteriorly, of about the same breadth for a considerable part of the length, and posteriorly gradually tapering to the tail-end. It measures about 250 mm. in length, and about 6 mm. in breadth at the end of the anterior third of the length.

The prostomium forms a short blunt cone, almost semicircular in outline. Eyes 2, not visible unless the snout be bent downward so as to expose the segment-junction.

As is usual in the group, the first two segments are bare. The anterior parapodia are small; posteriorly they gradually increase in size. At the 10th parapodium the posterior lobe is proportionally large, slanting abruptly downward and inward from its somewhat straight upper border. At the 30th parapodium the posterior lobe more nearly approaches the anterior in size, and the bristles pass out between the lobes. The anterior lobe is rounded dorsally, whereas the posterior forms superiorly an angle a little less than a right angle. The bristles are in about four groups, the upper having the longest, and the third the shortest tips. All have wings. On the dorsum near the base of parapodia is a very distinct papilla. The posterior hooks are strongly winged or guarded, a characteristic feature of the species (fig. 19).

The whole dental apparatus is of a deep blackish-brown color. The maxillae do not exhibit so marked an elevation at base as is usually seen in other species of the genus, and thus the anterior

and posterior (downward) curves are not conspicuous. The posterior processes are remarkable for their great length and acutely pointed condition. Each great dental plate has four teeth. The somewhat triangular horny region behind the dentary is marked off by a deep suture. The anterior plate is irregularly triangular, with a long tooth internally. Near the latter is an isolated accessory plate. A thin horny bar of ordinary appearance runs backward to the maxilla. The ventral surface of the mandibles presents the appearance of a *Tellina* shell. It is deeply coloured with blackish pigment and is veined. Three characteristically symmetrical horny plates (two lateral and one great dental) are visible on each side of the ventral surface, and the angle of the posterior (great dental) plate is distinct.

Habitat:—Gulf of Miya (MARENZELLER); Hanéda in Prov. Musashi (!); Nishinoyodomi in Sagami Bay, about 160 fathoms; Suruga Bay and Totomi Sea (“Albatross”); Off Yokohama and off Kobé (“Challenger”); Tomo Harbour in Prov. Bingo (!):

Lumbriconereis bifurcata McIntosh.

Pl. XIV, fig. 20.

1835. *Lumbriconereis bifurcata*, McIntosh. “Challenger” Annel., p. 241, Pl. XXXVI, figs. 10-12.

The prostomium forms a somewhat acute cone, dorsally marked with a few longitudinal streaks.

The body is slightly tapering in front, remains for a considerable distance in nearly uniform breadth, and again tapers toward the tail-end. It measures 130-145 mm. in length and about 5 mm. in breadth.

The parapodium in the posterior part of the body consists of

two nearly symmetrical lobes, one in front and the other behind the vertical row of bristles. The lobes are low and slightly pointed, and are directed outward and slightly upward. Toward the posterior end of body these lobes become longer than parapodium itself, i.e., they increase in length from before backward. Nothing very diagnostic can be stated of the bristles or hooks of this species, except perhaps the comparatively large size of the hooks and the very distinct serration on their crown (fig. 20).

Maxillae blackish brown in colour. The spathulate posterior processes are broad, and their posterior ends are evenly rounded. The left great dental plate with 5 teeth, and the right with 6. The first lateral plate is narrow and ends in a blunt tooth; the second plate is much larger than the first, with the inner edge produced into a sharp tooth. A small accessory plate immediately behind is pale brownish, thus contrasting with the rest of the apparatus. Mandibles are clavate, the anterior region being broadly triangular and the posterior region forming slender and tapering shafts. The ventral surface of the mandibles is somewhat semicircular, with curved veins running from side to side. On each side of the median notch there is a tooth. The striking point is the downward curvature of the maxillae, both anteriorly and posteriorly, the elevation occurring just in front of the spathulate posterior process.

Habitat:—Sagami Bay; “Southern shore of Japan” (“Challenger”).

Genus *Laranda* Kinberg.

Prostomium without appendage, anteriormost two segments lack parapodia. Parapodium with rounded lobe and simple

bordered bristles. Upper jaw-holder long; all the 4 pairs of jaws similar; the first pair toothed in the middle and provided with a terminal fang; the second small and toothed; the third and fourth falcate. Lower jaw shorter than the upper; the two halves thick, rounded on the anterior margin and tapering to the posterior end.

Laranda robusta Moore.

1903. *Laranda robusta*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 454, Pl. XXVI, figs. 64, 65.

Since I have not been able to examine this species myself, I will give the following extract from MOORE'S description. His incomplete type specimen, consisting of the prostomium and anterior 202 segments, measured 6.5 mm. in breadth and 165 mm. in length.

Prostomium has a peculiar flattened form, curved and hollowed below like the bowl of a spoon; it has a distinct dorsal longitudinal sulcus and is slightly dove-tailed into peristomium. No eyes visible.

Body nearly circular in section.

Parapodia uniform in character throughout; in the middle of body, where they reach largest size, they about equal the length of the segment, and are stout, obliquely truncate, not tapering, with a single blunt, conical postsetal process which arises from the ventro-lateral angle and is directed outward and slightly caudad.

Bristles in anterior parapodia arranged in two groups. All are pale brown, long, slender, simple, sharp-pointed and wingless, with a gentle sigmoid curve. After about the


18th parapodium the bristles of the dorsal bundle become stouter and deeper in colour. From 24th or 25th parapodium backwards, there exists a single stout acicula to each parapodium.

The colour of body is an iridescent purplish-brown; with dark-brown spots on dorsum, distributed on each segment in a narrow incomplete zone, spreading from parapodium base towards the median line.

Habitat:—Suruga Bay, 173–260 fathoms (“Albatross”).

Genus *Notocirrus* Schmarda.

Prostomium without appendages, with entire margin. Parapodium with knob-like dorsal and ventral cirri; simple bristles with sparsely toothed blade. Upper jaw-holder long; jaws in 4 pairs. Jaws of the first pair similar in form, toothed, without terminal fang; and those of the second pair unequal.



Acicula and bristle from the ventral group of a posterior segment of *Laranda robusta*. 130/1.
[After J. P. Moore.]

Notocirrus zonata Moore.

1903. *Notocirrus zonata*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 445, Pl. XXVI, figs. 66, 67.

In the absence of specimens of this species within reach of me, the following extract is made from MOORE'S description, which is based on a piece of the posterior end of the animal, containing about 120 segments. It measured 65 mm. in length, and 3 mm. in breadth including parapodia but not the bristles.

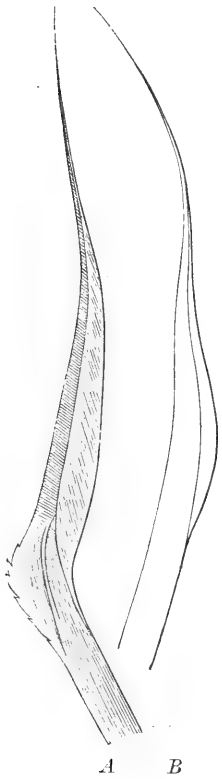
Body nearly round and tapering toward the anus, which is guarded by a pair of short and broad lateral lobes representing a pair of anal cirri.

Parapodia rather small and slender, with a prominent posterior ventral process, which is somewhat longer than the rest of the parapodium, and is directed caudad and laterad. Dorsal papilla small but prominent.

Bristles arranged in two groups, of which the ventral contains 3, and the dorsal 2; each bristle with delicate, tapering and winged tip, and sigmoid with the end directed dorsad; bristles of the ventral group shorter and only slightly bent; those of the dorsal group geniculate, strongly serrated at the winged knee.

The colour is very striking. The ground colour, including that of parapodia, is a pale yellow; the middle of each segment completely encircled by a rich orange-brown zone.

Habitat :—Totomi Sea, 34 fathoms ("Albatross").



- A. Bristle from the dorsal group of a middle segment of *Notocirrus zonata*. 332/1.
 B. Bristle from the ventral group of same. 332/1.
 [After J. P. Moore.]

Family **Lycoridae.**

Body elongate, vermiform, subcylindrical or subdepressed; segments short, numerous. Prostomium distinct, with 2 tentacles, 2 palpi and 4 eyes. Peristomium (the first body-segment) without parapodia, but with 4 tentacular cirri on each side. Parapodia

uniramous or biramous, with a dorsal and a ventral cirrus, accompanied with aciculæ and bundles of bristles. Pygidium with 2 anal cirri ventrally to anal opening. Proboscis divided into two rings in the protruded state, nearly always with paragnathi, rarely naked or with soft papillae; with 2 maxillae.

Key to the genera.

- a'*. Parapodium uniramous. *Lycastis*.
- a''*. Parapodium biramous.
 - b'*. With simple dorsal cirrus.
 - c'*. With superior and inferior ligula. *Nereis*.
 - c''*. Without superior ligula. *Ceratocephale*.
 - b''*. With feathered dorsal cirrus. *Dendronereis*.

Genus *Nereis* L.

Prostomium rotundate-pentagonal or triangular, narrowed anteriorly; both pairs of eyes in the posterior parts; tentacles 2, subulate, frontally situated; palpi 2, biarticulated, with basal part stout and long, with distal part soft, short and retractile. First body-segment with neither parapodia nor bristles, with 2 pairs of tentacular cirri on each side of prostomium and affixed to the segment.

Parapodia biramous, supported by 2 aciculæ; 1 ligula on ventral ramus and 2 on dorsal ramus; both dorsal and ventral cirri present. Bristles usually jointed, the shaft with dense transverse striations; setose on dorsal, and either setose or falcate or both on ventral, ramus; sometimes unjointed bristles present among jointed ones.

Proboscis protrusible, divided into two (maxillary and basal) rings by a circular furrow; maxillae crooked and mostly serrated;

paragnathi either on both rings or on maxillary ring alone, rarely entirely absent or coexistent with soft papillae.

Epitocous phase:—Generally both the rami and cirri of parapodia peculiarly enlarged; eyes larger, and inter-segmental annuli more distinct, than in the *atocous phase*. Bristles on parapodia partly or entirely replaced by paddle-shaped ones.

The method followed below in describing the proboscis and paragnathi of the various species is that of KINBERG,—a method which has been adopted also by GRUBE, CLAPARÈDE, EHLERS and MCINTOSH. Thus, the distal region of protruded proboscis is called the maxillary ring, and the proximal the basal ring. Of the several series of paragnathi, the median dorsal series at base of maxillae is called the first (I.); the group on each side of the foregoing is called the second (II.); the median ventral group at base of maxillae, the third (III.); the lateral series adjoining the last, the fourth (IV.); the median dorsal series on the basal ring of proboscis, the fifth (V.); the lateral series on each side of the foregoing, the sixth (VI.); the remaining ventral and lateral paragnathi of the same ring, generally disposed in a more or less continuous series, form the seventh and eighth series (VII. and VIII.).

Nereis mictodonta Marenzeller.

Pl. XVI, figs. 1—6.

1879. *Nereis mictodonta*, Marenzeller. Süd-jap. Annel., p. 10, Taf. II, Fig. 2.

This is one of the commonest marine annelids found between tide-marks in Japan. Its distribution ranges from Bonin Islands in the south to the Bay of Matsushima in the north.

Body slender, posteriorly gradually tapering; segments 95-135. Length 75-109 mm.; breadth 4.5-5 mm., or 7-8 mm. including bristles, in the broadest part of body, which lies at about the 40th segment.

In the living specimens the dorsum is of a bluish black colour in the anterior 15 or 16 segments, while the remaining parts are brownish gray.

Prostomium slightly longer than broad; anterior border obtusely conical; tentacles shorter than $\frac{1}{2}$ the length of prostomium, separated at base. Palpi stout, about as long as prostomium. Both pairs of eyes in the posterior half of prostomium, the posterior pair lying very close to the hind border of prostomium; eyes of anterior pair more apart from each other than those of posterior pair.

Peristomium $1\frac{1}{2}$ times as long as the next following segment; longest tentacular cirri reaching to 7th or 8th segment when laid back along the body; tentacular cirri of the anterior superior pair reaching to 3rd segment; those of the ventral pairs about $\frac{1}{3}$ as long as those of corresponding dorsal pairs. All tentacular cirri biarticulated.

A typical parapodium is shown in Pl. XVI, fig. 3. The two rami distinct. Superior ligula long and conical; middle ligula similar, but slightly shorter. Ventral ramus broad and short, being only $\frac{1}{2}$ as long as dorsal ramus, provided with three lips; posterior lip shorter than anterior lip; the supra-acicular parts of middle lip exceeding both other lips in length. Inferior ligula longer than ventral ramus, but shorter than middle ligula; all tips of the three ligulae nearly in a straight line. Dorsal cirrus extends slightly beyond tip of superior ligula; ventral cirrus short, about $\frac{1}{2}$ as long as inferior ligula. Bristles

with long setose or short falcate (fig. 4) end-piece. Aciculæ 2, slender, black.

In the anteriormost two parapodia, both superior and inferior ligulae are prominent; each with a single acicula; both cirri relatively large. In posterior segments, superior ligula only $\frac{1}{2}$ as long as dorsal cirrus; ventral cirrus equal in length to inferior ligula.

Anal segment longer than broad, with a pair of long anal cirri.

Proboscis long. Paragnathi: I. 3 in a triangle; II. in 3 oblique rows; III. in many longitudinal rows of 3-4 each; IV. in a dense triangular group; VI. a characteristic transverse row of 8-10 large paragnathi; V. one at each angle of an irregular triangle; VII., VIII. a continuous band of three indistinct rows.

MARENZELLER has described only the atocous phase of the species, collected by Dr. RORETZ in Japan. Like many others of the genus, this species attains sexual maturity on entering into the epitocous phase.

Epitocous phase:—In this phase the anterior 20 segments remain unchanged, while in the fully developed posterior segments the structure of parapodia (fig. 5) is very much complicated as compared with those of the atocous phase; thus there develops at the base of dorsal cirrus on the dorsal side a broad semicircular flap; the superior ligula is elongated, and on its dorsal side near the base a small ovoid process is developed; middle ligula also becomes much elongated, and is now provided with a dorsal, small, broadly based flap, and near its base with a ventral, oblong, short-necked flap. The ventral ramus is enlarged, and its posterior lip now expands into a large fan-shaped flap; the inferior ligula shows a small triangular process on the dorso-lateral side

near its base; the ventral cirrus is provided dorsally at the basal region with two elongated processes and ventrally with a broad oval expansion.

Both setose and falcate bristles of the atocous phase are now replaced by paddle-shaped ones (fig. 6) with rather broad end-piece.

Habitat:—Bonin Islands (Mr. S. HIROTA); Formosa; Shimo Koshikijima in Prov. Satsuma; Naruto-mura in Prov. Suō (!); Itsukushima in Prov. Aki (!); Hosojima Bay in Prov. Hyuga; Tomo Harbour in Prov. Bingo (!); Kasaoka in Prov. Bittyu (!); Kojima Gulf in Prov. Bizen (!); Naruto and Yuki in Prov. Awa (!); Sumoto in Prov. Awaji; Hama-shima and Toba in Prov. Shima (!); Shimizu, Komakoshi and Yenoura in Prov. Suruga (!); Ito in Prov. Izu (!); Misaki in Prov. Sagami (!); Kanazawa in Prov. Musashi (!); Bay of Tateyama in Prov. Boshu (!); Watanoha in the Bay of Matsushima, and the west coast of Kinkwasan in Prov. Rikuzen (!).

Nereis cultrifera Grube.

Pl. XVI, figs. 7—14.

1840. *Nereis cultrifera*, Grube. Actinien, Echinod. und Würmer, p. 74, Fig. 6.
1862. *Nereis Peaucoudrayi*, Keferstein. Zeit. f. Wiss. Zool. Bd. XII, p. 94, Taf. VIII, Fig. 1-6, 12.
1865. *Nereis caerulea*, Johnston. Catalogue of Brit. non-parasitic worms, p. 154.
1865. *Nereis fulva*, Quatrefages. Hist. des Annelés I, p. 507.
1867. *Lipephile margaritacea*, Malmgren. Ann. polych., p. 50.
1868. *Nereis cultrifera*, Ehlers. Die Borstenwürmer, p. 461.

Epitocous phase :

1837. *Lycoris lobulata*, Rathke. Beiträge zur Fauna der Krym. Mémoires prés. à l'Acad. Imp. de St. Pétersbourg, T. III, p. 415, Taf. VII, Fig. 2, 9-15.
1851. *Nereis lobata*, Grube. Familien der Anneliden, p. 50.
1865. *Heteronereis lobulata*, Johnston. Catalogue Brit. Worms, p. 161.
1867. *Hedyle lobulata*, Malmgren. Ann. Polych., p. 58.
1868. *Nereis cultrifera*, Ehlers. Die Borstenwürmer, p. 462, Taf. XXI, Fig. 31-36.

Body slender, tapering posteriorly; dorsal surface sometimes with dark transverse lines; segments 70-80. Length 50-65 mm. (rarely 85 mm.); breadth 3.5 mm. without, and 5.5 mm. with, parapodia and bristles.

Prostomium longer than broad, and as long as the two following segments; tentacles $\frac{1}{2}$ the length of prostomium; palpi longer than tentacles, extending a little beyond tips of these. First body-segment as long as the succeeding one; tentacular cirri short, the longest reaching to 5th or 6th segment.

Parapodium uniform throughout; lip of dorsal ramus conical; lips of ventral ramus shorter and more obtuse. Bristles in part with falcate, and in part with short setose, end-piece. Superior ligula longer than lip of dorsal ramus, conical and pointed; inferior ligula obtuse, not extending beyond lips of ventral ramus; dorsal cirrus on posteriorly placed parapodia arises nearer to tip of ligula than that on anterior parapodia, and extends beyond the ligula. Ventral cirrus scarcely reaches to half the length of ventral ligula.

Anal segment simple, long and conical, with two long anal cirri.

Paragnathi thick, blackish in colour: I. 2 or 3 in a longitudinal row; II. in two curved rows; IV. in multitudes;

III. crowded in two transverse rows; V. 3 small ones in a triangle; VI. a large transversely elongate one in each; VII., VIII. in two parallel continuous rows. Maxillae large but slender, with 5 teeth below terminal fang.

Epitocous phase:—In the female the first 18–23 segments, and in the male the first 14–20 segments, are unchanged. Anal segment fringed with short papillae. Male whitish, female greenish yellow.

I observed a large swarm on the night of Sept. 1st, 1896, in the Misaki harbour.

Habitat:—Misaki (!); Shimizu Harbour in Prov. Suruga (!); Toba in Prov. Shima (!); Bonin Islands (Mr. S. HIROTA); Formosa (Mr. M. ŌSHIMA).

Nereis cylindrata Ehlers.

Pl. XVI, Fig. 15.

1868. *Nereis cylindrata*, Ehlers. Die Borstenwürmer, p. 506, Taf. XXI, Fig. 37–40.

Body slender, uniformly broad; segments 60. Length 58 mm.; breadth 4 mm. without, and 5.5 mm. with, parapodia and bristles.

Prostomium scarcely longer than broad; tentacles slightly longer than half the length of prostomium and arising near each other. Palpi large, extending beyond tip of tentacles. First body-segment twice as long as the succeeding; tentacular cirri short, the longest reaching to the 5th segment. Parapodia uniform; lip of dorsal ramus conical, longer than that of the ventral ramus; tip of superior ligula conical, longer than

the lip of dorsal ramus; inferior ligula stout and conical, so long as the lip of ventral ramus. Bristles in part with falcate, and in part with short setose, end-piece. Dorsal cirrus filiform, extending far beyond the ligula; ventral cirrus also filiform, arising from the base of parapodium, and not extending beyond inferior ligula. Anal segment simple, short and conical.

Proboscis short; paragnathi small: I. 1 (or 2); II. in a double row; III., IV. crowded; V. absent; VI. in short double rows; VII., VIII. in double transverse rows, of which the anterior row consists of paragnathi larger than those of the posterior row. Maxillae slightly serrated, with 10 teeth.

Habitat:—Chōshi in Prov. Shimosa (!); Misaki in Prov. Sagami (!).

Nereis pelagica L.

Pl. XVII, fig. 1—6.

1758. *Nereis pelagica*, Linné. *Systema Naturae*, Ed. X, p. 654.
 1771. Die warzige Nereide, O. F. Müller. *Von Würmern*, p. 140, Taf. 7.
 1843. *Nereis pelagica*, Oersted. *Grönlands Annulata dorsibranchiata*, p. 23.
 1865. *Nereis pelagica*, Johnston. *Catalog.*, *Brit. Worms* p. 148.
 1865. „ „ *Quatrefages. Histoire des Anneles I*, p. 542.
 1868. „ „ *Ehlers. Die Borstenwürmer*, p. 511.
 1776. „ *verrucosa*, O. F. Müller. *Prodromus Zool. Dan.*, p. 217.
 1780. „ „ *O. Fabricius. Fauna Grönlandica*, p. 292.
 1879. „ *pelagica*, Marenzeller. *Südjav. Annel.*, p. 14.
 1890. „ „ „ *Bering Annel.*, p. 2.
 1903. „ „ „ *Moore. Proc. Acad. Nat. Sc. Philad.*, Vol. LV, p. 431.

Epitocous phase :

1843. ♂ *Heteronereis arctica*, Oersted. Grönlands Ann. dorsibr., p. 27.
 1843. ♀ „ *assimilis* Oersted. Ibid., p. 28.
 1843. *Nereis grandifolia*, H. Rathke. Beiträge zur Fauna Norwegens,
 p. 155.
 1865. ♂ ♀ *Heteronereis grandifolia*, Malmgren. Nordiska Hafs. An-
 nulater, p. 108, Pl. XI, figs. 15—16.
 1867. *Heteronereis grandifolia*, Malmgren. Annul. Polych., p. 60,
 Pl. V, fig. 31.
 1868. *Nereis pelagica*, Ehlers. Die Borstenwürmer, p. 511, Taf. XX,
 Fig. 11—12.

Body broadest in the middle region; 60—80 segments. Length 40—55 mm.; breadth 4.5 mm. without, and 6 mm. with, bristles.

Prostomium longer than broad, slightly longer than the first body-segment; tentacles scarcely half as long as prostomium; palpi longer than prostomium, extending beyond tip of tentacles. The first segment twice as long as the next following tentacular cirri short, the longest reaching to the 5th segment.

Parapodium uniform, the two rami lying closely together; lip of dorsal ramus obtusely rounded or moderately pointed; same of ventral ramus as broad as that of dorsal ramus, similar in length; bristles with either falcate or short setose end-piece. Superior ligula obtusely conical, not longer than the lip of dorsal (or superior) ramus; inferior ligula short and rounded, about half the length of the lip of ventral ramus. Dorsal cirrus simple; arising, in the anteriorly placed segments, from the middle of the dorsal margin of parapodium, and in the posteriorly placed segments, from a point nearer to tip than to base of parapodium, and extending far beyond the ligula.

Ventral cirrus arising from base of parapodium, almost as

long as the inferior ligula. Anal segment long, conical and simple, with 2 slender anal cirri.

Paragnathi stout, dark coloured : I. 3 in a longitudinal row ; II. in a curved double row ; IV. in a semicircular group ; III. in a large and rounded crowd ; V. unarmed ; VI. 4 (sometimes 7) ; VII., VIII. in a dense transverse band. Maxillae stout, black, with 7 teeth.

Epitocous phase :—In males, 7 anteriormost dorsal and 4 anteriormost ventral cirri thickened at base ; and suddenly from the 17th segment posteriorly the parapodia are enlarged. In females, the change of parapodia in form and size occurs gradually from the 18th segment posteriorly, the rami becoming outstretched, the lip of dorsal ramus and the posterior lip of ventral ramus enlarged, and the inferior ligula elongated. The skin fold along the inferior side of dorsal cirrus is warty in males. On base of ventral cirrus, there is found a simple skin-fold in females, and double skin-folds in males. Anal segment enlarged.

Habitat ;—Toba in Prov. Shima (!) ; Shikinejima, about 23 fathoms ; Misaki (!) ; Yokohama ; Choshi in Prov. Shimosa (Prof. S. Goro) ; Miyazu in Prov. Tango (!) ; Mororan Harbour in Hokkaido (!) ; Sagami Bay, 63 fathoms ; Tōtōmi Sea, 34 fathoms (“ Albatross ”).

Nereis pusilla Moore.

1903. *Nereis pusilla*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 428, Pl. XXIV, figs. 25—27.

Body, consisting of about 50 segments, measures 20 mm. in length and 2.2 mm. in breadth including parapodia.

Prostomium longer than broad ; the preocular region little narrower than the ocular ; anterior margin broad, truncate. Eyes

large, black; those of the posterior pair with lens, situated close to the hind margin of prostomium; those of the anterior pair larger, and elliptical in outline. Tentacles much shorter than $\frac{2}{3}$ the distance between the two posterior eyes. Palpi as long as prostomium.

First body-segment $\frac{1}{2}$ as long as prostomium. Tentacular cirri non-articulated, the longest reaching to the 5th and the shortest to the 3rd segment.

Parapodium (the 15th) about as long as high. The dorsal ramus larger than the ventral, which it slightly overlaps anteriorly; with two long, pointed, conical superior and inferior ligulae, and a short, slender, presetal lip; dorsal cirrus very slender, arising from the basal $\frac{1}{3}$ of superior ligula and extending scarcely beyond tip of same. Ventral ramus with an elongated conical inferior ligula and a slender lip, which divides at the end into a short and broad presetal and a very long and slender postsetal process; ventral cirrus small and slender, its origin distinctly separated from base of ventral ramus, and its lip not reaching the middle of inferior ligula.

Bristles in part with setose, and in part with falcate, end-piece.

Paragnathi brown, small, conical, the posteriorly situated ones in each group somewhat larger: I. 5 in a longitudinal series; II. in an oblique elliptical group, in 3 rows (an anterior lateral row of about 4, a middle row of 6, and a posterior internal row of 5); III. in a small longitudinally elongated group of about 10; IV. in a nearly circular group of about 20; V., VI., VII., VIII. absent. Maxillae with 3 teeth in the basal half, which are separated by a wide interval from a 4th double tooth situated near the terminal fang.

Habitat;—Suruga Bay, 63—75 fathoms (“Albatross”); Sagami Bay (Mr. K. AOKI).

Nereis Dumerilii Aud. et M.-Edw.

Pl. XVII, figs. 7—8.

1834. *Nereis Dumerilii*, Audouin et Milne-Edwards. Recherches pour servir a l'hist. nat. du littoral de la France, Tom. II, p. 196, Pl. IV-A, figs, 10—12.
1840. *Nereis Dumerilii*, Johnston. Miscellanea Zool. Annals of natur. history, Vol. V, p. 174.
1843. *Nereis zostericola*, Oersted. Annul. Dan. conspect., p. 22, figs. 20, 29, 67, 70, 71, 74.
1865. *Nereis Dumerilii*, Johnston. Catalogue Brit. worms, p. 156.
1865. „ „ Quatrefages. Hist. des Annelés I, p. 502.
1867. *Leontis Dumerilii*, Malmgren. Annul. Polych., p. 52.
1870. *Nereis Dumerilii*, Claparède. Les Annel. Chétop. du Golfe de Naples ; Suppl. p. 44 (p. 408), Pls. III—VI.
1879. *Nereis Dumerilii*, Marenzeller. Südjav. Annel., p. 15, Taf. II, Fig. 4.

Epitocous phase :

1843. *Heteronereis fuciola*, Oersted. Annul. Dan. Conspect., p. 19, figs. 17, 55—58, 61, 62.
1843. *Nereilepas variabilis*, Oersted. Annul. Dan. Conspect., p. 20, figs. 18, 26, 51, 52, 54, 59, 60 (Uebergangsform).
1868. *Nereis Dumerilii*, Ehlers. Die Borstenwürmer, p. 535, Taf. XX, Fig. 21—37.

Body rather slender, broadest near prostomium, 20—40 mm. long, 3 mm. broad, composed of 70—85 segments. Colour reddish with dark transverse bands.

Prostomium scarcely longer than broad; tentacles longer than half the length of prostomium; palpi short, not extending beyond tip of tentacles; first body-segment slightly longer than the succeeding, in dorsal aspect with a peak directed forward.

Tentacular cirri slender, all extending beyond tentacles ; the longest one reaching to the 15th segment, when laid backwards along the body.

Antermost 4 pairs of parapodia with closely laid rami, having pointed lips and ligulae. The next 5 or 6 pairs of parapodia with thicker rounded lip to dorsal ramus, and thinner lip to ventral ramus ; with thick, rounded superior and inferior ligulae, both which reach laterally to about same extent.

In still next following parapodia, the two rami are widely separated ; the dorsal ramus with conically pointed lip, the ventral with 2 similar and somewhat shorter lips ; superior ligula slender, conically pointed ; inferior ligula half as long as the ventral ramus. Dorsal cirrus in all segments filiform, extending far beyond the ligula.

In posterior parapodia, dorsal cirrus arises near the end of ligula and is longer than that in more anteriorly placed parapodia. Ventral cirrus arises from base of parapodium and is shorter than the ventral ramus. Dorsal bristle-tuft composed of a series of ordinary setose bristles, and of a single blackish hook (Pl. XVII, fig. 8) of the characteristic form. Ventral ramus bears setose bristles similar to those of dorsal ramus and short falcate bristles (Pl. XVII, fig. 7).

Anal segment short, divided by radial furrows, and with 2 triangular leaf-like appendages, one at base of each slender anal cirrus.

Proboscis short and thick. Paragnathi very small and of a light brown colour : I., II. absent ; IV. in dense comb-shaped rows forming a triangular group ; III. in a transverse group ; V. absent ; VI. in a short double row ; VII., VIII. in 6 small, distinctly divided groups, forming just behind the maxillary ring

a continuous row. Maxillae short and broad, with 5 or 6 teeth on each.

Epitocous phase :—In both males and females, there is no distinctly marked posterior region of body. In the male, the cirri of the first 4 pairs of parapodia are enlarged at their basal region. The change of parapodia in form takes place in the male from 16th segment, and in the female from 21st segment, posteriorly. Each lip of dorsal ramus and the posterior lip of ventral ramus are enlarged and form a flat skin-fold; superior ligula conically pointed; inferior ligula enlarged and provided with a hook-shaped process; on the posterior side of the base of dorsal cirrus a small, and on the base of ventral cirrus a trilobed, skin-fold is observed. Cirri of the female simple; dorsal cirrus of the male provided with warts on its thickened basal region, and its terminal region abruptly tapering to a sharp point.

Habitat :—Kanagawa in Prov. Musashi (Late Prof. K. MITSUKURI); Misaki (!); Toba in Prov. Shima (!); Satsuma (Late Prof. K. MITSUKURI and Mr. J. HARA); Gulf of Miya in Prov. Owari.

Nereis Agassizi Ehlers.

Pl. I, fig. 9; Pl. XVII, figs. 9—11.

1868. *Nereis Agassizi*, Ehlers. Die Borstenwürmer, p. 542, Taf. XXIII Fig. 1.

1901. *Nereis Agassizi*, Johnson. Polychaeta of Puget Sound Region, p. 399, Pl. IV, figs. 39—45.

Body slender, broadest near prostomium. Colour reddish yellow in an alcoholic specimen. In living specimens, the dorsum is anteriorly deep brownish in the female, and light bluish brown in the male; both sexes with fine brownish pigment spots scattered

all over dorsal surface of body; ventral surface pinkish yellow in female, and pinkish white in male.

Length 50—70 mm., consisting of 80—100 segments, breadth about 4 mm. without, and 6 mm. with, parapodia and bristles.

Prostomium broader than long; tentacles slightly shorter than prostomium separated at base; palpi large and thick, each with a large terminal boss, which extends a little beyond tentacles. First segment almost twice the length of the 2nd. Tentacular cirri long, all extending beyond tip of palpi, the longest reaching to 14th segment.

First 4 pairs of parapodia with pointed ligulae and lips. The next following 4 or 5 pairs of parapodia with ligula and lip of dorsal ramus rounded at end; lips of ventral ramus compressed and narrow. In all the remaining pairs of parapodia, the two rami are widely separated, and the lip of dorsal ramus is twice as long as the short lip of the ventral; the superior ligula is slender, conical, and longer than the lip of dorsal ramus, while the inferior ligula is as long as the ventral ramus. Bristles with setose or short falcate (fig. 11) end-piece; in dorsal ramus 1 or 2 (sometimes 4) strong hooks (fig. 10). Dorsal cirrus enlarged in basal region, longer than superior ligula; ventral cirrus as long as inferior ligula. Anal segment globular with a pair of long and slender anal cirri.

Proboscis short. Paragnathi small: I., II. absent; IV. in a triangular group; III. a roundish group of comb-like rows; V. absent; VI. two transverse rows; VII., VIII. a continuous band of 6 distinct, small, double-rowed groups, very near to the posterior boundary of the maxillary division. Maxillae short and broad, with 6—7 teeth.

The tube in which this annelid lives is leathery, and rather

tough, but is very flexible and translucent; pale white in colour. The worms are gregarious. Large masses of tangled branches of a floating *sargassum*, held together by the strongly adhesive secretion of the colony of *N. Agassizi*, are often found in Misaki.

Habitat :—Misaki in Prov. Sagami (!), March 29th, 1908.

Nereis kubiensis McIntosh.

Pl. XVII, figs. 12—13.

1885. *Nereis* (*Platynereis*) *kubiensis*, McIntosh. "Challenger" Annel., p. 210, Pl. XXXIV, figs. 3—6; Pl. XVI-A, figs. 2—4.

Body slender, measuring 40—60 mm. in length, and 3.5—4.5 mm. in breadth, including setae, at about 20th segment.

Prostomium somewhat longer than broad; tentacles about the length of prostomium. Palpi large, tip of the bosses scarcely reaching that of tentacles. Eyes large, each furnished with a lens. Tentacular cirri attenuate, the longest reaching to 14th or 15th segment. First segment longer than the second, and with a peak in front directed forward.

The body presents no colouration dorsally, the only pigment present being that in the granular masses at base of parapodia.

Parapodium (the 10th) with three prominent rounded ligulae, the superior being ventrally more oblique in outline than dorsally. Dorsal cirrus slightly longer than $\frac{3}{4}$ the height of parapodium, stretching considerably beyond superior ligula; ventral ramus not reaching tip of inferior ligula. Dorsal bristle-tuft composed of a series of ordinary bristles with short and boldly serrated setose end-piece, and of a single deep

amber-coloured, characteristic hook (fig. 13). Ventral bristle-tufts consist of bristles same as the above mentioned and of others having falcate end-piece.

The 30th or more posteriorly placed parapodium still exhibits three prominent ligulae, but are all more slender and more elongate than in more anteriorly placed parapodia; superior ligula somewhat conical in lateral view, while the middle and the inferior approach a lanceolate form. These characters are slightly modified in the 57th parapodium, in which the superior and inferior ligulae are longer, while the middle is proportionally short. Moreover, there occur two hooks above the superior acicula.

Paragnathi of proboscis: I., II. absent; III. an irregular transverse series; IV. in triangular groups, the paragnathi being larger than in III.; V. absent; VI. in double transverse rows; VII., VIII. in tolerably continuous, curved rows. Maxillae pale brown, with 8 teeth below terminal fang,

Habitat:—Off Kobé, 50 fathoms ("Challenger"); Misaki (!); Kanagawa in Prov. Musashi.

Nereis japonica Izuka.

Pl. XVII, figs. 14—16, 18.

1879. *Nereis diversicolor*, Marenzeller. Süd-jap. Annel. I, p. 14.

1908. „ *japonica*, Izuka. On the Breeding Habit and Development of *N. japonica*, Annot. Zool. Jap., Vol. VI, pt. 4, p. 295.

Body rather stout anteriorly, posteriorly gradually tapering; pinkish yellow when alive, with two brownish longitudinal bands on anterior segments; in alcoholic specimen, only a light brown hue left on the anterior dorsal surface of body; 90—120 segments.

Prostomium broader than long; tentacles scarcely $\frac{1}{3}$ as long, their bases separated; palpi short and thick, not extending beyond tip of tentacles. The eyes with distinct lens in each. First segment scarcely longer than the succeeding; tentacular cirri short, the longest extending a little beyond tip of tentacles.

Parapodium uniform, the rami being closely set in anterior parapodia, but somewhat diverging in the posterior; dorsal ramus with two ligulae, extending a little beyond the ventral ramus; superior ligula flat and triangular, with its tip extending beyond the dorsal ramus; inferior ligula shorter than the ventral ramus. Bristles with falcate or small elongate setose end-piece. One or two peculiar thorny bristles (fig. 15) are observed close to and alongside the outer end of superior acicula.

Dorsal cirrus filiform and small, never reaching to tip of the superior ligula. Ventral cirrus still shorter. Anal segment simple, shortly conical, with 2 slender anal cirri.

Proboscis stout. Paragnathi: I. absent or 2 in a longitudinal line; II. in curved double rows; IV. in a bow-shaped row; III. a transverse group; V. absent; VI. in small transverse double-rows; VII. and VIII. in a continuous transverse row. Maxillae with 7 (or 8) teeth.

Mature worms:—There is no marked structural difference between the immature and the mature or terminal pelagic stages, except in colour and dimensions. The colour changes with the development of sexual products; it again differs according to whether these are eggs or spermatozoa. The sexual products, which fill up not only the body cavity proper, but also its extension into parapodia, greatly distend the body-wall; so that fully mature worms generally attain a length of 110—120 mm. and a breadth of 7—8 mm., while immature worms

show a length of 60—100 mm. and a breadth of 5—6 mm. There is no indication of any change in the structure of parapodia, in the setae or in the eyes. Nor does the posterior region of body undergo shrivelling, as it does in *Ceratocephale osawai*.*

There can be no doubt, that the persistent condition of parapodia and setae enables the mature worm to swim as swiftly as in the immature stage.

The sexes are easily distinguishable by the colour of the worms. The females are of a deep green on the dorsal side and of a greenish yellow on the ventral. The males are dorsally light greenish yellow and ventrally pinkish white blending into a deep pink at base of parapodia.

This species comes very close to *Nereis diversicolor* O. F. MÜLL., as compared with the descriptions and drawings of the latter given by several authors (MALMGREN, EHLERS and SCHRÖDER, &c.) and also with alcoholic specimens from St. Andrews (Scotland) and from Foxfield in the Dudden estuary (England). However, there exist some differences between the two forms, mainly in the arrangement of paragnathi. Thus, in the Japanese species the paragnathi in the VII. and VIII. division of the proboscis are arranged in one continuous row (figs. 18), while in *N. diversicolor* they are arranged in three or four irregular rows (fig. 19); and moreover, the falcate bristles of the former are of a greater magnitude than those of the latter (figs. 16 and 17). The eyes of *N. japonica* are provided with a distinct lens in each, while there is no lens to be found in those of *N. diversicolor*. The breeding habit of the Japanese worm also differs from that of *N. diversicolor*, with regard

* IZUKA, A.—Observations on the Japanese Palolo, *Ceratocephale osawai*. (JOUR. COLL. SCI. VOL. XVII, ART. 11, 1903.)

to which species McINTOSH † says that the breeding season extends from November till May and that he observed no indication of swarming during those months. The same author further states that he obtained numerous postlarval stages of the species in or near the mouths of the burrows in which the annelid lives.

The worms which were collected by KOEBL in the Gulf of Miya in Prov. Owari and were identified with *N. diversicolor* by MARENZELLER, are in all probability *N. japonica*. The two species resemble each other so closely that they might easily be comfounded. Indubitable *N. diversicolor* has never yet been met with by me anywhere in Japan.

Habitat:—Sumida River in Tokyo (!); Gulf of Kojima in Prov. Bizen (!); Kasaoka in Prov. Bittyu (!); Hinuma in Prov. Hitachi (!); Gulf of Miya in Prov. Owari (!); Toba in Prov. Shima (!); Shimizu Harbour in Prov. Suruga (!); Ito in Prov. Izu (!); Yokohama (!); Kanazawa in Prov. Musashi (!); Chōshi in Prov. Shimōsa (!); Isumi River in Prov. Kazusa (Mr. T. SUZUKI); Bay of Matsushima and Samé Harbour on the east coast of Northern Japan (!); Lake Bousset in Sakhalin (Prof. I. IJIMA).

Remarks:—*Nereis japonica* is one of the most common littoral annelids in Tokyo and vicinity, where it is extensively used as bait, and is locally known under the name of “Gokai.” It is also very common in the Gulf of Kojima, Prov. Bizen, and in Hinuma, Prov. Hitachi. In the former locality, it is known under the name of “Umibiiru” and in the latter by that of “Kanko.” In both these localities the mature worms are largely used as manure.

Breeding habit:—The swarming of the mature worm in the Kojima Gulf occurs during the month of December, usually in

† McINTOSH:—On the Reproduction of *Nereis diversicolor*. (Ann. and Mag. Nat. Hist., 9 series, Vol. 20, p. 176, 1907).

one period lasting a few days; and the period begins on the night just before the day of the new or the full moon in the middle or the latter part of the month mentioned. It invariably takes place in the midnight just after flood-tide. Very rarely the swarming occurs in two periods, close to the consecutive new and full moons.

The swimming worms may be easily captured either with the tow-net or hand-net. The native fishermen, who capture them in quantities for the manure, employ "pyramidal net," a kind of large bag net, which is stretched so as to receive the swarm of the worms coming down along with the ebbing water.

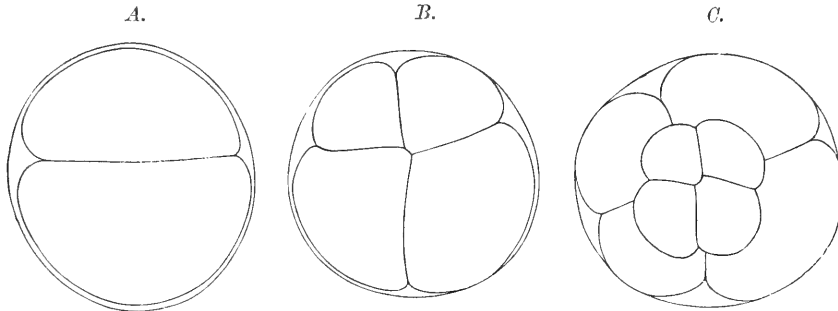
The mature worms can be easily kept alive for a week or more in shallow wooden vessels placed at a shaded place and containing a small quantity of water taken during high tide and just enough to cover the worms. The water must be changed at least once a day, taking care to remove all the injured worms as soon as possible, without which precaution the water will soon become so filled with discharged sexual products as to be detrimental to the health of the worms. Too much water, as also too much light, induces the worms to motion and thus increases the chance of their receiving injuries to the body.

Development :—Artificial fertilization can easily be effected, provided precaution be taken to keep the water at a constant temperature (about 15° C) and its salinity the same as at high tide in Kojima Gulf.

About 90 minutes after fertilization, the first polar body is extruded; the second follows about 30 minutes later.

The cleavage of the egg is total and unequal. The first cleavage takes place about three hours after fertilization (woodcut

A); the second is accomplished about forty minutes later (woodcut B); the third is completed about five hours and a half after fertilization (woodcut C).



Early stages of segmentation.

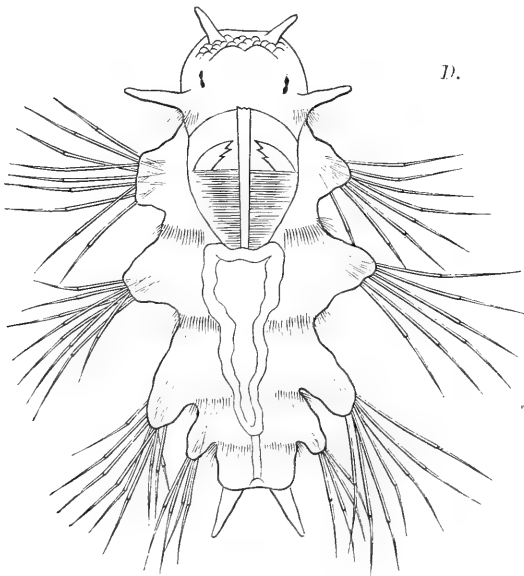
A. Completed 2-cell stage seen from the lower pole. 140/1.

B. View from the upper pole after completed second cleavage. 140/1.

C. " " " " " " " " third cleavage. 140/1.

(Polar bodies are not indicated. All the figures were drawn from the living egg).

Ciliated embryos first appear about 40 hours after fertilization; 4 or 5 hours after that the embryos are seen swimming



about very actively in the vessel. They then show a marked positive heliotactic nature, so that the water in the vessel may now be easily changed by means of a siphon.

About 90 hours after fertilization the setae begin to appear.

One of the embryos of about 9 days age is represented in woodcut

An embryo 9 days old, with 4 setigerous segments. 140/1. *Nat. Size.*

D; it is provided with four pairs of setigerous parapodia, a pair of tentacles, a pair of tentacul arcirri and a pair of short anal cirri. The two pairs of the "Anlagen" of eyes are distinctly seen on the postero-lateral parts of the head; a pair of jaws, each with three teeth, may also be seen already in this stage of development.

The embryos, at about this stage of development, begin to sink down gradually in the water, in which they have been reared; and about two days later, most of them are on the bottom and have entered into sedentary life.

Nereis dyamusi n. sp.

Pl. XVIII, figs. 1—7.

Body elongate, broadest in the anterior one-third of its length; up to 250 segments. Length of mature worms 340–490 mm.; breadth 11–13 mm., or 20–24 mm. including parapodia and bristles. Prostomium longer than broad; tentacles scarcely $\frac{1}{2}$ the length of the prostomium, meeting one another at their base; palpi extending beyond tentacles. First body-segment twice as long as the succeeding; its anterior border slightly overlaps the prostomium in the middle, being convex forward. Inferior tentacular cirri slightly shorter than palpi, the superior ones longer than the latter; longest tentacular cirri reaching to 8th segment.

Parapodium nearly uniform, the two rami in anteriorly placed parapodia more closely set than in posteriorly placed ones; dorsal ramus with two lips, of which the larger one is conical and as long as the inferior lip of ventral ramus in anteriorly placed

parapodia, but is longer than the latter in posteriorly placed parapodia.

Bristles in part with falcate, and in part with long slender setose, end-piece; superior ligula, with the exception of that of first 5 or 6 parapodia, a broad heart-shaped flap, arising from entire base of parapodium; inferior ligula slender and conical, as long as the ventral ramus; dorsal cirrus short, filiform, arising from the middle of the dorsal border of superior ligula, and not reaching so far as the dorsal ramus; ventral cirrus shorter than the dorsal, arising from base of parapodium. Anal segment long and conical, with longitudinal furrows; with two slender anal cirri.

Proboscis slender. Paragnathi dark: I. 4 or 5 in a group; II., IV., in irregular curved rows; III. in many transverse rows; V. 2 or 3; VI. single or represented by a small irregular mass; VII., VIII. in irregular transverse rows. Maxillae black, with 6—8 strong teeth below terminal fang.

Epitocous phase:—The change of parapodia in form is slight and takes place very gradually in both sexes. Superior ligula enlarged; post-setal lip of ventral ramus thinly expanded; ventral cirrus elongated, thickened at base, with small wing-like flaps. Anal segment with 2 slender anal cirri, equalling in length to 14—16 preceding segments taken together.

This species comes very close to both *Nereis virens* Sars (EHLERS: Die Borstenwürmer, p. 559) and *Nereis Brandti* (MALGR.), but differs from both in the number and arrangement of paragnathi in region I. Further it differs from *N. Brandti* in same in regions VII. and VIII., and from *N. virens* in same in region III., as well as in the number of teeth on the edge of maxillae.

Habitat:—Wakkanai in Prov. Kitami (Mr. H. WATANABÉ);

Hakodaté Harbour (Mr. K. YENDO); Chepissani in Aniwa Bay, Sakhalin (Prof. I. UJIMA).

Swarming:—This worm swarmed in abundance in Hakodaté Harbour on the night of May 11th, 1903, according to Mr. K. YENDO's observation.

Nereis oxypoda Marenz.

Pl. XVIII, figs. 8—11.

1879. *Nereis oxypoda*, Marenzeller. Süd-jap. Annel., p. 12, Taf. II, Fig. 3.

Body gradually tapers towards posterior end, consisting of 224–250 segments. It measures 230–300 mm. in length, 8 mm. in breadth, and 14 mm. in same including parapodia and bristles at about 50th segment. In the living state, the general colour is flesh-red; but in preserved specimens, it changes into liver-brown on the dorsum, and whitish on the large foliaceous superior ligula, as was stated by MARENZELLER.

Prostomium in the basal region between tentacular cirri, broader than long; beyond the region of anterior eyes it narrows anteriorly. Tentacles about $\frac{1}{5}$ the length of prostomium, closely set at their base. Palpi large, exceeding the tentacles by their knob-like end-piece. Peristomium about $1\frac{1}{2}$ the length of the succeeding segment; longest tentacular cirri reaching to 4th segment.

The anteriormost two pairs of parapodia are small, each consisting of a superior and an inferior ligula, in addition to two setal lobes or lips, which in anteriorly placed parapodia represent the ventral ramus. The remaining parapodia differs

in form according to regions of the body; thus in 13th parapodium, the superior ligula is lanceolate, and from its dorsal base arises the dorsal cirrus with broad base, and from a more proximal position a somewhat conical dorsal process. Ventral ramus, with elongated pre- and post-setal lobes (or lips), nearly as long as the dorsal ramus; inferior ligula shorter than setal lobes; ventral cirrus small, arising from base of parapodium.

In about 50th segment, superior ligula is much enlarged, the dorsal process somewhat elliptical in outline, and the dorsal cirrus shortly filiform. In the posterior region of body, the superior ligula becomes relatively more elongated dorso-laterally, while the parapodium itself becomes smaller posteriorly.

Bristles are entirely of the setose kind, more dorsally with finely haired longer blade, and more ventrally with relatively coarser haired, shorter and broader end-piece. Aciculæ two, black.

Proboscis stout. Paragnathi distinct: I. 1 or 2; II. an oblique band consisting of about 3 rows; III. a group of 6—8 small ones; IV. in curved groups of 17—20, convex on the outside; V. a single pale-coloured piece; VI. in circular groups; VII., VIII. in a continuous transverse band, consisting of many irregular rows. Maxillæ brownish black, with 11—12 teeth below terminal fang.

No structural difference is observed in parapodia between the atocous and the epitocous phase of this species.

Habitat:—? Yokohama (MARENZELLER); Misaki (!); Miyazu in Prov. Tango (!); Gulf of Kojima in Prov. Bizen (!).

Remark:—In Kojima Gulf and its vicinity, this annelid is much used as bait, and is known under the name of “Chibiiru,” so called on account of the red colour of the animal in living state.

The reproductive elements are ripe in Kojima Gulf in the month of December.

Nereis exoensis n. sp.

Pl. XVIII, figs, 12—20.

Body tapering posteriorly; brown or brownish gray; 95–100 segments. Prostomium as broad as long; tentacles longer than $\frac{1}{2}$ its length, touching one another at their base; palpi thick, their tip not reaching to that of tentacles. Peristomium twice as long as the succeeding segment; inferior tentacular cirri not extending beyond tentacles, the longest superior ones reaching to 4th segment.

Parapodia increase their length posteriorly; the rami slightly separated from each other; conical lip of dorsal ramus a little longer than ventral ramus; superior ligula conical, extending beyond the latter a little in anterior parapodia, but much in posterior parapodia. Dorsal border of dorsal ramus elevated, scarcely convex in anterior, but strongly so in posterior, parapodia; inferior ligula simple and conical, as long as ventral ramus. Bristles with either falcate or setose end-piece. The falcate end-piece of bristles much longer in this species than in the closely allied *Nereis vexillosa*.*

Dorsal cirrus filiform, extending far beyond parapodium. Ventral cirrus on a basal knob at base of parapodium, not so long as inferior ligula.

Proboscis stout. Paragnathi: I. single or none; II. in four irregular rows; IV. in curved groups; III. a transverse group consisting of 3–5 rows; V. absent; VI. a small group of 6–8; VII., VIII. a transverse band consisting of an anterior row of irregularly

* EHLERS:—Die Borstenwürmer p. 573, 1868.

arranged larger, and of several posterior rows of densely arranged smaller, ones.

Maxillae strong, with 8 teeth.

Epitocous phase:—The anterior 29 parapodia unchanged; in the 30th the change is slight, but after that it soon reaches maximum degree. Dorsal region of superior ligula becomes thin and broad; ventral border of dorsal cirrus shows a serrated or warty appearance; ventral lobe of dorsal ramus and pre-setal lobe of ventral ramus are greatly enlarged, the former becoming oblong and the latter oval in shape; basal region of ventral cirrus develops into thin wing-like flap. The ordinary bristles are replaced by paddle-shaped ones.

Habitat:—Wakkanai in Prov. Kitami (Mr. H. WATANABÉ); Oshoro in Prov. Shiribeshi; Mororan Harbour in Prov. Iburi (!); Shimushu, June 25th, 1903 (Mr. K. YENDO).

Nereis ijimai n. sp.

Pl. II, fig. 1; Pl. XIX, figs. 1—9.

This gigantic Nereid reaches 390 mm. in length, consisting of 215 segments; the breadth increases from the first segment, which is 6 mm., to about the 60th, where it measures 12 mm., or 20 mm. including parapodia and bristles. After that the body tapers gradually toward the posterior end.

The dorsum in the anterior region is of a light brownish colour, which passes posteriorly, in the main parts of body, into a deep brownish with slightly metallic iridescence. This again gradually becomes lighter toward the posterior end of body, which is almost of a flesh colour. The ventral surface as well

as the base of parapodia are of an almost pale flesh colour.

Prostomium somewhat triangular, with the angular points slightly truncate (Pl. XIX, fig. 1). One of these is directed anteriorly, and bears a pair of small tentacles, which are about $\frac{1}{4}$ the length of prostomium. Palpi large and conical, arising from the two antero-lateral sides of prostomium, extending far beyond tip of tentacles; terminal boss small.

The two pairs of eyes very small and black; the posterior pair situated very close to the posterior border of prostomium, and the anterior pair placed a short distance in front of the posterior. Eyes more widely separated in the former than in the latter.

Longest tentacular cirrus (7 mm. in length) reaches to middle of 6th segment, when stretched posteriorly along the body; shortest pair about $\frac{1}{3}$ the length of the longest. Peristomium slightly longer than the next succeeding segment.

Anteriormost pair of parapodia small; thus, in the 5th parapodium the dorsal ramus is slightly deeper than the ventral; the superior and middle ligulae and the pre-setal lobe of dorsal ramus are all nearly similarly shaped, being elongate conical; the two setal lobes of ventral ramus are nearly equal in length to the middle ligula; and the inferior ligula is much shorter than the middle, though of about the same shape. The dorsal cirrus, arising from the middle of the dorsal border of parapodium, tapers distally, and its tip does not reach to that of the superior ligula; the ventral cirrus, arising from the base of parapodium, is almost equal in length to the dorsal cirrus.

Parapodia, especially the dorsal rami, gradually enlarge posteriorly. In 30th parapodium (fig. 5), the superior ligula is

heart-shaped, with the pointed end directed laterally; from the dorsal border of the parapodium arises a large but thin fan-shaped fold as in *Nereis oxyroda*, the dorsal cirrus remaining relatively small; and there is observable on the base of ventral cirrus an indication of a process, which becomes larger towards the posterior end of body. No paddle-shaped bristles observed. The parapodium shows no epitocous character.

Structural change of parapodia takes place in 31st—40th. After that, setose bristles (fig. 9) are entirely replaced by paddle-shaped ones (fig. 8); post-setal lobe of ventral ramus becomes expanded dorsally as well as ventrally, which character is not found in mature specimens of *Nereis oxyroda*; and an elliptical process is found at the base of ventral cirrus (fig. 6).

On segments nearer to the posterior end of body, the parapodium becomes smaller and smaller again; bristles of setose kind reappear, while the processes on post-setal lobe of ventral ramus, as well as those on base of ventral cirrus, disappear (fig. 7).

Anal segment long, with two slender anal cirri. Each anal cirrus with a brownish coloured ring at base.

Proboscis stout. Paragnathi weakly developed: I. absent; II. in small groups; III. absent; IV. 3 or 4 in a group; V. absent; VI. 6 or 7 pieces in an oblique group, VII., VIII. a few large ones, with minute ones scattered among them, in two continuous transverse rows. Maxillae slender, light brownish, without serration.

The annelid was sexually mature; the body cavity as well as its extensions into parapodia were almost entirely filled with eggs.

Habitat:—Off Jōgashima in Sagami Bay, June 2nd, 1898.

Nereis shishidoi n. sp.

Pl. XIX, figs. 10—18.

Body stout, consisting of 121 segments, 180 mm. long; its breadth 10 mm. without, and 14 mm. with, parapodia and bristles in the broadest region of body, *i.e.*, at about 10th segment.

Prostomium longer than broad (fig. 10), tentacles $\frac{1}{2}$ as long, separated at base and divergent. Palpi large, closely appressed to tentacles, the terminal bosses reaching almost to tip of tentacles. Posterior pair of eyes lies close to the posterior border of prostomium; anterior pair at a little distance from the posterior pair, the two eyes being more apart from each other.

Peristomium (figs. 10, 11) forming a collar as in *Nereis cyclurus* HARRINGTON, to which this species comes nearest; longer than the two succeeding segments taken together on the dorsal side, and as long as the length of the 4 succeeding segments on the lateral side; smooth above, but ventrally and laterally with longitudinal wrinkles. Tentacular cirri small, the longest reaching to 4th and the shortest to 3rd segment.

In the first parapodium (fig. 12), dorsal cirrus is almost twice as long as the superior ligula, which has an elongated conical outline; the ventral cirrus rather stout, slightly longer than $\frac{1}{2}$ the dorsal; only one acicula present.

In the 10th parapodium (fig. 13), superior ligula is enlarged to a heart-shaped flap; the dorsal cirrus arises from the dorsal border of the latter near the base of parapodium and is shorter than same of the 1st parapodium; middle ligula well developed,

being much longer than the ventral ramus ; inferior ligula extends to the tip of the latter, and ventral cirrus, which is more slender than that of the 1st parapodium, is a little shorter than the ventral ramus ; aciculæ two ; bristles (figs. 16, 17, 18) in part with short setose, and in part with falcate, end-piece.

In the 30th parapodium (fig. 14), the dorsal border of dorsal ramus shows a flap-like enlargement between the body and the base of dorsal cirrus ; the middle ligula is more prominent than in preceding parapodia, the ventral ramus as well as dorsal and ventral cirri remaining nearly the same.

In the 5th parapodium (Fig. 15), the shape of dorsal ramus becomes slightly changed, indicating decrease in size of the parapodium itself ; both dorsal and ventral cirri are relatively long ; base of middle ligula with a slight constriction.

The body cavity and its extensions into parapodia are almost entirely filled with sexual element, the eggs.

Anal segment short and broad, without anal cirri.

Proboscis stout. Paragnathi : I. 3 in a longitudinal line ; II. in 3 oblique curved rows (16—18 paragnathi in total), with the convex side turned mediad ; III. transverse band of densely arranged minute ones ; IV. 25—28 in a curved group ; V. absent ; VI. in a circular group of 7 or 8 ; VII., VIII. in a transverse band of larger anterior and smaller posterior paragnathi. Maxillæ slender, dark amber coloured with sharp black tip, with indistinct serration.

Habitat :—Yuriagé in Prov. Rikuzen, found in a dead gastropod shell. (Prof. I. SHISHIDO).

Genus *Ceratocephale* Malmgren, Auctor emend.

Prostomium with 2 tentacles and 2 palpi. First body-segment (peristomium) without parapodia, with 4 tentacular cirri on each side. Parapodium biramous, with only inferior ligula, lacking superior ligula. Dorsal cirrus filiform; ventral cirrus bifurcated or simple. Proboscis with soft papillae and 2 maxillae.

Ceratocephale osawai Izuka.

1903. *Ceratocephale osawai*, Izuka. Journ. Coll. Sci. Imp. Univ., Tokyo, Vol. XVII, Art. 11, pp. 1-37, Pls. I and II.

Atocous phase:—Body very slender. Segments as many as 300. Prostomium subhexagonal with broad base; anteriorly concave on the sides; provided with two pairs of eyes, besides having a pair each of tentacles and palpi. Peristomium with 4 pairs of tentacular cirri. Proboscis protrusible, with soft papillae on the anterior or maxillary ring, while the posterior or basal ring is entirely destitute of them; paragnathi absent. Arrangement of the papillae: one in each of the areas I. and II.; in IV. a single papilla of quite insignificant height; in III. 17-27 in irregular transverse rows. Maxillae blackish brown but translucent, with 7-9 teeth.

Parapodia nearly similar throughout the body, all being biramous; only lower ligula of dorsal ramus is present. Both dorsal and ventral cirri are simple.

Pygidium with a pair of slender anal cirri.

Bristles in part with falcate, and in part with setose, end-piece.

Epitocous phase:—This is the head-bearing anterior portion of the original worm. The segments number 78 or less. They are

distinguishable into those of the thorax and of the abdomen. Head and thoracic segments remain unchanged in character, except that the eyes are now more conspicuous than before. Abdominal segments enlarged; their bristles, originally of the ordinary form, are now replaced by paddle-shaped ones.

Ceratocephale osawai is one of the most common littoral annelids in Tokyo and its vicinity, where it is extensively used as bait in both immature and mature phases. The immature phase is locally known under the name of "Itomé," and the mature phase under that of "Bachi." It is also very common in the Gulf of Kojima, Prov. Bizen, and in Hinuma, Prov. Hitachi. In both of these localities, the mature worm is greatly used as manure as well as bait. In the former locality it is called by the name of "Kawabiiru," and in the latter by that of "Umiko."

Habitat:—Gulf of Kojima (!); Miya in Prov. Owari (!); Shimizu Harbour in Prov. Suruga (!); Itō in Prov. Izu (!); Sumida River in Tokyo (!); Kasaoka in Prov. Bittyu (!); Hōjō in Prov. Boshu (!); Hinuma in Prov. Hitachi (!); Matsushima and Hachinohé on the east coast of Northern Japan (!).

Swarming:—To give in general terms the results derived from my observations on the swarming habit of this annelid in Sumida River:

1.—The epitocous worms swim out four times a year, in the months of October and November.

2.—Each swarming period extends from one to four consecutive days, immediately following the days of the new and the full moon.

3.—The largest swarms occur within three days after the day of the new and the full moon.

4.—The swarming is greater after the new moon than after the full moon.

5.—The swarming invariably takes place just after the flood-tide in the evening.

6.—The swarming continues generally from one to two hours.

7.—On warm cloudy nights, the swarming seems to take place generally in larger scale than on clear chilly nights.

As to the tidal conditions in the mouth of the Sumida River during the two months of October and November, it is known :

1) that spring-tides occur in the evening within three days following the day of the new and the full moon ; and

2) that the spring-tide following the new moon is higher than that after the full moon. There is then noticeable a parallelism between the occurrence of the densest swarm and the highest spring-tide during the months concerned. Noteworthy seems also the fact that in the present species the time of swarming closely follows both the new and full moons.

Family Syllidae.

Body very slender, definitely segmented, and often with articulated tentacles and cirri, the former and some of the latter being occasionally very long.

Prostomium, rounded or quadrangular, with 3 tentacles (a median and two laterals) and usually 4 eyes. Palpi generally present in various degrees of development and separation. Peristomium with tentacular cirri, rarely with bristles. The mouth followed by pharyngeal cavity, and then by the protrusible proboscis (Pharynx, Schlundröhre) with chitinous wall, which organ *in situ* is often sinuous and rarely straight. In its

protruded condition the proboscis shows a series of soft papillae on the anterior margin, and a little behind these one or more hard prominent teeth. It terminates posteriorly in the proventriculus, a region more or less barrel-shaped and with wall marked with in a longitudinal rows of dots. The proventriculus is followed by a short tract which frequently tapers posteriorly and which ends in a dilated part often provided with two lateral cæca and marked off from the intestine behind by a constriction. Body terminating posteriorly with two cirri. The minute parapodia have dorsal and ventral cirri, of which the latter may however be absent; they are uniramous and bear falcate bristles with a terminal process, which is either simple or bifid. Swimming dorsal bristles also occur in the sexual form. E. GRUBE has described the stolon as having a few segments, two or three tentacles, two palpi, and some tentacular cirri, besides two eyes which are generally large. Parapodia with two fascicles of bristles, of which some are compound, and others simple and long. Cirri present or absent. Proboscis and proventriculus absent.

Key to the genera found in Japan.

- a.*' Tentacles and cirri very long and slender; number of segments few.
 *Amblyosyllis*.
- a.*'' Tentacles not long, segments numerous.
- b.*' Proboscis with a single, large, anteriorly situated tooth.....*Syllis*.
- b.*'' Proboscis with a large tooth, accompanied with a trèpan.
 *Trypanosyllis*.

Genus *Amblyosyllis* Grube.

Prostomium short. Eyes four, the two on each side confluent. Tentacles and cirri long and slender. Palpi small, appearing as two bosses on the ventral surface. Two nuchal flaps.

Pharynx long, sinuous, armed with a tooth and a circle of papillae. Pharyngeal glands posteriorly situated; ventricle small, with two minute cæca.

Body of a few segments; cirri thread-like, not articulated (LANGERHANS). Ventral cirrus lanceolate. Falcate bristles bidentate. Penultimate segment provided with two pairs of cirri (MALAQUINS).

Amblyosyllis speciosa n. sp.

Pl. XX, fig. 1.

Prostomium small, bluntly triangular, with one angle pointed anteriorly; with three long and slender tentacles, the median being about twice the length of the two laterals; all of them indistinctly annulated. Eyes four, yellowish red, situated obliquely on each side, those of the anterior pair much larger and slightly wider apart than those of the posterior, the pair on each side almost connate. Behind the eyes are two ciliated nuchal wings of a light yellowish tint; posterior end of the wings reaching to middle of second body-segment.

Body about 10 mm. in length excluding tentacles and anal cirri; consisting of 16 segments, of which 13 are parapodiated; both first and penultimate segments provided only with a long dorsal and a short ventral cirrus on each side.

The breadth increases gradually from the first segment to the sixth, where it measures about 1 mm.; on the seventh segment it abruptly increases to 1.6 mm., and thereafter it remains nearly the same to the 14th segment; with deep indentation at intersegmental sutures. Penultimate segment somewhat pear-shaped, longer than broad, being about 1.2 mm. in breadth.

Anal segment short and small, somewhat conical, the tip facing posteriorly, with 2 long anal cirri.

Parapodia in 13 pairs, increasing in size from the first and almost to the last. The setigerous lobe is stout, with a conical papilla above acicula. Dorsally is a long indistinctly annulated cirrus, which arises from the posterior part of the lobe. Bristles in a dense group; terminal-piece longest in dorsally placed bristles, and shortest in ventrally placed ones, each tapering to the hook at tip, with a process on the edge beneath the terminal hook. Ventral cirrus curved, lanceolate, scarcely reaching to tip of the setigerous region.

Colour of living specimens purplish brown dorsally, with a median longitudinal yellowish patch in each segment, except on anteriormost six segments and the anal segment; on the sixth segment a broad yellowish transverse band; posterior half of penultimate and anal segments lighter coloured. All the tentacles and cirri are milk-white; when not extended, they are curled up into regular compact spirals close to the body, and are frequently clustered over the dorsum so as to almost conceal it. At other times the cirri are thrown out perfectly straight; but on least annoyance, they coil up one after the other.

Habitat:—In a tide-pool near Misaki in Prov. Sagami, August 17th, 1906.

Genus *Trypanosyllis* Claparède.

Prostomium with well-developed palpi. Eyes four, large; tentacle large, long, and distinctly articulated. Body proportionally large, with large dorsal cirri which are alternately long and short. Anal cirri two, with a short median process between them.

Ventral cirri lanceolate (pinniform). Proboscis (in extrusion) with an anterior row of twelve flat papillae, and behind these a series of horny teeth. A single dorsal tooth. Parapodium truncate, bilobed; bristles with rather large, boldly bifid terminal-piece.

Trypanosyllis misakiensis Izuka.

Pl. XX, figs. 2—6.

1906. *Trypanosyllis misakiensis*, Izuka. Annot. Zool. Jap., Vol. V, p. 283.

Body elongate, depressed; dorsum slightly convex; ventral surface plain, longitudinally bisected by a median welt bounded by two fine parallel grooves. The body narrows posteriorly more than anteriorly. Length of body 21.0 mm.; maximum breadth including parapodia 2.2 mm. at about the posterior end of the anterior third of body; thickness 0.7 mm. in the same position.

Segments short and numerous (in all about 260 in number).

Prostomium broader in front than behind, bilobed. Ocular region on each side elevated into a prominent subelliptical lobe, which extends a considerable distance behind posterior eye. Eyes in two pairs; anterior eye about twice the posterior in diameter, directed slightly forwards and upwards, with an indication of a lens. Posterior eyes a short distance behind the anterior. Median tentacle arises from about the level of the anterior pair of eyes, while paired tentacles originate from the anterior end of prostomial lobes. All the three tentacles are nearly equal in length, and are annulated similarly as peristomial and dorsal

cirri. Palpi are slightly depressed dorso-ventrally and are bent downwards and outwards at tip.

Peristomium very short, being less than $\frac{1}{2}$ the length of the succeeding segment; peristomial cirri two on each side; ventral cirrus about $\frac{2}{3}$ as long as dorsal cirrus. Segments I.—III. curved so as to keep parallel to the outline of mouth.

Parapodium moderately elongate, its infero-lateral margin sloping downwards and inwards from the extreme apex; aciculae about 4; bristles stout, falcate, the end-piece with 3 teeth. Dorsal cirrus annulated, borne on a prominent cirriphore; ventral cirrus small, not annulated, arising from base of parapodium and not reaching to tip of same. Proboscis short, thin-walled; oesophagus moderately long, extending through segments VII—XXII, with the usual chitinous lining, which anteriorly terminates in a “trephine” of 10 crenulations. Proventriculus extends through segments XXIII—XLV.

The posterior extremity of the worm is capable of producing successive crops of collateral sexual buds. Each bud shows an external structure similar to that of the mother individual and is provided with a pair of long and annulated anal cirri.

The tail buds, 14 in number, present various stages of development. They are attached in a cluster to the ventral aspect of the posterior end. Among them, only three have reached an advanced stage of development, though the eyes are observable in a number of seven at least. Seen from the ventral side, the cluster shows an interesting feature, in that at its base and in the median line it includes three buds which as yet show no segmentation but are each provided with two distal processes, the “Anlagen” of anal cirri.

One of the better developed bud is elliptical in shape, con-

sisting of 19 segments besides the anterior eye-bearing and the posterior anal segment. The body is much flattened; length 2.4 mm.; maximum breadth at about the 8th segment, 1.0 mm. including the parapodia. An accumulation of sexual element (spermatozoa) fills up nearly the entire space of the body-cavity as well as its extensions into parapodia. The attachment of the buds to the mother individual is effected by a short pedicle at the anterior extremity, just in front of the eye-bearing segment.

Habitat:—The unique specimen was found crawling upon a block of stone brought up from a depth of about 7 fathoms, off the western coast of Jōgashima, Misaki (!).

Genus *Syllis* Savigny.

Prostomium with three tentacles; tentacular cirri in two pairs, all moniliform. Palpi separate throughout. Body more or less elongate, with distinct segments. Opening of pharynx (proboscis) with papillæ only; armature of same a single antero-dorsal tooth. Proventriculus short, two T-shaped glands behind. Parapodia with moniliform dorsal and filiform or pinniform ventral cirri. Bristles falcate with short terminal-piece ending with a single hook, or simple. Anal segment with two elongated cirri.

Reproduction normal, or by alternation of generations. Sexual individuals furnished only with two tentacles, and devoid of tentacular cirri. Sexes similar.

Syllis ramosa McIntosh.

Pl. XX, figs. 7—8.

1879. *Syllis ramosa*, McIntosh. Jour. Linn. Soc. London (Zool.), Vol. XIV, p. 720.

1885. *Syllis ramosa*, McIntosh. "Challenger" Rep. Annel., p. 198, Pl. XXXI, fig. 1.

The living animal is of a beautiful rose-red colour, in contrast to the colourless sponge in which it is found; it may thus be easily detected when present, in spite of the thinness of its body.

The annelid is found located for the most part in the gastral cavity and adjoining canals of a certain Hexactinellid sponge (*Crateromorpha meyeri rugosa* IJIMA) collected in Sagami Bay. The annelid is very remarkable for the unique power of branching or budding.

The intricate manner, in which the branches are entangled in the sponge, makes it a very difficult matter to extricate the worm; even after removal from the sponge it is a laborious operation to unravel it without frequent rupture.

The body as well as the numerous branches measure about 0.7 mm. in breadth and 0.3 mm. in thickness. Each segment is furnished with a pair of parapodia.

The parapodium has dorsally a long cirrus, composed of a variable number of joints. The longer cirri consist of about 28 joints; and the shorter cirri, which alternate with the longer, show about 15 joints. The setigerous lobe is somewhat conical and is provided with a few bristles. Each bristle with stout shaft and short terminal piece, the latter rather indistinctly separated from the former and having curved tip. A single stout acicula supports the setigerous lobe. The ventral cirrus is broad and short.

Young buds consist of numerous, distinctly marked, narrow segments, each furnished with well-formed parapodia. They remain slender until after reaching a considerable length; into

each of them enters a diverticulum of the alimentary canal of the mother-animal. The buds, on attaining certain size, again give off buds, so that the whole attains a remarkably complicated condition. In the buds, the posterior region is early formed, and soon becomes furnished with two long anal cirri.

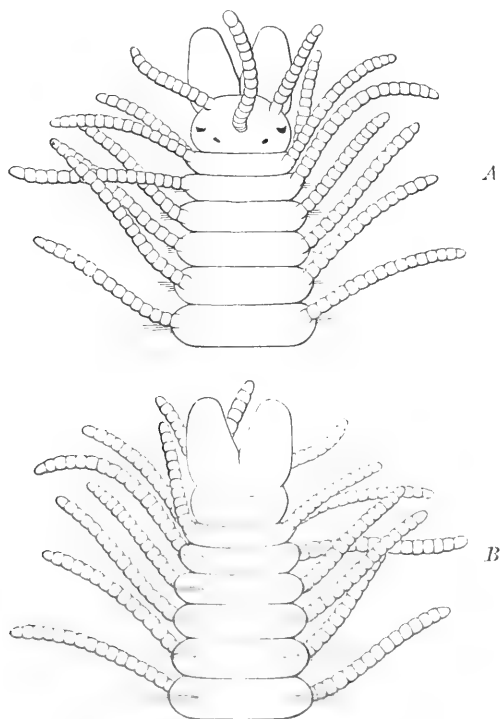
Reproduction is effected by branching as just described and also by the formation of sexual buds, each of which is provided with two eyes, but lacks tentacles and tentacular cirri.

It is a very difficult matter to procure the cephalic region of the annelid; indeed this has never before been got in Japan.

After laborious examinations of several specimens I was fortunate enough to observe the cephalic region of the species, in the last winter, during a short stay in the Misaki Marine Station.

Prostomium somewhat elliptical in outline and a little longer than $\frac{1}{2}$ the breadth, with a pair of large, somewhat conical palpi of about the length of the prostomium itself. Anterior pair of eyes much larger than the posterior, more apart from each other than those of the latter.

Median tentacle arising from about the middle of the dorsal surface of prostomium, extending a little beyond the anterior border of palpi. Lateral tentacles



A. Dorsal aspect of the cephalic region of *Syllis ramosa*. 30/1.

B. Ventral aspect of same. 30/1.

arising from the antero-lateral angle of prostomium, slightly shorter than the median.

Peristomium anteriorly overlaps the prostomium. Dorsal pair of tentacular cirri much longer than the ventral pair.

In the ventral aspect of the cephalic region there is a deep sulcus (the mouth), bounded posteriorly by the lower lip, which has a broad indentation in the middle.

Habitat:—Sagami Bay, about 100 fathoms; and Suruga Bay, 90 fathoms (Mr. K. AOKI).

Syllis inflata Marenz.

Pl. XX., figs. 9—10.

1879. *Syllis inflata*, Marenzeller. Süd-jap. Annel., p. 23.

Body slender, consisting of about 130 segments, 25 mm. in total length, 2.5 mm. in maximum breadth at about the posterior end of the anterior fifth of the body; tapering rapidly towards anterior end, but gradually towards posterior. Dorsal surface of body strongly arched, ventral surface almost flat.

The colour of body appears yellowish to the naked eye; under the microscope there are observed three distinct brownish transverse lines on the dorsal surface of each segment.

Prostomium elliptical in outline, scarcely as long as $\frac{1}{2}$ the breadth. The three tentacles are of about similar length, or the median tentacle is slightly longer than the two laterals, which arise from the frontal margin of prostomium, while the median tentacle arises from the dorsal surface of prostomium behind the line of the base of lateral tentacles.

Eyes four; the anterior larger, reniform; the posterior smaller, roundish, situated close to the anterior.

Peristomium, which almost completely covers the prostomium, bears 2 somewhat club-shaped tentacular cirri on each side; the dorsally situated tentacular cirrus longer than the median tentacle by nearly half the length of the latter; the ventrally situated cirrus somewhat shorter.

Segments short; their breadth on the ventral surface in the middle parts of body about six times the length of the segment.

Parapodium well-developed, longer than high; anterior lip roundish, extending beyond the more conical posterior lip; dorsal cirrus arising from a short distance above parapodium, indistinctly annulated.

Bristles of falcate kind with bifid tip; about 15 in a bundle. Superiorly placed bristles with long and slender end-piece; the middle ones with short (fig. 10), and the inferiorly placed ones with still shorter and broader (fig. 9), end-piece.

Ventral cirrus thick and cylindrical in form, not reaching to tip of the posterior lip of parapodium.

Pharynx 1 mm. in length, with 14 papillae. Proventriculus 2.25 mm. in length, with about 37 glands. Posterior to the latter are affixed two T-shaped glands.

Habitat:—Jōgashima near Misaki; "South Japan" (MARENZELLER).

Family **Hesionidae.**

Prostomium with two pairs of eyes, two or three tentacles, and generally two biarticulated palpi. Body of moderate length. Pygidium with two anal cirri. Proboscis protrusible, armed or unarmed. Anterior segments (1—4) distinct or more or less fused, each carrying two pairs of tentacular cirri. The re-

maining segments provided with uniramous or biramous parapodia ; dorsal ramus generally reduced, furnished with simple bristles ; ventral ramus with compound bristles. Dorsal and ventral cirri filiform, faintly annulated.

Genus *Hesione* Savigny.

Prostomium small, distinct, with 4 eyes and 2 tentacles. Tentacular cirri 16. Proboscis protrusible and unarmed. Body consisting of a small number of segments. Parapodium uniramous, with compound bristles.

Hesione reticulata Marenz.

Pl. II., fig. 7.

1879. *Hesione reticulata*, Marenzeller. Südjav. Annel., p. 21, Taf. III, Fig. 4.

Body consists of 19 segments, of which 16 are setigerous. Length of a medium sized specimen, 58 mm. ; maximum breadth in 11th segment, 9 mm. without and 16 mm. with parapodia and bristles. Length of the largest specimen ever got in Japan 90 mm. ; breadth 10 mm. and 18 mm. respectively.

Dorsal surface greatly arched. The cushion-like side-region occupies about $\frac{1}{3}$ of the lateral half of segment at about the 10th segment.

Dorsum brownish red with light greenish iridescence ; prostomium and anterior few segments deeper in colour, gradually fading towards posterior segments. At about the middle of each segment, there are observed three white spots situated in a transverse line ; these white spots are continuous in the 2nd,

3rd, 4th and 5th segments, so that they appear like a white band, traversing the middle of the segments. Posteriorly the spots become more or less irregularly distributed. Besides these spots many white wavy lines run antero-posteriorly throughout the whole length of body, anastomosing and again dividing so as to form a kind of network. Ventral surface of body white.

Prostomium bluntly conical, anteriorly narrowed, with convex lateral sides, divided into two lateral halves by a slight median depression. Eyes in two pairs, situated in postero-lateral region of prostomium; those of anterior pair larger and more apart from each other than those of the posterior. Tentacles small, one on each antero-lateral corner of prostomium. Tentacular cirri on each side 8 in number, arranged in two horizontal rows; those of the dorsal row longer than those of the ventral. Second dorsal tentacular cirri the longest, reaching to the anterior margin of 6th segment; and the last ventral one the shortest, reaching to the posterior border of 3rd segment, when stretched along the dorsum.

The lines of demarkation between segments are distinct on the sides of body, but not so in the median parts of both dorsal and ventral body surfaces.

Parapodium uniramous, of the form of an obliquely truncated cone, its dorsal margin projecting laterally to form a small pyramidal process. Dorsal cirrus consisting of a short cirriphore and a long style, arising from dorsal base of parapodium. Ventral cirrus slightly longer than parapodium, arising from distal end of the basal third of parapodium. Acicula simple, black. Bristles compound; the shaft green, the end-piece colourless or slightly yellowish, finely serrated on the concave side, and with a short broad-based and a long slender process below terminal fang.

The longest dorsal cirrus is that of 11th segment, being about three times as long as the length of the segment itself. Preanal segment with only dorsal and ventral cirri, lacking parapodia.

Anal cirri long, reaching to anterior margin of 15th segment, when stretched forwards along dorsum.

Proboscis cylindrical, its length about equal to that of the two anteriormost setigerous segments. It consists of two regions of nearly equal length, the anterior being white and the posterior slightly tinged with brownish hue; a small papilla-like process found on the dorsal median line of the latter region.

Habitat:—Shores of Misaki and its vicinities (!); Yokohama (Mr. U. TAKAKURA); Yenoura in Prov. Suruga (!); Agu in Prov. Shima (!); Kushimoto in Prov. Kii (Mr. K. YENDO); Sagami Bay, about 310 fathoms; Yenoshima (MARENZELLER).

Family **Phyllodocidae.**

Prostomium bluntly conical, cordiform or sub-oval; tentacles four or five, the unpaired posterior in position. Eyes two, posteriorly situated, generally small, rarely four. Body long, vermiform, rounded or depressed; segments numerous; anal cirri two, short. Tentacular cirri 1—4 pairs. Proboscis long, bipartite, with short papillae; no jaws. Parapodium as a rule simple, with one acicula and a fascicle of compound bristles; capillary bristles present in the epitocous phase of certain species. Dorsal and ventral cirri foliaceous.

Key to the genera found in Japan.

- a.*' Tentacles 4.
- b.*' Tentacular cirri in 4 pairs; first pair under cephalic-lobe, 2nd and 3rd pairs on peristomial segment, and 4th pair on second segment. *Phyllodoce*.
- b.*'' Tentacular cirri in 4 pairs; 3 pairs either on 1st segment alone or on 1st and 2nd segments, and one pair on next following segment. *Carobia*.
- b.*''' Tentacular cirri in 2 pairs. *Eteone*.
- a.*'' Tentacles 5. Tentacular cirri in 4 pairs.
- b.*' 1st pair of tentacular cirri on 1st segment, which is soldered to cephalic-lobe. *Eumida*.
- b.*'' 1st pair of tentacular cirri on 1st segment, which is free from cephalic-lobe. *Eulalia*.
- b.*''' All the 4 pairs of tentacular cirri borne on 2 segments, the 2 shorter pairs in front and the 2 longer pairs behind. . . *Notophyllum*.

Genus *Phyllodoce* Savigny.

Prostomium elongate, often longer than broad, oval, or cordate posteriorly. One pair of round eyes. Occasionally two rudimentary nuchal organs; four short tentacles; four pairs of tentacular cirri, the first pair under cephalic-lobe, the second and third pairs on peristomial segment, and the fourth pair on second segment. Body elongated, flattened; segments two-ringed; dorsal cirri large, lamelliform, carried vertically; ventral cirrus much smaller than the dorsal.

Phyllodoce lamelligera (Gmel.).

Pl. XXI, fig. 1.

1791. *Nereis lamelligera*, Gmelin. Linn. Syst. Nat., ed. 13, p. 3120.

1820. *Phyllodoce laminosa*, Savigny. *Syst. Annel.*, p. 43.
1834. „ „ „ Aud. et M.-Edwards. *Annel. (Litt. France, ii)*, p. 222, Pl. 5A, figs. 1—8.
1840. *Phyllodoce lamelligera*, Johnston. *Ann. Nat. Hist.*, p. 225, Pl. VI, figs. 1—6.
1851. *Phyllodoce laminosa*, Grube. *Fam. Annel.*, pp. 55, 129.
1865. „ „ *lamelligera*, Johnston. *Cat. Brit. Mus.*, p. 175, Pl. XVI, figs. 1—6.
1865. *Phyllodoce laminosa*, de Quatrefages. *Annel.*, II, p. 133.
1867. „ „ „ Malmgren. *Ann. Polych.*, p. 24, Pl. III, fig. 17.
1875. *Phyllodoce Paretti*, Marion et Bobretzky. *Ann. Sc. Nat.*, 6 sér., T. II, p. 61.
1885. *Phyllodoce laminosa*, Pruvot. *Arch. Zool. Exp*, 2^e sér., T. III, p. 287, Pl. XI, figs. 6, 7; Pl. XIV, figs. 4—8.
1888. *Phyllodoce (Carobia) laminosa*, de St. Joseph. *Ann. Sc. Nat.*, 7^e sér., T. V, p. 274, Pl. XI, figs. 133—136.
1902. *Phyllodoce lamelligera*, Marenzeller. *Polych. Grundl.*, p. 14.
1905. „ „ „ (= *P. Ehlersii*, de Quatrefg.), Graeffe. *Arbeit. Zool. Stat. Triest*, XV, p. 325.

Prostomium somewhat conical, anteriorly bluntly rounded, cordate at base owing to two projecting processes. The ground colour is olive green, with pinkish iridescence, with a black spot in front. Eyes two, large, placed at about the middle of prostomium. Tentacles subulate and short; tentacular cirri ringed in basal part present in three pairs on peristomial segment; the first pair situated under cephalic lobe, and the fourth pair on second segment. Both tentacles and tentacular cirri have the same dull greenish hue as dorsal cirri. At the posterior outer angle of prostomium and just in front of first tentacular cirri, there is a very large papilla on each side. A minute papilla occurs

in the centre of the posterior sinus of prostomium.

Body consisting of about 350 segments, much elongated (190—200 mm.), convex dorsally and flattened ventrally, tapering a little anteriorly and more distinctly so posteriorly. Posterior end with two rather stout anal cirri. Segments transversely ringed, shorter and broader anteriorly than posteriorly. The cuticle is remarkably iridescent, and there is a median series of blackish specks on dorsum. A conspicuous dark belt on the upper and anterior edge of the pedicle of parapodium. Ventral surface with dusky pigment and three rows of specks, the median speck being pale. The proboscis in extrusion is long, dark, and clavate; the basal parts covered with small papillæ, the distal parts with numerous low transverse papillæ, and the terminal disc with about twenty-one papillæ. Anteriorly situated dorsal cirri are reniform or ovate; those on thirtieth parapodium elongate-ovoid, and those on sixtieth wide in the upper part, so that the whole process forms a broad flap. More posteriorly, they again diminish in width so as to resemble an acuminate leaf. Setigerous process somewhat clavate, with bifid tip. Bristles pale, slightly curved at distal end of shaft which has minute spines on the terminal ridges and over the surface. The terminal blade is of a moderate length, obliquely striated, the edge boldly serrated. The ventral lamella is almost reniform in front but becomes ovato-acuminate behind. Anal cirri subulate.

Proboscis in extrusion with six rows of papillæ at base, and from sixteen to twenty-one papillæ at junction with stomach.

Habitat :—Off Moroiso near Misaki, 14 fathoms (!); Tomo Harbour in Prov. Bingo (!).

Phyllodoce groenlandica Oersted.

Pl. XXI, fig. 2.

1843. *Phyllodoce groenlandica*, Oersted. Grönland Annul. Dorsibr., p. 192, figs. 19—20, 22, 29, 30, 31, 32.
1851. *Phyllodoce mucosa*, Oersted. Consp. Annul., p. 31, figs. 25, 79 83 and 89.
- „ *Phyllodoce groenlandica*, Grube. Fam. Annel., pp. 56, 129.
1865. „ „ Malmgren. Nord. Hafs-Annul., pp. 96. 129.
- „ *Phyllodoce groenlandica*, de Quatrefages. Annel., II, p. 141.
- „ „ *lamelligera*, Carrington. Annel. Southport (Proc. Lit and Philos. Soc. Manch., IV), p. 5.
1867. *Phyllodoce groenlandica*, Malmgren. Annul. Polyeh., p. 21.
1874. „ „ McIntosh. Ann. Mag. Nat. Hist., sér 4, Vol. XIV, p. 196.
1898. *Phyllodoce groenlandica*, de St. Joseph. Ann. Sc. Nat., 8° sér., T. V, p. 326, Pl. XVIII, figs. 124—126.
1901. *Phyllodoce groenlandica*, Whiteaves. Geol. Surv. Canada, No. 722, p. 82.
1903. *Phyllodoce groenlandica*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 428.

Prostomium somewhat ovate, longer than broad; its posterior border cordate in that there exist two acute peaks separated by a deep notch. Two well marked eyes occur at about the commencement of the posterior third part. The tentacles are short and subulate. The tentacular cirri are of the usual proportions.

Body of considerable length (170–200 mm.), slightly tapering anteriorly and much more so posteriorly, rounded dorsally and somewhat flattened ventrally. The segments are distinctly marked on both surfaces by deep grooves. The posteriormost segment

bears two anal cirri. The animal is of a sandy or grayish-green hue, more darkly pigmented on the edges of the lamellæ.

Proboscis in extrusion with six rows of large tubercles anteriorly and numerous rows of smaller conical papillæ posteriorly.

Dorsal cirri much developed superiorly, so as to be almost rectangular; ventral cirri ovate-elliptical, turned upwards in the middle segments; setigerous lobe bifid; shaft of bristles with enlarged spinigerous tip, the blade long and serrated.

Habitat:—Suruga Bay, 63—75 fathoms (“Albatross”); and Misaki (!).

Genus *Carobia* Quatréfages.

Prostomium with four tentacles, anteriormost segment free from prostomium. Four pairs of tentacular cirri: three pairs on first segment, or on first and second segments, and one pair on the next following.

Carobia castanea Marenz.

Pl. XXI, fig. 3.

1879. *Carobia castanea*, Marenzeller. Süd-jap. Amel., p. 19, Taf. III, Fig. 2.

1905. *Carobia castanea*, Willey. Report on the Pearl Oyster Fishery, Suppl. Rept. XXX, p. 262.

This species may be distinguished from other Japanese Phyllodoceidae by its deep red colour.

Prostomium arched, as long as broad, with narrow anterior border. Maximum breadth in the middle of prostomium. Behind that line of greatest breadth lies the anterior margin of a pair of large, oval and black eyes. Both pairs of tentacles conical,

slightly shorter than the length of prostomium ; the superior pair arises from the anterior end of prostomium, while the inferior pair arises a little more posteriorly on the ventral surface of same.

Body slender, consisting of 150—192 segments, 30–39 mm. long, and 1.5–1.8 mm. broad in the anterior region of body. The breadth of body segments is about 4 times their length in the anterior parts of body, and about 6 times that in the middle parts.

Four pairs of tentacular cirri borne on two segments ; three pairs of them are on the anteriormost segment formed by fusion of the first and second body-segments and which is $1\frac{1}{2}$ times as long as the next following segment. Of these tentacular cirri, the postero-dorsal is the longest, and the postero-ventral the shortest. Their form is not cylindrical, but is much flattened and tapers distally. The anterior margin of the segment referred to above has in the middle a process which is applied to the posterior border of the prostomium.

The next following segment bears a pair of tentacular cirri slightly longer than those of the anteriormost pair. Under them the segment carries parapodia with ventral cirrus.

Parapodium short and conical, with longer anterior lobe and shorter, simple, roundish posterior lobe. Dorsal cirrus somewhat cordate ; those on anterior parapodia rounded, with symmetrical ventral prolongations ; those on posterior parapodia shorter and broader, with the outer ventral prolongation longer than the inner. Ventral cirrus reniform, with convex outer border.

Bristles transparent, about 14 in a bundle ; each with rather short end-piece, and with shaft showing many long spines. Anal segment with 2 anal cirri.

Habitat :—Misaki (!) ; Yenoshima (MARENZELLER).

Genus *Eteone* Savigny.

Body linear, consisting of numerous segments. Prostomium provided with 4 tentacles, with or without eyes. Peristomium simple. Tentacular cirri in 2 pairs. Parapodium uniramous; cirrus more or less foliaceous; bristles compound.

Eteone ornata Grube.

1877. *Eteone ornata*, Grube. 55. Jahresbericht d. Schles. Gesell. f. vaterländ. Cultur, p. 106.

GRUBE'S type is the only specimen as yet obtained of this species. The following I take from his description:

Body elongated, with 3 striking longitudinal rows of violet pigment-spots upon a pale-yellowish ground colour. Toward the middle parts of body the pigment-spots become gradually smaller and blend into a single streak, while in the posterior region of body they entirely disappear. Dorsal cirrus comparatively small and borne on distinct stalk as in *E. armata* CLAP. (1868) and *E. siphodonta* D. CH. (1850). Prostomium roundish-triangular, somewhat broader than long, and longer than peristomium. Eyes two, small and dot-like.

Habitat:—"North Japan Sea" (GRUBE).

Genus *Eumida* Malmgren.

Prostomium furnished with five tentacles, the median tentacle on dorsal surface; four pairs of tentacular cirri. First segment soldered to prostomium, and bearing the first pair of tentacular cirri.

Eumida sanguinea (Oersted).

Pl. XXI, fig. 4.

1843. *Eularia sanguinea*, Oersted. *Annul. Dan. Consp.*, p. 28, figs. 80—82.
1851. *Phyllodoce* (*Eulalia*) *sanguinea*, Grube. *Fam. Annel.*, pp. 56, 129.
1865. *Eumida sanguinea*, Malmgren. *Nord. Hafs-Annul.*, p. 97, Pl. XIV, fig. 28.
- „ *Eularia sanguinea*, de Quatrefages. *Annel.*, II, p. 123.
1867. „ „ Malmgren. *Annul. Polychaeta*, p. 25.
1874. *Eumida* „ McIntosh. *Ann. Mag. Nat. Hist.*, ser. 4, Vol. XIV, XIV, p. 196.
1888. *Eularia pallida*, de St. Joseph. *Ann. Sc. Nat.*, 7^e sér., T. V, p. 294.
1897. *Eumida communis*, Gravier. *Bull. Sc. Fr. Belg.*, T. XXIX, p. 310, Pl. XVI, figs. 7—10.
1906. *Eularia pallida*, de St. Joseph. *Ann. Sc. Nat.*, 9 sér., T. III, p. 224.

Prostomium rounded, cordate, broader than long; pale or slightly pinkish, straw-yellow or greenish; eyes large and prominent, black or brownish black. Anterior tentacles of moderate length, subulate; median tentacle somewhat shorter, arising just in front of the line of eyes. Tentacular cirri of moderate length, the dorsal one in each pair longer than the ventral, all tapering from base to filiform tip, which in the posterior pair is finely attenuate; the ventral of the second pair slightly flattened and nearly narrowly lanceolate in form. Body 50—80 mm. in length, proportionally bulky, somewhat narrowed in front, and tapering to posterior end where it terminates with two anal cirri. Colour

of body light greenish-brown, yellowish, or colourless and almost translucent anteriorly, faintly straw-yellow in dorsal median line, and with a dusting of brownish grains all over. The first segment has a white bar or white grains. In many segments the borders along segment-junctions are narrowly white or yellowish, which colour in alcoholic specimens is generally changed into madder brown. Proboscis long, transversely rugose behind tip, which shows twenty papillæ.

In typical (the sixtieth) parapodium, the dorsal cirrus is subvertical, broadly ovate, with acuminate tip, while the base is subcordate. It is borne on a long pedicle. Setigerous lobe comparatively long and bifid. The translucent shaft of bristles with distinct shoulder; the bevelled tip with spinigerous ridges; the terminal blade minutely serrated. Ventral cirrus is broadly lanceolate, with somewhat acuminate tip, which does not quite reach that of the setigerous lobe.

Habitat :—Misaki (!); Yenoura in Prov. Suruga (!).

Eumida caeca Moore.

Pl. XXI, fig. 5.

1903. *Eumida caeca*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 426.

Prostomium nearly circular, its postero-lateral region somewhat encroached upon by sides of peristomium. Eyes absent. Frontal tentacles short, shorter than the distance between them. Median tentacle very short, at extreme posterior margin of prostomium.

Peristomium of about twice the width of prostomium but equalling it in length, encircling it as a prominent fold besides covering it on sides, but dorsally emarginated to

accommodate the median tentacle. Anterior half of peristomium bears the first pair of tentacular cirri, and more ventrally the palpi. Tentacular cirri short, with very short basal joint. The remaining body-segments well marked, strongly arched above, flattened below, increasing in length to the middle of body. Caudal end blunt. Body measures 88—120 mm. in length and 4—4.5 mm. in breadth including parapodia in the middle parts of body.

Parapodium uniramous throughout, all its parts more or less foliaceous, least so anteriorly. Presetal lobe much the larger, broadly rounded and divided by a narrow cleft at apex; postsetal lobe very short. Ventral cirrus leaf-like, broadly ovate, obtusely apexed, obliquely attached by basal half of dorsal margin to parapodium. Dorsal cirrus reniform; its long diameter equal to about twice the short diameter.

Bristles compound; shaft very gently curved, slightly enlarged at end, and provided with one large and three or four smaller teeth; end-piece very delicate, elongate, attenuate, normally straight, the edge knife-like and rather remotely serrulate with small short teeth.

Habitat:—Matsuwa in Prov. Sagami (!); Uraga Channel, 260 fathoms; Sagami Bay, 31—41 fathoms (“Albatross”).

Genus *Eulalia* Oersted.

Prostomium furnished with five tentacles, the median one arising in front of the eyes. First segment free from prostomium. Four pairs of tentacular cirri with or without parapodia beneath. Dorsal cirri arranged in various ways. Ventral cirri nearly horizontal.

Eulalia viridis (O. F. Müller).

Pl. XXI, fig. 6.

1776. *Nereis viridis*, O. F. Müller. Zool. Danic. Prodr., No. 2636.
1870. „ „ Fabricius. Fauna Groenl., p. 297.
1800. Die grüne Nereide, O. F. Müller. Naturges. einiger Wurm-Arten, p. 162, Taf. II, Figs. 1—6.
1828. *Nereiphylla viridis*, de Blainville. Dict. Sc. Nat., T. LVII, p. 466, Pl. XIII, fig. 2.
1833. *Phyllodoce clavigera*, Aud. et M.-Edw. Ann. Sc. Nat., T. XXIX, p. 248, Pl. XVI, figs. 9—13.
1840. *Phyllodoce viridis*, Johnston. Ann. Nat. Hist., iv, p. 228, Pl. VI, figs. 11—14.
1843. *Eulalia viridis*, Oersted. Groenl. Annul. Dorsibr., p. 188.
1851. *Phyllodoce* (*Eularia*) *viridis*, Grube. Fam. Annel., pp. 56, 129.
1864. *Eulalia virens*, Ehlers. Die Borstenwürmer, p. 159, Taf. VII, Figs. 1—5.
1865. *Phyllodoce viridis*, Johnston. Cat. Brit. Mus., p. 178, Pl. XVI, figs. 11—15.
- „ *Eulalia viridis*, Malmgren. Nord. Hafs-Annul., p. 98, Pl. XV, fig. 39.
- „ *Eulalia viridis*, de Quatrefages. Annel. II, p. 122.
1879. „ „ Langerhans. Zeit. f. Wiss. Zool., XXXIII, p. 309.
1885. *Eulalia clavigera*, Pruvot. Arch. Zool. Exp., 2^e sér., T. III, p. 291, Pl. XIV, figs. 9—11.
1888. *Eulalia viridis*, de St. Joseph. Ann. Sc. Nat., 7^e sér., T. V, p. 283, Pl. XII, fig. 154.
1897. *Eulalia aurea*, Gravier. Bull. Sc. Fr. Belg., T. XXIX, p. 309, Pl. XVI, figs. 2—6.
1903. *Eulalia viridis*, McIntosh. Mar. Invert. S. Africa, Vol. III, p. 34.
1904. „ *ornata*, Allen. Jour. M.B.A., Vol. VII, p. 223.

1905. *Eulalia viridis* (= *E. virens*, Ehlers and *E. guttata* Clap.), Graeffe, Arbeit. Zool. Stat. Triest. XV, p. 325.
1906. *Eulalia viridis*, de St. Joseph. Ann. Sc. Nat., 9^e sér., T. III, p. 224.

This is one of the commonest annelids in Misaki and vicinities. Its main characters are as follows :

Prostomium bluntly conical and pale greenish in colour ; eyes two, black, occasionally with an additional speck occurring externally to each eye. Tentacles subulate, slightly tapering. First pair of tentacular cirri somewhat lanceolate, and attached to the first segment on each side ; second and third pairs longer and attached to the second segment ; fourth pair arising from the third segment.

Body linear, elongate (100—120 mm.), arched dorsally and flattened ventrally, slightly tapering anteriorly and more distinctly so posteriorly, terminating behind with two lanceolate and somewhat darker anal cirri. Colour deep green or grass-green, paler in the region of proboscis, and dorsally with two dark belts on each segment. Ventral surface marked by a median moniliform line of dark olive, posteriorly with a dark tinge on each parapodium.

Proboscis in extrusion with twenty-two or twenty-three papillæ terminally.

Dorsal cirrus lanceolate with tapering tip ; setigerous region short ; bristles in two groups, the enlarged end of shaft minutely spinous ; the terminal blade short, rapidly tapering, and with bold serration on edge. Ventral cirrus ovate and slightly acuminate, projecting a little beyond tip of setigerous lobe.

Habitat :—Jōgashima and Moroiso in Prov. Sagami (!).

Eulalia albopicta Marenz.

1879. *Eulalia albopicta*, Marenzeller. Südjav. Annel., p. 20.

Body, consisting of 77 segments, measures 18 mm. in length and about 2 mm. in breadth including dorsal phyllodes (cirri) of both sides. It tapers anteriorly less than posteriorly. Colour reddish gray. Dorsum darker than ventral surface and cirri. On dorsal surface, each segment shows transversely elongate white spot, at first in single number and after that mostly in twos, but without regular order.

Prostomium more than $1\frac{1}{2}$ times broader than long, with roundish pentagonal outline. The anterior margin indented in the middle. Superior pair of tentacles conical and as long as prostomium; inferior pair of same arising from ventral surface of prostomium. Medial tentacle arising from the middle of the dorsal surface of prostomium, somewhat longer than the paired ones. Eyes 2, large, round, with an indication of a lens in each, placed nearer to posterior border than to anterior border of prostomium.

Tentacular cirri in 4 pairs: first pair as long as the breadth of prostomium, borne on the first segment; second and third pairs borne on the second segment, which has a pair of rudimentary parapodia with bristles; the second pair of tentacular cirri is the longest of all, reaching to the 11th segment; fourth pair of tentacular cirri borne on the 3rd segment.

The anteriormost 10 segments are short; after that the length quickly increases; the ratio of length to breadth as measured on the ventral surface being 1:6 or 1:7 in the anterior segments, and 1:3 in the middle region of body.

Parapodium in ventral aspect half as long as the breadth of the segment. Anterior lobe longer than the posterior, its end rounded; anterior end of posterior lobe conical. Dorsal cirrus cordate with sharply pointed tip and broad base in anterior segments, but in posterior parts of body its shape becomes lanceolate. Ventral cirrus cordate, much smaller than the dorsal, with rounded tip; somewhat broader than high, but posteriorly it becomes lanceolate like the dorsal cirrus.

Bristles compound, about 32 in a bundle; upper end of shaft distinctly serrated, but without large spines; setose end-piece with distinct serration in basal parts.

Habitat :—“ South Japan ” (MARENZELLER); Sagami Bay.

Genus *Notophyllum* Oersted

(*non* Schmarda).

Body linear, gently tapering at both extremities; dorsum convex, ventral surface flattened and grooved. Two very large eyes. Tentacles five: four anterior and one median. Tentacular cirri on two segments, four on each side, the two anterior pairs shorter than the two posterior pairs. Dorsal ramus of parapodium little differentiated, still with an acicula and a few simple bristles besides supporting a large irregularly reniform dorsal cirrus. The series of dorsal cirri imbricate, almost covering the dorsum and parapodia. Ventral ramus of parapodium has a much smaller, vertical, and somewhat reniform lamellar cirrus, and also an acicula together with numerous bristles, the shaft of which is curved distally and ends in a dilatation provided with a series of spikes that guard the base of the long sabre-shaped terminal blade minutely serrated on the edge. The ventral border of

parapodium has a prominent process, to which the inner edge of ventral cirrus is attached.

Notophyllum japonicum Marenz.

1879. *Notophyllum japonicum*, Marenzeller. Südjap. Annel., p. 18, Taf. III, fig. 1.

Prostomium roundish-pentagonal, somewhat broader than long; anteriorly a little prolonged. Median tentacle small, not reaching to front end of prostomium. Lateral tentacles in 2 pairs; the ventral pair arising from about the anterior border and ventral side of prostomium, and the dorsal pair from the dorsal surface of prostomium inside the anterior border of eyes, which are very large and are placed near the lateral border.

Body, consisting of 25 segments, measures 10 mm. in length, and about 1.5 mm. in breadth in the anterior as well as in the posterior parts, and about 2 mm. in the middle.

First segment is not visible in dorsal aspect; second segment short, being scarcely one half the length of the next following. Each of the 2 anteriormost segments bears a pair of tentacular cirri on each side. Those of the first segment are short, the longer being $\frac{1}{3}$ the length of prostomium; and those of the second segment twice as long as prostomium, reaching to about 7th segment.

Parapodium long, biramous; dorsal ramus rudimentary, having one, rarely two, small aciculæ, which are smaller than those of ventral ramus. Ventral ramus oval in outline. Dorsal cirrus large and reniform, borne on the dorsal border of dorsal ramus. Ventral cirrus roundish-cordate, arising from the middle part of the postero-lateral side of ventral ramus. From the

middle of the ventral border of parapodium arises a triangular process with broad base. Ventral ramus with an acicula and a bundle of 12—18 compound bristles. Distal end of bristle shaft with 5 or 6 spikes on each side; end-piece broad, minutely serrated and very finely tipped.

Anal segment with two short and broad anal cirri.

Habitat:—"South Japan" (MARENZELLER); Sagami Bay, 100 fathoms ("Golden Hind").

Notophyllum sagamianum n. sp.

Pl. XXI, figs. 7—9.

The following description of this species is based on a unique specimen collected in Yodomi, in the Bay of Sagami, 40 fathoms, on July 29th, 1907.

Body linear, consisting of 116 segments, measuring 43 mm. in length and 3.5 mm. in breadth including parapodia. The large phyllodes, which are imbricated and entirely cover the dorsal surface of body, are white with a light bluish tint; ventral surface of body yellowish.

Body greatly arched dorsally and flattened ventrally.

Prostomium longer than broad, boldly pentagonal, posteriorly with broad base; the two sides adjacent to base almost parallel; the remaining two sides antero-lateral and slightly concave, from which concavity arises the dorsal pair of tentacles. Ventral pair of tentacles slightly in advance of the dorsal. All the tentacles not cylindrical, but slightly flattened and with fine tip; their length equal to about $\frac{1}{2}$ that of prostomium.

Eyes two, very large and elliptical in outline, their long axes parallel to the axis of body. Median tentacle about

the same in form as frontal tentacles, arising from between the anterior halves of the eyes, and not reaching to the anterior end of prostomium. Tentacular cirri in four pairs, arranged in two vertical rows on each side; ceratophores rather long; anterior dorsal tentacular cirrus with rod-like style; the anterior ventral one with slightly flattened and distally tapering style. The two posterior tentacular cirri with elongate conical style of nearly twice the length of the anterior ventral pair.

Arising from the ventro-lateral parts of the posterior end of prostomium are four long and somewhat flattened appendages on each side, of which the outermost and the innermost are a little shorter, and the middle two a little longer, than prostomium.

Parapodium biramous, with short dorsal and long ventral ramus; dorsal acicula much smaller than the ventral, which latter supports a bundle of 18-23 setose bristles; upper end of shaft with 7-8 spines on each side; end-piece finely serrated for the greater part.

Dorsal cirrus very large and somewhat reniform; ventral cirrus small and also reniform, vertical in position, arising from the middle of the postero-ventral side of parapodium.

Anal segment with 2 anal cirri.

This species comes close to *Notophyllum imbricatum* MOORE (Proc. Acad. Nat. Sc. Philad., 1906, p. 217), but differs from it in the form of prostomium and in the structure of tentacular cirri, especially of the anterior dorsal pair; and also in number as well as in relative length of the posterior appendages arising from beneath the posterior margin of prostomium.

Habitat:—Yodomi in Sagami Bay, 40 fathoms (Mr. K. AOKI).

Family **Nephtyidae.**

Prostomium flattened, generally quadrangular, rarely nearly hexagonal; a short tentacle at each anterior angle, and one palpus in a little more posterior and ventro-lateral position, or the both may be absent. Eyes two, or none. Body elongate, almost tetragonal in section, though convex dorsally and flattened ventrally. Segments similar. Anus terminal with a single cirrus (rarely two, EHLERS) beneath. Peristomial segment fused with the segment behind. Proboscis large, sub-cylindrical, ovate or obovate, with or without bifid papillæ, with or without a pair of horny teeth. Two rami of parapodium widely separated, flattened, each bearing an acicula and a double row of bristles; the dorsal ramus having superiorly a lamella and other processes as well as a small dorsal cirrus in connection with branchia; the ventral ramus has a lamella and a ventral cirrus, with or without other processes.

Genus *Nephtys* Cuvier.

Prostomium as in the family; both tentacles present. Rarely with a pair of eyes. Proboscis made up of two parts; in extrusion with 22 rows of distal papillæ, a double arch of bifid papillæ round the aperture, and a pair of horny teeth internally. Body as in the family. Parapodium with dorsal and ventral cirri which are either conical or foliaceous. Lamellæ generally well developed. Bristles of two kinds: barred bristles placed anteriorly in each ramus; and longer serrated bristles with flattened, though narrow, terminal blade, placed posteriorly in each ramus.

Nephtys caeca (O. F. Müller).

1776. *Nais caeca*, O. F. Müller. Zool. Dan. Prodr., p. 219, No. 2653.
1780. *Nereis caerulea*, Fabricius. Fauna Groenl., p. 298.
1820. *Aonis (Nereis) caeca*, Savigny. Syst. Annel., p. 45.
1829. White Worm, Drummond. Lond. Mag. Nat. Hist., Vol. ii, p. 121.
1835. *Nephtys margaritacea*, Johnston. Ibid., Vol. viii, p. 341, fig. 33.
1843. „ *caeca*, Oersted. Groenl. Dorsibr., p. 193, figs. 73, 74, and figs. 77-86 (excl. fig. 78).
1843. *Nephtys longisetosa*, idem. Ibid., p. 195, fig. 75, 76.
1844. „ *bononensis*, de Quatrefages. Ann. Sc. Nat., 3^e sér., 14, p. 352, Pl. 9, fig. 2.
1853. *Nereis (Nephtys) lineata*, Dalyell. Pow. Creat., ii, p. 146, Pl. XXI, figs. 4-10.
- „ *Nephtys ingens*, Stimpson. Mar. Invert. Grand Manam, p. 33.
1865. „ *caeca*, Malmgren. Nord. Hafs-Ann., p. 104, Tab. xii, fig. 18.
- „ *Nephtys margaritacea*, de Quatrefages. Annel., I, p. 423.
- „ „ *bononensis*, idem. Ibid., p. 425.
- „ „ *Oestedi*, idem. Ibid., p. 427.
- „ *Portelia caeca*, idem. Ibid., p. 433.
1865. *Nephtys margaritacea*, Johnston. Cat. Brit. Mus., pp. 167, 342, fig. 34.
1867. *Nephtys caeca*, Malmgren. Annel. Polych., p. 18.
1868. „ „ Ehlers. Die Borstenwürmer, p. 588, Taf. XXIII, Fig. 10-34.
1869. *Nephtys ciliata*, McIntosh. Rept. Brit. Assoc., 1868, p. 337.
1874. „ *caeca*, McIntosh. Ann. Mag. Nat. Hist., ser. 4, Vol. XIV, p. 195.
1890. *Nephtys caeca*, Marenzeller. Annel. Beringsm., p. 1.
1901. „ „ Johnson. Proc. Bost. Soc. Nat. Hist., Vol. XXIX, No. 18, p. 401.
1904. *Nephtys caeca*, Allen. Jour. M.B.A., n.s., Vol. VII, p. 225.

Body elongate, slightly tapering anteriorly, and more distinctly so posteriorly. Segments numbering 140–160; length 185–220 mm., and breadth 6–6.5 mm. including parapodia at the hind end of the anterior body third. Colour pearl-gray with pinkish iridescence. Dorsum convex. Ventral surface with a median groove, which splits into two in front behind the central prominence and runs forwards one on each side to terminate at the mouth. The parts in the fork is marked by a close series of longitudinal furrows.

Prostomium rounded in front; eyes absent; two papillæ on the posterior parts of prostomium.

Proboscis in extrusion a massive pinkish iridescent organ shaped like a pear, with 22 rows of distal papillæ, there being usually 5 and occasionally 6 papillæ in each row; each lip of proboscis with 10 forked papillæ and a median simple papilla.

Parapodium with a large fan-shaped dorsal lamella projecting like a crest from the posterior border of dorsal ramus, having greatest vertical diameter in the distal parts. The fleshy base of parapodium, with the posterior part of which that lamella is continuous, slopes from above downwards and outwards, and terminates in a rounded lobe above the cirrus. Immediately below the lamella is the short tapering dorsal cirrus, followed after an interval by the externally coiled branchial process. A semicircular flap lies over the base of the branchial process anteriorly, it being the inferior termination of the flattened lamina between two rows of bristles. Ventral ramus with a large, broadly lanceolate and pointed lamella continuous with a fleshy lobe of the ramus; ventral cirrus of a moderate size, slightly flattened and conical.

Setose bristles have terminal blade with a close series of fine spikes. Beyond the serrated parts the bristle extends as a

finely attenuating process which terminates with a fine point. Barred bristles subulate. Segmental organs opening at base of parapodia ventrally. Anal cirrus single and long.

Habitat :—Misaki (!) ; Mororan Harbour in Prov. Iburi (!).

Nephtys ciliata (O. F. Müller).

1789. *Nereis ciliata*, O. F. Müller. Zool. Danica, iii, p. 14, Tab. LXXXIX, figs. 1-4.
1791. *Nereis ciliata*, Gmelin. Linnaeus, Syst. Nat., ed. 13, p. 3120.
1843. *Nephtys longisetosa*, Oersted. Groenl. Ann. Dorsibr., Tab. VI, fig. 78.
- „ *Nephtys ciliata*, H. Rathke. Beitr. Fauna Norweg., p. 170.
1851. „ „ Grube. Fam. Annel., pp. 53, 128.
1853. „ „ (*borealis*, Oersted), Stimpson. Mar. Invert. of Gr. Manam, p. 33.
1865. *Nephtys borealis*, de Quatrefages. Annel. I, p. 428.
- „ „ *ciliata*, idem. Ibid., p. 429.
- „ *Diplobranchus ciliata*, idem. Ibid., p. 434.
- „ *Nephtys ciliata*, Malmgren. Nord. Hafs-Ann., p. 104, Tab. XII, fig. 17.
1867. *Nephtys ciliata*, idem. Annul. Polych., p. 17.
1868. „ „ Ehlers. Die Borstenwürmer, p. 629, Taf. XXIII, Fig. 36.
1873. *Nephtys ciliata*, Verrill. Invert. Vineyard Sound, p. 583.
1879. „ „ Hansen. Nyt. Mag. f. Naturvid., XXIV (Annel. Norske Nordhav. Exped.), p. 268.
- „ *Nephtys ciliata*, Théel. Acad. Handl. Stockholm, Bd. XVI (Annél. Nouv. Zemb.), p. 24.
1881. *Nephtys ciliata*, Horst. Nederland. Arch. f. Zool., Bd. V., Suppl., p. 7.
1883. *Nephtys ciliata*, Levisen. Vidensk. Meddel. Foren. Kjöbenh., p. 217 (Syst.-geogr. Overs. Nord. Annel., p. 60).

1890. *Nephtys ciliata*, Malaquin. Rev. Biol. du Nord Fr., p. 32 (Annel. Boulon.).
1893. *Nephtys ciliata*, Levinsen. Vidensk. Ud. "Hauchs," p. 337.
1898. " " Michaelsen. Zool. Ergebn., IX, Grönl. Annel., p. 126.
1900. *Nephtys ciliata*, Fauvel. Annél. Cherbourg, Mém. Soc. Nationale des Sc. Nat., etc., Tom. XXXI, p. 309.
- " *Nephtys ciliata*, McIntosh. Ann. Mag. Nat. Hist., ser. 7, Vol. V, p. 258.
1901. *Nephtys ciliata*, idem. Ibid., Vol. VIII, p. 222.
- " " " Whiteaves. Geol. Surv. Canada, No. 722, p. 82.
1902. *Nephtys ciliata*, Marenzeller. Polych. des Grundes, Denkschr. d. k. Akad. d. Wiss., Wien, Bd. LXXIV, Separatabdr., p. 11.
1903. *Nephtys ciliata*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 433.

Body slightly tapering in front, more so posteriorly, and terminating behind with an anal cirrus. Segments numbering 90–135; length 140–185 mm.; breadth about 5.5 mm. including parapodia.

Prostomium longer than wide, with broad and slightly convex anterior border and slender tentacles, the anterior tentacles being lateral and the posterior ventro-lateral in position.

Peristomial segment with dorsal and ventral spine-like papillæ having two kinds of bristles in each. Proboscis in extrusion generally papillose, with 22 rows of elongate and slender distal papillæ, of which there are 5–7 in each row. A median cirrus in front of the rows in mid-dorsal line.

Parapodium with rounded dorsal lamella, its greatest vertical diameter being near base. At the outer edge of the dorsal lamella is another smaller rounded lamella. Dorsal cirrus long and slender. Branchial process of a moderate length, coiled distally. Ventral

ramus sinuous provided with a small terminal and a short inferior lamella, with a small papilla at the inner superior border of the terminal lamella. Ventral cirrus large and conical. Compound bristles brownish, comparatively short, distinctly curved in the dilated parts beyond the shaft, with serrated edge. Barred bristles tapering to fine tip.

Remarks :—Typical parapodium of the species is distinguished from that of *Nephtys caeca* (O. F. MÜLLER) by the fact that the dorsal lamella is smaller and more rounded, its greatest vertical diameter being nearly in the middle and its long axis being directed dorsally (upwards) instead of obliquely outwards as in *N. caeca*. In fact, the weaker development of the lamella in *N. ciliata* suffices to at once distinguish that species from *N. caeca*.

Habitat :—Misaki (!) ; “ North Japan, 57 fathoms ” (“ Alb-tross ”).

Nephtys brachycephala Moore.

1903. *Nephtys brachycephala*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 431.

This species was described by MOORE from an incomplete specimen having 60 segments and a length of 64 mm. I have not obtained a specimen that could be identified with this species. I take the following from his description.

Body relatively slender, not depressed, anteriorly slightly arched, but flattened on ventral surface ; posteriorly nearly quadrate in section. Maximum breadth including parapodia 4 mm. at about 10th segment.

Prostomium very short, twice wider than long, deeply sunk into peristomium, roughly oblong ; lateral margins slightly convex, anterior margin gently concave, and posterior margin straight.

Eyes absent. Tentacles very short, being about $\frac{1}{3}$ the length of prostomium.

Parapodium short; both dorsal and ventral rami about equally developed; the latter simple, truncate, conical, with slight acicular lobe and circumsetal collar, but without distinct lamellæ; cirrus very short, thick, conical. Dorsal ramus also simple, short, truncate, conical, without lamellæ; acicular lobe well-marked and notched at end; circumsetal collar oblique, its posterior region high, the anterior very low. No dorsal cirrus, but a short special cirrus present on ventral side of dorsal ramus, closely connected with the external side of the base of branchial stem. Branchia a large wrinkled leaf-like structure, with a thick tapering midrib running through middle. A single, slightly brownish, stout acicula supports each ramus. None of the bristles were complete in MOORE'S specimen.

Habitat;—Sagami Bay, 175–190 fathoms (“Albatross”).

Family **Amphinomidae.**

Body oval, oblong or elongate. Prostomium very small, rounded or compressed. A median and two lateral tentacles present, the latter sometimes wanting; an elongate dorsal caruncle and four eyes present; subtentacles two or none. Mouth-opening ventral, surrounded by several similar segments; proboscis protrusible, devoid of jaws. Dorsal cirri one or two; ventral cirrus one or none. Branchiæ well developed, dorsal or marginal in position, pinnate, arborescent or filiform. Anus dorsal. Posterior appendages two.

Key to the genera found in Japan.

- a.*' Parapodium uniramous or biramous; tentacles alone present. . . . *Euphrosyne*.
a." Parapodium biramous; both tentacles and subtentacles present.
b.' Branchiæ pinnate. *Chloëia*.
b." ,, arborescent. *Amphinome*.
b." ,, short and filiform or pinnate in cluster. *Notopygos*.

Genus *Euphrosyne* Savigny.

Body oval or oblong, equally narrowed at both ends; 2 thick posterior appendages. Prostomium with 1 or 3 tentacles, 2 or 4 eyes and a laterally compressed caruncle. Subtentacles none. Parapodium uniramous or biramous. Branchiæ consisting of a series of branchial trunks, each bearing a number of branches.

Euphrosyne superba Marenz.

Pl. II, fig. 5; Pl. XXII, figs. 1—2.

1875. *Euphrosyne superba*, Marenzeller. Süd-jap. Annel., p. 2, Taf. I, Fig. 1.

Body oblong, yellowish brown, consisting of 45 segments. It measured, in a living specimen collected at Misaki, 54 mm. in length and 16 mm. in maximum breadth excluding setae in the middle parts of the body. Setae and branchiæ cover the dorsal surface of body except a median longitudinal band of about 3 mm. breadth. In the anterior border of each segment, there is found a small triangular area, with one of the angles pointing backwards. Dorsal surface of body finely wrinkled, and divided by a shallow longitudinal groove into two lateral halves. Caruncle about 4 mm. long, fixed to the first 5 segments and extending to the commencement of 6th segment, terminating with

tapering free extremity. Median tentacle cylindrical, and about equal in thickness to dorsal cirri. Eyes 2 on dorsal side, one on each side of the base of median tentacle. Another pair of triangular eyes occur on the ventral surface of the narrow cephalic lobe. Six dorsal cirri belonging to the first six body-segments are found on each side of the caruncle. Two prominent fleshy lobes on the anterior border of mouth measure about 4 mm. in length; their breadth, taking the two together, less than the length. Each lobe somewhat semicircular in shape, with straight inner and convex outer border; on the sides of the latter lie 4 body-segments. Posteriorly the mouth-opening is bordered by the 5th and 6th segments.

A row of 8 branchial tufts occur on each lateral half of the dorsal surface of segments; the lateralmost tuft the largest, but none of the tufts reaching to tip of bristles. Each branchial tuft arises as a short and stout stem, and soon divides into 3-5 (or rarely more) short branches, which again divide into branchlets. Just behind and a little outside the lateralmost branchial tuft, there arises a large bundle of bristles; and inferiorly to these there arises a short ventral cirrus. Dorsal cirri are situated in front of the 1st branchial tuft and of the interspace between the 3rd and 4th branchial tufts, in the line of the row of bristles; they are nearly equally long as the branchiæ. Large dorso-lateral bundle of bristles lies posteriorly to lateralmost branchia, while the dorsal row of bristles are in front of branchial tufts.

Bifid dorsal bristles are of two kinds:—those smooth in the fissure (Pl. XXII, fig. 1.) and those crenated in same (Pl. XXII, fig. 2.). Bifid ventral bristles are all smooth.

Anal cirri present in a pair, tongue-like, about 2 mm. in length and 1.5 mm. in breadth.

Habitat :—Misaki, under stones between tide-marks (!) ; Gulf of Aomori in Prov. Mutsu (!) ; Yenoura in Prov. Suruga (!) ; Kominato in Prov. Bōshiu ; Yenoshima (MARENZELLER) ; Suruga Bay (“ Albatross ”).

Euphrosyne magnoculata n. sp.

Pl. XXII, figs. 12—15.

Body oblong, pale white in colour but translucent, consisting of 30 segments, 10 mm. long, and 3 mm. in maximum breadth at about the middle of body excluding bristles. Bristles and branchiæ cover lateral regions of body on dorsal side, leaving exposed a median longitudinal region of about $\frac{1}{4}$ the breadth.

Caruncle about $1\frac{1}{2}$ mm. in length, its base reaching posteriorly to 4th segment, and its free posterior extremity to 5th segment. Median tentacle cylindrical and slightly thicker than dorsal cirri, distally abruptly diminishing in thickness and forming a short terminal filament. Lateral tentacles absent. Dorsal pair of eyes situated side by side between tentacle and caruncle, very large and elliptical in outline, with long axis directed antero-posteriorly. Ventral eyes (Pl. XXII, fig. 12) also very large, oval in outline, the broader end directed anteriorly, and about as long as dorsal eye.

On each side of the caruncle, there are found five dorsal cirri belonging to the first five segments.

Mouth-opening bears on its anterior border two prominent fleshy lobes (fig. 12) of a somewhat elliptical outline and of a length nearly equal to that of the narrow cephalic lobe on the ventral side ; breadth of the two lobes taken together is about equal to the length. The inner borders of the lobes lie on

the median longitudinal line; and along their outer convex borders, there occur two body-segments. The mouth-opening is posteriorly bordered by the 3rd, 4th and 5th segments.

There are six branchial tufts on each lateral half of the dorsal surface of segments. The first or the innermost branchial tuft is the largest, but does not reach the length of bristles. Dorsal cirri situated on the inner side of the first branchial tuft and in front of the interval between the 2nd and 3rd branchial tufts; their length about equal to that of the branchiæ.

Branchial tuft arises with a short stem; and this divides into 3-4 branches, which again divide into branchlets. A little to the outer and ventral side of last branchial tuft, there is situated a large bundle of bristles (figs. 13, 14); and inferiorly to the latter there arises a slender ventral cirrus. Dorso-lateral bundle of bristles lies posterior to lateralmost branchial tuft, while a row of dorsal bristles (fig. 15) lies in front of all branchial tufts.

Anal cirri two, oval and tongue-like.

Habitat:—Misaki, Aug. 17, 1904; collected by me with a neac-surfet at night, using the light of a lantern submerged about one metre into the sea.

Genus *Chloeia* Savigny.

Body more or less oval, with a pair of cylindrical cirri at posterior extremity. Prostomium with 3 tentacles, 4 eyes and a caruncle; subtentacles 2. Parapodium biramous, the rami very distinct. Branchiæ pinnate, placed at a dorsal position apart from superior ramus of parapodium.

Chloeia flava (Pallas).

Pl. II, fig. 4; Pl. XXII, figs. 3—5.

1766. *Aphrodita flava*, Pallas. Misc. Zool., p. 97.
 1820. *Chloeia capillata*, Savigny. Syst. Annel., p. 58.
 1874. „ *ceylonica*, Grube. Proc. Zool. Soc., 1874, p. 326.
 1885. „ *flava*, McIntosh. "Challenger" Rep. Annel., p. 8, Pl. III, figs. 1, 2; Pl. IA, figs. 7-9.
 1903. *Chloeia flava*, Moore. Proc. Acad. Nat. Sci. Philad., Vol. LV, p. 426.

Body somewhat fusiform in outline, but the addition of bristles gives it an ovoid appearance in life. An average Misaki specimen, consisting of 35 segments, measures 75 mm. in length and 18 mm. in breadth at 15th segment. The largest one ever procured by me in Japan measures 140 mm. in length and 25 mm. in breadth, consisting of 37 segments; while the smallest specimen in my hand is 15 mm. long and 4 mm. broad, with only 21 segments. This small specimen is perhaps a young animal.

Prostomium small, dorsally almost wholly occupied by the tentacles and the caruncle. Tentacles 3, purple brown in colour; lateral tentacles about $\frac{1}{2}$ the length of the median tentacle, which arises close to the front end of caruncle. Subtentacles 2, of a pale white colour, widely separated from each other at base, occurring ventral to lateral tentacles, much shorter than these. Caruncle large and rugose, consisting of an elevated, doubly crenate crest and a wrinkled horizontal portion; moreover, the middle of the crest is marked by a longitudinal series of small madder-brown elevations, which appear in alcoholic specimens as an interrupted brown line. The caruncle, fixed to the first two para-

podiated segments, extends posteriorly to the commencement of the 4th segment and terminates with a free tapering extremity. A pair of large eyes is situated in line with the anterior margin of caruncle; behind them a pair of smaller eyes.

Anterior to mouth-opening there are 2 prominent fleshy lobes, extending to the anterior border of prostomium. The posterior border of mouth is formed by the anterior margin of the 4th segment.

Typical body segment bears in dorsal aspect a branchial tuft, a well-marked dorsal papilla with a fascicle of bristles, and a long dorsal ramus on each side. Antermost 3 segments without branchial tuft, but each with a secondary small cirrus at base of dorsal cirrus. This secondary cirrus becomes much shorter in the 4th segment (first branchiated segment), and is almost invisible in the 5th.

Dorsal bristles spring out in a radiating fan-like manner from a papilla. The bristle (fig. 3) is long and tapers to the pointed tip; on one side it is smooth and bears a basal spur, on the opposite edge provided with 14–24 (McINTOSH gives 20) large recurved fangs, besides being faintly serrated in the distal part beyond the fangs. Anterior dorsal bristles have, in some cases, the distal part smooth and are provided with larger basal spur (fig. 4). Ventral bristles long and slender, yellowish in colour, with tip like that represented in Pl. XXII, fig. 5.

Dorsal cirrus arises from the posterior border of bristle-papilla, and consists of a cirriphore and an elongated style, which latter is purplish-brown throughout, whereas the former is less deeply coloured and shows a pale yellow band in front. From the base of dorsal cirrus a fan-shaped patch of pigments extends downwards and inwards on the bristle-papilla. Ventral

cirrus pale white, lying below and rather behind the ventral tuft of bristles.

About 26 pairs of branchiæ are arranged along the dorsum; each pair situated at the posterior border of segment, a short distance from dorsal cirrus. Their structure is somewhat dendritic, spreading nearly in one plane; the main stem first gives off a large external branch; this generally divides into two and then into branchlets which bear ultimate pinnules. Other branches of the main stem are transversely directed and become subdivided into pinnules. The branchiæ continue to occur posteriorly to the penultimate segment, continually diminishing in size.

The dorsum of the worm has a very conspicuous median row of deep brownish-purple spots, each of which occupies about the posterior $\frac{2}{3}$ of each segment. The spot is encircled by a yellowish-white band. A transverse brown band also occurs in the anterior part of each segment, running outwards from base of branchiæ. Two elongated anal cirri are situated behind and below anus.

The food of this animal consists of small crabs and other living organisms. The breeding season extends from July to August in Misaki.

Habitat:—This species occurs all along the Pacific coast of Japan, from the Bay of Sagami as far south at least as the Gulf of Kagoshima. On the Japan Sea side, it extends from Tsushima Island to the coast of Nanao in the Province of Noto. Two examples of this species were trawled by "Challenger" at her Stat. 233B ("South of Japan") from a depth of 15 fathoms; Tatyama (Tateyama?), 8 fathoms ("Albatross").

Genus *Amphinome* Bruguière.

Body elongate. Prostomium with 3 tentacles, 4 eyes, and a more or less folded caruncle which covers 2–3 segments; sub-tentacles 2. Parapodium biramous, the rami very distinct, sometimes with hairs. Branchiæ arborescent, the branches and branchlets very numerous.

Amphinome rostrata (Pallas).

Pl. I, fig. 3; Pl. XXII, figs. 6–9.

1766. *Aphrodita rostrata*, Pallas. Misc. Zool., p. 106.

1885. *Amphinome rostrata*, McIntosh. "Challenger" Rep. Annel., p. 21, Pl. I, fig. 7; Pl. IV, fig. 1; Pl. IA, fig. 16.

By good fortune the author found several living specimens of the present species on a floating timber on sea near the Misaki Marine Laboratory, July 19th, 1905.

In the living animals the entire body is of a bluish-black colour, while the tentacles, cirri and branchiæ are deep red. When preserved in alcohol, the colour of body changes into a peculiar slate-blue, and that of tentacles, cirri and branchiæ into a ferruginous hue.

Body elongate and somewhat tetragonal in cross-section. Measurements and number of body-segments in three large examples are as follows:—

Length	Maximum breadth including parapodia	Maximum breadth excluding parapodia	Number of segments
143 mm.	14 mm.	10 mm.	54
98 mm.	11 mm.	8 mm.	53
85 mm.	10 mm.	7 mm.	53

Both dorsal and ventral surfaces of body are somewhat convex, the former being transversely marked with intersegmental lines and slightly corrugated throughout; the latter showing segment-junctions more distinctly.

Prostomium slightly differentiated and disproportionately small for so large a body. In front the snout bears two subtentacles, which are conical and of a ferruginous hue from base to apex. The two lateral tentacles, situated at the anterior border of prostomium, have each a bluish ceratophore. Immediately behind them there is a small tongue-shaped caruncle, arising nearly in line with the anterior border of the first parapodiated segment, and terminating in a groove in front of the posterior border of same. The caruncle is deeply cordate in front, and bears at the termination of the sinus a short, conical, ferruginous median tentacle.

Mouth opens ventrally at the anterior border of the 3rd parapodiated segment. From the oral aperture two well-marked folds run forwards to the anterior prominence of snout which bears the subtentacles. These folds are wide in front and narrow behind. Two additional plaits appertain to the 2nd segment, and another to the first.

Branchiae commence to occur on the 3rd parapodiated segment. They have the form of a dense arbuscle, which consists of 6 or 7 main stems springing from a common base and divides somewhat dichotomously into a dense bush of filaments. The outer stems have shorter terminal processes; the inner possess both longer branches and longer terminal processes. The terminal processes are ferruginous in colour throughout, while the stems and branches are of the usual bluish tint. The tuft is situated close to base of dorsal bristle-papilla, and somewhat to the

inner or dorsal side. Branchiæ continue to occur to the posterior end of body, without decreasing in size.

Dorsal cirrus with cirriphore arising from the posterior part of dorsal bristle-papilla. The cirriphore is bluish in colour; the style ferruginous and tapering towards the extremity, which extends nearly to tip of bristles.

Ventral cirrus very short, but of a similar structure as the dorsal.

Dorsal bristles form a curved row with the convexity directed forwards, and consist of two kinds, viz., stout bristles with grooved and serrated tip (Pl. XXII, fig. 6) and longer ones with tapering and curved tip (fig. 7). Ventral bristles few in number and comparatively short, but strongly developed (fig. 8); the tip strongly curved, and marked with a series of fine striæ in the opaque or whitish parts.

Acicula in both dorsal and ventral rami of parapodium is peculiarly expanded at tip, the expansion differing in form with dorsal and ventral aciculæ. In the former it is of an elongate shape, while in the latter it is larger though shorter (fig. 9).

Anus is a large elliptical opening, the maximum diameter of which lies in the median line of body. It occupies several segments at the posterior end of body. Internally, the mucous membrane forms a prominent mass, occasionally showing rugæ in somewhat radial arrangement. The large size of anus may indicate certain peculiarity in the digestive function. In the intestinal canal were found fragments of small crustaceans, generally mixed with some brownish-purple debris. Cirri and valves of *Lepas* were also found among the contents.

Habitat:—Off Misaki, on a large floating timber, on which a

large cluster of *Lepas anatifera* was attached.

Genus *Notopygos* Grube.

Body oblong or vermiform, with a pair of short and stout processes at posterior extremity. Prostomium with 3 tentacles, 2 subtentacles and 4 eyes. Caruncle thick. Parapodium biramous, the rami very distinct. Dorsal cirri 2 in each segment, one simple and the other biarticulated. Branchiæ filiform or pinnate, in cluster. Anus opens in adult worm dorsally on a segment apart from the posterior extremity.

Notopygos mitsukurii n. sp.

Pl. XXII, figs. 10—11.

The following description is based on an unique specimen found in a collection made by the late Prof. MITSUKURI in April, 1901, at Inanzé, off Naha in Okinawashima, one of the Loo-Choo Islands.

The specimen was preserved in alcohol, so that the original colouration of the animal can not be told. It shows only brownish pigmentation in the anterior margin of dorsal bristle-papillæ, deeper in anterior segments than in those posteriorly placed.

Body elongate, somewhat tetragonal in cross-section, consisting of 31 setigerous segments in addition to the very short posteriormost segment, which bears two short and broad terminal styles. It measures 48 mm. in length, 8 mm. in breadth and 5 mm. in thickness at about the middle parts of the body. Both dorsal and ventral surfaces slightly convex; segmental junctions more distinct on the latter than on the former, which exhibits irregular, somewhat obliquely directed wrinkles.

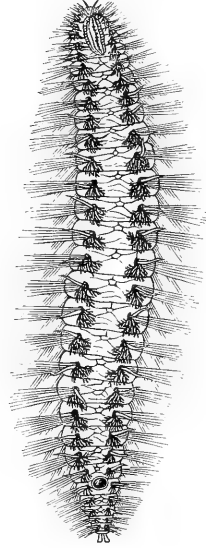
Prostomium small; subtentacles short and conical; lateral tentacles situated just dorsal to, and a little longer than subtentacles. Median tentacle attached in a groove at the anterior end of caruncle, $\frac{1}{2}$ as long as lateral tentacle; it is, like the others a simple subulate process.

Caruncle large and rugose, consisting of an elevated, doubly crenate crest and a wrinkled horizontal portion; the middle of the crest marked with a longitudinal series of small elevations. The organ is fixed to the first 4 parapodiated segments, and extends posteriorly to the commencement of the 6th, terminating with free extremity.

Anterior pair of eyes situated in the line passing just through front of the anterior border of caruncle; and posterior pair of eyes, which appear to be smaller than those of the anterior, situated a short distance behind these and on sides of the caruncle.

Mouth opens at the inferior anterior border of the 4th parapodiated segment; from the oral aperture two very prominent longitudinal folds run forwards to the anterior end of snout, where they unite to form the anterior lip.

Branchiæ commence to occur on the 5th parapodiated segment, and are situated close to the inner or dorsal side of dorsal bristle-papilla. They continue to exist posteriorly to the end of body, without decreasing in size. Each branchia has the form of a short arbuscle and consists of 5 or 6, nearly equally long, main stems springing from common base, which stems branch



Dorsal view of *Notopygos mitsukurii*.
3/2. Nat. size.

somewhat pinnately and thus form a bush of filaments.

Simple dorsal cirrus small and filiform, arising on the inner or dorsal side of the bunch of dorsal bristles, slightly exceeding branchial filaments in length. Articulated dorsal cirrus, arising just posterior to the bunch of dorsal bristles and lateral to branchial tuft, consists of a stout cylindrical cirriphore and of a long slender style, the tip of which reaches nearly to tip of bristles. The ventral cirrus is short, not reaching to tip of ventral bristle-tuft in the anteriorly placed few segments; in the middle parts of body it is about $\frac{1}{2}$ as long as the bristle-tuft. It is attached to the posterior side of the ventral border of parapodium.

Dorsal bristles form a slightly curved row, with the convexity directed forward. Each is long and bifurcated, having the tip shaped as shown in Pl. XXII, fig. 10. Ventral bristles form a vertical row, and are less numerous than in the dorsal row; and compared with the dorsal bristle, they are more slender and make wider angles at bifurcations (fig. 11).

Anus, a large round opening, lies in the anterior $\frac{2}{3}$ of the 26th parapodiated segment. The large size of the anal opening may be in relation with the circumstance that a pretty large fragment of a gasteropod shell (a small *Purpura*) is contained just within it.

Habitat:—Naha in Okinawashima, one of the Loo-Choo Islands

Family Goniadidae.

Body long, slender, slightly depressed; consisting of numerous segments, partly with uniramous and partly with biramous parapodia. Prostomium small, conical, annulated, with

4 tentacles on tip. Anteriorly situated uniramous parapodia with compound bristles; posteriorly situated biramous parapodia with simple bristles on dorsal ramus and compound ones on ventral ramus. Anal cirri 2. Proboscis in extrusion long, with a ring of dissimilar chitinous jaws inside the anterior margin; jaw-gland absent.

Genus *Goniada* Aud. et M.-Edw.

Body-segments divided into square fields in median region of dorsal and ventral surfaces. Uniramous parapodia with 2 anterior ligulæ; biramous parapodia with 2 anterior ligulæ on ventral ramus; simple bristles on dorsal ramus, either very fine or short and stout. Proboscis anteriorly enlarged, with a row of V-shaped chitinous jaws on each side.

Goniada japonica n. sp.

Pl. XXIII, figs. 1—6.

A large and complete specimen, consisting of 327 segments, measures 225 mm. in length, and 2.5 mm. in breadth including parapodia and 1.5 mm. excluding same in 40th segment; maximum breadth attained in about 150th segment, 3.5 mm. with and 2.5 mm. without parapodia.

Body consisting of the anterior region 52 mm. long and comprising 76 segments, and of the posterior region comprising 251 segments, of which the two anteriormost segments are transitional in form.

Prostomium (fig. 1) long, conical, slightly depressed; the length

two and a half times the width, having 9 annuli. Ventral pair of tentacles slightly longer than the dorsal. Palpi not conspicuous.

As typical parapodium of the anterior region may be described the 45th (fig. 2). It consists of a rather long ventral ramus, divided into an anterior lobe having two slender ligulae and a posterior slender and shorter lobe, which is situated just opposite a notch in the former. Ventral cirrus large, arising from the middle of the ventral border of parapodium, and extending a little beyond the tip of anterior lobe; dorsal cirrus long and slender, arising from the base of parapodium, and running at first laterad, then dorsad, and finally curving downwards. Bristles arranged in a fan-shaped vertical series, all compound.

Toward the anterior body end, the difference in length between the anterior and posterior lobes of parapodium becomes more and more marked; the ventral cirrus becomes gradually shorter, so that in the 13th parapodium it is slightly shorter than the anterior lobe; the dorsal cirrus becomes relatively longer.

The parapodia in the first two segments of the posterior body region are transitional in form; more posteriorly they quickly assume characteristic structure.

Typical posterior parapodium (the 140th) consists of a dorsal and a ventral ramus, separated by a wide interval and each bearing its peculiar cirrus (fig. 3). The ventral ramus is essentially as in an anterior parapodium, but both the anterior and posterior lobes are much broader, the latter being slightly shorter than the former, while the ventral cirrus nearly equals in length that of the anterior lobe. The large compound bristles have vertical fan-like arrangement, each having slender, finely serrated blade (fig. 5); in addition to these a few small bristles (fig. 6) with very short blade are present at the upper end of the bristle-fan.

Dorsal ramus about $\frac{1}{2}$ the length of the ventral, broadly attached, and not constricted at base ; its terminal parts presenting a somewhat triangular outline, one corner of which is directed laterally. Dorsal cirrus broad and leaf-like, arising from the middle of the dorsal border of parapodium, with tip directed dorso-laterally. Dorsal bristles are represented by only two short stout spines (fig. 4).

Proboscis large, measuring 21 mm. in length and 2 mm. in maximum breadth near the anterior end in fully protruded condition. There are many slight longitudinal folds running from base to tip of proboscis ; and on each side of the latter near the buccal segment there are found some 19 V-shaped black paragnathi (longitudinal series of accessory jaws), the angle of each V being pointed towards the buccal segment.

Jaws black, opaque, forming a continuous ring just inside a circle of 16 obtuse lobes at the extreme end of fully protruded proboscis. One principal jaw on each side, the right one bearing 2 large hooked spines of different length ; the left bearing in addition 2 smaller spines. In the dorsal interval between the two principal jaws are 16 smaller accessory jaws, each bearing a pair of hooked teeth ; and in the ventral interval between same there are 11 smaller 2-toothed jaws. Papillæ somewhat heart-shaped and leaf-like, sparsely distributed in regular rows.

General colour of body brownish, lighter anteriorly and deeper posteriorly ; in the dorso-lateral corner of each segment, as well as on tips of parapodia, there is developed deep-brownish pigment, which is especially conspicuous on segments of the posterior region.

Habitat :—Misaki (!) ; Naruto in Prov. Awa (!).

Goniada foliacea Moore.

1903. *Goniada foliacea*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 457.

In the absence of specimens within reach of me I will make the following extract from MOORE'S description which was based on a single incomplete specimen consisting of 160 segments, about 100 of these constituting the posterior body region.

Length of the specimen 98 mm.; the breadth 4 mm. including bristles in the anterior region, and 5.3 mm. at 63rd segment, or the beginning of the posterior region. Prostomium bluntly conical, 4-ringed, slightly depressed, length twice width.

Parapodium of 15th segment consists of a rather stout ventral ramus divided into a broad foliaceous anterior lobe with two tongue-like tips and a somewhat slender lanceolate posterior lobe; ventral cirrus stout. Dorsal cirrus consists of a rather stout rounded stalk, with swollen base and somewhat flattened foliaceous appendage.

Typical parapodium of the posterior region (75th segment) with two widely separated rami; the ventral ramus essentially as in parapodia of the anterior region, but with both lobes much broader and more leaf-like, with the 2 divisions of anterior lobe more divergent, both divisions being longer and the dorsal division larger than the posterior lobe; ventral cirrus relatively short. Dorsal ramus about $\frac{1}{2}$ as long as the ventral. Dorsal cirrus arising from base of the dorsal ramus and directed almost vertically dorsad. Ventral bristles compound, with very long shaft and slender blade. Dorsal bristles simple, slightly bent, the surface marked with fine granules, which appear as somewhat irregular serration at the edge.

Jaws black, forming a ring just caudad of a circle of 18 obtuse lobes. Left principal jaw with 2 long hooked spines, while associated with the right are 2 or 3 smaller spines. Dorsal interval between the principal jaws with 14 accessory jaws, each bearing 2 or 3 teeth; the ventral interval more than twice the dorsal in length and with 28 smaller jaws. Longitudinal series of accessory jaws absent; proboscis papillæ mammiliform.

Habitat:—Sagami Bay, 190 fathoms; North of Sendai Bay, 62 fathoms (“Albatross”).

Goniada distorta Moore.

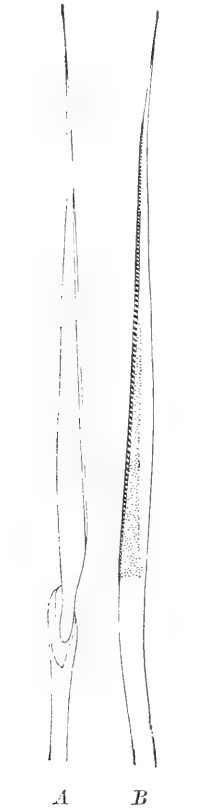
Pl. XXIII, fig. 7.

1903. *Goniada distorta*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 461.

Body slender and nearly round; length 153 mm.; maximum breadth, attained at about 60th segment, nearly 4 mm. including parapodia; thence the breadth gradually diminishes towards posterior body end. Number of segments 220, of which 54 constitute the anterior region of body.

Prostomium conical, elongate, with 7 annulations in addition to basal ring, which constitutes nearly $\frac{1}{3}$ of the length of prostomium. Body segment distinct, showing no indication of subdivision into rings.

Typical anterior parapodium a compressed cylinder about as high as long, with one posterior and two anterior cirriform lobes, of which the dorsal anterior is the longest. Ventral cirrus conical,



A B
 .1. Ventral bristle of *G. foliacea*. 580/1.
 B. Dorsal bristle of same. 580/1.
 [After J. P. Moore]

at its base nearly twice as thick as parapodial lobes. Dorsal cirrus, swollen at its basal region, terminates with blunt conical tip; not foliaceous.

Typical posterior parapodium basally nearly as high as body; its ventral ramus longer than the dorsal and divided into two rather short pointed anterior lobes and a much broader, leaf-like, posterior lobe. Ventral cirrus elongate-conical, with a distinct basal part arising from about the middle of the ventral border of parapodium, its tip reaching to end of ventral anterior lobe. Dorsal ramus united with dorsal cirrus for about $\frac{3}{4}$ of its length. Ventral bristles (fig. 7) compound with tapering, fringed terminal-piece. Dorsal bristles few in number; simple, shorter but stouter than the ventral, tapering to fine point, with granulation on the convex border.

Proboscis very long, with papillæ of two kinds: bluntly conical ones which are very numerous, and somewhat larger ones which have compressed bifid tip and occur more sparsely and confined to the muscular ridge. Marginal lobes 16 or 18; jaws black, principal ones 4-toothed. Accessory jaws 1—3-toothed; 13 of them in the dorsal, and 19 in the ventral, interspace.

Habitat: —Suruga Bay, 35-65 fathoms ("Albatross"); Yodomi in Sagami Bay, about 40 fathoms (Mr. K. AOKI).

Family **Glyceridae.**

Body slender, nearly round in cross-section, consisting of numerous segments, with similar parapodia throughout. Prostomium conical, annulated, with 4 tentacles on tip. Parapodium either biramous with simple bristles on dorsal ramus and compound bristles on the ventral, or uniramous showing only the ventral

ramus. Anal cirri 2. Proboscis short, barrel-shaped or slenderly club-shaped, with 4 chitinous jaws.

Key to the genera found in Japan.

- a'*. Parapodium biramous ; with 2 bristle-bundles, each of which includes an acicula. *Glycera*.
a''. Parapodium uniramous, with a single bundle of compound bristles and an acicula. *Hemipodus*.

Genus *Glycera* Savigny.

Prostomium with 8 or more rings ; segments 2—3 ringed ; parapodium with 2, more or less distinctly developed rami, with both simple and compound bristles, with a ventral and a dorsal cirrus, the latter being variable in position ; with or without branchiæ. Proboscis large, club-shaped, in protruded condition with 4 uniform black jaws at anterior end ; a large jaw-gland behind each jaw.

Glycera goesi Malmgren.

Pl. XXIV, figs. 1—2.

1867. *Glycera goesi*, Malmgren. *Annulata Polychaeta*, p.71, Pl. XIV, fig. 81.
 1879. *Glycera decipiens*, Marenzeller. *Süd-jap. Annel.*, p. 32, Taf. VI, Fig. 3.
 1903. *Glycera goesi*, Moore. *Proc. Acad. Nat. Sc. Philad.*, Vol. LV, p. 464.

Body consisting of 150—200 segments, posteriorly strongly tapering, 125—170 mm. long. Breadth in the middle region of body 4—4.5 mm. excluding parapodia. Segments bi-annulated.

Prostomium 10-ringed, its length about 3 times the breadth. Tentacles short.

The two anteriormost pairs of parapodia rudimentary; first dorsal cirrus wanting. Parapodia in the anterior and middle regions of body (fig. 1) bear two anterior and two posterior ligulæ, of which the former are longer and more pointed than the latter; ventral cirrus somewhat conical and pointed, and dorsal cirrus elliptical in outline. Parapodia (fig. 2) in the posterior region of body bear two long and sharp pointed anterior ligulæ; and of the posterior ligulæ, the superior one is a little shorter than the two anterior, while the inferior one is very short and rounded at end. Ventral cirrus long and pointed. Dorsal cirrus oblong, placed at base of parapodium. Dorsal ramus with simple bristles, the ventral with articulated bristles in which the blade is finely serrated.

Gill simple, slender, situated on the anterior side of parapodium at about the base of the distal $\frac{1}{3}$ of its length; often invisible in posterior view, especially in alcoholic specimens.

Anal segment somewhat longer than the two preceding segments taken together; anal cirri very long and slender.

Proboscis short; its papillæ either conical or hemispherical with broad base, the former form being more numerous than the latter. Triangular appendage of jaws well-developed.

There exists not angible distinction between *G. goesi* MALMGREN and *G. decipiens* MARENZELLER. The specimens came from shallow water as well as from a depth of 60 fathoms or more.

Habitat:—Misaki (!); Gulf of Miya (MARENZELLER); Gulf of Tokyo (!); Watanoha in Prov. Rikuzen (!); Wakkanai in Prov. Kitami; Suruga Bay, 65 fathoms and Sendai Bay, 18 fathoms ("Albatross").

Glycera opisthobranchiata Marenzeller.

Pl. XXIV, figs. 3—4.

1879. *Glycera opisthobranchiata*, Marenzeller. Südiap. Annel., p. 31, Taf. VI, Fig. 2.

Body consisting of 250—290 parapodiated segments, tapering toward both ends; length 200—235 mm.; breadth in the middle region of body 5—6 mm. excluding parapodia. Segments bi-annulated. A longitudinal shallow groove is found on both dorsal and ventral surfaces of body. Colour reddish-dark-gray, the median part of the ventral surface being lighter in colour.

Prostomium 11-annulated, nearly so broad as long; the first six annuli being equal in length to one another. Palpi inconspicuous.

Parapodia of the two anteriormost pairs lack dorsal cirrus. The third parapodium and all behind it are similar in structure. Typical parapodium (fig. 3) very short and blunt, a little longer than high; posteriorly situated parapodia somewhat longer than anterior ones. The two anterior ligulæ in typical parapodium conical with blunt end, separated from each other by a deep notch, the superior slightly longer than the inferior, and both also longer than the two posterior ligulæ which are separated from each other by a shallow notch. Dorsal ramus of parapodium with simple bristles; ventral ramus with articulated bristles (fig. 4), of which the blade is finely serrated. Dorsal cirrus arising from base of parapodium, short and cylindrical in form, with rounded end. Ventral cirrus arising from middle of the ventral border of parapodium, large, its end scarcely reaching to middle of the ventral border of posterior inferior ligula.

Gill dendritic, arising from the posterior side of parapodium near base of dorsal ramus. The well-developed gill bears as much as 12 branches, some of which extend beyond the upper border of parapodium. Colour of gills darker than their surroundings. Anal segment conical, slightly longer than the preceding body-segment, with 2 anal cirri.

Protruded proboscis 45—50 mm. long; the papillæ oblong, nearly twice as long as broad. Jaws moderately curved, the rod-like part of their posterior prolongation well developed. Behind the jaws, there is a circle of 18 small membranous elevations.

This annelid lives burrowing in sand and mud between the tide-marks, so that it can be got only by digging.

Habitat:—Misaki (!); Ōtsu in Prov. Hitachi (!); Nagai in Prov. Sagami (!); Tomo Harbour in Prov. Bingo (!); South Japan (MARENZELLER).

Glycera tessellata Grube.

Pl. XXIV, figs. 5—6.

1863. *Glycera tessellata*, Grube. Beschreib. neuer oder wenig bekannt. Annel., (Arch. f. Natur-gesch. Jahrg. 29, p. 41, Taf. IV, Fig. 4).
 1868. *Glycera tessellata*, Ehlers. Die Forstenwürmer, p. 654, Taf. XXIV, Fig. 2, 33, 34.
 1885. *Glycera tessellata*, McIntosh. "Challenger" Rep. Annel., p. 343, Pl. XLII, fig. 5.
 1903. *Glycera tessellata*. Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 464.

Body rather slender, consisting of 90—98 segments; length 50—65 mm; breadth in about the middle of body 2.—2.5 mm. without, and 3.5—4 mm. with, parapodia. Parapodium long, conical, having about 15 annuli. Segments bi-annulated.

First two pairs of parapodia rudimentary, dorsal cirrus wanting. Typical parapodium (fig. 5) provided with two short and almost depressed posterior ligulæ and two long slender anterior ligulæ. Gills absent; ventral cirrus conical. Dorsal cirrus situated at a little distance from base of parapodium.

Proboscis short, club-shaped; the papillæ (fig. 6) uniform, slender and pointed; basal prolongation of jaws with two equal rod-like processes.

Habitat:—Yodomi in Sagami Bay, about 40 fathoms (Mr. K. AOKI); Sagami Bay, 153 fathoms ("Albatross"); Tsuro in Prov. Tosa (Mr. K. TAGO).

Glycera misakiensis n. sp.

Pl. XXIV, figs. 7—9.

The following description is based on a complete and unique specimen collected on the shore of Koajiro, Misaki.

Body long and stout measuring 280 mm. in length, with 328 parapodiated segments; the maximum breadth, attained at about 50th segment, is 8 mm. excluding parapodia, and 10 mm. including them. Segments bi-annulated.

General colour of body in the living state was pinkish white, except at parapodium tips, where deep brown pigments were developed.

Prostomium conical, with breadth of about $\frac{2}{3}$ the length, 10-ringed. The two pairs of tentacles are short.

The two anteriormost pairs of parapodia lack dorsal cirrus. All parapodia from the third posteriorly are of a similar structure. Gills begin to occur from the 18th parapodium.

Typical parapodium (fig. 7) short, slightly longer than high; posteriorly situated parapodia longer than those more anteriorly placed. The two anterior ligulae separated by a deep notch, conical in shape, and nearly equally long. The two posterior ligulae separated by a shallow notch, shorter than anterior ligulae, with rounded end. Bristles of two kinds, simple and compound; the blade in the latter kind finely serrated.

Dorsal cirrus arising from base of parapodium, short and somewhat cylindrical in form, with rounded end. Ventral cirrus arising from about the middle of the ventral border of parapodium, large and stout, its end not reaching to middle of the inferior border of posterior inferior ligula. In general, the parapodium resembles very much that of *Glycera opisthobranchiata*, but differs markedly in the structure of gills. The gill in this species is very large with dichotomously dividing branches, and arises from the postero-superior surface of the base of parapodium. Well developed gill bears as much as 16 branches, which spread over the dorsal aspect of parapodium.

The 240th parapodium (fig. 8) is much longer than typical parapodium. In it the posterior superior ligula is a little longer than the posterior inferior, but still shorter than the anterior two ligulae; the ventral cirrus is a short conical process; the tip of gill does not reach to distal end of the parapodium, the number of its branches being reduced to 12.

Anal segment small, and anal cirri short.

Proboscis measures, when protruded, 90 mm. in length; the papillae (fig. 9) somewhat conical and more than twice longer than wide. Jaws more curved than in *G. opisthobranchiata*, and the rod-like part of their basal prolongation well developed.

Habitat:—On sandy shore, Misaki in Prov. Sagami (!).

Glycera onomichiensis n. sp.

Pl. XXIV, figs. 10—12.

Body measures 70—90 mm. in length, comprising 100—140 segments. Maximum breadth at about 40th segment, 5 mm. with parapodia and 4 mm. without them. Segments bi-annulated. General colour of body dark brown, basal region of parapodia being lighter.

Prostomium conical, more than twice longer than wide, 10-ringed. Tentacles small. Three anteriormost pairs of parapodia without dorsal cirrus.

Typical parapodium (fig. 10) long, longer than high; two posterior ligulæ separated by a shallow notch, with conical tip; two anterior ligulæ slightly longer than the posterior, with pointed tip; ventral cirrus large and pointed; dorsal cirrus situated at base of parapodium; bristles of two kinds, simple and compound. Gills not found.

Parapodia become slightly longer towards posterior end of the body; in 105th parapodium (fig. 11) the two posterior ligulæ are a little shorter than in the typical one (fig. 10), so that the tips of these two ligulæ and of the ventral cirrus lie in nearly vertical straight line. In those parapodia which lie near posterior end of body, the difference in length between anterior and posterior ligulæ is more marked than in anterior parapodia, so that the distal end of the ventral cirrus lies beyond that of the posterior ligulæ.

Proboscis club-shaped, measuring about 15 mm. in length; with two kinds of papillæ: one small and slender (fig. 12) with obliquely cut end, and the other much larger, conical in form, and

found scattered among the first kind. Jaws moderately curved; their basal prolongation well-developed.

Habitat:—Onomichi in Prov. Bingo, on sandy shore between the tide-marks (!); Misaki (!); Gulf of Kagoshima in Prov. Satsuma.

Glycera chirori n. sp.

Pl. II, fig. 8; Pl. XXIV, fig. 13.

The following description is based on specimens collected on the muddy shore of Kasaoka in Prov. Bittyu, where this worm is very common and is extensively used for bait by fishermen. It is locally known under the name of "Chirori."

Body large and stout, consisting of 170—200 segments, 105—140 mm. in length. Maximum breadth attained at about 40th segment, 6 mm. without parapodia and 8.5 mm. with same. Segments bi-annulated. Prostomium short and conical with broad base, 10-ringed; the 4 tentacles short, small.

First two pairs of parapodia rudimentary, wanting dorsal cirrus.

Typical parapodium (fig. 13) long, nearly twice longer than high; the two anterior ligulae roundish, with a flap-like terminal part in each, and the superior of them a little longer than the inferior; posterior superior ligula with conical end, shorter than anterior ligula; and posterior inferior ligula very short and blunt, with roundish lateral border; ventral cirrus short with conical end; dorsal cirrus knob-like, arising from base of parapodium; a simple slender gill arises from the middle part of the anterior surface of parapodium. Simple bristles in dorsal ramus, and

compound bristles in ventral ramus. Anal cirri very long and slender.

Proboscis short and stout, measuring 15—20 mm. in length in fully protruded condition; papillæ leaf-like and sparsely distributed over the entire surface of proboscis. Jaws moderately curved, with well developed basal prolongation.

Habitat:—Kasaoka in Prov. Bittyu (!); Kanazawa in Prov. Musashi; Kojima Gulf in Prov. Bizen (!); Tomo Harbour in Prov. Bingo (!); Kagoshima in Prov. Satsuma.

Glycera hasidatensis n. sp.

Pl. XXIV, figs. 14—15.

The following description is based on four complete specimens collected by myself on the west side of Hashidaté in the Gulf of Miyazu, Prov. Tango.

Body slender, 60—70 mm. in length, consisting of 135—150 segments; maximum breadth attained at about 50th segment, 3 mm. without parapodia and 4.5 mm. with them.

Prostomium long, conical, 10-ringed. The first two pairs of parapodia are rudimentary and lack dorsal cirrus. Posterior parapodia longer than anterior.

Typical parapodium with two elongate and conical-tipped anterior ligulæ separated by a deep notch; with a broad postero-superior ligula and a small almost depressed postero-inferior ligula (figs. 14 and 15); ventral cirrus large, with conical tip, arising from middle of the ventral border of parapodium; dorsal cirrus short arising close to parapodial base.

Gills begin to occur from 29th or 30th parapodium, arising from the anterior surface of parapodia; they are elongate and

usually simple but sometimes divided into two or three branches.

Bristles simple on dorsal, and compound on ventral, ramus of parapodia.

General colour of body as well as of parapodia light brown, with rather deep brownish pigments developed on tip of ligulæ and of dorsal cirri.

Anal segment small, with comparatively large anal cirri of a deep brown colour.

Proboscis large, club-shaped, measuring 13 mm. in length, provided with elongate leaf-like papillæ. Basal prolongation of jaws provided with a slightly curved appendage.

Habitat :—West side of Hashidaté in Prov. Tango, July 8th, 1903.

In that season of the year the body-cavity was full of reproductive elements.

Glycera alba Rathke.

Pl. XXIII, figs. 8—9.

1843. *Glycera alba*, Rathke. Beiträge zur Fauna Norwegens, p. 173, Taf. IX, Fig. 9.
1867. *Glycera alba*, Malmgren. Annulata Polychaeta, p. 69, Pl. XIV, fig. 82.
1868. *Glycera alba*, Ehlers. Die Borstenwürmer, p. 661.
1903. *Glycera alba*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 464.

Body tapers much posteriorly; segments 80—100; length 56—75 mm.; breadth about 4 mm. including parapodia.

Prostomium conical, its indistinctly annulated basal region somewhat longer than one-third of the entire length, the remaining

distal region with 8 distinct annuli. Segments bi-annulated.

Parapodium in anterior region of body short; and that in posterior region long, with two equally long and conical-tipped anterior ligulæ, a similar postero-superior ligula and a very short bluntly ending postero-inferior ligula. Gills filiform, dorsal in position; they are wanting on the first parapodium as well as in the last 12 pairs of parapodia. Ventral cirrus with conical tip; dorsal cirrus knob-like and situated at base of parapodia.

Proboscis large, club-shaped, with slender papillæ which are obliquely cut off at end (fig. 9); basal wing-like prolongation of jaws forming a triangular plate with a short process.

Habitat:—Gulf of Aomori in Prov. Mutsu (!); Sagami Bay, Suruga Bay and “North Japan,” from depths of 31—75 fathoms (“Albatross”).

Glycera robusta Ehlers.

Pl. XXIII, fig. 10.

1868. *Glycera robusta*, Ehlers. Die Borstenwürmer, p. 656, Taf. XXIV, Fig. 31, 32.
 1903. *Glycera robusta*, Moore. Proc. Acad. Nat. Sc. Philad., Vol. LV, p. 464.

Body long and stout; 250—280 segments; length 370—420 mm.; breadth about 5 mm. excluding parapodia at about the anterior third of body.

Prostomium short and conical; the 4 tentacles simple and very short. Segments bi-annulated.

Parapodium short and blunt, with two depressed posterior ligulæ which are separated from each other by only a shallow

notch, and with two slightly longer anterior ligulæ; with wreath-like vesicular dorsal gills occurring from the 20th parapodium posteriorly; ventral cirrus bluntly rounded; small dorsal cirrus arising from parapodial base.

Proboscis club-shaped, with small oval leaf-like papillæ; basal prolongation of jaws a triangular plate with a long process.

Habitat:—Suruga Bay, 65 fathoms ("Albatross"); Sagami Bay (K. AOKI).

Glycera capitata Oersted.

Pl. XXIII, figs. 11—13.

1843. *Glycera capitata*, Oersted, Grönlands Annulata dorsibranchiata, p. 196, Pl. VII, figs. 87, 88, 90—94.
 1845. *Glycera alba*, Johnston. Miscellanea Zoologica, p. 147, Pl. IX, figs. 1—10.
 1850. *Glycera capitata*, Grube. Fam. d. Annel., p. 308.
 1865. *Glycera mülleri*, de Quatrefages. Histoire des Annelés II, p. 172.
 1868. *Glycera capitata*, Ehlers. Die Borstenwürmer, p. 648, Taf. XXIII, Fig. 47—49.

Body long, consisting of 150—180 segments; length 63—82 mm.; maximum breadth 3—3.5 mm. excluding parapodia.

Prostomium conical, having 8 annuli. Segments 3-ringed.

Parapodium short (fig. 11), provided with a single posterior ligula, and two anterior ligulæ, of which the superior is short and the inferior long and conical; dorsal cirrus short and small, situated a short distance dorsad from base of parapodium; ventral cirrus long and with rather broad end.

Proboscis long, club-shaped; most of its papillæ are long and filiform (fig. 12), while the remaining papillæ are short and

conical (fig. 13) or oval-shaped; basal region of jaws somewhat triangular with a long rod-like prolongation.

Habitat :—Chepissani in Sakhalin Island (Prof. I. IJIMA).

Genus *Hemipodus* Qtrfg.

Prostomium many-ringed; segments 3-ringed; parapodium uniramous, with a long anterior and a round posterior ligula; bristles compound; branchiæ absent. Proboscis short, more or less barrel-shaped, with 4 similar jaws; jaw gland present.

Hemipodus yenourensis n. sp.

Pl. XXIII, figs. 14—15.

This species was collected by myself first at Nagahama in the Gulf of Yenoura, Prov. Suruga, on January 8th, 1898; and afterwards it has become known to me that it exists also in Misaki and in Ujina.

Colour in living specimens yellowish white, with light brownish pigments at tip of parapodia. Specimens preserved in alcohol appear yellowish brown.

Body consisting of 140—150 segments, 45—60 mm. long; maximum breadth 2.5 mm. excluding parapodia and 3.5 mm. including them.

Prostomium conical, 15-ringed, the length about twice the width at basal part. The 4 tentacles long, about one-half the length of prostomium, indistinctly divided into 8 or 9 rings. Segments 3-ringed.

Parapodium short; its anterior ligula may be divided into a broad proximal and a lanceolate distal portion (fig. 14); posterior

ligula a little broader than proximal parts of anterior ligula, with roundish end, extending a little beyond proximal parts of anterior ligula; only compound bristles present; ventral cirrus long and conical, situated almost parallel to distal lanceolate parts of anterior ligula; dorsal cirrus large and cylindrical with rounded end, arising a short distance dorsad from base of parapodium. Ventral cirrus in anteriorly placed parapodia shorter than that of more posteriorly situated ones, pointing in infero-lateral direction.

Anal segment short, with two small anal cirri.

Proboscis short and somewhat barrel-shaped, measuring 5—6 mm. in length when fully protruded. Jaws well developed, moderately curved, with somewhat broad triangular process and long rod-like appendage; papillæ (fig. 15) on the whole surface of proboscis, long and slender.

Habitat:—Yenoura in Prov. Suruga (!); Ujina in Prov. Aki; Misaki (!).

Remarks:—Most of the specimens collected at Misaki in the months of March and April contained nearly ripe reproductive elements (eggs and spermatozoa).

Tokyo, March 30th, 1910.

**Key to the Families of Polychaeta Errantia
represented in Japan.**

- a.*' Segments dissimilar.
- b.*' With elytra.
- c.*' Dorsal cirri alternate with elytra.
- d.*' Jaws horny.
- e.*' Elytra not on every alternate segment
 *Polynoidea*, p. 7.
- e.*'' Elytra on every alternate segment . . . *Acoetidae*, p. 65.
- d.*'' Jaws none, or rudimentary . . . *Aphroditidae*, p. 73.
- c.*'' Dorsal cirrus on each parapodium . . . *Sigalionidae*, p. 85.
- b.*'' Without elytra *Palmyridae*, p. 93.
- a.*'' Segments similar or subsimilar.
- b.*' Buccal armature complex *Eunicidae*, p. 95.
- b.*'' Buccal armature simple or none.
- c.*' Prostomium of ordinary form.
- d.*' Without branchiae.
- e.*' With a pair of jaws, and with paragnathi or
 papillæ *Lycoridae*, p. 146.
- e.*'' Without jaws and paragnathi.
- f.*' Cirri simple.
- g.*' Tentacular cirri 2 or 4 . . . *Syllidae*, p. 181.
- g.*'' Tentacular cirri numerous *Hesionidae*, p. 191.
- f.*'' Cirri lamellar *Phyllodocidae*, p. 194.
- d.*'' With branchiae.
- e.*' Branchiae cirriform *Nephtydidae*, p. 212.
- e.*'' Branchiae arborescent . . . *Amphinomidae*, p. 218.
- c.*'' Prostomium conical and annulated.
- d.*' Parapodia unlike in shape in anterior and posterior
 regions of body; proboscis with numerous dissimilar
 jaws *Goniadidae*, p. 231.
- d.*'' Parapodia similar in all segments; proboscis with
 4 similar jaws *Glyceridae*, p. 237.

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ABBREVIATION.

(!)...This sign indicates that the specimen has been collected by the present writer.

ERRATA

Page	3,	11th line	<i>for</i>	Sakhalin (1905)	<i>read</i>	Sakhalin (1906).
„	14,	17th „	„	cephalic	„	cephalic.
„	22,	9th „	„	length	„	length.
„	25,	20th „	„	<i>pleiopsis</i>	„	<i>pleiolepis</i> .
„	42,	14th „	„	or	„	of.
„	46,	8th „	„	pl.	„	pt
„	47,	last „	„	Chikuzeu	„	Chikuzen.
„	56,	14th „	„	and on	„	on the.
„	67,	27th „	„	Anothe risolated	„	Another isolated.
„	78,	11th „	„	1904	„	1905.
„	94,	11th „	„	frem	„	from.
„	94,	last „	<i>insert</i>	“;”	<i>after</i>	“right.”
„	104,	18th „	„	“as”	„	“far.”
„	117,	1st „	<i>for</i>	$\frac{1}{2}$	<i>read</i>	$\frac{1}{4}$.
„	118,	1st „	„	tentacles	„	tentacle.
„	154,	9th „	„	double	„	two.
„	169,	2nd „	„	tentacul arcirri	„	tentacular cirri.
„	184,	26th „	„	Boby	„	Body.
„	„	28th „	„	cirri	„	cirri.
„	213,	19th „	„	Oested	„	Oersted.
„	222,	20th „	„	neac-surfet	„	surface-net.
„	226,	4th „	„	tt ucles	„	tentacles.
„	239,	24th „	„	not angible	„	no tangible.
„	240,	14th „	„	pairsl ack	„	pairs lack.

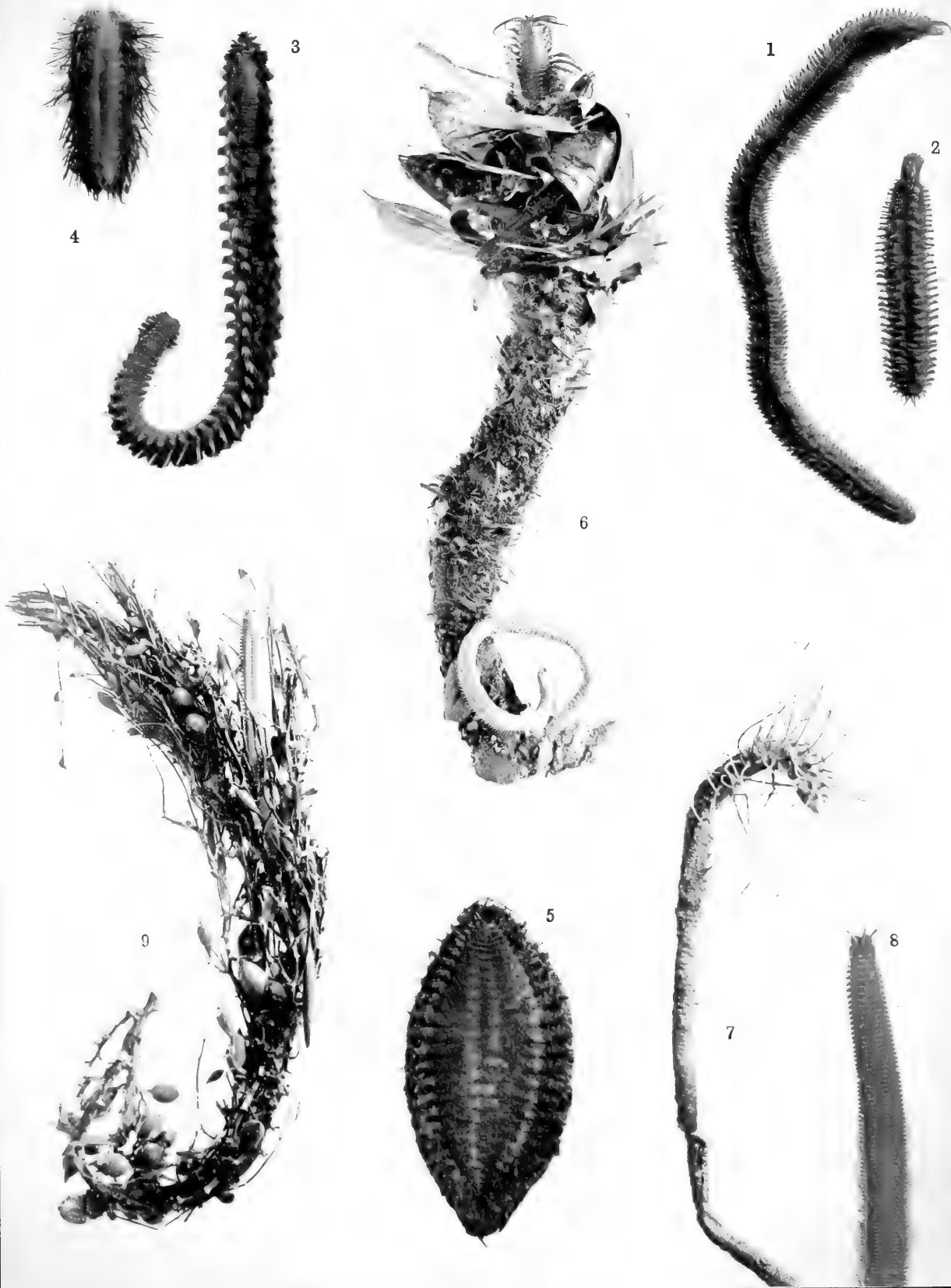
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ERRANTIAE POLYCHAETA OF JAPAN.

PLATE I.

Explanation of Plate I.

- Fig. 1. Dorsal view of *Polynoë longissima* n. sp. 1/1.
- Fig. 2. Dorsal view of *Polynoë vexillaria* (Moore). 1/1.
- Fig. 3. *Amplinome rostrata* (Pallas). 1/1.
- Fig. 4. Dorsal view of *Laetmatonice japonica* McIntosh. 1/1.
- Fig. 5. Ventral view of *Aphrodita watasei* n. sp. Slightly reduced.
- Fig. 6. *Diopatra sugokai* n. sp., with tube. 1/1.
- Fig. 7. Tube of *Onuphis willemoesii* (McIntosh). 2/3.
- Fig. 8. Dorsal view of the anterior portion of *Marphysa iwamusi* n. sp. Slightly reduced.
- Fig. 9. *Nereis Agassizi* Ehlers, with tube among branches of *Sargassum*. Slightly reduced.



A. Izuka: Errantiate Polychaeta.

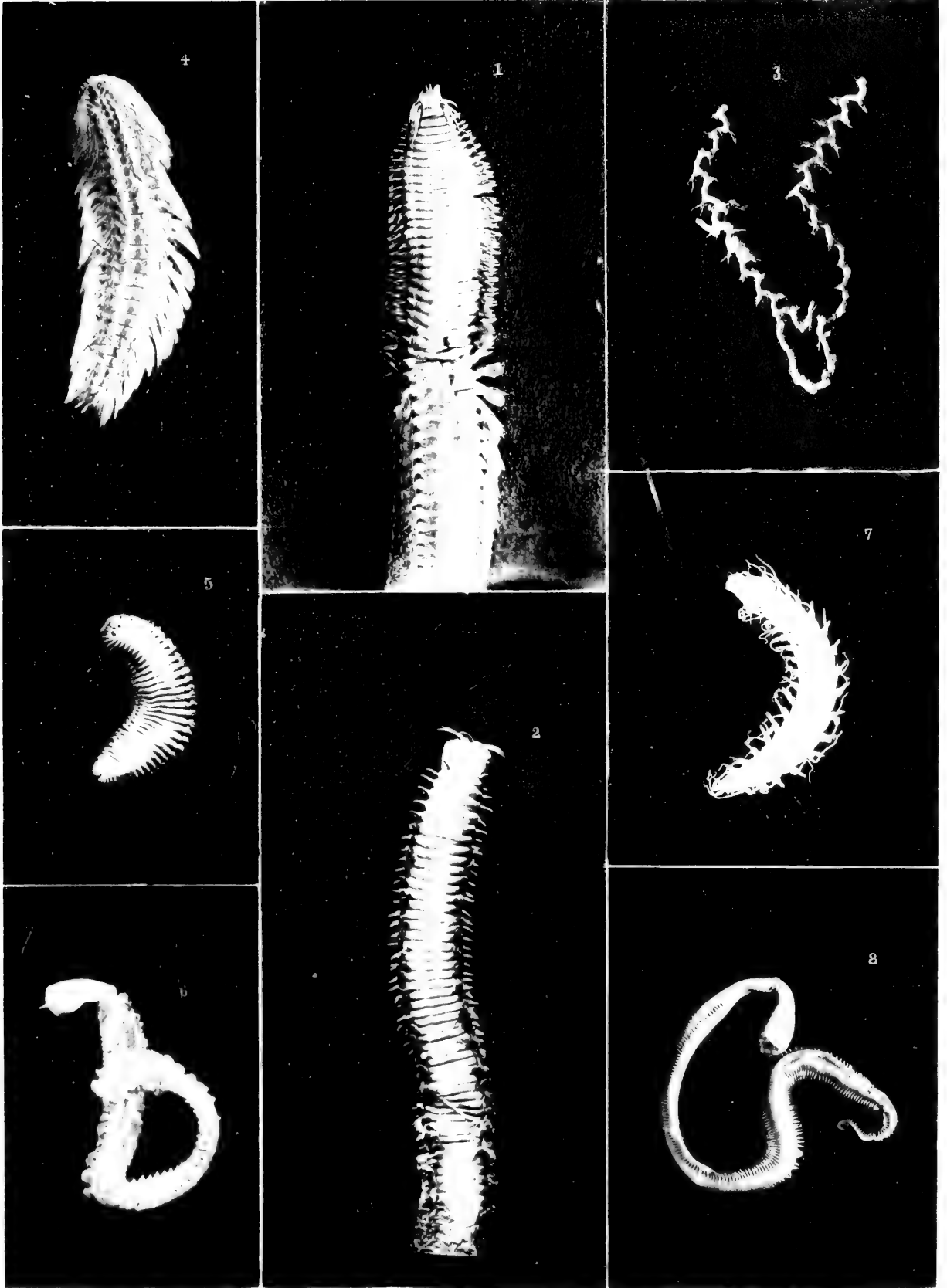
A. IZUKA.

ERRANTIAE POLYCHAETA OF JAPAN.

PLATE II.

Explanation of Plate II.

- Fig. 1. Dorsal view of the anterior portion of *Nereis ijimai* n. sp. Slightly reduced.
- Fig. 2. Dorsal view of the anterior portion of *Eunice aphroditois* (Pallas). 1/2.
- Fig. 3. Tube of *Eunice tibiana* (Pourt.). Slightly reduced.
- Fig. 4. Dorsal view of *Chloeia flava* (Pallas). 2/3.
- Fig. 5. Ventral view of *Euphrosyne superba* Marenz. 1/2.
- Fig. 6. Dorsal view of *Panthalis jogasimae* n. sp. Slightly reduced.
- Fig. 7. Dorsal view of *Hesione reticulata* Marenz. Slightly reduced.
- Fig. 8. *Glycera chirori* n. sp. 2/3.



A. Izuka: Errantiate Polychaeta.



A. IZUKA.

ERRANTIAE POLYCHAETA OF JAPAN.

PLATE III.

Explanation of Plate III.

(*Polynoë*).

- Fig. 1. Dorsal view of the anterior extremity of *Polynoë gymmonota* Marenz. 15/1.
- Fig. 2. Slender dorsal bristle of same. 91/1.
- Fig. 3. Short dorsal bristle of same. 91/1.
- Fig. 4. Ventral bristle of same. 91/1.
- Fig. 5. Ventral bristle of *Polynoë ijimai* n. sp. 91/1.
- Fig. 6. Right elytron of the 5th segment of same. About 5/1.
- Fig. 7. Left elytron of the 5th segment of *Polynoë squamata* (L.). 8/1.
- Fig. 8. Dorsal bristle of same. 200/1.
- Fig. 9. Ventral bristle of same. 200/1.
- Fig. 10. Right anteriormost elytron of *Polynoë clava* Montag. 20/1.
- Fig. 11. Ventral bristle of same. 390/1.
- Fig. 12. Superior dorsal bristle of *Polynoë vaxillaria* (Moore). 390/1.
- Fig. 13. Portion of a middle dorsal bristle of same. 390/1.
- Fig. 14. Ventral bristle of same. 220/1.



Izuka del.

1-4. *Polynoë gymnonota* Marenz. 5-6. *P. ijimai* n. sp. 7-9. *P. squamata* (L.)
10-11. *P. clava* Montag. 12-14. *P. vexillaria* (Moore).

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ERRANTIAE POLYCHAETA OF JAPAN.

PLATE IV.

Explanation of Plate IV.

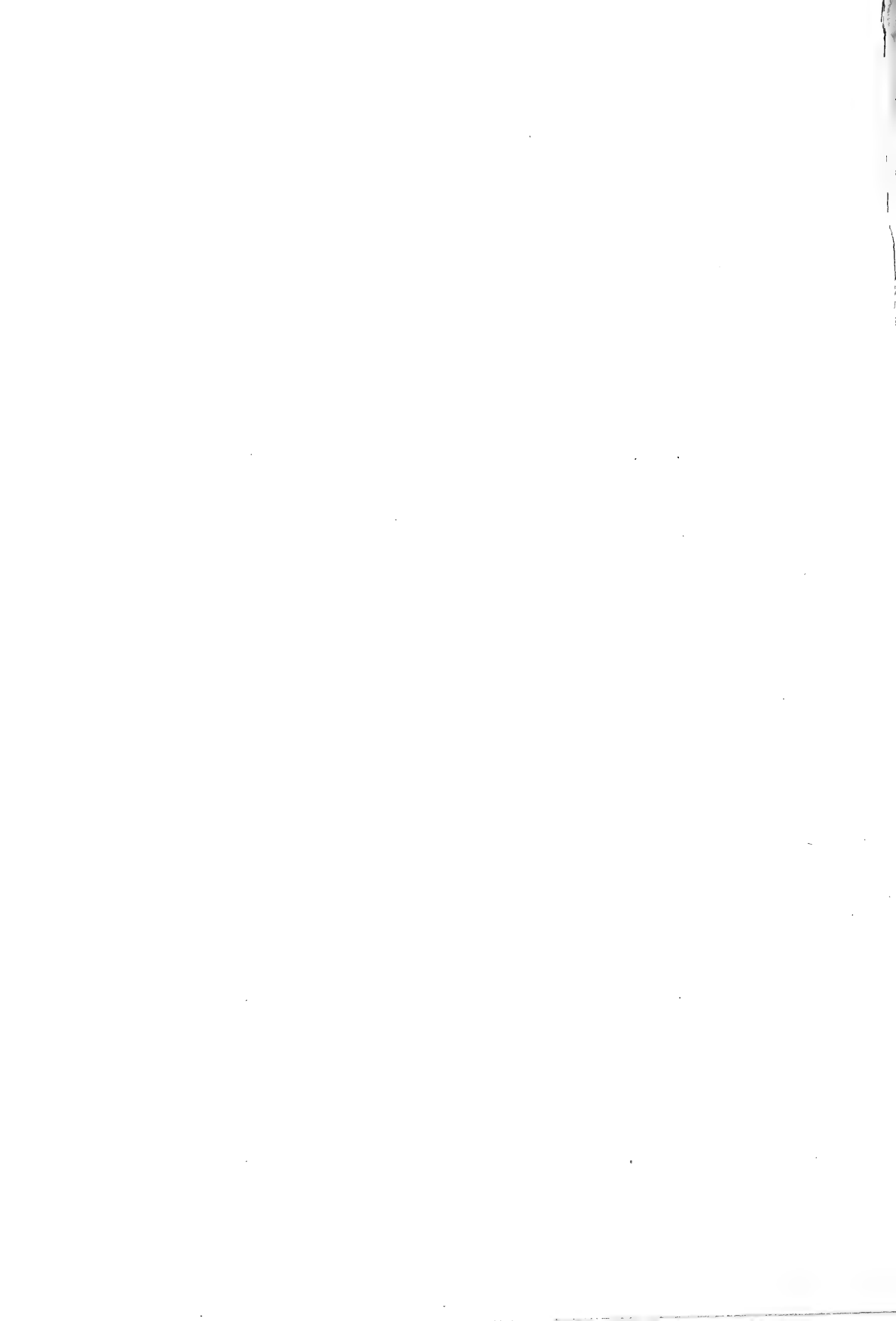
(*Polynoë*).

- Fig. 1. Dorsal view of the anterior extremity of *Polynoë longissima*
n. sp. 8/1.
- Fig. 2. Posterior view of a parapodium of same. 22/1.
- Fig. 3. Superior ventral bristle of same. 390/1.
- Fig. 4. Middle " " " " "
- Fig. 5. Inferior " " " " "
- Fig. 6. Dorsal view of the anterior extremity of *Polynoë microsetosa*
n. sp. 12/1.
- Fig. 7. Right elytron of the 7th segment of same. 12/1.
- Fig. 8. Anterior view of parapodium from 8th segment of same. 26/1.
- Fig. 9. Dorsal bristle of same. 930/1.
- Fig. 10. Middle ventral bristle of same. 520/1.
- Fig. 11. Dorsal view of the anterior extremity of *Polynoë sargamiana*
n. sp. 18/1.
- Fig. 12. Left elytron of the 9th segment of same. 12/1.
- Fig. 13. Posterior view of parapodium from 10th segment of same.
18/1.
- Fig. 14. Dorsal bristle of same. 390/1.
- Fig. 15. Ventral " " " "



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1-5. *Polynoë longissima* n. sp. 6-10. *P. microscopica*



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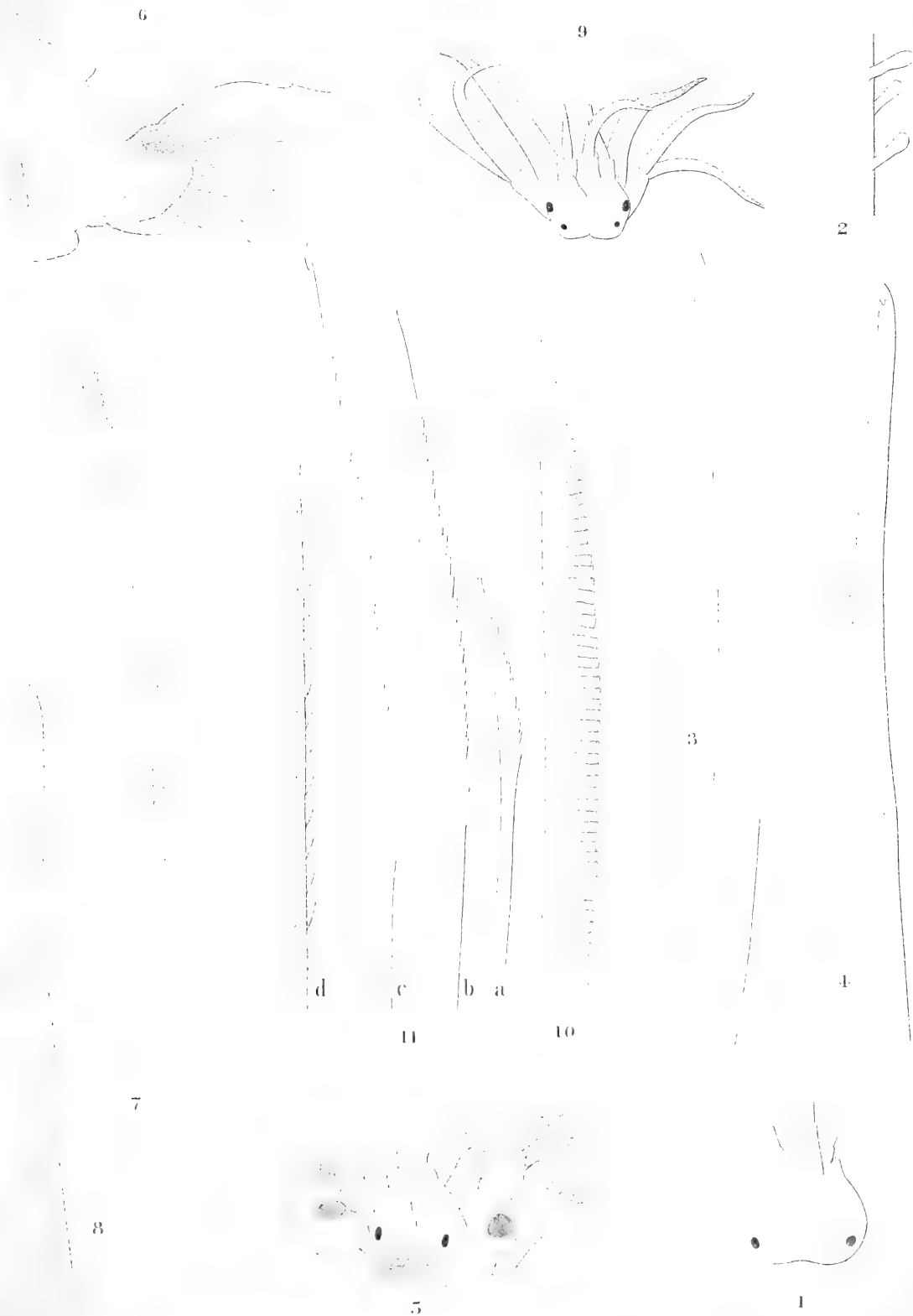
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE V.

Explanation of Plate V.

(*Harmothoë*).

- Fig. 1. Dorsal view of a prostomium of *Harmothoë imbricata* (L.).
15/1.
- Fig. 2. Three papillæ on the surface of a tentacle of same. 90/1.
- Fig. 3. Dorsal bristle of same. 115/1.
- Fig. 4. Ventral bristle (medium size) of same. 115/1.
- Fig. 5. Dorsal view of the anterior extremity of *Harmothoë yendoï* n. sp.
11/1.
- Fig. 6. Posterior view of a parapodium from 8th segment of same.
11/1.
- Fig. 7. Dorsal bristle of same. 140/1.
- Fig. 8. Ventral bristle of same. 140/1.
- Fig. 9. Dorsal view of a prostomium of *Harmothoë lamellifera*
(Marenz). 12/1.
- Fig. 10. Dorsal bristle of same. 115/1.
- Fig. 11. Four kinds of ventral bristles of same. 115/1.



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1-4. *Harmothoe imbricata* L. 5-8. *H. yendoi* n. sp. 9-11. *H. lamellifera* (Marenz.)

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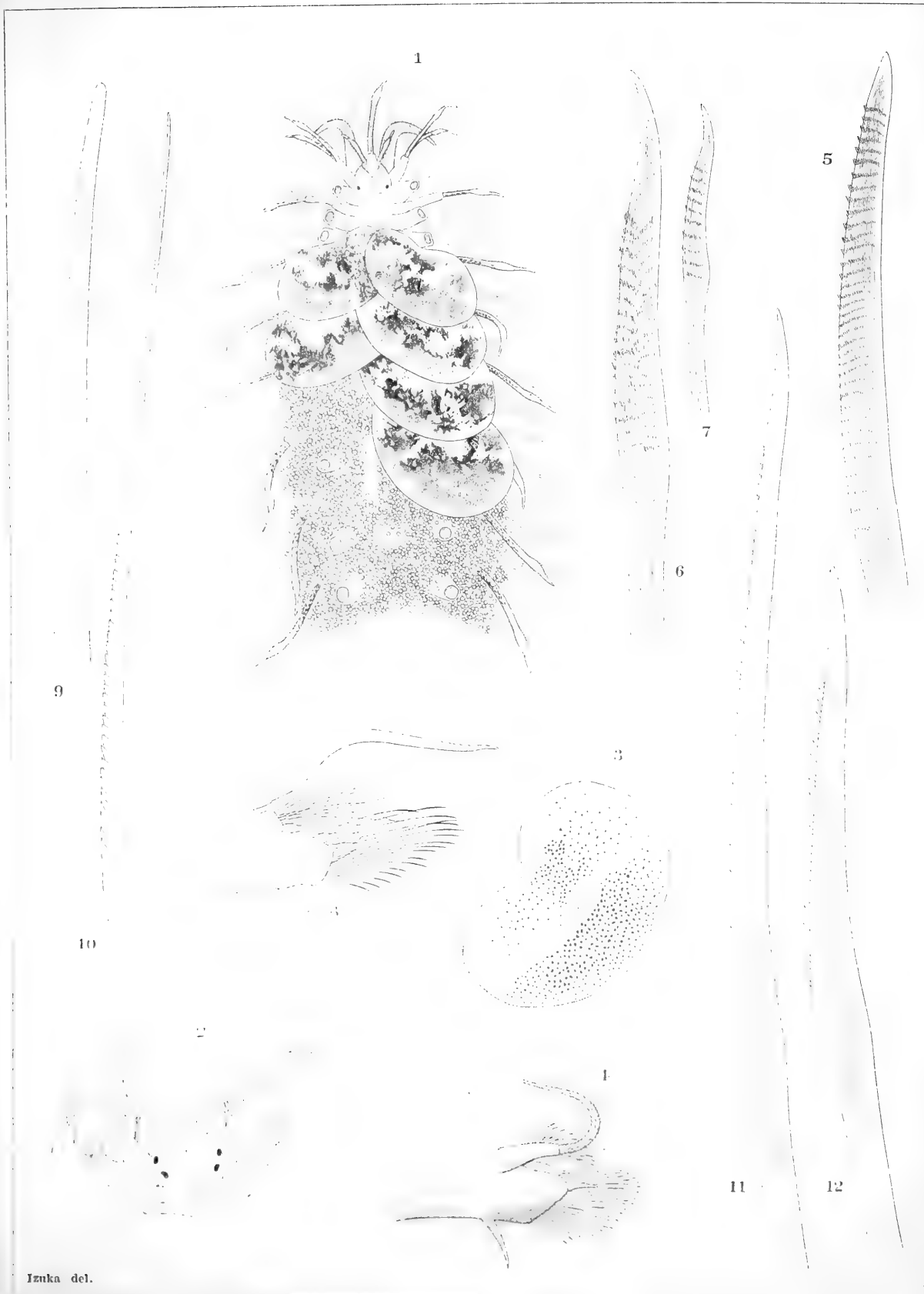
ERRANTIATE POLYCHAETA OF JAPAN.

PLATE VI.

Explanation of Plate VI.

(*Harmothoë*).

- Fig. 1. Dorsal view of the anterior portion of *Harmothoë imbricata* (L.), showing eggs under elytra. 6/1.
- Fig. 2. Dorsal view of the anterior extremity of *Harmothoë holothuricola* n. sp. 11/1.
- Fig. 3. Left elytron of the 13th segment of same. 11/1.
- Fig. 4. Posterior view of right parapodium from 8th segment of same. 11/1.
- Fig. 5. Dorsal bristle of same. 140/1.
- Fig. 6. Superior ventral bristle of same. 140/1.
- Fig. 7. Inferior ventral bristle of same. 140/1.
- Fig. 8. Posterior view of right parapodium from 14th segment of *Harmothoë sinagawaensis* n. sp. 12/1.
- Fig. 9. Superior dorsal bristle of same. 200/1.
- Fig. 10. Inferior " " " " "
- Fig. 11. Superior ventral " " " " "
- Fig. 12. Inferior " " " " "



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1. *Harmothoe imbricata* L. 2-7. *H. holothuricola* n. sp. 8-12. *H. sinagawaensis* n. sp.

A. IZUKA.

ERRANTIAE POLYCHAETA OF JAPAN.

PLATE VII.

Explanation of Plate VII.

(*Scalisetosus*, *Iphione*).

- Fig. 1. Dorsal view of the anterior extremity of *Scalisetosus pacificus* n. sp. 20/1.
- Fig. 2. Dorso-lateral view of same, showing the position of eyes. 31/1.
- Fig. 3. Right parapodium of 22nd segment of same. 20/1.
- Fig. 4. Superior dorsal bristle of same. 500/1.
- Fig. 5. Inferior " " " " "
- Fig. 6. Superior ventral " " " "
- Fig. 7. Inferior " " " " "
- Fig. 8. Dorsal view of the anterior extremity of *Iphione hirotai* n. sp., with protruded proboscis. 12/1.
- Fig. 9. Third elytron of the left side of same. 8/1.
- Fig. 10. Papillæ on the surface of elytron of same. 52/1.
- Fig. 11. Space in elytron of same. 125/1.
- Fig. 12. Posterior view of the parapodium of 10th segment of same. 18/1.
- Fig. 13. Anterior view of same. 18/1.
- Fig. 14. Dorsal bristle of same. 500/1.
- Fig. 15. Ventral " " " "



1-7. *Scalisetosus pacificus* n. sp. 8-15. *Iphione hirotai* n. sp.

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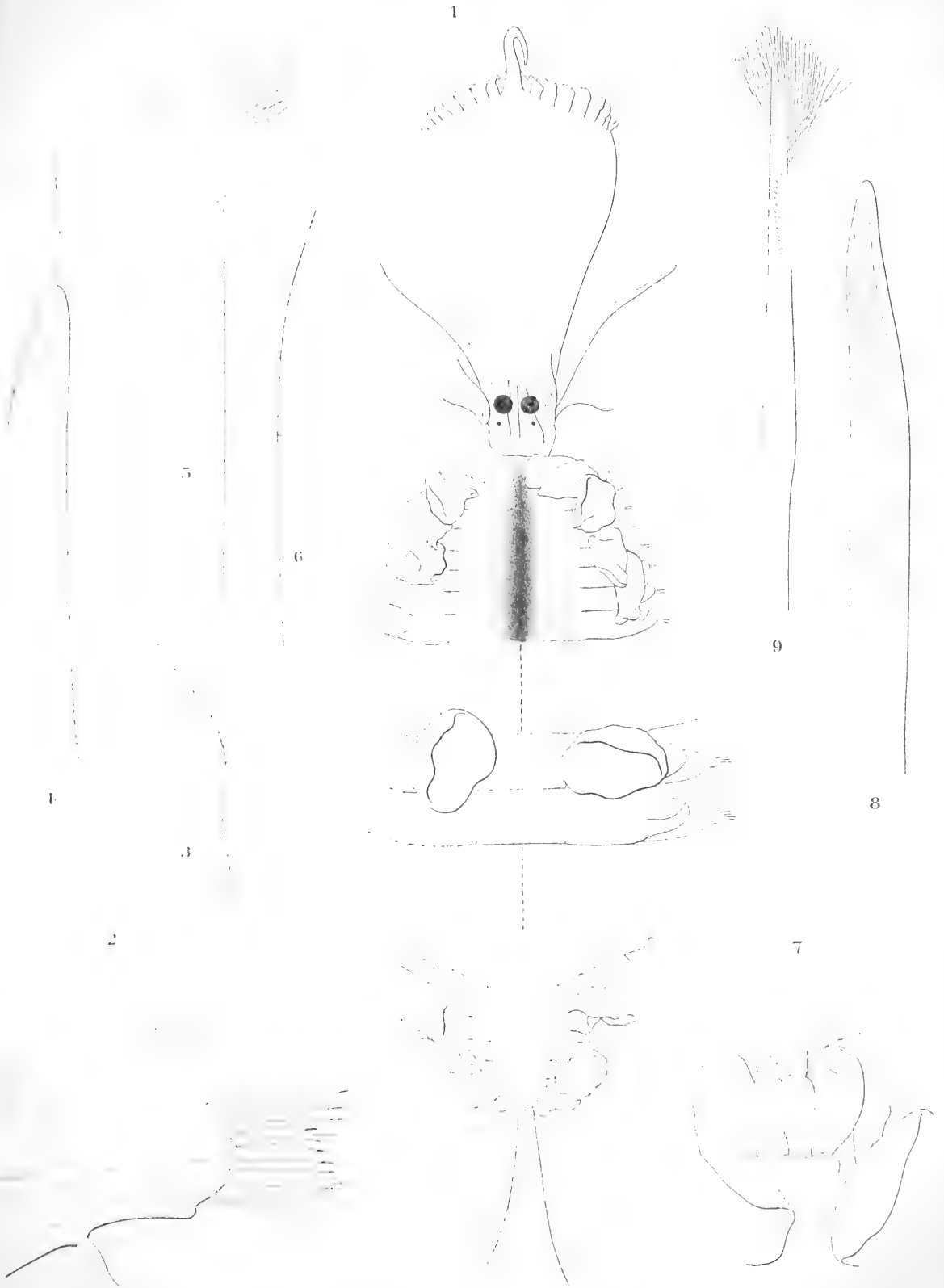
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE VIII.

Explanation of Plate VIII.

(*Panthalis*).

- Fig. 1. Dorsal view of the anterior, middle and posterior portions of the body of *Panthalis jogasimae* n. sp. 6/1.
- Fig. 2. Posterior view of 40th parapodium of same, containing some number of eggs. 18/1.
- Fig. 3. Ventral bristle of same. 220/1.
- Fig. 4. Middle „ „ „ „
- Fig. 5. Dorsal „ „ „ „
- Fig. 6. Fine setose bristle of same. 500/1.
- Fig. 7. Dorsal view of the anterior extremity of *Panthalis mitsukurii* Izuka. 3/1.
- Fig. 8. Middle bristle of 37th parapodium of same. 85/1.
- Fig. 9. Dorsal bristle of same. 175/1.



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ERRANTIAE POLYCHAETA OF JAPAN.

PLATE IX.

Explanation of Plate IX.

(*Aphrodita*, *Laetmatonice*).

- Fig. 1. Tip of dorsal bristle from the middle part of the body of *Aphrodita japonica* Marenz. 80/1.
- Fig. 2. Tip of superior ventral bristle of same. 80/1.
- Fig. 3. Tip of inferior " " " " "
- Fig. 4. Tip of inner dorsal spine of *Aphrodita australis* Baird. 200/1.
- Fig. 5. Dart-shaped bristle from inferior ventral group of same. 140/1.
- Fig. 6. Inferior ventral bristle of same, with entire tip. 140/1.
- Fig. 7. Tip of outer dorsal spine of *Laetmatonice producta* var. *benthaliana* McIntosh. 80/1.
- Fig. 8. Inner dorsal bristle of same. 50/1.
- Fig. 9. Portion of inner dorsal bristle of same. 200/1.
- Fig. 10. Ventral bristle of same. 52/1.
- Fig. 11. Tip of the 'felt'-forming hair of *Laetmatonice aphroditoides* McIntosh. 320/1.
- Fig. 12. Tip of the dorsal brown spine of same. 52/1.
- Fig. 13. Ventral bristle of same, showing the hairy condition of the tip. 52/1.
- Fig. 14. Dorsal spine of *Laetmatonice japonica* McIntosh. 80/1.
- Fig. 15. Ventral bristle of same. 80/1.
- Fig. 16. Tip of inferior ventral bristle of *Aphrodita watasii* n. sp. 90/1.



Izuka del.

1-3. *Aphrodita japonica* Marenz. 4-6 *A. australis* Baird. 7-10. *Laetmatonice producta* var. *benthaliana* McIntosh. 11-13. *L. aphroditoides* McIntosh. 14-15. *L. japonica* McIntosh. 16. *Aphrodita watasei* sp.

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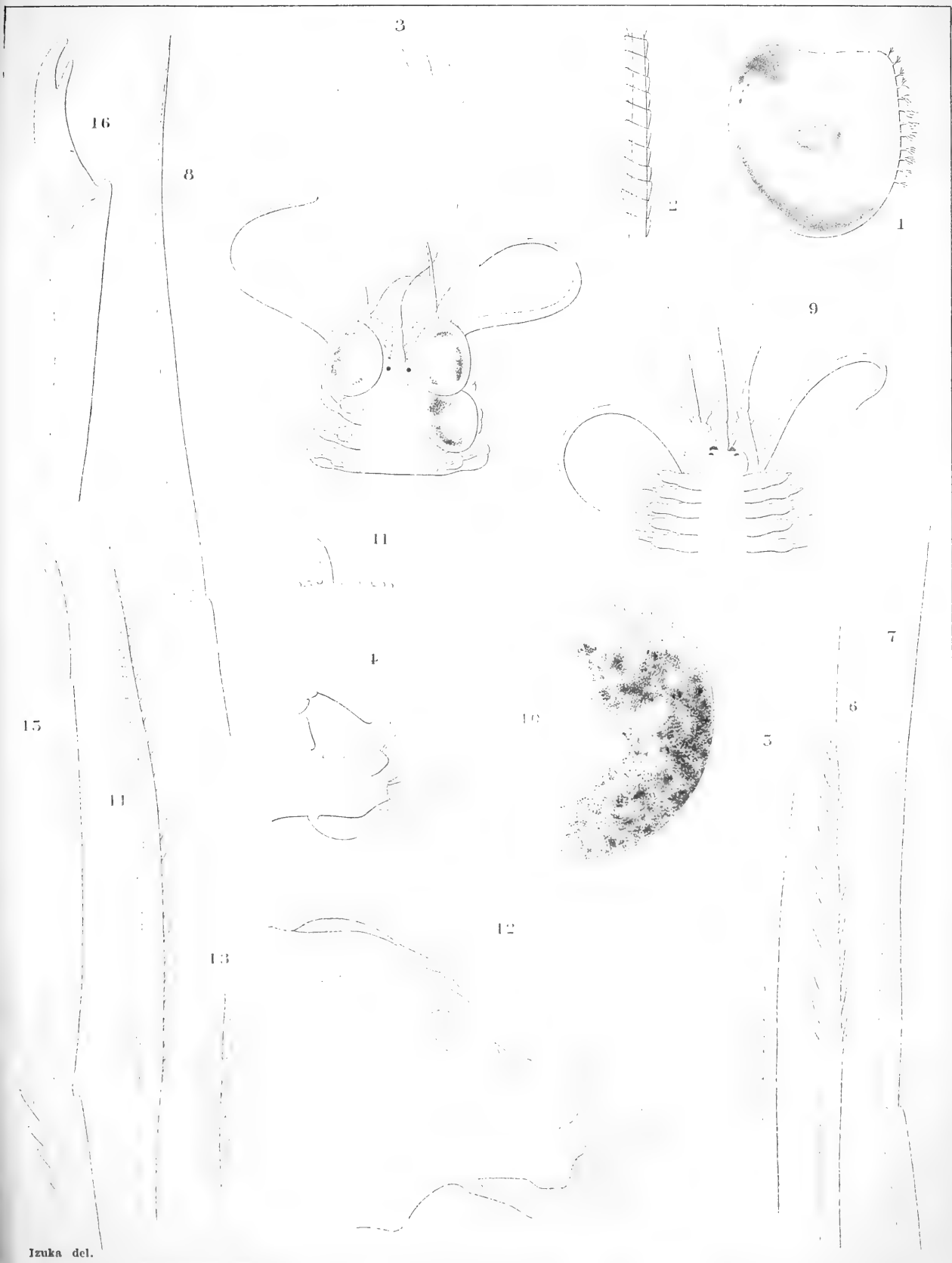
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE X.

Explanation of Plate X.

(*Thalenessa*, *Sthenolepis*, *Sthenelais*).

- Fig. 1. Anterior elytron of *Thalenessa oculata* McIntosh. 9/1.
Fig. 2. Portion of the thickest region of a dorsal bristle from the parapodium of same. 500/1.
Fig. 3. Dorsal view of the anterior portion of *Sthenolepis japonica* (McIntosh). 10/1.
Fig. 4. Right anterior parapodium of same. 22/1.
Fig. 5. Portion of dorsal bristle of same. 500/1.
Fig. 6. Superior ventral bristle of same. 500/1.
Fig. 7. Inferior " " " " "
Fig. 8. Ventral bristle of the anterior third of the body of *Sthenolepis areolata* (McIntosh). 390/1.
Fig. 9. Dorsal view of the anterior portion of *Sthenelais boa* (Johnston). 10/1.
Fig. 10. Right elytron of same. 16/1.
Fig. 11. Papillæ on the external margin of the same elytron. 140/1.
Fig. 12. Right parapodium of 33rd segment of the same annelid. 22/1.
Fig. 13. Portion of a bristle from dorsal ramus of same. 390/1.
Fig. 14. Superior ventral bristle of same. 390/1.
Fig. 15. Inferior " " " " "
Fig. 16. Middle " " " " "



Izuka del.

1-2. *Thalenessa oculata* McIntosh. 3-7. *Sthenolepis japonica* (McIntosh).

8. *S. areolata* (McIntosh). 9-16. *Sthenelais boa* (Johnston).

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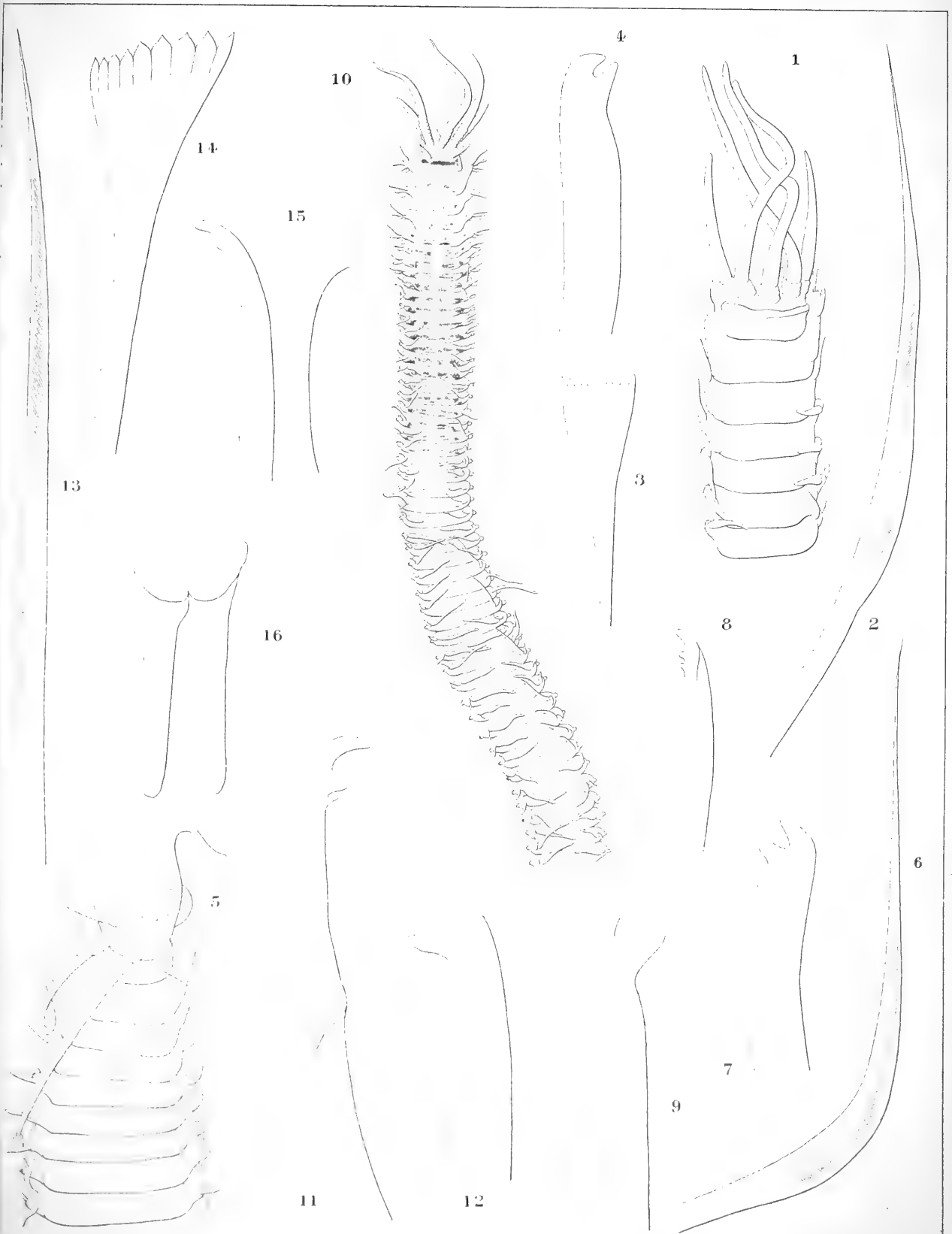
ERRANTIATE POLYCHAETA OF JAPAN.

PLATE XI.

Explanation of Plate XI.

(*Hyalinaecia*, *Onuphis*, *Diopatra*).

- Fig. 1. Dorsal view of the anterior extremity of *Hyalinaecia tubicola* (Müll.) 8/1.
- Fig. 2. Setose bristle of same. 175/1.
- Fig. 3. Pectinate bristle of same. 550/1.
- Fig. 4. Hook of same. 175/1.
- Fig. 5. Dorsal view of the anterior extremity of *Onuphis conchylega* Sars. 8/1.
- Fig. 6. Setose bristle of same. 320/1.
- Fig. 7. Hook of same. 220/1.
- Fig. 8. Tip of a bristle from first parapodium of *Onuphis geophiliformis* (Moore). 550/1.
- Fig. 9. Hook from 40th parapodium of same. 390/1.
- Fig. 10. Dorsal view of the anterior portion of *Onuphis holobranchiata* Marenz. 4/1.
- Fig. 11. Compound bristle of same. 320/1.
- Fig. 12. Hook of same (from 3rd parapodium). 320/1.
- Fig. 13. Setose bristle from 20th parapodium of *Diopatra sugokai* n. sp. 115/1.
- Fig. 14. Pectinate bristle of same. 320/1.
- Fig. 15. Bristles from first parapodium of same. 115/1.
- Fig. 16. Ventral view of mandibles of same. 12/1.



Izuka del.

1-4. *Hyalinaecia tubicola* (Mull.) 5-7. *Onuphis conchylega* Sars. 8-9. *O. geophiliformis* (Moore.)

10-12. *O. holobranchiata* Marenz. 13-16. *Diopatra sugokai* n. sp.

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PLATE XII.

Explanation of Plate XII.

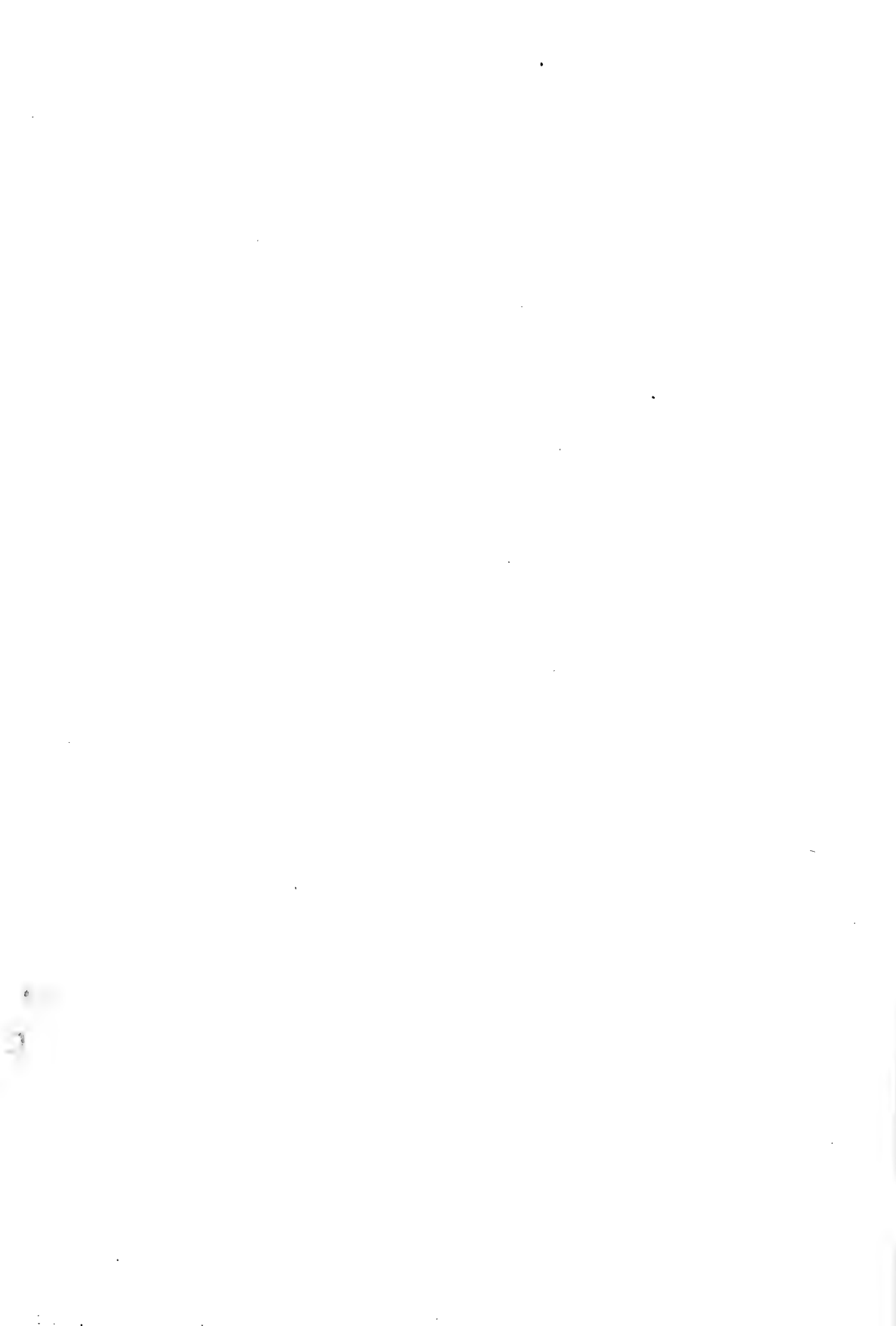
(*Onuphis*, *Eunice*, etc.).

- Fig. 1. Bifid bristle from first parapodium of *Onuphis macrobranchiata* (McIntosh). 220/1.
- Fig. 2. Hook from 20th parapodium of same. 220/1.
- Fig. 3. Maxillary apparatus of the same. 20/1.
- Fig. 4. Bifid bristle from 4th parapodium of *Onuphis cirrobranchiata* Moore. 250/1.
- Fig. 5. Hook from 26th parapodium of same. 250/1.
- Fig. 6. Funnel-shaped bristle from 11th parapodium of same. 340/1.
- Fig. 7. Mandibles of *Eunice vittata* (D. Ch.). 20/1.
- Fig. 8. Compound bristle of same. 320/1.
- Fig. 9. Hook of same. 175/1.
- Fig. 10. Compound bristle of *Eunice gracilis* Moore. 495/1.
- Fig. 11. Hook of same. 320/1.
- Fig. 12. Posterior view of a parapodium of *Polynoë pleiolepis* Marenz. 18/1.
- Fig. 13. Ventral bristle of same. 220/1.
- Fig. 14. Dorsal " " " "
- Fig. 15. " " " *Harmothoë yedoensis* (McIntosh). 220/1.
- Fig. 16. Ventral " " same. 220/1.
- Fig. 17. Dorsal " " *Scalisetosus formosus* Moore. 415/1.
- Fig. 18. Inferior ventral bristle of same. 415/1.
- Fig. 19. Superior " " " " "



Izuka del.

1-3. *Onuphis macrobranchiata* (McIntosh) 4-6. *O. cirrobranchiata* Moore. 7-9 *Eunice vittata* (D. Ch.)
10-11. *E. gracilis* Moore. 12-14. *Polynoë pleiolepis* Marduz. 15-16. *Harmothoë yedoensis* (McIntosh).



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PLATE XIII.

Explanation of Plate XIII.

(*Eunice*).

- Fig. 1. Maxillary apparatus of *Eunice aphroditois* (Pallas). 4/1.
- Fig. 2. Mandibles of same. 4/1.
- Fig. 3. Right 64th parapodium of same. 7/1.
- Fig. 4. Setose bristle of same. 240/1.
- Fig. 5. Pectinate bristle of same. 240/1.
- Fig. 6. Compound bristle of same. 240/1.
- Fig. 7. Right 40th parapodium of *Eunice indica* Kinberg. 18/1.
- Fig. 8. Compound bristle of same. 415/1.
- Fig. 9. Hook of same. 320/1.
- Fig. 10. Compound bristle of *Eunice microprión* Marenz. 415/1.
- Fig. 11. Right 8th parapodium of *Eunice kubiensis* McIntosh. 31/1.
- Fig. 12. Compound bristle of same. 390/1.
- Fig. 13. Right parapodium of *Eunice quinquifida* Moore. 31/1.
- Fig. 14. Pectinate bristle of same. 550/1.
- Fig. 15. Compound „ „ „ 390/1.
- Fig. 16. Hook of same. 390/1.
- Fig. 17. Compound bristle of *Eunice northioides* Moore. 390/1.
- Fig. 18. Hook of same. 390/1.



Izuka del.

1-6. *Eunice aphroditois* (Pallas). 7-9. *E. indica* Kinberg. 10. *E. microprion* Marenz. 11-12. *E. kobiensis* McIntosh. 13-16. *E. quinquifida* Moore. 17-18. *E. northioides* Moore.

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PLATE XIV.

Explanation of Plate XIV.

(*Eunice*, *Lysidice*, *Marphysa*, *Lumbriconereis*).

- Fig. 1. Anterior view of 45th parapodium of *Eunice flavopicta* n. sp. 10/1.
- Fig. 2. Setose bristle of same. 220/1.
- Fig. 3. Pectinate „ „ „ 390/1.
- Fig. 4. Compound bristle of same. 220/1.
- Fig. 5. Hook of same. 390/1.
- Fig. 6. 10th parapodium of *Eunice mucronata* Moore. 31/1.
- Fig. 7. Compound bristle of same. 520/1.
- Fig. 8. Hook of *Eunice medicina* Moore. 390/1.
- Fig. 9. Right 20th parapodium of *Lysidice collaris* Gr. 31/1.
- Fig. 10. Compound bristle of same. 760/1.
- Fig. 11. 100th parapodium of *Marphysa iwamusi* n. sp. 12/1.
- Fig. 12. Setose bristle from the same parapodium. 220/1.
- Fig. 13. Pectinate bristle from the same. 320/1.
- Fig. 14. Compound „ „ „ „ 220/1.
- Fig. 15. Maxillary apparatus of the same species. 6/1.
- Fig. 16. Ventral view of mandibles of same. 6/1.
- Fig. 17. Anterior view of 30th parapodium of *Lumbriconereis japonica* Marenz. 18/1.
- Fig. 18. Compound bristle of same. 390/1.
- Fig. 19. Hook of *Lumbriconereis heteropoda* Marenz. 390/1.
- Fig. 20. Hook of *Lumbriconereis bifurcata* McIntosh. 390/1.



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1-5. *Eunice flavopicta* n. sp. 6-7. *E. mucronata* Moore. 8. *E. medicina* Moore.

9-10. *Lysidice collaris* Gr. 11-16. *Marphysa iwamusi* n. sp. 17-18. *Lumbriconereis japonica* Marenz.

19. *L. heteropoda* Marenz. 20. *L. bifurcata* McIntosh.

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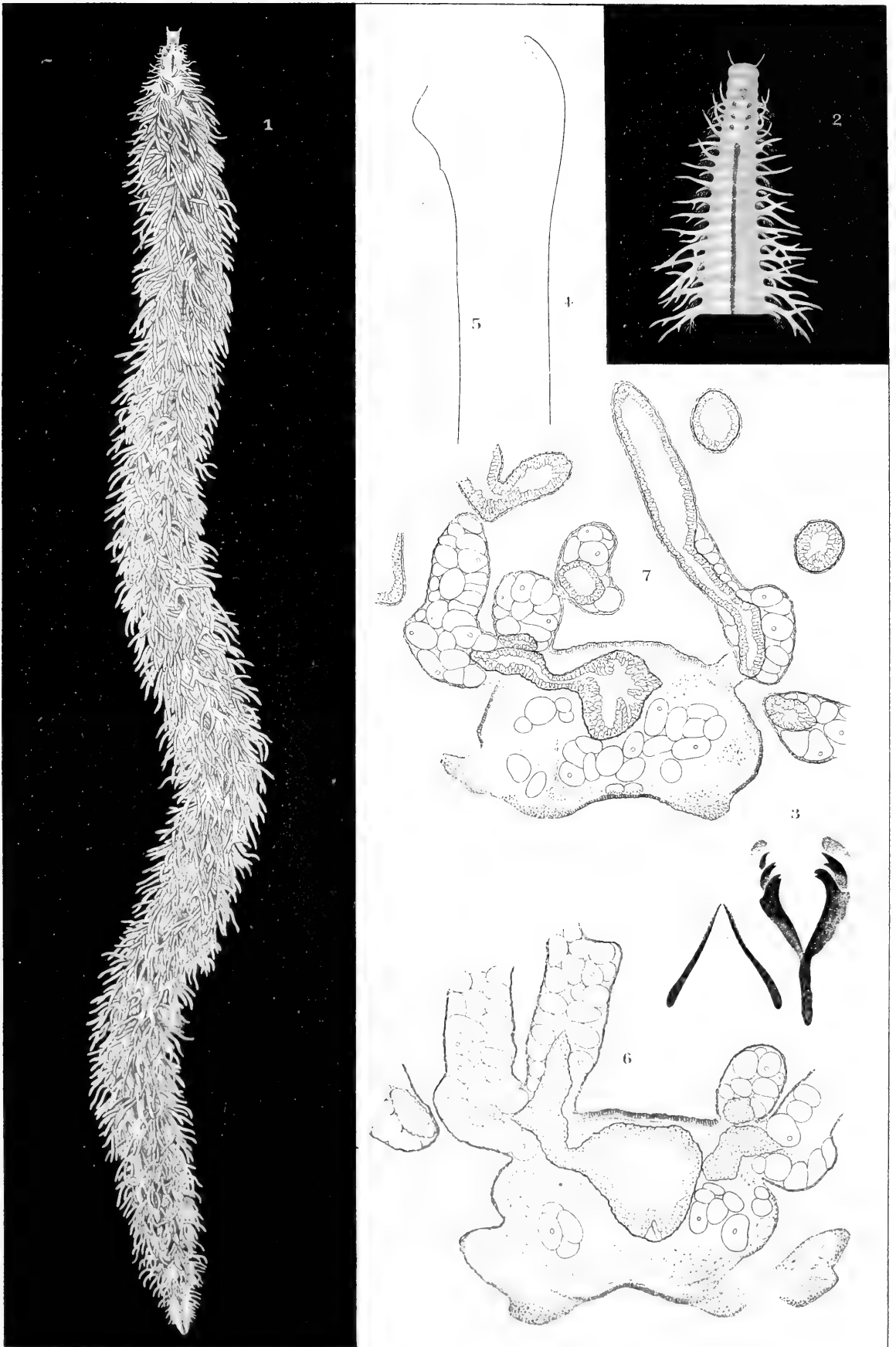
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE XV.

Explanation of Plate XV.

(*Coelobranchus*).

- Fig. 1. Dorsal view of a mature female of *Coelobranchus papillosus* n. g. et n. sp. 2/1.
- Fig. 2. Dorsal view of the anterior extremity of same. 5/1.
- Fig. 3. Jaw-apparatus of the same species. 140/1.
- Fig. 4. Simple bristle of same. 667/1.
- Fig. 5. Compound bristle of same. 667/1.
- Fig. 6. A cross-section of the body of same, showing diverticula of alimentary canal extending into branches of gill. (Eggs are contained not only in the body-cavity but also in the cavities of gills). 31/1.
- Fig. 7. Another cross-section of the body of same, showing intestinal diverticula reaching to distal end of gill-filaments. 31/1.



Izuka et Sakuma del.

1-7 *Coelobranthus papillosus* n. g. et n. sp.

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PLATE XVI.

Explanation of Plate XVI.

(*Nereis*).

- Fig. 1. Dorsal view of proboscis of *Nereis mictodonta* Marenzeller. 8/1.
Fig. 2. Ventral view of same. 8/1.
Fig. 3. Posterior view of 40th parapodium of the same species in atocous phase. 31/1.
Fig. 4. Falcate bristle of same. 390/1.
Fig. 5. Posterior view of 40th parapodium of same in epitocous phase. 22/1.
Fig. 6. Paddle-shaped bristle of same. 320/1.
Fig. 7. Dorsal view of the anterior extremity of *Nereis cultrifera* Gr. with protruded proboscis. 15/1.
Fig. 8. Ventral view of same. 15/1.
Fig. 9. Setose bristle of same. 390/1.
Fig. 10. Falcate bristle of same. 390/1.
Fig. 11. Parapodium of 15th segment of the epitocous male of same. 28/1.
Fig. 12. Parapodium of 40th segment of same. 28/1.
Fig. 13. Dorsal view of the posterior extremity of same. 15/1.
Fig. 14. Paddle-shaped bristle of same. 390/1.
Fig. 15. Anterior view of 23rd parapodium of *Nereis cylindrata* Ehlers. 31/1.



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1-6. *Nereis mictodonta* Marenz. 7-14. *N. cultrifera* Gr. 15. *N. cylindrata* Ehlers.

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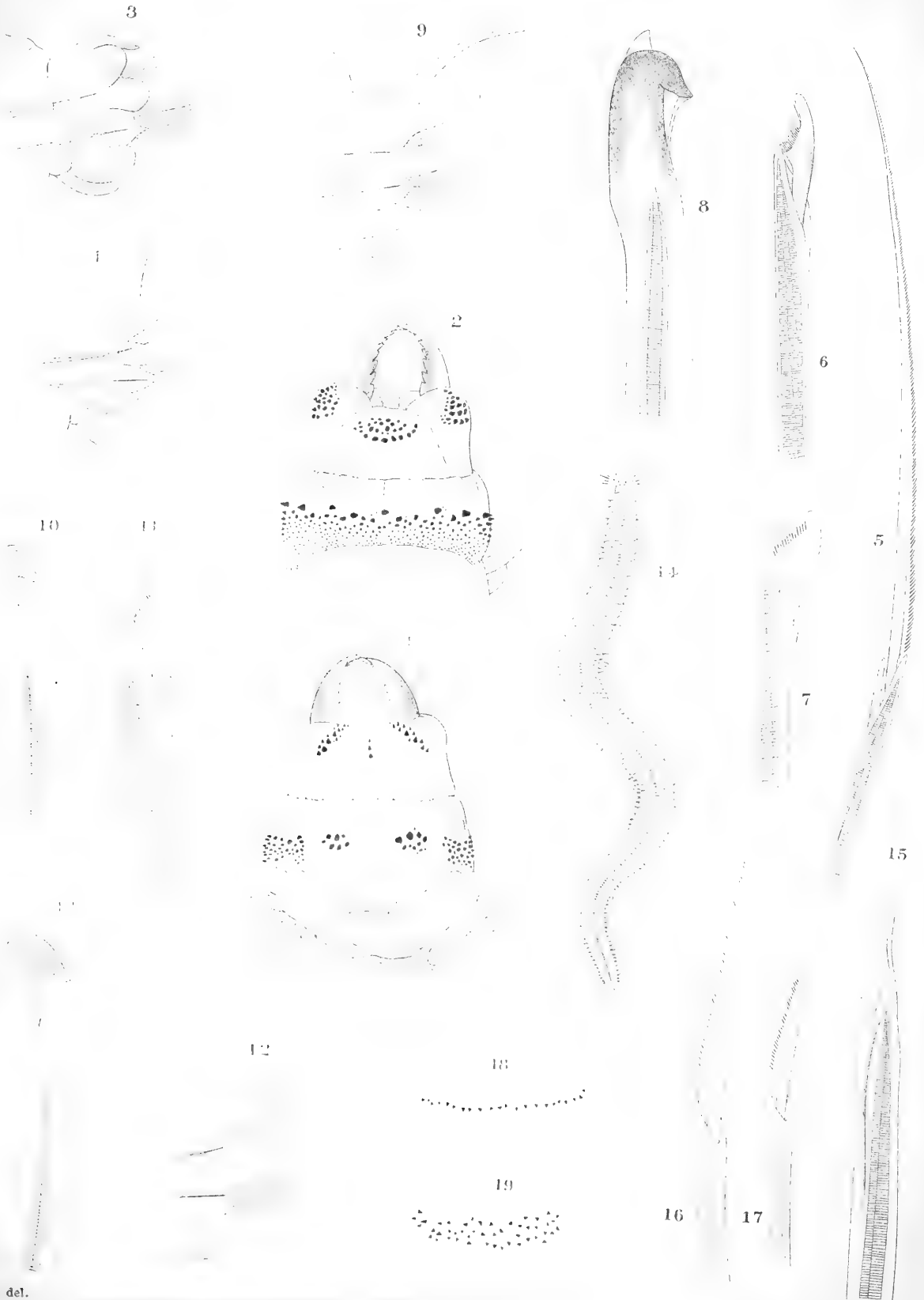
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE XVII.

Explanation of Plate XVII.

(*Nereis*).

- Fig. 1. Dorsal view of the protruded proboscis of *Nereis pelagica* L. 10/1.
- Fig. 2. Ventral view of same. 10/1.
- Fig. 3. Posterior view of 13th parapodium of the same species. 10/1.
- Fig. 4. " " " 54th " " " " " "
- Fig. 5. Setose bristle of same. 220/1.
- Fig. 6. Falcate " " " "
- Fig. 7. " " " *Nereis Dumerilii* Aud. et M.-Edw. 390/1.
- Fig. 8. Hook from upper side of acicula in the dorsal ramus of 27th parapodium of same. 390/1.
- Fig. 9. Posterior view of parapodium from middle region of the body of *Nereis Agassizi* Ehlers. 22/1.
- Fig. 10. Hook from dorsal ramus of same. 320/1.
- Fig. 11. Falcate bristle from ventral ramus of same. 390/1.
- Fig. 12. Posterior view of 30th parapodium of *Nereis kobiensis* McIntosh. 31/1.
- Fig. 13. Hook from dorsal ramus of the same parapodium. 320/1.
- Fig. 14. Dorsal view of *Nereis japonica* Izuka. 1/1.
- Fig. 15. Thorny bristle of same. 420/1.
- Fig. 16. Falcate " " " 390/1.
- Fig. 17. " " " *Nereis diversicolor* O. F. Müller, from coast of England. 390/1.
- Eig. 18. Arrangement of paragnathi in regions VII and VIII of the proboscis of *Nereis japonica* Izuka. 10/1.
- Fig. 19. Arrangement of paragnathi in same regions of the proboscis of *Nereis diversicolor* O. F. Müller, from coast of England. 10/1.



Izuka del.

1-6. *Nereis pelagica* L. 7-8. *N. dumerilii* Aud. et M-Edw. 9-11. *N. Agassizi* Ehlers.
12-13. *N. kobiensis* McIntosh. 14-16, 18. *N. japonica* Izuka. 17, 19. *N. diversicolor* O. F. Müll.

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ERRANTIAE POLYCHAETA OF JAPAN.

PLATE XVIII.

Explanation of Plate XVIII.

(*Nereis*).

- Fig. 1. Dorsal view of anterior extremity of *Nereis dyamusi* n. sp. 2/1.
Fig. 2. Posterior view of 50th parapodium of the same species in atocous phase. 10/1.
Fig. 3. Setose bristle of same. 220/1.
Fig. 4. Falcate „ „ „ „
Fig. 5. Posterior view of 50th parapodium of the same species in epitocous phase. 4/1.
Fig. 6. Posterior view of 219th parapodium of same. 4/1.
Fig. 7. Paddle-shaped bristle of same. 320/1.
Fig. 8. Posterior view of 13th parapodium of *Nereis oxyroda* Marenzeller. 12/1.
Fig. 9. Posterior view of 56th parapodium of same. 12/1.
Fig. 10. „ „ „ 203th „ „ „ „
Fig. 11. Long setose bristle of same. 390/1.
Fig. 12. Dorsal view of proboscis of *Nereis exoensis* n. sp. 5/1.
Fig. 13. Ventral view of same. 5/1.
Fig. 14. Posterior view of 30th parapodium of same. 10/1.
Fig. 15. „ „ „ 50th „ „ „ „
Fig. 16. Setose bristle of same. 220/1.
Fig. 17. Falcate „ „ „ „
Fig. 18. Posterior view of 30th parapodium of the same species in epitocous phase. 8/1.
Fig. 19. Posterior view of 50th parapodium of same. 8/1.
Fig. 20. Paddle-shaped bristle of same. 220/1.



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1-7. *Nereis dyamusi* n. sp. 8-11. *N. oxyroda* Marenz. 12-20. *N. ezoensis* n. sp.

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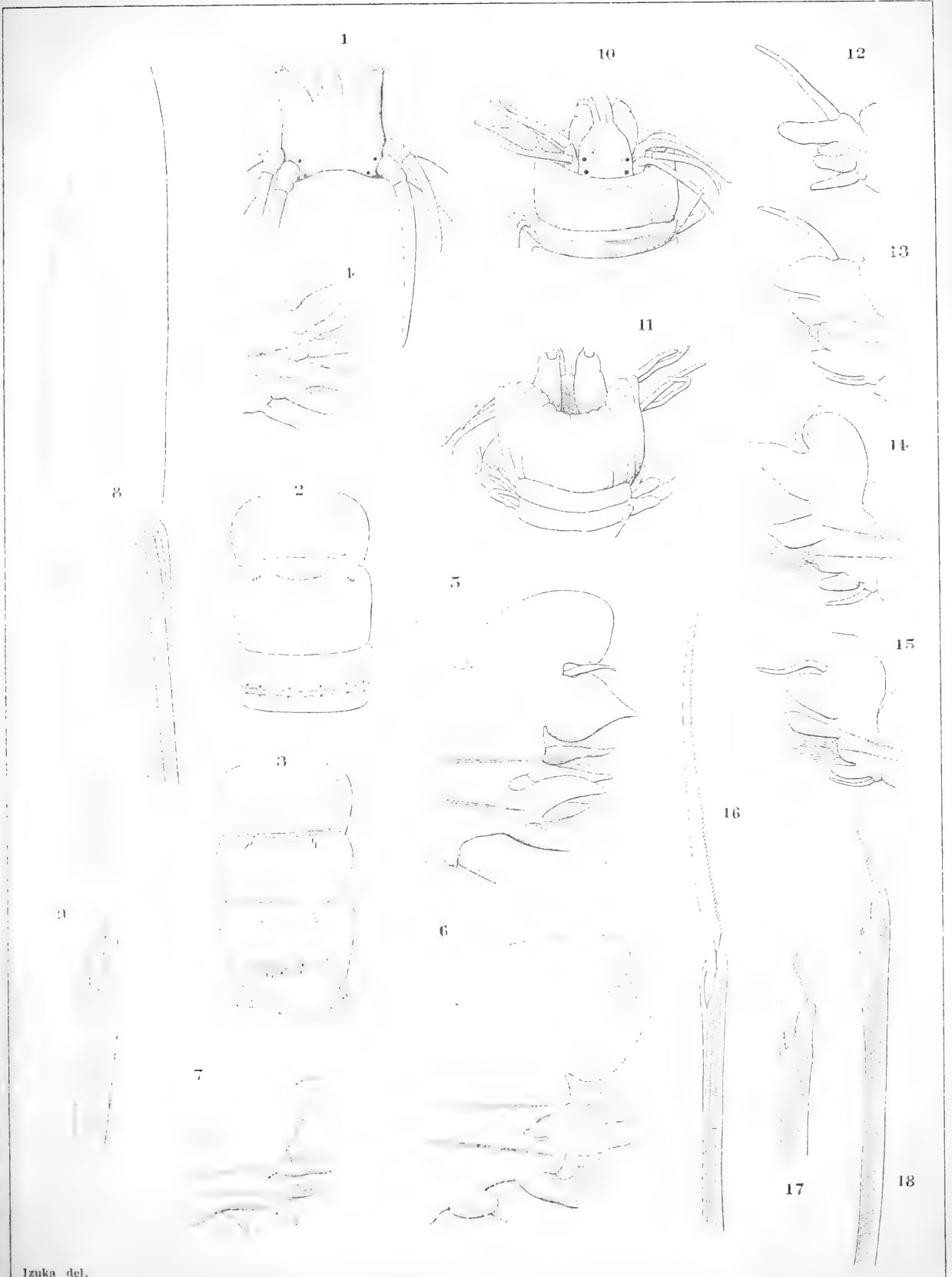
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE XIX.

Explanation of Plate XIX.

(*Nereis*).

- Fig. 1. Dorsal view of anterior extremity of *Nereis ijimai*. n. sp. 3/1.
Fig. 2. Ventral view of proboscis of same. 3/1.
Fig. 3. Dorsal " " " " " "
Fig. 4. Posterior view of 5th parapodium of same. 5/1.
Fig. 5. " " " 30th " " " "
Fig. 6. " " " 80th " " " "
Fig. 7. " " " 179th " " " "
Fig. 8. Paddle-shaped bristle of the same species. 390/1.
Fig. 9. Setose bristle of same. 390/1.
Fig. 10. Dorsal view of anterior extremity of *Nereis shishidoi*. n. sp.
3/1.
Fig. 11. Ventral view of same. 3/1.
Fig. 12. Anterior view of 1st parapodium of the same species. 5/1.
Fig. 13. Anterior view of 10th parapodium of the same " 5/1.
Fig. 14. " " " 30th " " " " "
Fig. 15. " " " 50th " " " " "
Fig. 16. Setose bristle of the same species. 390/1.
Fig. 17. Falcate " " " " " "
Fig. 18. Another form of falcate bristle of the same species. 390/1.



1-9. *Nereis ijimai* n. sp. 10-18. *N. shishidoi* n. sp.



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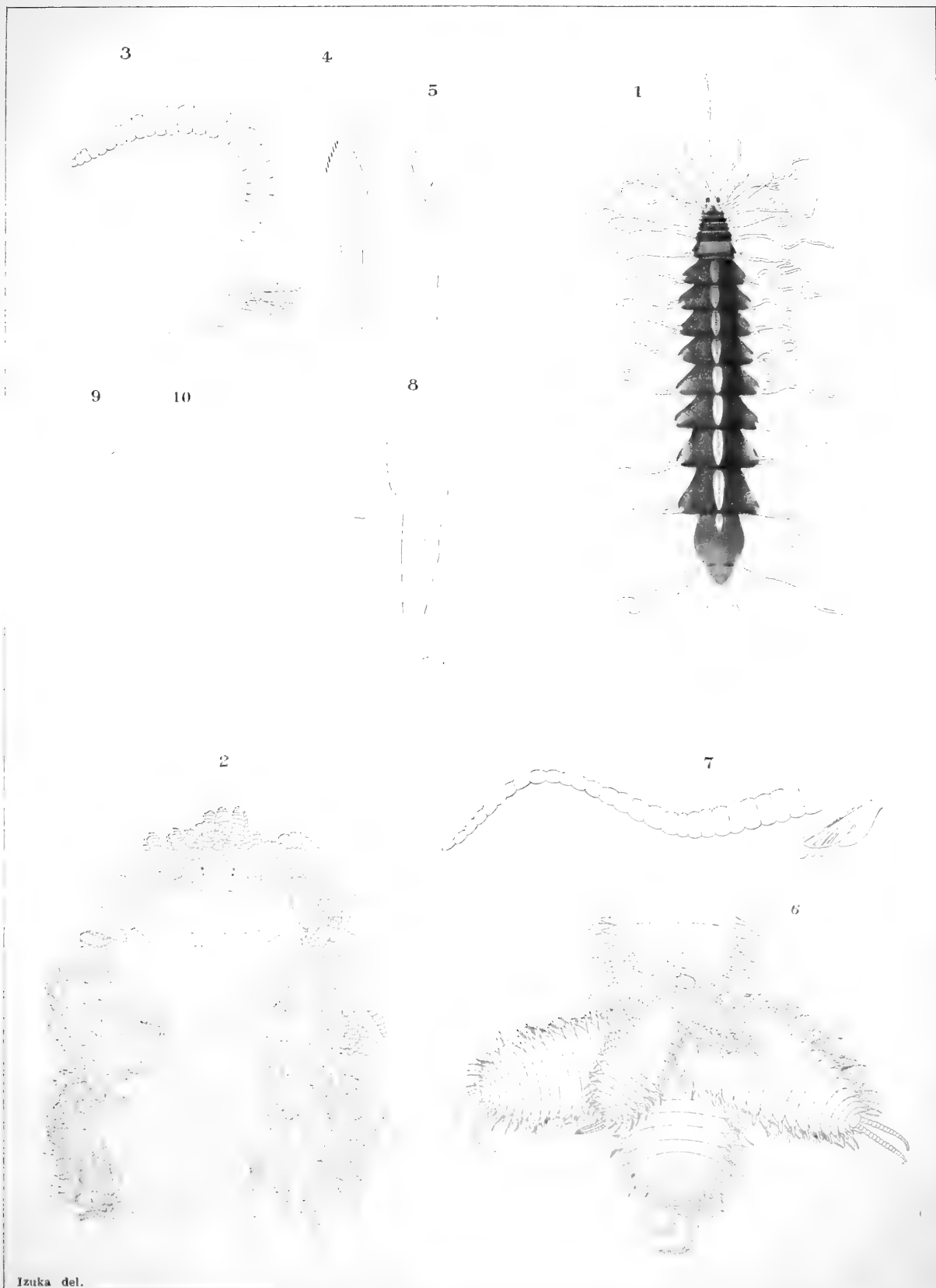
ERRANTIATE POLYCHAETA OF JAPAN.

PLATE XX.

Explanation of Plate XX.

(*Amblyosyllis*, *Trypanosyllis*, *Syllis*).

- Fig. 1. Dorsal view of *Amblyosyllis speciosa* n. sp. 7/1.
Fig. 2. Dorsal view of anterior extremity of *Trypanosyllis misakiensis* Izuka. 20/1.
Fig. 3. Posterior view of 78th parapodium of the same species. 40/1.
Fig. 4. Bristle from the same parapodium. 390/1.
Fig. 5. Bristle from a parapodium of a sexual bud. 390/1.
Fig. 6. Ventral view of posterior extremity of the same species, with a cluster of sexual buds. 20/1.
Fig. 7. Parapodium of *Syllis ramosa* McIntosh. (Parent stock). 50/1.
Fig. 8. Bristle of same. 930/1.
Fig. 9. Inferior bristle from parapodium of *Syllis inflata* Marenz. 600/1.
Fig. 10. Middle bristle from the same parapodium. 600/1.



Izuka del.

1. *Amblyosyllis speciosa* n. sp 2-6. *Trypanosyllis misakiensis* Izuka.
7-8. *Syllis ramosa* McIntosh. 9-10. *Syllis inflata* Marenz.



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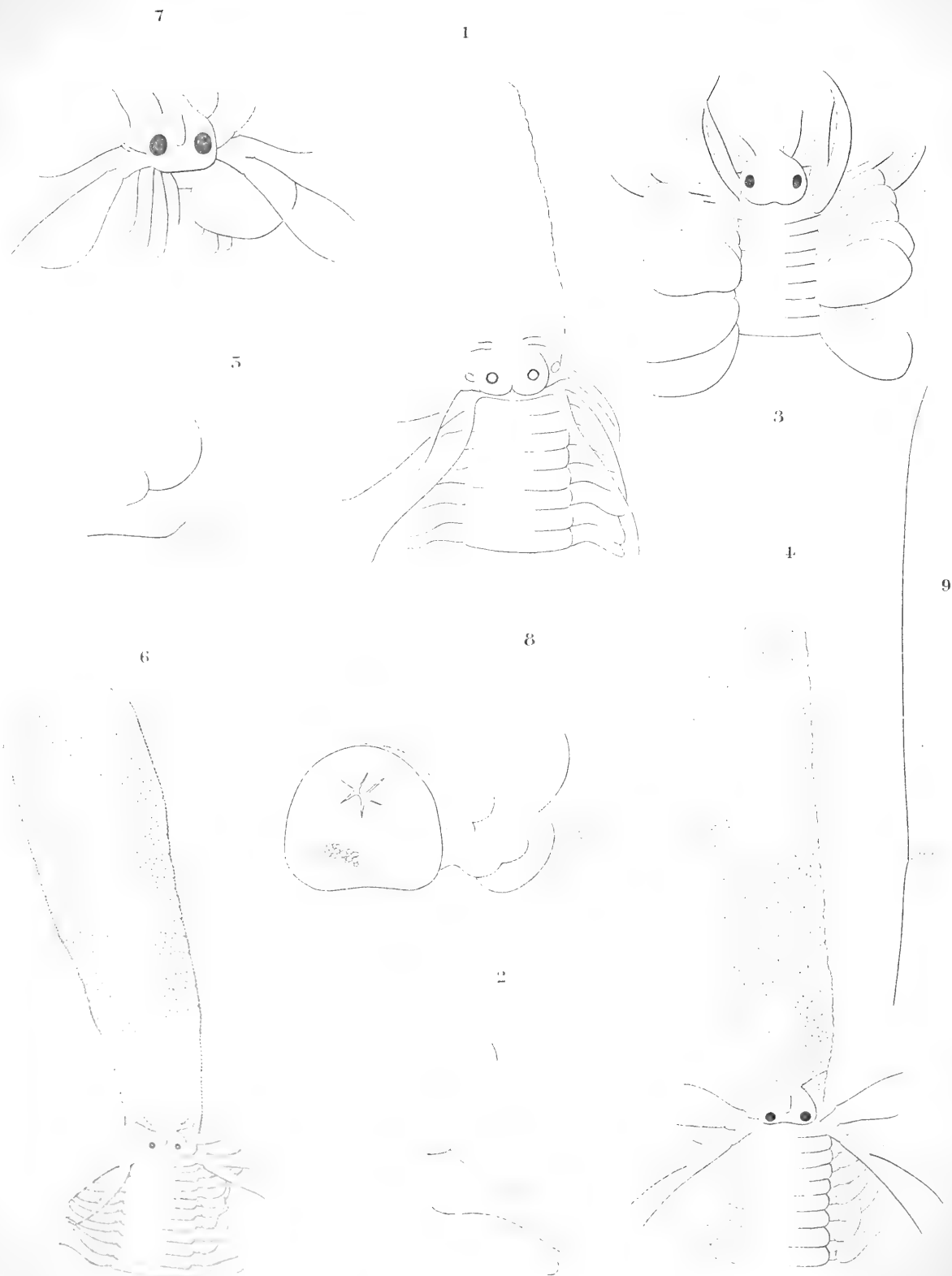
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE XXI.

Explanation of Plate XXI.

(*Phyllodoceidæ*).

- Fig. 1. Dorsal view of anterior extremity of *Phyllodoce lamelligera* (Gmel.). 12/1.
- Fig. 2. Posterior view of 50th parapodium of *Phyllodoce groenlandica* Oerst. 31/1.
- Fig. 3. Dorsal view of anterior extremity of *Carobia castanea* Marenz. 31/1.
- Fig. 4. Dorsal view of anterior extremity of *Eumida sanguinea* (Oerst.). 18/1.
- Fig. 5. Posterior view of parapodium from the middle body region of *Eumida caeca* Moore. 18/1.
- Fig. 6. Dorsal view of anterior extremity of *Eularia viridis* (O. F. Müller). 18/1.
- Fig. 7. Dorsal view of anterior extremity of *Notophyllum sagamianum* n. sp. 12/1.
- Fig. 8. Posterior view of 40th parapodium, together with cross-section of the body of the same species. 31/1.
- Fig. 9. Setose bristle of the same species. 390/1.

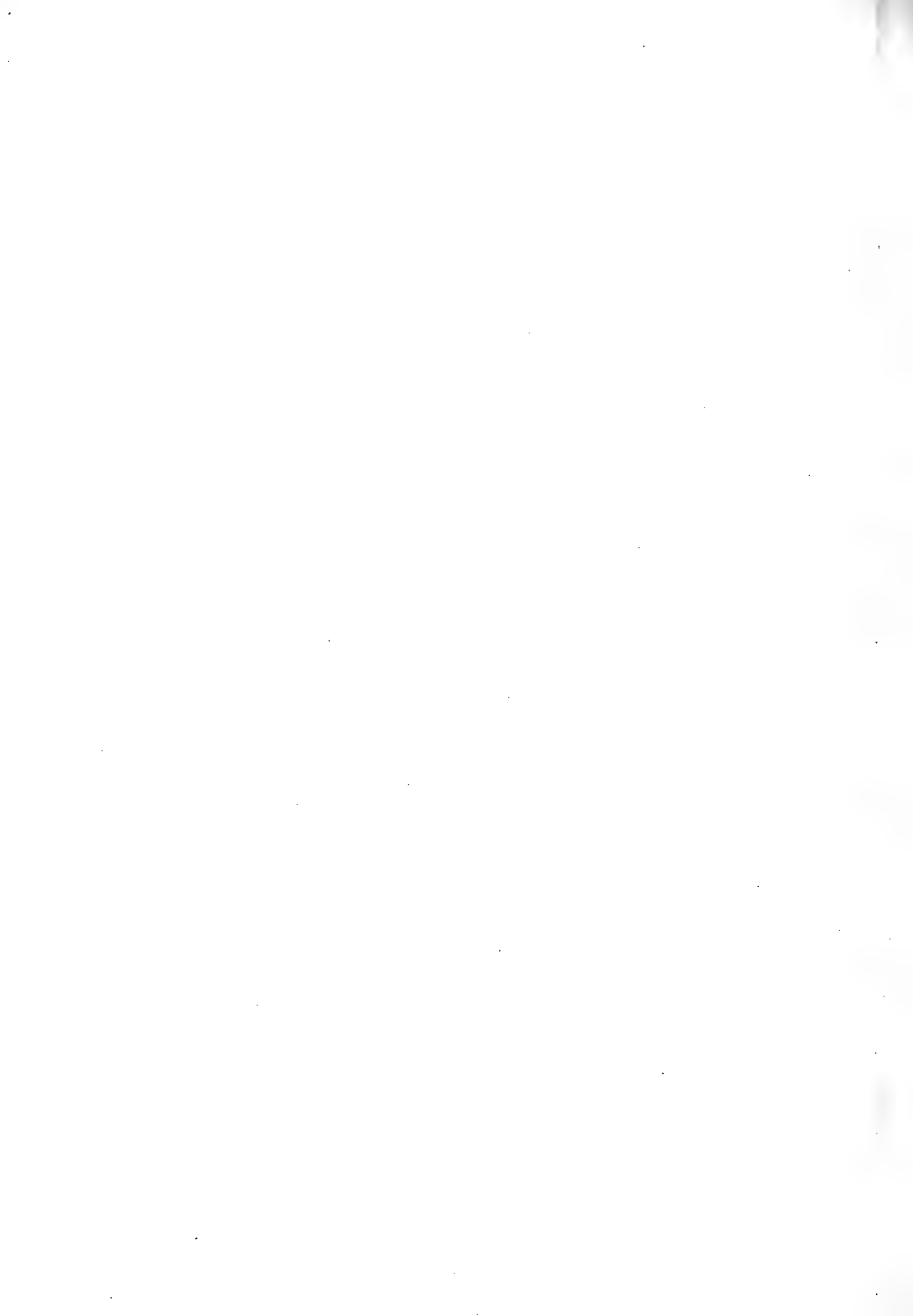


Izuka del.

1. *Phyllodoce lamelligera* (Gmel.) 2. *P. groenlandica* Oerst. 3. *Carobia castanea* Marenz.

4. *Eumida sanguinea* (Oerst.) 5. *E. caeca* Moore. 6. *Eularia viridis* (O. F. Müll.)

7-9. *Notophyllum sagamianum* n. sp.



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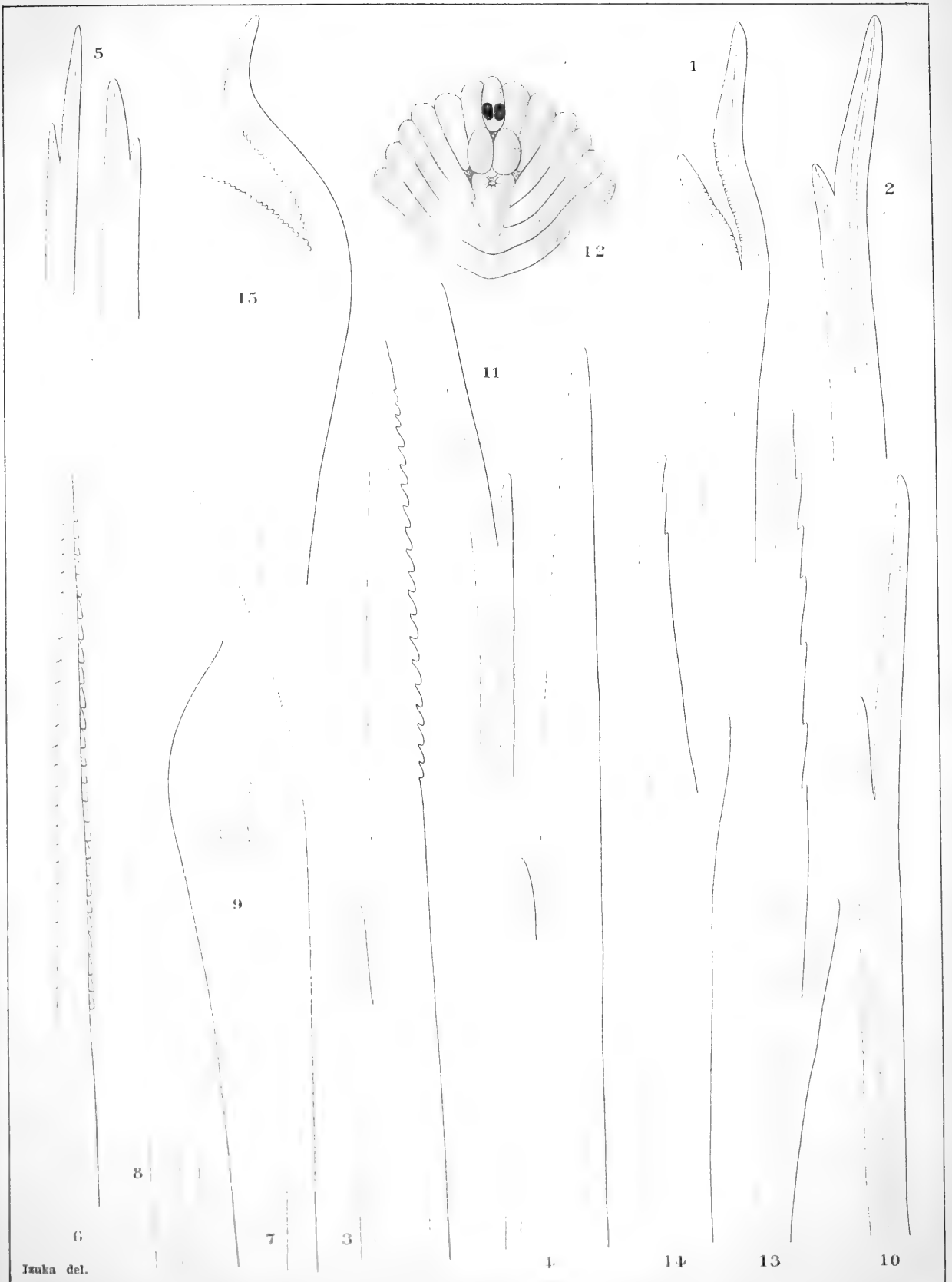
ERRANTIAE POLYCHAETA OF JAPAN.

PLATE XXII.

Explanation of Plate XXII.

(*Amphinomidae*).

- Fig. 1. Bifid dorsal bristle, crenated in the fissure, from *Euphrosyne superba* Marenz. 220/1.
- Fig. 2. Smooth dorsal bristle of the same species. 220/1.
- Fig. 3. Serrated dorsal bristle of *Chloëia flava* (Pallas). 115/1.
- Fig. 4. Smooth dorsal bristle from the anterior body region of same. 115/1.
- Fig. 5. Two kinds of ventral bristles of the same species. 115/1.
- Fig. 6. Serrated dorsal bristle of *Amphinome rostrata* (Pallas). 140/1.
- Fig. 7. Setose bristle of same. 140/1.
- Fig. 8. Stout ventral bristles of same. 140/1.
- Fig. 9. Tip of acicula of same. 140/1.
- Fig. 10. Dorsal bristle of *Notopygos mitsukurii* n. sp. 80/1.
- Fig. 11. Ventral bristle of same. 80/1.
- Fig. 12. Ventral view of anterior body extremity of *Euphrosyne magnoculata* n. sp. 12/1.
- Fig. 13. Long ventral bristle of the same species. 930/1.
- Fig. 14. Short " " " " " " " 520/1.
- Fig. 15. Bifid dorsal bristle, crenated in the fissure, from the same species. 520/1.



Izuka del.

1-2. *Euphrosyne superba* Marenz. 3-5. *Chloecia flava* (Pallas). 6-9. *Amphinome rostrata* (Pallas).

10-11. *Notopurca mitsukurini* n. sp. 12-15. *E. flava* (Pallas).

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ERRANTIAE POLYCHAETA OF JAPAN.

PLATE XXIII.

Explanation of Plate XXIII.

(*Goniadidae*, *Glyceridae*).

- Fig. 1. Dorso-lateral view of anterior extremity of *Goniada japonica* n. sp., with fully protruded proboscis. 8/1.
- Fig. 2. Posterior view of 45th parapodium of same species. 26/1.
- Fig. 3. " " " 140th " " " " " "
- Fig. 4. Spine from dorsal ramus of the same parapodium. 115/1.
- Fig. 5. Large setose bristle from ventral ramus of the same parapodium. 320/1.
- Fig. 6. Small setose bristle from upper part of the same ramus. 320/1.
- Fig. 7. Ventral bristle of *Goniada distorta* Moore. 390/1.
- Fig. 8. Posterior view of parapodium from the middle body region of *Glycera alba* Rathke. 20/1.
- Fig. 9. Papilla of proboscis of the same species. 390/1.
- Fig. 10. Posterior view of 50th parapodium of *Glycera robusta* Ehlers. 15/1.
- Fig. 11. Anterior view of 45th parapodium of *Glycera capitata* Oersted. 52/1.
- Fig. 12. Long papilla of proboscis of the same species. 220/1.
- Fig. 13. Short " " " " " " " " " "
- Fig. 14. Anterior view of 95th parapodium of *Hemipodus yenourensis* n. sp. 40/1.
- Fig. 15. Papillae of proboscis of the same species. 320/1.



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1-6. *Goniada japonica* n. sp. 7. *Gon. distorta* Moore. 8-9. *Glycera alba* Rathke.
10. *G. robusta* Ehlers. 11-13. *G. capitata* Oerst. 14-15. *Hemipodus yenourensis* n. sp.

A. IZUKA.

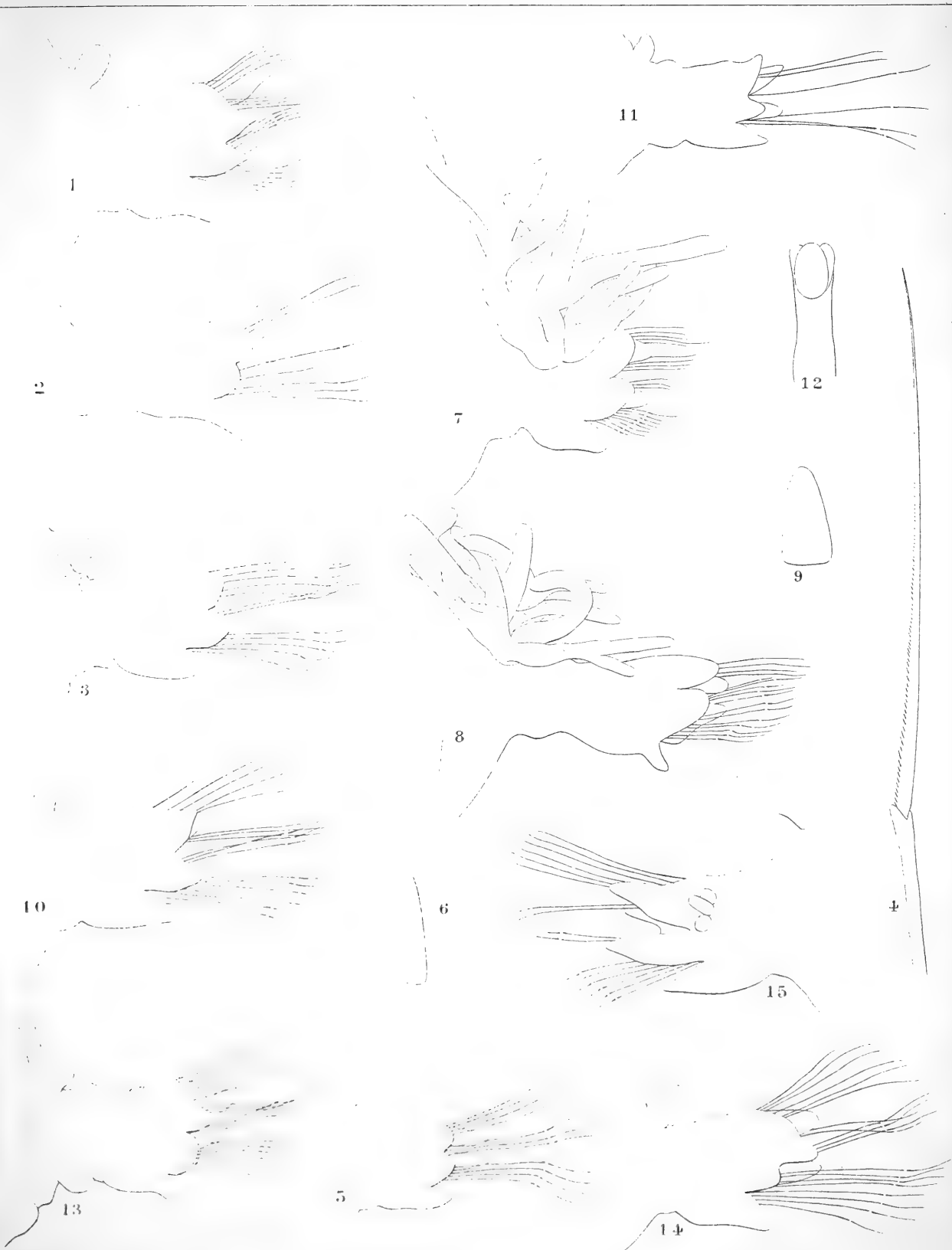
ERRANTIATE POLYCHAETA OF JAPAN.

PLATE XXIV.

Explanation of Plate XXIV.

(*Glyceridae*).

- Fig. 1. Posterior view of 22nd parapodium of *Glyceria goesi* Malgr. 26/1.
- Fig. 2. Posterior view of 165th parapodium of same. 26/1.
- Fig. 3. " " " 203rd " " *Glyceria opisthobranchiata* Marenz. 26/1.
- Fig. 4. Ventral bristle of same. 320/1.
- Fig. 5. Posterior view of 36th parapodium of *Glyceria tessellata* Gr. 40/1.
- Fig. 6. Papilla of proboscis of same. 175/1.
- Fig. 7. Posterior view of 78th parapodium of *Glyceria misakiensis* n. sp. 20/1.
- Fig. 8. Posterior view of 240th parapodium of same. 20/1.
- Fig. 9. Papilla of proboscis of same. 175/1.
- Fig. 10. Posterior view of 35th parapodium of *Glyceria onomichiensis* n. sp. 26/1.
- Fig. 11. Posterior view of 105th parapodium of same. 26/1.
- Fig. 12. Papilla of proboscis of same. 390/1.
- Fig. 13. Posterior view of 20th parapodium of *Glyceria clarori* n. sp. 20/1.
- Fig. 14. Posterior view of 25th parapodium of *Glyceria hasidatensis* n. sp. 30/1.
- Fig. 15. Anterior view of 58th parapodium of same. 30/1.



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1-2. *Glycera goesi* Malgr. 3-4. *G. opisthobranchiata* Marenz. 5-6. *G. tessellata* Gr.
7-9. *G. misakiensis* n. sp. 10-12. *G. onomichiensis* n. sp. 13. *G. chirori* n. sp.
14-15. *G. hisidatensis* n. sp.

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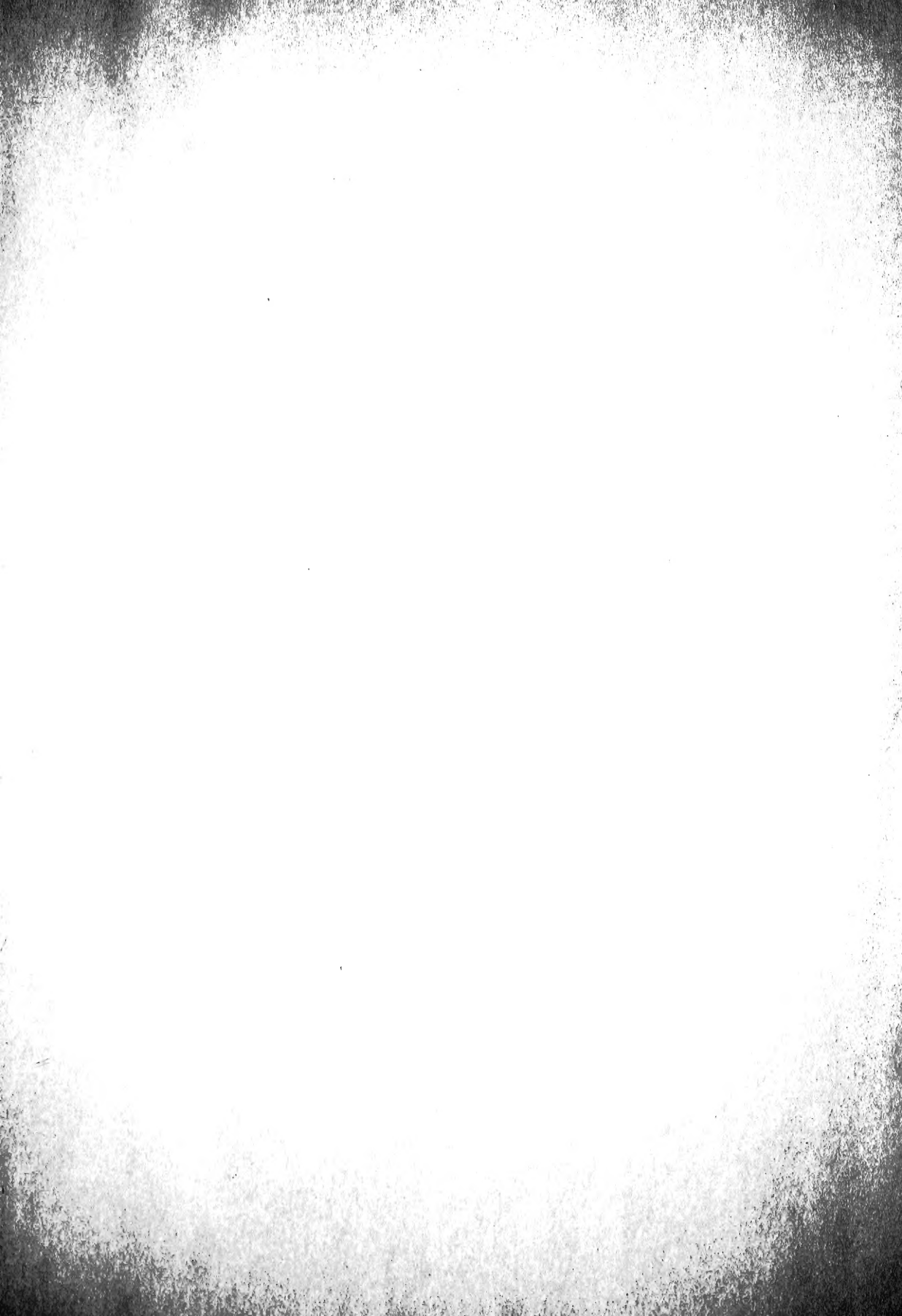
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Art. 2. A. IZUKA:—The Errantiate Polychæta of Japan. *With 24 plates.*
Publ. May 31st, 1912.

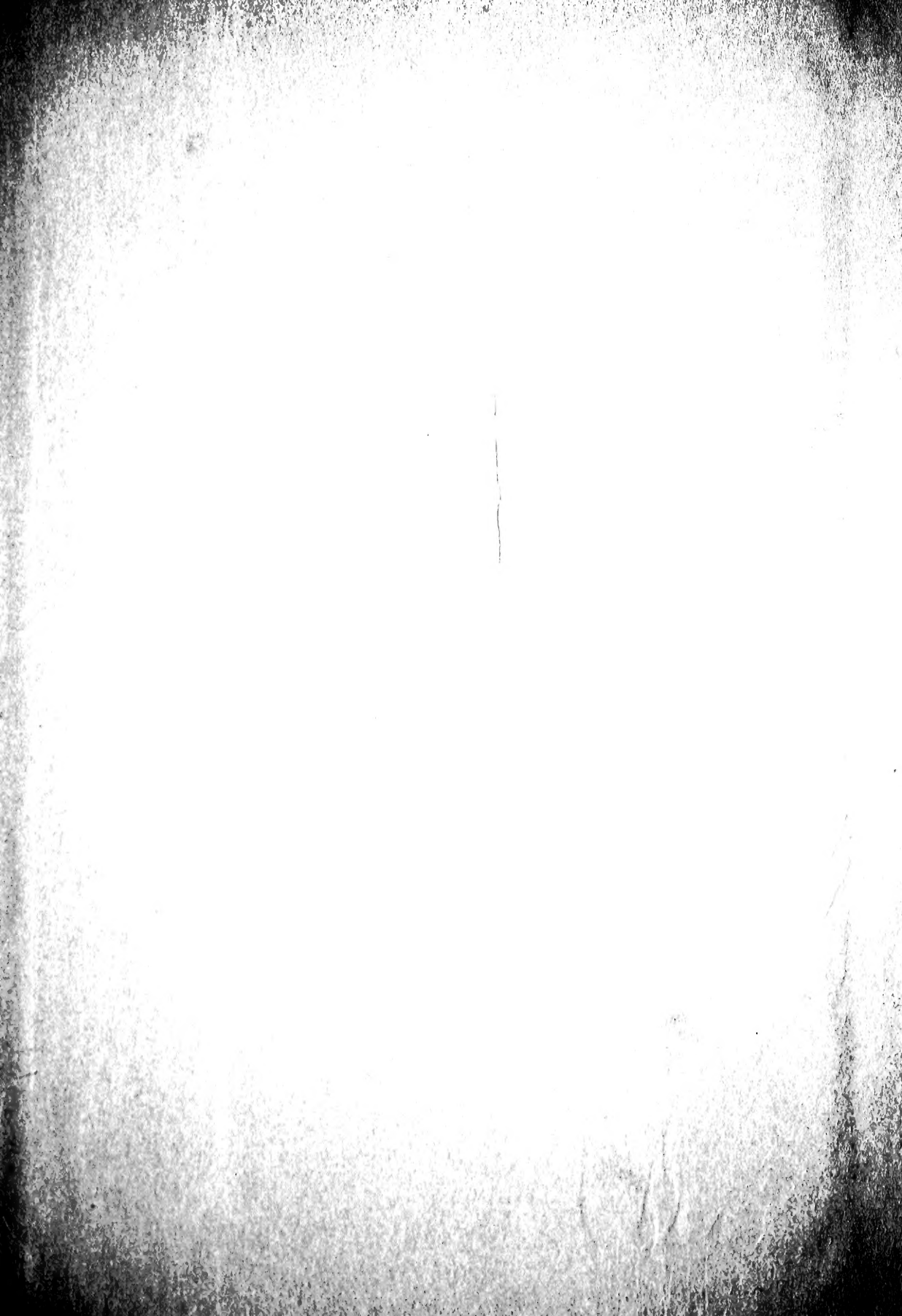
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Vol. XXXII. Articles already published:—

- Art. 1. G. KOIDZUMI:—Revisio Aceracearum Japonicarum. *With 33 plates.*
Publ. Aug. 2nd, 1911.
Art. 2. N. OHNO:—Beobachtungen an einer Süßwasser Peridinee. *Mit 1 Tafel.*
Publ. Nov. 20th, 1911.
Art. 3. Under press.
Art. 4. R. TORII:—Études Anthropologiques. Les Aborigènes de Formose.
Fase. II. Publ. Jan. 16th, 1912.
Art. 5. M. YOKOYAMA:—Climatic Changes in Japan since the Pliocene Epoch.
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