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CONTENTS.

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Eine neue Ascidienart aus der Gattung *Agnesia* Michaelsen.

Von

Dr. Asajiro Oka.

Mit 3 Figuren.

Die Corellidengattung *Agnesia* Michaelsen, die sich vor allem durch das vollständige Fehlen der inneren Längsgefässe am Kiemensack auszeichnet, ist bisher nur in zwei Arten (*A. glaciata* Michaelsen[1]) 1900, aus Süd-Feuerland und *A. septentrionalis* Huntsman[2]) 1912, von der Westküste Kanadas) bekannt. Es dürfte daher die folgende Mitteilung über eine dritte Art dieser Gattung aus Japan auch in tiergeographischer Hinsicht nicht ohne Interesse sein.

Agnesia himeboja[3]) nov. sp.

Die in Formalin konservierten Tiere haben einen regelmässig eiförmigen Körper mit einem verhältnismässig grossen, aber ganz flachen Buckel an der Dorsalseite der vorderen Körperhälfte (Fig. 1). Die Ingestionsöffnung findet sich am vordern Körperpol, die Egestionsöffnung in der Mitte des dorsalen Buckels, der nichts anders ist als der Atrialsipho in kontrahiertem Zustande. Das hintere Körperende ist kugelrund und zeigt weder Haftfortsätze noch besondere Anheftungsfläche. Der Querschnitt in der Körpermitte ist annähernd kreisförmig. Die grösseren Exemplare haben durchschnittlich folgende Dimensionen: Körperlänge 11 mm, grösste Querdurchmesser

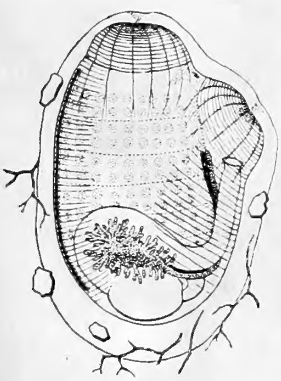

Fig. 1.
Agnesia himeboja. Von links. ×4

1) Michaelsen, W. Die holosomen Ascidien des magalhaensisch-südgeorgischen Gebietes. 1900.

2) Huntsman, A. G. Holosomatous Ascidians from the Coast of Western Canada. 1912.

3) *Hime* Prinzessin, *Hoja* oder *Boja* Ascidie (japanisch).

7–8 mm, Entfernung der Körperöffnungen von einander 5 mm.

Alle mir vorliegende Stücke sind an einer zierlichen, dichotomisch verästelten Fadenalge, *Ceramium gracillimum* Criff. et Harv. (= *Hormoceras flaccidum* Kützing) befestigt. Die Anheftung erfolgt in ganz einfacher Weise, indem die Testa an irgend einer Partie der Körperoberfläche direkt mit den Algenfäden verwächst. Die Tiere sind vollkommen durchsichtig und farblos mit Ausnahme der nächsten Umgebung der beiden Körperöffnungen, wo der Innenkörper schön orangerot gefärbt ist. Die inneren Organe, zumal die opakweissen Gonaden, lassen sich durch die wasserklare Testa sehr deutlich erkennen. Die Oberfläche ist im allgemeinen nackt und glatt, doch beobachtet man zuweilen ausser den spärlichen Algenfäden noch einige wenige angeklebte Sandkörnchen.

Beide Körperöffnungen zeigen gut ausgeprägte Lappenbildung. Die Ingestionsöffnung ist mit 7, die Egestionsöffnung mit 6 deutlichen dreieckigen Lappen versehen. Im Leben jedoch, wenn die Öffnungen weit klaffen, ist von der Lappenbildung fast gar nichts zu erkennen. Der unpaare Lappen der Ingestionsöffnung liegt in der dorsalen Medianlinie, dem Dorsaltuberkel am nächsten.

Die Testa ist dünn, weich gallertig, aber ziemlich zäh, und lässt sich ohne jede Schwierigkeit vom Innenkörper loslösen. Sie ist vollkommen farblos und durchsichtig. Beim konservierten Tiere ist die Testa etwas aufgequollen und durch einen Spaltraum von der darunterliegenden Tunica getrennt. Die Tunica ist mit einem ganz regelmässigen System von Längs- und Quermuskeln ausgestattet. Die Längsmuskelbündel sind wenig zahlreich und auf die Siphonen beschränkt; sie strahlen alle von den Körperöffnungen aus und endigen etwas unterhalb der Basis der Siphonen, wo sie sich mehrfach spalten. Von den Quermuskeln unterscheidet man zwei Gruppen, nämlich die der Siphonen und die des Rumpf es. Erstere stellen die Ringmuskelbündel dar, die die beiden Körperöffnungen konzentrisch umkreisen und mit den Längsmuskelbündeln regelmässige, länglich rechteckige Maschen bilden. Die Quermuskeln des Rumpfes lassen sich wieder in zwei Abteilungen, eine ventrale und eine dorsale, sondern. Die ventrale Abteilung besteht aus kurzen Muskelbündeln, die, in annähernd gleichmässigen Abständen parallel angeordnet, die ventrale Medianlinie senkrecht schneiden, während die dorsale durch längere Muskelbündel gebildet wird, die, ebenfalls in gleichmässigen Abständen parallel angeordnet, schräg über die dorsale Partie der Seitenfläche des Rumpfes verlaufen. Die Muskelbündel sind überall beinahe gleich stark.

Die Tentakel sind einfach, fadenförming, spitz auslaufend. Man kann vier verschiendene Grössen unterscheiden, von denen die Tentakel 1. bis 3. Ordnung ziemlich regelmässig nach dem Schema 1. 3. 2. 3. 1....... alternieren, die Tentakel 4. Ordnung dagegen schieben sich nur hier und da zwischen die grösseren. Bei einer Anzahl ausgewachsener Stücke, die ich darauf hin genau untersuchte, zählte ich 30–33 Tentakel, und zwar 6 annähernd gleich grosse Tentakel 1. Ordnung, 6 Tentakel 2. Ordnung, die merklich an Grösse variieren, 12 Tentakel 3. Ordnung und 6–9 Tentakel 4. Ordnung. Die beiden letzteren lassen sich nicht immer nach der Grösse unterscheiden, da die kleineren der 3. Ordnung zuweilen noch kleiner sind als die grösseren der 4. Ordnung, wohl aber durch die Lageverhältnisse. In der Anheftungsweise der Tentakel bietet nun unsre Form etwas Abweichendes. Zwar springen alle Tentakel wie gewöhnlich von einem ringförmigen Tentakelträger, aber sie erheben sich nicht gleich von demselben, sondern schmiegen sich für eine kurze

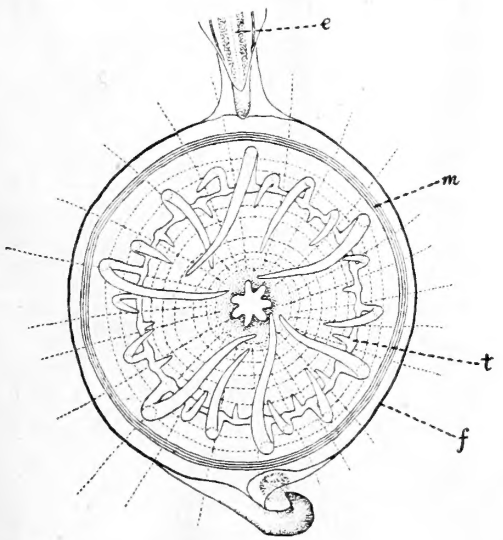

Fig. 2.
Tentakelkrone und Flimmerreif. Von unten. ×24.
e. Endostyl. f. Flimmerreif. m. Muskelsaum. t. Tentakelträger.

Strecke an die Innenfläche des Ingestionssiphos dicht an, ehe sie als selbständige Tentakel in den Innenraum vorragen (Fig. 2). Da die Länge dieser Strecke je nach der Grösse des betreffenden Tentakels variiert, so gewinnt man, wenn man den kriechenden Basalteil ausser Acht lässt, den Eindruck, als ob die Tentakel ganz unregelmässig in verschiedener Höhe an der Innenfläche des Ingestionssiphos ständen. Dieses Verhalten, welches an die Anheftungsweise der Tentakel bei gewissen craspedoten Medusen erinnert, ist, soviel ich weiss, bisher noch bei keiner Ascidienart beobachtet worden.

Der Kiemensack ist ballonförmig und hängt fast ganz frei im Peribranchialraum, indem er nur durch den ventralen Rand und durch den Vorderrand mit der Leibeswand verbunden ist. Er ist zart, glatt, faltenlos und weist keine Spur von rippenartigen Längsgefässen auf; dagegen sind die Quergefässe wohl entwickelt. Es lassen sich Quergefässe 1. und 2. Ordnung unterscheiden, die aber in der Breite kaum variieren. Der Unterschied besteht vielmehr darin, dass auf ersteren ziemlich breite Horizontalmembranen sitzen, die links wie rechts in bestimmten Abständen 5 breit zungenförmige, etwas gegen die dorsale Medianlinie hin überhängende Fortsätze tragen. Ausserdem weisen die Horizontalmembranen in geringer Entfernung links von der dorsalen Medianlinie je einen besonders grossen zungenförmigen Fortsatz auf, der wohl als homologon der fehlenden Dorsalfalte zu deuten ist. Die Kiemenspalten bilden einfache grosse Spiralen, deren äussere Windungen annähernd quadratischen Verlauf nehmen; sie sind tief trichterförmig eingesenkt und bilden echte Infundibula. Die Spiralen sind in 12 Querreihen angeordnet, die sich durch

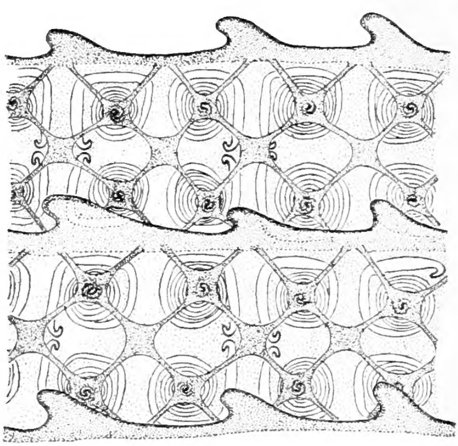

Fig. 3.
Stück des Kiemensackes. ×24.

die Quergefässe 1. Ordnug in 6 Doppelreihen gruppieren. In jeder Querreihe zählt man 11 Spiralen. Die einzelnen Spiralen zeigen 6–7 Windungen und bestehen im grösseren Teil des Kiemensackes aus je einer einzigen fortlaufenden Spalte, nur in der Nähe des Endostyls und an der hintersten Kiemensackpartie sind sie unterbrochen und unregelmässig gestaltet. Das äusserste Ende der Kiemenspalte ist stets hakenförmig umgebogen und mit einer besonders hohen Zilienepithel ausgekleidet. Ausser den Quergëfassen besitzt der Kiemensack auch noch ein System von sehr zarten Radiärgefässen. Diese verlaufen von den Zentren in den Diagonalen nach den vier Ecken, so dass zu jeder Spirale 4 Radiärgefässe gehören (Fig. 3). Der Endostyl verläuft in gerader Linie ventralmedian bis an den Hinterrand des Kiemensackes.

Eine geschlossene Dorsalfalte kommt nicht vor. Sie wird vielmehr durch die oben erwähnten, besonders grossen Fortsätze an den Horizontalmembranen sowie durch den infolge der Vereinigung der beiderseitigen Flimmerbogen entstandenen zungenförmigen Fortsatz repräsentiert. Der Dorsaltuberkel ist sehr klein und einfach gebaut, er wird bei normaler Lage von dem Flimmerbogen, durch den er undeutlich durchschmmert, fast vollständig verdeckt.

Der Darm liegt gänzlich an der linken Seite des Kiemensackes. Der Oesophagus ist kurz, halbkreisförmig gebogen, an seiner Einmündungsstelle in den Kiemensack etwas trompetenförming erweitert. Der Magen liegt horizontal am hintern Körperende ; er ist länglich ellipsoidisch, scharf gegen den Oesophagus und Mitteldarm abgesetzt, glattwandig. Die Mitteldarm und Enddarm sind beinahe gleich dick, von einander nicht abgesetzt und zeigen zusammen einen S-förmigen Verlauf. Der After ist glattrandig und ein wenig erweitert.

Die Gonaden füllen den Raum innerhalb der Darmschlinge an der linken Körperseite vollständing aus. Das Ovarium ist lang birnförmig und liegt in der Mitte des Schlingenraums. Der Hoden besteht aus zahlreichen fein verästelten Schläuchen, die sich an der Peripherie des Ovariums ordnen und auch über die Aussehfläche der Darmschlinge erstrecken. Beim konservierten Tier sind beide opakweiss. Ein Eileiter und ein Samenleiter treten getrennt aus der Masse der Gonaden hervor und ziehen sich, dicht an der Innenseite des Enddarms angelegt, nach oben, um etwas oberhalb des Afters in den Kloakenraum auszumünden.

Von den beiden bereits bekannten Arten der Gattung steht unsre Form *A. septentrionalis* entschieden näher als *A. glaciata*, was aus den Fundorten dieser Arten schon im voraus zu erwarten ist. Während *A. glaciata* durch die abweichende Körperform, die knorpelige Beschaffenheit der Testa und die eigentümliche Gestaltung der Korperöffnungen schon äusserlich von der neuen Art leicht unterscheiden lässt, stimmt *A. septentrionalis* in einer Reihe systematisch wichtiger Charaktere mit der vorliegenden Form überein, vor allem in der Zahl der Lappen an den Körperöffnungen, 7 an der Ingestions- und 6 an der Egestionsöffnung. Indessen giebt es nicht wenige Unterscheidungsmerkmale, die uns zwingen, die beiden Formen artlich zu trennen. Im Gegensatz zu *A. himeboja*, deren Körperoberfläche ganz nackt und glatt ist, trägt die Testa von *A. septentrionalis* überall wurzelartige Fortsätze, an denen Sandkörner etc. sich anheften. Ferner die Zahl der Querreihen der Kiemenspalten, die Zahl der WIndungen der einzelnen Spiralen, die Zahl der zungenförmigen Fortsätze an den Horizontalmembranen, und die Anordnung der Tentakel sind bei beiden Arten, wenn auch nicht sehr bedeutend, doch immer hinreichend verschieden. In der Gestaltung der inneren Radiärgefässe am Kiemensack stimmt die neue Form mit *Corellopsis pedunculata* Hartmeyer[1] aus Spitzbergen sehr gut überein.

Alle mir vorliegende Exemplare, ca 80 an der Zahl, wurden von mir selbst im April 1904 in der Bucht von Tateyama, Prov. Awa, aus einer Tiefe von 5–7 Faden gesammelt.

Tokio, d. 23. VIII. 1914.

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1) Hartmeyer, R. Die Ascidien der Arktis. 1903.

On a new Polycystid Gregarine, *Spirosoma caudata* nov. gen. et nov. sp., from a Diplopod.

By

Shigemi Ishii, *Rigakushi.*

With two figures.

In examining specimens of *Fontaneria coarctata* Pocock preserved in alcohol, which were collected on Mt. Kinkazan in Gifu, I have discovered numbers of a curious gregarine showing conspicuous spiral striation in the posterior parts of body. I regard the form to represent a new genus and species, which I shall call by the name of *Spirosoma caudata.*

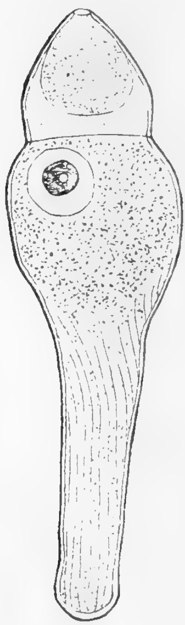
Spirosoma caudata, n. g., n. sp.

Sporonts always solitary. The entire body, up to 400 μ in length, consists of a broad anterior part, prolonged posteriorly into a narrow tail-like part.

Protomerite short, usually a little broader than long; generally conical, sometimes somewhat pentagonal in lateral view. Fully developed adults frequently show a shallow depression on the sides of protomerite. In the young the protomerite is relatively large, and usually a little longer than broad; there is no depression on the sides; the anterior end is narrower than in the adult. The smaller sporonts exhibit a pore-like structure at the apex of protomerite, while the larger sporonts either show it but very inconspicuously or are entirely without it. From the presence of the pore-like structure if only in the younger stages, and also from the fact of the host being a diplopod, I should place the gregarine in the family Stenophoridae Léger & Duboscq.

Deutomerite large and elongate; divisible into two parts, the broad anterior and the narrow posterior. The anterior part is usually of an ovoid form; it is always somewhat shorter than the posterior tail-like part. The latter is cylindrical and tapers very slightly towards the posterior end which is swollen into a small terminal knob. In the young, the distinction of the two deutomerite parts is not so marked as in the adult, the tail being broader and the terminal swelling much less conspicuous. These features of the deutomerite, together with the relatively large size of the protomerite, give to immature individuals an appearance more or less different from that of the adult.

A. Adult sporont. ×260



B. Young sporont. ×560

Between protomerite and deutomerite there always exists a distinct constriction, which is especially marked in the younger stages. Septal region pretty well developed, especially so in adults.

The epicyte of protomerite and of the broad anterior part of deutomerite shows the ordinary fine longitudinal striation, while in the tail the same striation takes a spiral course as shown in figure A. The striae are much less densely arranged in the tail than in more anterior parts; so that, while in the latter parts at least 4 striae can be counted within a transverse extent of 3.7 μ, in the former there may exist only two of them in the same extent of space. The spiral striation takes same direction in all individuals. In lateral view of these it is seen to run from the left above obliquely downwards to the right below. In the hind parts of tail the spiral winding grows gradually more and more oblique, until on the terminal swelling the striation is nearly meridional. In the young, the striae, besides being more sparse than in the adults, exhibit spiral winding only to a weak degree.

Sarcocyte is pretty well developed; it is usually a little thicker near the septum and in posterior parts of the tail than in other parts.

Endocyte dense, especially so in the broad anterior part of deutomerite and also in the swelling at tail end. In the protomerite of the young the coarser endocyte granules were often observed to form a distinct mass in direct touch with the apical pore, the remaining parts of protomerite being filled up with comparatively fine granules.

Nucleus is found in the broad anterior part of deutomerite. It is large and vesicular, containing a single large spherical karyosome, which, in many cases, was seen to contain a small vacuole.

Measurements of variously old sporonts:

Specimens.	Total length of body	Length of protomerite	Length of deutomerite	Breadth of body	Diameter of nucleus	Diameter of karyosome	Length of the broad part of deutomerite.	Length of the tail part of deutomerite	Breadth of the tail part of deutomerite in the middle.
A	112 μ	24 μ	88 μ	32 μ	—	—	—	—	—
B	127 „	27 „	100 „	36 „	—	—	—	—	—
C	184 „	32 „	152 „	48 „	20 μ	8 μ	—	—	—
D	192 „	32 „	160 „	52 „	20 „	10 „	—	—	—
E	200 „	20 „	180 „	44 „	—	—	60 μ	120 μ	20 μ
F	264 „	32 „	232 „	60 „	20 „	12 „	104 „	128 „	24 „
G	264 „	24 „	240 „	72 „	—	—	100 „	140 „	28 „
H	332 „	32 „	300 „	80 „	—	—	120 „	180 „	24 „
I	400 „	32 „	368 „	100 „	—	—	160 „	208 „	28 „

Habitat: Anterior parts of the alimentary canal of *Fontaneria coarctata* Pocock.

Infection: Heavy and common.

On the Hemerobiinæ of Japan.

By

Waro Nakahara.

With Pl. I.

In continuation of my paper on the subfamily Osmylinae (family Hemerobiidæ), published in the 'Annotationes,'[1] I propose here to give short descriptions of all the Japanese forms, known to me at present, of another subfamily, the Hemerobiinæ.

Only five species[2] of the Hemerobiinæ, so far as I am aware, have hitherto been recorded as indiginous to Japan, *viz*, *Hemerobius Harmandinus* Navás, *Ninguta deltoides* (Navás), *Micromus numerosus* Navás, *M. novitius* Navás, and *Sisyrella nikkoana* (Navás). From my studies of the subfamily during the last few years seventeen more species have become known to me, thus giving in all twenty-two species to the Hemerobian fauna of Japan. Of the newly added species only two could be identified with species hitherto known outside of Japan, and all the rest I consider to be new to science. Two new genera I have been led to erect for the reception of some of the species. Besides, I have divided the subfamily into two tribes, the Hemerobiini and the Neurorthini.

Here I beg to express my warmest thanks to Mr. E. Petersen, who has kindly taken the wing photographs reproduced in this article and moreover has favored me with kind advice and valuable specimens of European Hemerobians. My hearty thanks are also due to Messrs. A. Nohira, S. Yamamura, and some other friends for gifts of many interesting specimens.

1) On the Osmylinae of Japan. Annot. Zool. Japon., viii, pp. 485-518 (1914).

2) Without taking into account nomina nuda, such as *Megalomus punctatus* Mats., *Hemerobius albostigma* Mats., *Micromus multipunctatus* Mats., &c., which were given by Prof. Matsumura in his "Konchû-Bunruigaku" and "Ekichu-Mokuroku."

List of species treated of in this paper, showing their geographical distribution.

	Japan				Other Regions
	Hokkaido	Hondo	Shikoku	Kyushiu	
Neurorthus punctatus n. sp.		*			
N. fuscinervis n. sp.		*			
Sisyrella nikkoana (Navás).		*			
Notiobiella subolivacea n. sp.		*			
Sympherobius tessellatus n. sp.		*			
Hemerobius humuli L.	*	*			Europe, Siberia, N. America.
H. japonicus n. sp.		*			
H. striatalis n. sp.		*			
H. nigricornis n. sp.	*	*			
H. irregularis n. sp.		*			
H. Shibakawae n. sp.		*			
H. nitidulus Fab.		*	*		Europe.
(Syn. *H. Harmandinus* Navás).					
Micromus pulchellus n. sp.		*			
M. novitius (Navás).		*		*	
Eumicromus (n. g.) *numerosus* (Navás).		*	*	*	
E. Arakawae n. sp.			*		
E. maculatipes n. sp.	*	*			
E. alpinus n. sp.		*			
E. angulatus (Steph.).	*				Europe, Siberia, N. America.
E. dissimilis n. sp.	*	*			
Oedobius infalcatus n. g., n. sp.		*			
Ninguta deltoides (Navás).		*			Siberia.

Family HEMEROBIIDÆ.

Subfamily HEMEROBIINAE.

The subfamily Hemerobiinæ can scarcely be sharply distinguished from the Osmylinæ. The condition of subcosta, which Banks[1] has utilized as distinctive criterion between the two subfamilies, is not always adequate enough for the purpose, since in certain Hemerobian genera, *e. g.*, *Ninguta* and *Sympherobius*, some species have the said vein united to radius near apex of forewing in a manner somewhat as in some Osmyline forms. Nevertheless, for the sake of convenience I follow Banks (l. c.) in defining the subfamily as follows:

Ocelli absent; antennæ moniliform, not pectinate in either sex. Prothorax short, being broader than long. Wings with few crossveins, commonly arranged in two gradate series; usually several sectors present, when but one, it is connected to radius by not more than four crossveins; subcosta almost always not united with radius near tip of wings. Legs slender; hind tibia commonly dilated in middle. Ovipositor of the female, when exserted, very short.

The two tribes into which I divide the subfamily, are characterized as follows:

Tribe Neurorthini.—*Female with ovipositor, which is short, stout and split on the ventral side (as in Sisyra). Branches of radial sector on forewing arise from common stalk, thus showing only one radial sector.* (See Pl. I, fig. 1).

Tribe Hemerobiini.[2]—*Female without exserted ovipositor. Branches of radial sector on forewing arise separately from radius, thus showing more than two radial sectors.* (See Pl. I, fig. 2–6).

The presence of exserted ovipositor in the female of *Neurorthus*, similar to that of the Osmyline genus *Sisyra*, distinguishes that genus from

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1) Trans. Amer. Ent. Soc., xxxii, p. 23 (1905), and xxxix, p. 211 (1913).

2) The old name "Hemerobiini" of Latreille is here retained with extensive alteration in sense.

all the remaining Hemerobian forms. Moreover, since the branches of radial sector, though variable in their number, undoubtedly stand in important relation to the evolution of the peculiar Hemerobian type of venation, I regard the above distinction into the two tribes to be justifiable.

Tribe **Neurorthini** nov.

The tribe is based on the genus *Neurorthus*. Two more genera, viz. *Nosybus* and *Sisyrella*, not improbably belong to it. The former is a genus characterized by the forewing having no recurrent vein but one radial sector, by the hindwing showing some gradate veinlets, and by the occurrence of a short ovipositor of unknown structure in the female. In the latter the forewing has neither recurrent vein nor gradate series of crossveins, but has one radial sector; the hindwing has no crossvein at all; and nothing certain is known about ovipositor. As far as the radial sector goes, therefore, *Nosybus* and *Sisyrella* agree with each other as well as with *Neurorthus*; and all the three may, on that account, be associated together. However, our deficient knowledge concerning ovipositor in the two genera referred to, precludes definitive inclusion of these in the Neurorthini.

Genus ***Neurorthus*** Costa.

Neurorthus Costa, Atti dell' Accademia di scienze fisiche e matematiche, i, p. 32 (1863); Banks, Trans. Amer. Ent. Soc., xxxix, p. 217 (1913).
Sartena Hagen, Ann. Soc. Ent. de France, p. 41 (1864).

Antennæ moniliform. Forewing rather broad; subcosta runs into margin of wing; costal area not broad at base, without recurrent vein; costal crossveins mostly simple; one radial sector; three series of gradate veinlets; cubitus not forked near base of wing. Hindwing smaller, with only one gradate series.

Type: *Neurorthus fallax* (Rambur).

Of this very interesting genus, there are two species occurring in Japan. Both differ from the type species in having costal crossveins in forewing partly forked, but the character is much subject to individual variation and is quite inadequate to serve for systematic purpose. The two Japanese species may be distinguished as follows :

Longitudinal veins entirely yellow ; crossveins and forking points of most longitudinal veins marked with blackish ; smaller (expanse : about 14 mm.) ... ...*N. punctatus.* n. sp.

Longitudinal veins partly blackish or fuscous black ; crossveins and forking points of longitudinal veins not marked with blackish ; larger (expanse : about 20 mm.) ... ...*N. fuscinervis* n. sp.

Neurorthus punctatus n. sp.

(Pl. I, fig. 1).

Head yellowish, suffused with whitish above, with a row of minute tubercles on occiput ; apex of mandible blackish ; palpi yellowish, more or less suffused with fuscous. Antennæ yellow with concolorous hairs ; the 2nd joint much longer than other joints.

Prothorax pale whitish with three transverse furrows above. Meso- and metathorax brownish, with two slight yellowish longitudinal lines above (in a dried specimen).

Legs slender, pale ; foreleg and tarsal joints of other legs somewhat fuscous ; basal tarsal joint longer than the apical.

Wings elongated, rather rounded at apex, hyaline, and very slightly tinged with yellowish ; pterostigmatic region yellowish ; longitudinal veins yellowish ; crossveins mostly fuscous, broadly margined with fuscous black ; fuscous black spots on almost all forking points of longitudinal veins. Forewing with little more than twenty costal crossveins, greater part of which forked ; radial sector with three branches before outer gradate series ; three crossveins between radius and radial sector ; the 1st branch of radial sector dichotomously forked three times ; three series of gradate veinlets, of which inner series rather imperfect. Hindwing with one series of gradate veinlets.

Abdomen yellowish, strongly suffused with whitish on ventral side; almost every segment irregularly and often very slightly marked with a dark transverse band on dorsal side. In the male, upper pair of appendages long, directed inwards and covered with fine pale hairs; lower pair very short, distinctly directed upwards, and beset with many long hairs. Ovipositor of the female rather small.

Measurements:

Length of body	5–7 mm.
Length of forewing	6–7 mm.
Width of forewing...	...about 3 mm.
Length of hindwing	5–6 mm.

Habitat: Of this species, I have received a large number of specimens from the following localities:

Tottori, Prov. Inaba (August, '13), Mr. A. Nohira coll.

Kyoto (July, '13), Mr. A. Nohira coll.

Mt. Minomo near Osaka (July, '14), Mr. M. Shibakawa coll.

Mt. Atago near Kyoto (August, '14), Mr. A. Nohira coll.

Neurorthus fuscinervis n. sp.

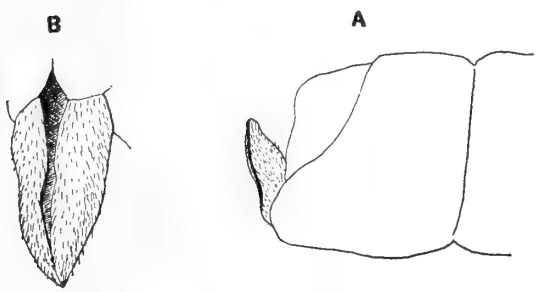
(Textfig. 1).

Head pale; vertex whitish with many minute tubercles; apex of mandible blackish; palpi pale white, the last joint of maxillary palpus somewhat fuscous. Antennæ pale white with several terminal joints somewhat suffused with dark yellow; basal joint much enlarged; the 3rd and 4th joints usually small.

Prothorax whitish, covered with fine concolorous hairs, with two transverse furrows above. Meso- and metathorax pale yellow, with a whitish median band above. Legs pale; anterior tibia and all tarsal joints somewhat ochraceous.

Wings colorless and hyaline; neuration fuscous or fuscous black, excepting costa, subcosta, radius, basal part of radial sector, median and cubitus, which are pale yellow; crossveins blackish. Costal area of forewing with crossveins mostly simple, but several of those in the middle of the area are almost always forked; three veinlets between radius and its sector; radial sector with three branches before outer gradate series; median and cubitus forked a little beyond the first branch of radial sector. Hindwing with costal area very narrow; costal crossveins simple; three veinlets between radius and its sector; radial sector with three branches before gradate series.

Abdomen pale yellow, with median part of every dorsal segment narrowly and transversely clouded with fuscous black. In the male, there arise from the 9th abdominal segment two pairs of appendages: upper pair long and stout, directed distinctly downwards; the lower very short, rather triangular in shape with sharply pointed apex; dorsal plate subquadrate, covered with fine pale hairs. Ovipositor of the female rather long, but shorter than the abdomen is thick.



Textfig. 1.
Neurorthus fuscinervis n. sp. ♀
A. Apex of abdomen, from side, ×10.
B. Ovipositor, from below, ×20.

Measurements:

Length of body	5 (♂)—7 (♀) mm.
Length of forewing	10 mm.
Width of forewing	3.5 mm.
Length of hindwing	8 mm.

Six male and a single female specimens (in alcohol), captured by Mr. A. Nohira on Mt. Atago near Kyoto on July 2, '14, are in my collection.

Remark: This species is closely allied to *N. punctatus* n. sp. and *N. fallax* Ramb. of Europe. However, from the former it differs distinctly in many respects. The latter is a species with no forked costal crossvein, with veins and body rather blackish, and with crossveins very narrowly margined with blackish, so that it cannot be identified with the Japanese form.

Genus ***Sisyrella*** Banks.

Sisyrella Banks, Trans. Amer. Ent. Soc., xxxix, p. 216 and 218 (1913).

Nopia Navás, Rev. Russ. d'Entom., ix, p. 397–28 (1910), preoccupied by Walker in 1862.

This genus with the single species, *S. nikkoana*, is unknown to me. The following is the original description given by Navás of the genus and of the species :

" Similis *Micromo* et *Sympherobio*.

" Campus costalis alae anterioris angustus, sine venula recurrente, venulis costalibus simplicibus, haud furcatis. Subcosta et radius divisi usque ad apicem alae. Sector radii unicus. In neutra ala adsunt venulae gradatae. Inter procubitum et cubitum duae venulae, inter cubitum ejusque sectorem una.

" Au premier abord il semble un *Sisyra*, surtout par l'absence de vénules en gradins ; mais il s'en éloigne beaucoup par la disposition des veines subcostale et radius, qui restent séparées dans toute leur longueur. L'absence totale de vénules en gradins le sépare des genres *Micromus* et *Sympherobius* ses voisins ; et de celui-ci en outre il se distingue par la forme du champ costal de l'aile antérieure, qui ne possede pas, comme le *Sympherobius*, la vénule recurrente basilaire."

Sisyrella nikkoana (Navás).

Nopia nikkoana Navas, Rev. Russ. d'Entom., ix, p. 398 (1910).

Sisyrella nikkoana Banks, Trans. Amer. Ent. Soc., xxxix, p. 398 (1913).

" Nigra, parva.

" Caput nitens, vertice fornicato, pilis raris fulvis hispido ; palpis longis, fusco-fulvis, ultimo articulo longissimo, cylindrico, vix inflato ; antennis nigris, apice fuscis, longis, longiter pilosis, moniliformibus, articulis brevissime pedunculatis. Thorax et abdomen nigra, sublaevia. Alae oblongæ, ellispticæ, immaculatæ, membrana hyalina, iridea, leviter fusco tincta ; venatione fulva, stigmate invisibili. Ala anterior area costali parum dilatata, venulis omnibus simplicibus, paucis. Radius cum subcosta una venula basilari conjunctus. In campo radiali duae venulae. Sector radii quater furcatus, ramis 2 venulis prope radicem junctis. Procubitus ramo inferiore flexuoso, duplici venula cubito juncto. Cubitus flexuosus, cum sectore venula prope basim junctus. Ala posterior area costali et subcostali venulis libera, nisi ad stigma; sectore radii ter furcato, cum radio una venula conjuncto. Procubitus ter successive furcatus, ramo anteriore cum sectore radii, furea posterioris cum cubito venula conjuncto. Cubitus ramis posterioribus instructus.

" Longit. corpor. 3 mm., l. alae anter. 6, 5 mm., l. alae poster. 6 mm.

" Patrie : Nippon moyen, env. de Tokio et Alpes de Nikko. J. Harmand, 1901 (Mus. de Paris)." (From Navás).

Tribe **Hemerobiini** Latreille, restricted.

Of this tribe I recognize the following seven genera as occurring in Japan :

1. No recurrent vein at base of forewing ... ... 2.
——A recurrent vein at base of forewing ... ... 3.
2. Median and cubitus coalesce in both wings... ... ... *Micromus.*
——Median and cubitus not coalesce at least in hind wing ... ... *Eumicromus.*
3. Forewing with two radial sectors ; no series of crossveins in hindwing ... ... 4.
——Forewing with more than three radial sectors ; two series of crossveins in hindwing ... ... 5.
4. Forewing with at least three preapical crossveins. *Sympherobius.*
——Forewing with but one preapical crossvein ... ... *Notiobiella.*
5. Forewing with more than ten radial sectors... ... *Oedobius.*
——Forewing with less than five radial sectors ... ... 6.
6. Forewing with three series of gradate veinlets. ... *Ninguta.*
——Forewing with two series of gradate veinlets. ... *Hemerobius.*

Beside the seven genera tabulated above, some seven or eight more genera, *viz.*, *Drepanepteryx*, *Megalomus*, *Neuronema*, *Megalomina*, *Carobius*, *Psychobiella*, *Boriomyia*, etc., may be placed under this tribe.

Genus ***Notiobiella*** Banks.

Notiobiella Banks, Proc. Ent. Soc. Wash., xi, p. 80 (1909); Banks, Ent. News, xxi, p. 389 (1910); Banks, Trans. Amer. Ent. Soc., xxxix, p. 216 (1913).

Annandalia Needham, Rec. Ind. Mus., iii, p. 208 (1909).

Forewing rather short and broad, with a series of gradate veins and a single preapical crossvein; costal area very broad basally, with a recurrent vein and many branched crossveins, two radial sectors, the 1st sector connected to the 2nd near base. Hindwing small with no series of crossveins.

Type :—*N. unita* Banks.

A single species of this genus occurs in Japan.

Notiobiella subolivacea n. sp.

(Pl. I, fig. 3).

Head pale yellow, more or less suffused with green; genæ fuscous black. Antennæ greenish yellow, paler at apex and at base.

Prothorax rather elongate, light yellowish green, with two transverse furrows above. Meso- and metathorax pale yellow.

Legs pale yellow, the last tarsal joint of each leg somewhat darkish; middle and hind tibiæ fusiform.

Forewing hyaline and colorless, very broad, but not plainly broadest at middle; costal area broad, especially so at base, with one recurrent and 10–15 branched crossveins; pterostigmatic region more or less tinged with grey. Neuration light green (yellowish in alcoholic specimens); each vein somewhat brownish at base; forking points of most veins slightly marked with brownish; two radial sectors, the 1st sector with four and the 2nd sector with one branches before outer gradate series; the crossvein between the 1st and 2nd radial sectors very distinctly marked with blackish.

Hindwing much smaller than forewing, hyaline, and colorless; neuration pale yellow, more or less suffused with greenish ; pterostigmatic region pale.

Abdomen yellowish, slightly suffused with brown ; dorsal appendage of the male very long, furcate and distinctly directed downwards at apex ; subgenital plate rather short.

Measurements :

Length of body	4 mm.
Length of forewing	7 mm.
Width of forewing	3.5 mm.
Length of hindwing	4 mm.

Habitat : Kyoto (March, April, and October, '14), three male and two female specimens, Mr. A. Nohira coll.

Gifu (April, '14), a single female specimen, Mr. S. Yamamura coll.

Kusakimura, Prov. Harima (Descember, '08) ; a single male specimen, Mr. S. Iguchi coll.

Remark : This species is closely allied to *N. unita* Banks of Queensland, but is distinguishable from it by size, shape of wings, wing-markings, etc.

Judging from the fact that the adults were captured in late autumn as well as in early spring, this species probably hibernates in the adult condition.

Genus ***Sympherobius*** Banks.

Sympherobius Banks, Trans. Amer. Ent. Soc., xxxii, p. 40 (1905) ; Banks, l. c., xxxix, p. 216 (1913).

Spadobius Needham, N. Y. S. Mus. Bull. 86, p. 16 (1905).

Palmobius Needham, l. c., p. 17.

Costal area of forewing rather broad at base, with a recurrent vein ; costal crossveins mostly branched ; four, or rarely three, preapical crossveins ; two radial sectors. No series of crossveins in hindwing.

Type :—*S. amiculus* (Fitch).

The following is the only species of the genus as yet met with in this country.

Sympherobius tessellatus n. sp.

(Pl. 1, fig. 2).

Head fuscous or fuscous black, whith an obscure blackish spot between antennæ. Antennae fuscous, suffused with pale yellow beyond middle; basal joint enlarged and marked with piceous. Labial palpus blackish, excepting the apical joint which is pale; maxillary palpus blackish, apical joint small and pale.

Prothorax wider than long, fuscous or fuscous black; meso- and metathorax fuscous grey. Legs yellowish, or fuscous yellow; end of tibia darkish; hind tibia fusiform.

Forewing hyaline; a large number of brown spots distributed all over the wing gives it a checkered appearance; neuration fuscous; subcosta comes in contact with radius at one point near tip of the wing; both 1st and 2nd radial sectors forked before inner gradate series.

Hindwing hyaline; no marking, excepting pterostigmatic region which is slightly tinged with brownish. Cubitus rather strongly thickened.

Abdomen fuscous grey, hind margin of most segments covered with fine hairs. In the male, the 9th segment rather small, subgenital plate very long, stout, and covered with long hairs.

Measurements:

Length of body ... ... 6 mm.
Length of forewing ... ... 6 mm.
Width of forewing ... ... 2.5 mm.
Length of hindwing ... ... 5 mm.

Habitat: Gifu, two male and a single female specimens, Mr. S. Yamamura coll.

Osaka, a single female specimen, Mr. Teranishi coll.

Kyoto, November, '14, a single male specimen, Mr. T. Esaki coll.

Genus ***Hemerobius*** Linné.

Hemerobius Linné, Syst. Nat., x, p. 549 (1758) ; Walker, Cat. Neuropt. Brit. Mus., ii, p. 276 (1853); Hagen, Syn. Neuropt. N. Amer., p. 200 (1862); Needham, N. Y. Mus. Bull. 47, p. 551 (1901); Banks, Trans. Amer. Ent., Soc., xxxii, p. 17 (1905); Needham, N. Y. Mus. Bull. 86, p. 17 (1905); Banks, Trans. Amer. Ent. Soc., xxxix, p. 217 (1913).

Mucropalpus Rambur, Hist. Neuropt., p. 420 (1842).

Antennæ of usual structure. Forewing moderately broad; costal area broad at base, with humeral crossvein recurrent and branched on the outer side; costal crossveins branched; two series of gradate veinlets in both wings; usually three, rarely four, radial sectors. Hindwing with median fork farther out than the fork of 1st radial sector; upper division of median fork more or less confluent with base of radial sector.

Type :—*H. humuli* L.

There are seven species of the genus occurring in Japan, of which five seem to be new to science and one to be new to that country.

Synopsis of the Species :

1. Antennæ blackish or fuscous black... ... ... 2.
——Antennæ yellowish or pale yellow... ... ... 3.
2. Forewing tinged with brownish yellow, excepting a hyaline transverse space in discal area...*H. nitidulus* F.
——Forewing not tinged with brownish yellow, but spotted with fuscous black... ... ...*H. nigricornis* n. sp.
3. Forewing with many wavy fuscous lines runing across it.... ... ... *H. Shibakawæ* n. sp.
——Forewing without such marking ... ... 4.
4. Forewing with a distinct piceous streak formed of many spots at the posterior border of discal area ... ...*H. striatalis* n. sp.
——Forewing without such marking ... ... 5.
5. Costal area of forewing very broad at base ...*H. irregularis* n. sp.

——Costal area of forewing not so broad at base... 6.

6. Lower limb of the male genital appendages very short, not more than one third the length of the upper limb ... ...*H. humuli* L.

——Lower limb of the male genital appendages not much shorter than the upper limb ... ...*H. japonicus* n. sp.

Hemerobius humuli Linné.

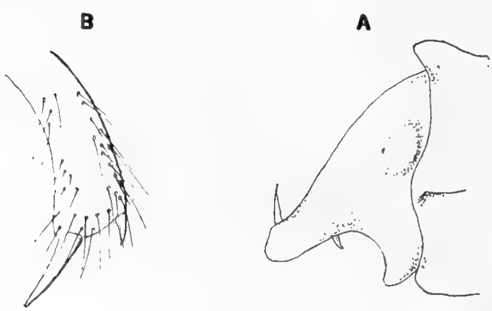
(Textfig. 2).

Hemerobius humuli L., Syst. Nat., x, p. 550 (1758); Burmeister, Handb. Ent., ii, p. 974 (1883); Walker, Cat. Neuropt. Brit. Mus., ii, p. 286 (1853); Hagen, Syn. Neuropt. N. Amer., p. 205 (1862); Banks, Trans. Amer. Ent. Soc., xxxii, p. 32 (1905); Navás, Rev. Russ. d'Entom., xii, p. 419 (1912).

Hemerobius castanæ Fitch, First Rep. Ins. N. Y., p. 94 (1855); Hagen, l.c., p. 202.

Hemerobius tutatrix Fitch, l. c.; Hagen, l.c., p. 202; Needham, N. Y. Mus. Bull. 86, pl. ii, fig. 1 (1905).

Head yellowish, somewhat suffused with whitish, with a red-brown stripe from each eye to mouth; palpi fuscous, the last joint of each palpus always blackish; antennæ yellowith, somewhat darkish at apex.



Textfig. 2.
Hemerobius humuli Linné, ♂.
A. Apex of abdomen, from side, ×15.
B. Apex of genital appendage, from above, ×30.

Prothorax yellowish or occasionally rather whitish, with red-brown leteral stripes. Meso- and metathorax dark brown with a broad median yellowish stripe.

Fore- and midlegs yellowish, accasionally slightly suffused with testaceous; hindleg pale yellow; tarsus terminally darkish in each leg.

Forewing hyaline; costal area not so broad at base; hind marginal and apical areas clouded with greyish in such a manner as to cause pale and dark spots alternately;

longitudinal veins pale yellow, spotted with brown rather evenly ; crossveins blackish, slightly margined with greyish ; a heavy dark brown spot on the crossvein connecting median and cubitus. Three radial sectors, of which the third is forked twice or three times before outer gradate series ; median is bent toward cubitus at connecting veinlet.

Hindwing with apical and hind marginal areas slightly tinged with greyish ; neuration mostly pale ; gradate veinlets mostly blackish.

Abdomen brownish on both dorsal and ventral sides. Genital appendage long, with two processes on apex, one long and the other very short ; lower limb very short, not more than one third the length of the upper limb.

Measurements :

Length of body	5— 7 mm.
Length of forewing	6.5—8.5 mm.
Width of forewing	3— 4 mm.
Length of hindwing	5.5—6.5 mm.

Habitat : A large series of specimens from the following localities are in my collection :

Kyoto, March and April, '14, Mr. A. Nohira coll.

Osaka, July, '14, Mr. A. Nohira coll.

Akakura, Prov. Echigo, August, '14, Mr. A. Nohira coll.

Nikko, July, '14, the author coll.

Sapporo, Hokkaido, Mr. H. Okamoto coll.

So far as I know, this species is here recorded from Japan for the first time. It is known also from Europe, Siberia and North America.

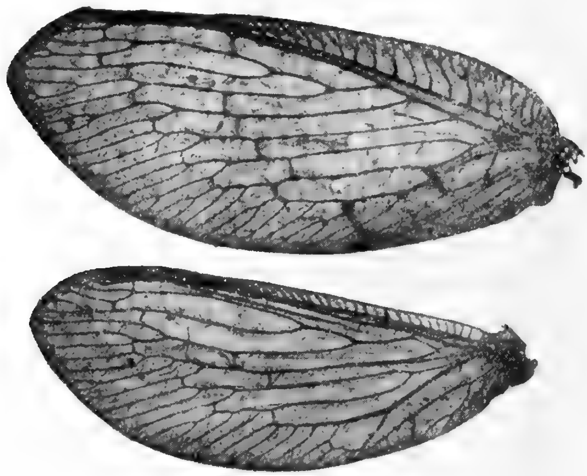
Hemerobius japonicus n. sp.

(Textfig. 3 and 4).

Body yellowish. Head pale yellow with genæ and both sides of vertex blackish ; maxillary palpus blackish ; labial palpus testaceous yellow with blackish apical joint. Antennæ yellowish, somewhat darker at apex.

Prothorax pale yellow with both sides narrowly variegated with light brown, trace of brown also on the sides of meso- and metathorax. Legs pale yellow; tibia I and tarsi of all legs somewhat brownish.

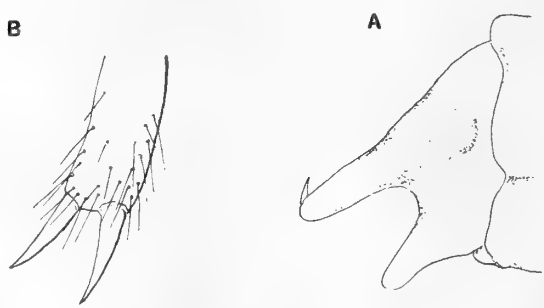
Forewing hyaline, similarly marked with greyish as in *H. humuli*, but the veins, which are pale yellow, are somewhat less minutely spotted with fuscous black; many greyish spots in discal area, sometimes becoming united together and forming several imperfect wavy streaks running across the wing. Three, very rarely four, radial sectors; the 3rd sector with two, occasionally three, branches before outer gradate series.



Textfig. 3.
Wings of *Hemerobius japonicus* n. sp., ×8.

Hindwing rather broad, colorless and hyaline, with pterostigmatic region pale brown. Neuration pale; radial sector fuscous at end; crossveins blackish.

Abdomen greyish fuscous above, under side commonly yellowish. Male genital appendage deeply furcate, *i. e.*, the lower limb of the appendage prolonged to a length much longer than half



Textfig. 4.
Hemerobius japonicus n. sp., ♂
A. Apex of abdomen, from side, ×15.
B. Apex of genital appendage., from above, ×30.

of the upper limb; upper limb of the appendage long and provided with two processes of nearly same length at apex.

Measurements:

Length of body	...5.5—6.5 mm.
Length of forewing	...7.5— 8 mm.
Width of forewing	ca. 4 mm.
Length of hindwing	...6.5— 7 mm.

Habitat: I have in my collection a large number of specimens of this species from the following localities:

Tokyo, April, '12, the author coll.

Inokashira near Tokyo, April, '14, the author coll.

Mt. Takao, Prov. Musashi, September, '14, the author coll.

Nikko, July, '14, the author coll.

Kyoto, April to August, '14, Mr. A. Nohira coll.

Osaka, Mr. Teranishi coll.

Gifu, April to August, '14, Mr. S. Yamamura coll.

Remark: This species closely resembles in general appearance *H. humuli L.*, *H. marginatus Steph.*, *H. greeni* Banks, *H. Eatoni* Morton, ***H. pacificus*** Banks, etc., but male genital appendages of this species are structurally quite different from those of any other species.

Hemerobius nigricornis n. sp.

Blackish. Head black with an irregular w-shaped yellowish mark above; frons entirely black; upper part of genæ narrowly marked with yellowish; maxillary palpi fuscous, apical joint small and pale; antennæ blackish or fuscous black, with the basal joint deep black.

Prothorax black with a narrow median yellowish fascia above; a small yellowish spot on each side of the median fascia. Meso- and metathorax fuscous black with an interrupted pale median band above.

Legs yellow; coxae deeply variegated with dark brown; femora and tibiæ of most legs marked with greyish at their extremities; end of tarsi and claws fuscous black.

Forewing moderately broad, slightly tinged with dark grey; an irregular blackish fascia along cubital vein; inner marginal and apical areas irregularly clouded with greyish; gradate series of crossveins broadly margined with greyish; a blackish spot at base of each radial sector; pterostigmatic region dark yellow. Neuration mostly black, many times interrupted by pale spaces; three radial sectors, of which the 3rd is provided with three, rarely two, branches before outer gradate series.

Hindwing very slightly tinged with greyish; pterostigmatic region brownish yellow; radial sector with two branches before outer gradate series.

Abdomen fuscous black on both dorsal and ventral sides; pleuram yellowish. In the male, upper division of genital appendage brownish yellow with its apex provided with a short testaceous spine; lower division very slender and almost blackish, with a long needle-like colorless process at apex.

Measurements:

Length of body	7—7.5 mm.
Length of forewing	8—8.5 mm.
Width of forewing	3.5 mm.
Length of hindwing	7—7.5 mm.

Habitat; Of this species there are in my collection many specimens from the following localities:

Sapporo, Hokkaido, Mr. H. Okamoto coll.

Mt. Eizan, near Kyoto, May, '14, Mr. A. Nohira coll.

Gifu, Mr. S. Yamamura coll.

Chūjenji, Nikko, July, '14, the author coll.

There exists a single female specimen, captured at Natsusawa-tōge, Prov. Shinano by Mr. Chino, in the collection of the Agricultural College, Tokyo Imperial University. It was kindly shown me by Dr. T. Miyake.

Hemerobius striatus n. sp.

Head yellow with a black spot between antennæ; clypeus somewhat paler; genæ blackish; palpi fuscous black, end of maxillary palpus somewhat yellowish; antennæ yellowish, somewhat darker at apex.

Prothorax piceous with a narrow yellowish median band above. Mesothorax yellowish, suffused with fuscous on lateral sides. Metathorax nearly entirely fuscous.

Legs yellow, very slightly suffused with fuscous; apical tarsal joint of each leg darkish.

Forewing rather broad, slightly tinged with fulvous brown in marginal area; piceous spots on cubital vein and inner gradate veinlets, which are themselves blackish and are margined with piceous, form an irregular curved line on posterior border of discal area. Neuration pale yellow, those in discal area blackish; subcosta also blackish; radius striped with blackish; pterostigmatic region brownish. Three radial sectors; the 3rd sector with two branches before outer gradate series; two series of gradate veinlets in rather irregular arrangement.

Hindwing slightly tinged with fulvous brown in apical and hind marginal areas; costal area darkish beyond middle; pterostigmatic region brownish, more or less suffused with blood-red. Veins fuscous black, most of them yellowish at base; cubitus stout and blakish.

Abdomen blackish on both dorsal and ventral sides; somewhat yellowish at apex.

Measurements:

Length of body	8 mm.
Length of forewing	10 mm.
Width of forewing	3.5 mm.
Length of hindwing	9 mm.

A single female specimen, captured by myself on the shore of Lake Oze, Prov. Kōzuke, on August 1st, '13, is in my collection.

Hemerobius irregularis n. sp.

Head pale yellow with a fuscous black mark on each gena; vertex somewhat fuscous; antennæ pale yellow, with a few paler basal joints and somewhat brownish terminal joints.

Prothorax with a rather broad fuscous stripe on each side. Mesothorax sulphurate yellow, striped with brown on each side.

Legs pale ; tibiæ I and II somewhat darkish ; tibia III darkish at apex; tarsal joints of all legs variegated with ochraceous yellow.

Forewing rather broad, moderately rounded at apex, hyaline ; hind marginal area with alternate streches of pale and fuscous ; a darkish streak exists in the space between 1st and 2nd radial sectors, beyond inner gradate series ; neuration pale yellow, marked rather evenly with brown; gradate veinlets fuscous black, narrowly margined with fuscous. Costal area very broad, but not over five times the length of veinlet connecting subcosta and radius; costal crossveins furcate; three radial sectors. In the type specimen the third sector of right wing gives off four branches before outer gradate series, while on the left wing the second sector is forked before inner gradate series and the third shows only three branches before outer gradate series ; median slightly bent toward cubitus at connecting veinlet.

Hindwing hyaline and colorless ; neuration pale yellow, anal veins terminally blackish ; radial sector with three branches before outer gradate series.

Abdomen darkish yellow on both dorsal and ventral sides. Female has stout subgenital plate, which is, when seen from below, tongue-like in shape.

Measurement :

Length of body	7 mm.
Length of forewing	11 mm.
Width of forewing	4.5 mm.
Length of hindwing	9 mm.

A single female specimen captured by Mr. A. Nohira at Akakura, Prov. Echigo, on August 3, '14, is in my collection.

Remark : This species is of much interest on account of its close resemblance to *Megolomus* in several respects, f. i. in the very broad costal area of forewing, etc.

Hemerobius Shibakawæ n. sp.

Head pale yellow, a blackish stripe from each eye to mouth ; brownish behind eye ; antennæ yellowish somewhat brownish toward apex.

Prothorax pale yellow, slightly brown on each side ; anterior portion of the brown space strongly suffused with darkish. Meso- and metathorax nearly uniformly yellowish. Legs pale yellow.

Wings hyaline, venation pale yellow. Forewing rather distinctly marked with numerous wavy brownish lines running across the wing ; median not bent toward cubitus at connecting veinlet ; three radial sectors, the third forked three or four times before outer gradate series ; upper branch of the third sector forked before inner gradate series, lower branch simple.

Hindwing without marking, except in pterostigmatic region which is light yellow.

Abdomen yellowish. In the male, 9th dorsal segment produced triangularly at hind margin ; genital appendage not forked, the apex furnished with a short stout process.

Measurements :

Length of body	6 mm.
Length of forewing	7 mm.
Width of forewing	3 mm.
Length of hindwing	6 mm.

A pair (♂ ♀) captured by Mr. M. Shibakawa at Akakura, Prov. Echigo, on July 30, '14, and a female specimen captured by Mr. A. Nohira at the same locality on August 7, '14, are in my collection.

Remark : Besides the three specimens just referred to, there is further a female specimen captured by the author at Nikko, July 18, '14, which closely resembles this species, but differs from it in having the wing-markings much restricted and the basal two abdominal segments deeply variegated with black on dorsal side. I think the specimen should be looked upon merely as a variational form of the species, so at least until contradictory evidences can be produced.

Hemerobius nitidulus Fabricius.

Hemerobius nitidulus Fabr., Ent. Syst., ii, p. 83 (1798); Walker, Cat. Neuropt. Brit. Mus., ii, 296 (1852).

Hemerobius Harmandinus Navás, Rev. Russ. d'Entom., ix, p. 395–96 (1910).

Head fuscous brown ; face somewhat darkish ; vertex fuscous ; maxillary palpi fuscous black ; antennæ fuscous black, somewhat darker toward apex.

Prothorax yellowish, suffused with fuscous. Meso- and metathorax brownish yellow, more or less suffused with darkish above.

Legs yellowish ; entire foreleg and tarsal joints of other legs rather testaceous ; tibia III fusiform.

Forewing tinged with brownish yellow, with a broad ill-defined longitudial hyaline band in discal area ; a fuscous cloud exists along the anterior border of the hyaline band, extending from disk to apex of the wing. Neuration yellow, minutely dotted with fuscous black ; two series of gradate veinlets complete and are commonly margined with greyish ; three radial sectors, of which the 3rd gives off two branches before outer gradate series.

Hindwing slightly margined with yellowish, and sometimes showing a darkish clouding as in forewing ; neuration pale yellow, not dotted with blackish.

Abdomen fuscous, much suffused with yellowish. Genital appendage of the male not forked, but very long, slender and somewhat dilated at apex.

Measurement :

Length of body	5 mm.
Length of forewing	7 mm.
Width of forewing	3 mm.
Length of hindwing	5 mm.

Habitat : Tsuchiura, Prov. Hitachi, two female specimens, the late Mr. S. Kimura coll.

Kyoto, a pair (♂ ♀), Mr. A. Nohira coll.

Gifu, a single male, Mr. S. Yamamura coll.

Uwajima, Prov. Iyo, a single female specimen, Mr. S. Arakawa coll.

Remark: The Japanese form described by Navás (l. c.) under the name of *H. Harmandinus* and the European form *H. nitidulus* are, in my opinion, not specifically separate. Comparing the two forms, I find that the Japanese form slightly differs from the European in having a fuscous cloudy fascia on forewing, but this can scarcely be of sufficient weight to base specific distinction upon.

Genus ***Micromus*** Rambur.

Micromus Rambur, Hist. Nat. Neuropt., p. 416 (1842); Hagen, Syn. Neuropt. N. Amer., p. 198 (1862); Banks, Trans. Amer. Ent. Soc., xxxii, p. 44 (1905); Needham, N. Y. S. Mus. Bull. 86, p. 16 (1905); Banks, Proc. Ent. Soc. Wash., xi, p. 76 (1909); Banks, Trans. Amer. Ent. Soc., xxxix, p. 216 (1913).

The genus *Micromus* includes numerous species which widely deviate in structure from the original genotype. I now propose to restrict the range of *Micromus*, as indicated by the following definition.

Forewing narrow with outer margin not excised; costal area narrow, especially so at base; humeral crossvein not recurrent; three or four radial sectors; two series of gradate veinlets; median runs into cubitus before origin of 1st radial sector. Hindwing narrow with two series of gradate veinlets; median runs into cubitus; branches of upper cubitus run into a vein parallel to hind margin of the wing.

Type: *M. variegatus* Fabr.

Of this genus, two species occur in Japan:

Forewing with many distinct blackish markings *M. pulchellus* n. sp.
Forewing without such marking, but with fuscous spots on neuration and greyish tinge in hind marginal area ... ... *M. novitius* Nav.

Micromus pulchellus n. sp.

Head black, with three irregular yellowish spots above; genæ yellowish; frons and clypeus blackish, occasionally strongly suffused with yellow; palpi fuscous. Antennæ pale yellow at base, darkish at apex; the 1st joint spotted with black.

Prothorax short, blackish with its anterior margin and narrow median line above yellowish ; lateral margins somewhat pale.

Meso- and metathorax blackish, more or less suffused with yellowish ; scutum and scutellum yellowish.

Legs pale ; tibiæ I and II marked with black at base, at middle and at apex ; tibia III slightly marked with fuscous at apex ; tarsi somewhat yellowish, with the last joint fuscous black, claws fuscous black.

Forewing slender, hyaline, distinctly marked with blackish : a large mark at the inner side of pterostigmatic region, extending from costa to 1st radial sector ; an irregular and interrupted longitudinal streak, formed of spots, runs from inner marginal area to apical area ; many small spots at margins and in discal area. Neuration partly pale and partly black ; three radial sectors, the 1st with a branch before outer gradate series ; posterior branch of media and anterior branch of cubitus fused together for a considerable distance ; the two series of gradate veinlets very irregular in arrangement.

Hindwing shorter and narrower than forewing, with five blackish spots beyond middle of costal area, of which the two on both sides of pterostigmatic region are larger than others. Neuration mostly pale, rather blackish in apical area of the wing.

Abdomen fuscous, more or less suffused with greyish on dorsal and lateral sides ; apex yellow. In the male, the 9th segment very short ; seen from side, genital appendage somewhat oval in outline, and below it there is a small elevation from which two stout fuscous spines arise.

Measurements :

Length of body	4.5 mm.
Length of forewing	7 mm.
Width of forewing	2.5 mm.
Length of hindwing	5 mm.

Habitat ; Kyoto, May 14, '14 a single male specimen, Mr. A. Nohira coll.

Gifu, one female specimen and two male specimens, Mr. S. Yamamura coll.

Remark: This species is closely allied to *M. variegatus* Fab. of Europe, but can be distinguished from that species by markings on body and wings, size, etc.

Micromus novitius Navás.

(Pl. I, fig. 4).

Micromus novitius Navás, Rev. Russ. d'Entom., ix, p, 397 (1910).

Head yellowish with fuscous spots behind eyes and an arcuate fuscous mark before antenna; face yellow with two blackish spots on each side, more or less suffused with darkish on clypeus; palpi testaceous yellow, apical joint of maxillary palpus strongly suffused with fuscous; antennæ fuscous, yellowish in basal half.

Prothorax yellowish, with four indistinct fuscous spots above; lateral sides somewhat fuscous. Meso- and metathorax yellowish with a broad fuscous fascia on each side.

Legs yellowish; tibiæ fusiform; anterior tibia with a slight darkish mark near end; apical joint of tarsi darkish; spurs on tibia very short; claws testaceous, short, strongly curved.

Forewing elongate and very narrow; hind marginal area slightly tinged with fuscous; neuration mostly pale yellow, spotted and striped with fuscous; costa and subcosta nearly entirely pale yellow; costal crossveins pale yellow and mostly forked, but a few of those in basal part of costal area simple; four radial sectors, most of which are forked before outer gradate series; median and cubitus fused together for a considerable distance.

Hindwing hyaline and colorless, with neuration nearly entirely pale yellow; gradate series of crossveins blackish; lower branch of media runs into cubitus.

Abdomen testaceous, occasionally strongly suffused with yellowish; dorsal plate of the male short, subquadrate; ventral appendage, from which two small ovate apparatus arise, rounded and covered with yellowish hairs.

Measurements:

Length of body	6 mm.
Length of forewing	8 mm.
Width of forewing	2.5 mm.
Length of hindwing	7 mm.

Habitat: Osaka, a single male specimen, Mr. Teranishi coll.

Kusakimura, Prov. Harima, several specimens, Mr. S. Iguchi coll.

Gifu, three specimens, Mr. S. Yamamura coll.

Yanagawa, Kyushu, a single male specimen, Mr. Takamuku coll.

Remark: This species evidently hibernates in the adult condition, since most of the specimens in my collection were captured in late autumn and in early spring.

Genus ***Eumicromus*** n. gen.

=*Micromus* auct. in part.

Forewing broad with outer margin not excised; costal area narrow at base, without recurrent vein; 4—8 radial sectors; median commonly not confluent with cubitus, but connected thereto by one or two crossveins; very rarely the two veins are fused together for a short distance; two series of gradate veinlets. Hindwing rather broad, two series of gradate veinlets; median not running into cubitus; no vein runs parallel to hind margin of the wing for a long distance, and most branches of upper cubitus end at the margin.

Type: *Micromus numerosus* Navás.

There are six species of this genus known to me to occur in Japan. They may be distinguished as follows:

1. Forewing more or less tinged with brownish yellow ... ... 2.
——Forewing not tinged with brownish yellow... 4.
2. Forewing without marking ... ... *E. Arakawæ* n. sp.
——Forewing with some markings ... ... 3.
3. No marking on tibia I. ... ... *E. numerosus* Nav.

——Tibia I with distinct brown marks ... ... *E. angulatus* Steph.
4. Tibia I with distinct blackish marks ... ... *E. maculatipes* n. sp.
——Tibia I without mark ... ... 5.
5. Forewing with many dark markings besides fuscous spots on neuration ... ... *E. alpinus* n. sp.
——Forewing without marking excepting fuscous spots on neuration ... ... *E. dissimilis* n. sp.

Eumicronus numerosus (Navás).

(Pl. I. fig. 6).

Micromus numerosus Navás. Rev. Russ. d'Entom., ix, p. 396 (1910).

Head piceous yellow, with two small fuscous spots in lower parts of frons, more or less suffused with fuscous around base of antennæ; clypeus yellow, narrowly fuscous on both sides; palpi fuscous brown. Antennæ ferruginous; basal joint enlarged and variegated with fuscous; some terminal joints also fuscous.

Prothorax fuscous, somewhat yellowish in middle, beset with yellowish hairs. Mesothorax ferruginous yellow, much darker on lateral sides. Metathorax nearly entirely ferruginous.

Legs testaceous yellow, hind tibia somewhat paler; claws testaceous, long, strongly curved.

Forewing elongate and broad, slightly tinged with brownish yellow; neuration fulvous, many times interrupted by fuscous spaces; gradate series of crossveins blackish; posterior part of wing irregularly clouded with fuscous grey, especially densely in hind marginal area. Five to seven radial sectors; the 1st sector forked once or twice before outer gradate series; the last sector forked before inner gradate series. Median and cubitus not fused together, but connected with each other by three crossveins.

Hindwing colorless and hyaline with yellowish pterostigmatic region; neuration yellowish; outer gradate series blackish; radial sector almost always with five branches; median somewhat bent toward cubitus at connecting veinlet.

Abdomen fulvous brown, yellowish at apex; dorsal appendage of male very large, and covered with long hairs.

Measurements:

Length of body	6–8 mm.
Length of forewing	8.5–10 mm.
Width of forewing	3–3.5 mm.
Length of hindwing	7–9 mm.

Habitat: This is the commonest representative of *Eumicromus* in Japan. I have in my collection a large number of specimens of this species from the following localities:

Tokyo, October and November, '12, '13, the late Mr. S. Kimura and the author coll.

Osaka, August, '13, Mr. Teranishi coll.

Nikko, July, '14, the author coll.

Kyoto, March and October, '14, Mr. A. Nohira coll.

Gifu, March–May, '14, Mr. S. Yamamura coll.

Akakura, Prov. Echigo, August, '14, Mr. A. Nohira coll.

The shore of Lake Kizaki, Prov. Echigo, August, '14, Mr. A. Nohira coll.

Matsuyama, Prov. Iyo, Mr. Nagai coll.

Yanagawa, Prov. Chikugo, Kyushū, Mr. Takamuku coll.

Eumicromus Arakawæ n. sp.

Head yellow, somewhat suffused with piceous; palpi brown; antennæ brownish yellow, with two basal joints rather darkish.

Prothorax ferruginous yellow, with a broad blackish stripe on each side. Meso- and metathorax fuscous yellow; scuttellum rather ochraceous. Legs testaceous yellow; claws fuscous.

Forewing broad, hyaline, slightly tinged with brownish yellow, no marking. Neuration pale, excepting costal crossveins and subcosta which are somewhat fuscous; seven radial sectors, the 1st sector forked just before inner gradate series, the 7th sector forked beyond inner but before outer gradate series; crossveinlets in gradate series pale, regular in arrangement; median and cubitus connected with each other by three crossveins.

Hindwing hyaline and nearly colorless; pterostigmatic region very slightly tinged with brown; neuration pale; four branches to radial sector.

Abdomen fuscous brown with a narrow yellowish line on dorsal side. Dorsal appendage of the male very large, yellowish, with two minute tubercles on its posterior margin.

Measurements:

Length of body	4 mm.
Length of forewing	10 mm.
Width of forewing	4 mm.
Length of hindwing	9 mm.

A single male specimen (dried), captured by Mr. S. Arakawa at Uwajima, Prov. Iyo, in August, 1911, is in my collection.

Remark: This species is closely allied to *E. numerosus* (Navás), but differs from it in the markings on prothorax and forewing, and in the structure of male genital appendage.

Eumicronus maculatipes n. sp.

(Pl. I, fig. 5).

Head yellow with two arcuate black mark on vertex; occiput clouded with fuscous; frons pale, occasionally somewhat pinkish; clypeus pale yellow; genæ greyish yellow, blackish on anterior and posterior borders. Antennæ yellow, somewhat darkish beyond middle; the 1st joint very large, slightly variegated with grey; the 2nd joint black.

Prothorax yellow with two irregular longitudinal piceous lines above; anterior margin somewhat produced in middle and variegated with piceous; lateral sides piceous.

Mesothorax yellowish; praescutum with two fuscous spots on its anterior border; scutum with two fuscous spots on the sides; scutellum also spotted with fuscous. Metathorax yellowish with a large fuscous spot on both sides.

Legs pale; femur I slightly marked with greyish at end; tibiæ I and II distinctly marked with blackish at base, at middle and at end, thus forming three blackish rings on the joints; tibia III somewhat dilated at middle; tarsi yellowish or testaceous; apical joint of tarsi and claws fuscous black.

Forewing broad, hyaline; outer marginal area irregularly clouded with grey; neuration mostly pale, minutely spotted with greyish; gradate veinlets black, and margined with grey so as to form two irregular, oblique lines; a row of blackish spots along cubital vein. Seven or eight radial sectors; 1st sector forked before outer gradate series; posterior branch of median not fused with cubitus.

Hindwing hyaline; costal area slightly darkish beyond middle; apical area slightly tinged with greyish. Neuration mostly pale, blackish in apical area of the wing; outer gradate series blackish.

Abdomen fuscous grey, yellowish toward apex.

Measurements:

Length of body	♂6 (dried specimen)–♀8 mm.
Length of forewing...	8 („ „)– 9 mm.
Width of forewing	3.5 („ „)– 4 mm.
Length of hindwing	6 („ „)– 7 mm.

Habitat: Mt. Minomo near Osaka, a single female specimen (May, '14), Mr. T. Esaki coll.

Gifu, a single dried and somewhat mutilated male specimen, Mr. S. Yamamura coll.

Kyoto, three female specimens (October, '14), Mr. A Nohira coll.

Remark: Judging from the specimens on hand, the wing-markings of this species seem to be subject to much individual variation. While Gifu and Kyoto specimens have forewings strongly marked, the Minomo specimen shows much more restricted markings on forewing.

The species probably passes winter in the state of imago.

Eumicromus alpinus n. sp.

Head yellowish; clypeus somewhat piceous. Antennaæ also yellowish, the 1st joint enlarged, 2nd and 3rd joints nearly same in size and somewhat larger than remaining joints.

Prothorax yellowish (somewhat fuscous in dried specimen), with two blackish spots above. Meso- and metathorax yellowish, more or less suffused with fuscous.

Legs pale yellow, femora and tarsi somewhat fuscous.

Forewing rather broad with very slight greyish tinge; basal portion of posterior margin narrowly variegated with fuscous; three fuscous longitudinal streaks in outer marginal area, of which median one extends to discal area; an oblique fuscous line on each gradate series. Subcosta entirely pale, other veins mostly pale and many times interrupted by blackish or fuscous spaces; gradate series blackish, complete, and regular in arrangement; five radial sectors, the 5th sector with two branches before outer gradate series.

Hindwing somewhat narrow, not much shorter than the forewing; marginal area slightly tinged with greyish. Neuration mostly pale yellow; apex of subcosta and of radius fuscous; anal veins also fuscous; outer gradate series black and margined with darkish.

Abdomen fuscous (nearly blackish in dried specimen), yellowish at apex.

Measurements:

Length of body	8 mm.
Length of forewing	10 mm.
Width of forewing	4 mm.
Length of hindwing	9 mm.

Two specimens are in my collection: one male, dried and somewhat mutilated, captured by Mr. A. Nohira on Mt. Yatsugatake, Prov. Shinano, on August 5th, '14, and the other (♀ in alcohol) captured by the same gentleman on Mt. Tateyama, Prov. Ecchū, on July 30th, '14. Mt. Yatsugatake (2932 m. in height) and Mt. Tateyama (2985 m.) are among the highest mountains in central Japan.

Remark: This species is to a great extent allied to *Eumicromus paganus* (L.) and *E. angulatus* (Setph.), but is distinguishable from both these species in markings of body and legs, in coloration and markings of wings, etc.

Eumicromus angulatus (Stephens).

Hemerobius angulatus Steph., Cat. Brit. Ins., p. 312 (1829); Walker, Cat. Neuropt. Brit. Mus., ii, p. 292 (1853).

Micromus angulatus Hagen, Proc. Bost. Soc. N. H., xxiii, p. 280 (1886); Banks, Trans. Amer. Ent. Soc., xxxii, p. 45 (1905); Navás, Rev. Russ. d'Entom., xii, p. 420 (1912).

Head brownish above, somewhat yellowish on frons, palpi testaceous brown; antennæ testaceous yellow with basal two joints somewhat fuscous.

Prothorax pale brown, beset with testaceous hairs on sides. Meso- and metathorax also pale brown, with darker patches on lateral lobes. Legs yellowish, more or less suffused with brown; anterior tibia with brown marks on outer side; last tarsal joint and claws brownish.

Forewing rather broad, hyaline, slightly tinged with brownish, and indistinctly marked with wavy brown bands; hind marginal area with four brownish bands stretching out to the margin; inner marginal area not tinged with brown. Neuration pale, spotted with brown; crossveins entirely brown; the two gradate series even; four radial sectors forked just beyond inner gradate series; four sectors; the 1st sectors forked just beyond inner gradate series; the 4th sector forked just before outer gradate series; median connected to cubitus by two short crossveins.

Hindwing hyaline; pterostigmatic region slightly tinged with brownish. Neuration pale, excepting brown apex; gradate series of crossveins mostly pale and not margined with darkish.

Abdomen brown with yellowish hairs; somewhat yellowish at apex.

Measurements:

Length of body ... ... 4 mm.

Length of forewing ... ... 7 mm.
Width of forewing ... ... 3 mm.
Length of hindwing ... ... 6 mm.

Habitat: Sapporo, Hokkaido (four female specimens captured by Mr. H. Okamoto on October 11, '14).

Remark: This is known as the "mountain loving species" in Europe and also in North America, and was recently reported by Navas (l.c.) from Siberia. The Japanese specimens on hand differ somewhat from the European form in being slightly larger, and in the color of wings being to a degree lighter; nevertheless, all are without doubt specifically identical.

Eumicromus dissimilis n. sp.

Head yellowish with two small fuscous spots before antennæ. Antennæ yellow, with some terminal joints fuscous.

Prothorax yellowish with two small darkish spots anteriorly, lateral sides suffused with fuscous black. Meso- and metathorax also yellowish, more or less suffused with fuscous.

Legs pale; tarsi somewhat brownish.

Forewing rather elongate, hyaline; hind marginal area slightly tinged with greyish. Neuration mostly brownish yellow, spotted with fuscous; costa, subcosta, and most of costal crossveins pale; radius pale, many times interrupted by fuscous spaces; five or six radial sectors, the last sector with three branches before outer gradate series.

Hindwing colorless and hyaline; neuration mostly pale; all of inner and a few of outer gradate crossveins black.

Abdomen dark brown, strongly suffused with whitish. The 9th segment in the male very short; dorsal appendage rather short, rounded at apex; ventral appendage, from which a very slender testaceous apparatus arises, is large, hairly and rather triangular in shape.

Measurements:

Length of body ... ... 8 mm.
Length of forewing... ... ... 9–10 mm.

Width of forewing ... ... 3.5–4 mm.
Length of hindwing ... ... 7–8 mm.

Habitat : Sapporo, Hokkaido, a single female specimen, Mr. H. Okamoto coll.

Kyoto, a single female specimen, Mr. A. Nohira coll.

Gifu, two male and female specimens (in alcohol), Mr. S. Yamamura coll.

Remark : In wing-markings this species somewhat resembles *Micromus novitius* Navás.

Genus ***Oedobius*** n. gen.

Antennæ comparatively short. Legs rather stout.

Forewing broad and elongate, subacute but not falcate at apex, with all the veins very close together. Costal area very broad at base, with a recurrent vein ; costal crossveins branched and crossed ; some four or five crossveins between subcosta and radius ; a basal gradate series in addition to three series of discal gradate crossveins ; a little more than ten radial sectors, of which the 1st and the last give off a certain number of branches.

Hindwing with only one radial sector and two series of gradate veinlets.

Type : *Oedobius infalcatus* n. sp.

This genus is closely allied to *Drepanepteryx*, *Neuronema*, *Ninguta*, *Megalomus*, etc. It can at once be distinguished from *Drepanepteryx* in the forewing being not falcate at apex, from *Neuronema* and *Ninguta* in the radial sectors on forewing being exceedingly numerous, and from *Megalomus* in having four, istead of two, gradate series of crossveins on forewing.

Oedobius infalcatus n. sp.

Head fulvous, somewhat paler on clypeus ; palpi fuscous ; antennæ fuscous black, with basal two joints yellowish.

Prothorax fulvous, somewhat suffused with fuscous and covered with long fulvous brown hairs ; vertex with two triangular dark marks in its anterior portion. Meso- and metathorax dark fulvous, with an irregular and interrupted median stripe above.

Legs fulvous, somewhat brownish on tarsal joints ; claws piceous, long, and strongly curved.

Forewing elongate at apex, tinged with brownish yellow especially strongly in hind marginal area ; an ill-defined darkish streak runs from discal area to the apex of the wing ; costal area with a long, hyaline line running parallel to costa ; pterostigmatic region rather pinkish ; hind margin of the wing with alternate brown and yellow small patches. Neuration mostly fulvous brown ; gradate veinlets mostly marked with blackish, some of those in outer two series whitish and marked with hyaline spots.

Hindwing hyaline and slightly tinged with dark brown, excepting basal and discal areas which are colorless ; pterostigmatic region distinctly pinkish. Neuration fulvous brown ; gradate veinlets nearly colorless ; anal veins fuscous.

Abdomen brownish, with broad yellowish lateral stripes ; the last segment rather yellowish and covered with short concolorous hairs.

Measurements :

Length of body	11 mm.
Length of forewing	14 mm.
Width of forewing	5 mm.
Length of hindwing	12.5 mm.

The type is a single female specimen captured by Mr. A. Nohira at Kyoto, on August 8, 1914.

Genus ***Ninguta*** Navás.

Ninguta Navás, Rev. Russ. d'Entom., xii, p. 420 (1912).

Wings exceedingly broad with all the veins very close together. Costal area of forewing very broad at base, with one recurrent vein and many branched costal crossveins ; three series of gradate veinlets ; five, four, or occasionally three radial sectors. Hindwing with two series of gradate veinlets.

Contains but one species—*Ninguta deltoides* (Navas).

This genus is closely allied to *Neuronema*, *Megalomus*, *Drepanepteryx*, etc. It differs from *Neuronema* in having fewer radial sectors, from *Megalomus* in having three series of gradate veinlets in forewing, and from *Drepanepteryx* in the forewing being not falcate at apex.

Ninguta deltoides (Navas)

Megalomus deltoides Navás, Rev. Russ. d'Entom., ix, p. 397, fig. 1 (1910).
Ninguta deltoides Navas, l.c., xii, p. 420 (1912).

Head fulvous with a π-shaped fuscous mark on vertex; palpi yellowish, last joint of maxillary palpus fuscous black. Antennæ yellowish, more or less suffused with fuscous; basal joint enlarged and spotted with fuscous.

Prothorax ferruginous, covered with long yellowish hairs, with two blackish longitudinal stripes above. Meso- and metathorax also ferruginous, irregularly irrorated with fuscous.

Legs yellowish; femur I with a fuscous mark near its end; tibia I with two distinct blackish marks; tibia II with a blackish mark in middle.

Forewing broad, tinged with light fuscous; apical and hind marginal areas densely clouded with fuscous; a distinct deltoid white mark at the middle of hind marginal area. Neuration yellowish, spotted and striped with fuscous; costal crossveins branched; 3–5 radial sectors; gradate veinlets blackish; outer gradate series runs almost parallel to the outer magin of the wing.

Hindwing hyaline, with marginal area slightly tinged with fuscous; pterostigmatic region fuscous brown; neuration mostly yellowish.

Abdomen ferruginous, somewhat fulvous at apex. The last ventral segment of the male hairly, and produced into a large subgenitalplate.

Measurements:

Length of body	8–9 mm.
Lengh for forewing	11–13 mm.
Width of forewing	about 5 mm.
Length of hindwing	9–10 mm.

Habitat: There exists in my collection a single female specimen captured by Mr. M. Shibakawa at Akakura, Prov. Echigo, in July, '14. Mr. A. Nohira has also captured three male specimens of this species at the same locality in August, '14, and has kindly sent them to me for examination.

According to Navas,[1] the species occurs also in Siberia.

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1) Rev. Russ. d'Entom,, xii, p. 420 (1912).

Explanation of Plate I.

1. *Neurorthus punctatus* n. sp. × 10.
2. *Sympherobius tessellatus* n. sp. × 6½.
3. *Notiobiella subolivacea* n. sp. × 8.
4. *Micromus novitius* Navás × 8.
5. *Eumicromus maculatipes* n. sp. × 9.
6. *E. numerosus* (Navás) × 7.

The Fate of the Peristomal Mesoderm and the Tail in Petromyzon[1]

By

S. Hatta.

Except my two papers (91, 07) we have had no publication which deals with the peristomal mesoderm in *Petromyzon.* Basing upon his observations in Amphibia, Mollier (06) asserts that in *Petromyzon* that colossal mass of vascular cells which appears under the enteric canal, is derived from the yolk cells[2] and from a portion of embryonic tissue which I have identified (91) with Rabl's peristomal mesoderm in Selachii.

The assumption of Mollier is, however, not correct. The vascular cells are derived from certain parts of the mesoderm established (Hatta, 14a; Keiser, 14). No part of the peristomal mesoderm is resolved into the vascular cells, but it represents a temporary stage by which the micromeric layer round the blastopore develops into the gastral mesoderm. To make intelligible the accounts given in the following pages, the process, about which the peristomal mesoderm is called in existence, will briefly be stated below.

During the invagination the blastoporic lip is raised into a ridge describing an arc which is most prominent at the mid-dorsal point of the lip and grows lower towards both the arms of the arc (Hatta, 07, fig. 7c.) which occur along the lateral lips. On sagittal and frontal sections it is

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1) *Lampetra mitsukurii,* Hatta.

2) In spite of their entodermic origin, the cells of this lot are regarded by the author as the *mesodermal.* According to his assumption, the free cells have destination to form the ventral portion of the mesoderm, but they are directly converted into the vascular cells, jumping over the process, by which the epithelial mesoderm is produced.

obvious that the prominence of the ridge depends partly upon the depth to which the macromeric surface of egg embraced by the two arms of the ridge sinks in, but mainly on the extent to which the micromeric layer folded and grows inwards. At the middle part of the arc where the ridge is most prominent, the ingrowth of the micromeric layer is greatest in extent and becomes less as we proceed towards the extremities of both the arms of the arc, until at last the layer does no longer grow inwards.

By stages the ridge extends ventrally, so that its extremities on both sides are brought nearer and finally meet with each other at the middle point of the ventral blastoporic lip, while the mocromeric surface of egg is depressed and is surrounded by the ridge all around. At the same time the ridged lateral lips shift so as to approach one another and the median line, and as a consequence the arc is converted into an equilateral triangle whose apical angle represents the dorsal blastoporic lip. This angle is not acute, but takes the form of a rounded notch (Hatta, fig. 9c).

The notch passes, on one hand, gradually into the dorsal groove[1] running lengthwise on the dorsal median line and leads, on the other, into the archenteron which is at first very short, but becomes longer by degrees.

The dorsal and the lateral lips of the blastopore are not stationary, but *grow posteriorly*, as the following facts make evident.

In the first place, as time goes on the archenteric pocket is deepened. In consequence the roof of the cavity is added to in the direction of its long axis. The outer layer which covers the archenteric roof, the ectoderm, undergoes, of course, the parallel anteroposterior extension. In the second place, the blastopore is reduced by stages, i.e. the lateral lips of its shortened. (Hatta, 07, figs. 8c, 9c, 10c). As the ventral blastoporic lip is stationary so long as both the ridged arms of the lateral lips are prolonged to meet, on the median point of the ventral lip, it is obvious that the reduction of the blastopore is carried on from before backwards.

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1) This groove is identical with the "Rückenrinne" of German authors, or the primtive groove in higher Craniota.

In short, *the outer and inner layers roofing over the archenteron in front of the dorsal blastoporic lip are added to by the posterior growth of the dorsal and lateral lips, by which the blastopore is reduced.*

During the reduction of the blastopore, in the inner layer which passes round the blastoporic lips into the outer layer, can therefore always be distinguished three divisions: the median stem in front of the dorsal blastoporic lip and two limbs behind it, which latter constitute what is known as the *peristomal mesoderm.*

This process of reduction must not be mistaken for the so called "concrescence." The median stem is not brought about, as one might assume, by coalescence of the two posterior limbs, but both the divisions are the product of one and the same process: the blastoporic lips grow along their whole extent in reducing the blastopore[1]. The limbs become apparent, because the growth commences its work at the mid-dorsal point of the lip and proceeds both sides towards the lateral lips, so as to produce in the latter part the posterior limbed division, and because in the subsequent growth is kept the similar difference of progress concerning the dorsal and lateral sections of the lip. The occurrence of the peristomal mesoderm is, therefore, due to nothing but the delay which is displayed by the lateral and ventral sections of the blastoporic lip in their growing.

The last remnant of the blastopore, which alone is regarded by all other observers as the blastopore, is raised up all around the ridge. Only the dorsal lip is indented to a rounded notch which is dorsally shallowed out into the dorsal groove.

The overgrowth of the blastoporic lip, by which the blastopore is

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1) This fact is in parallel with the discovery by MacBride (07) in Amphioxus. The author pointed out the nuclear structure which is quite different according as the ecto- and entoderm and therefore, by which the two germinal layers can fairly be put from each other.
I was fortunate enough by his kindness to have looked through the series of sections through Amphioxus embryos in his possession and to have confirmed his account. This discovery affords the direct and so strong positive evidence for the reduction of the blastopore by the growth of its lips, that there is hardly room for assumption of the concrescence. In spite of my efforts, I could detect in Petromyzon neither the parallel fact nor any other cytological difference between the roof of the archenteron and the ectoderm over it, although Lwoff (94) distinguish them by the size of yolk-granules, etc. from each other.

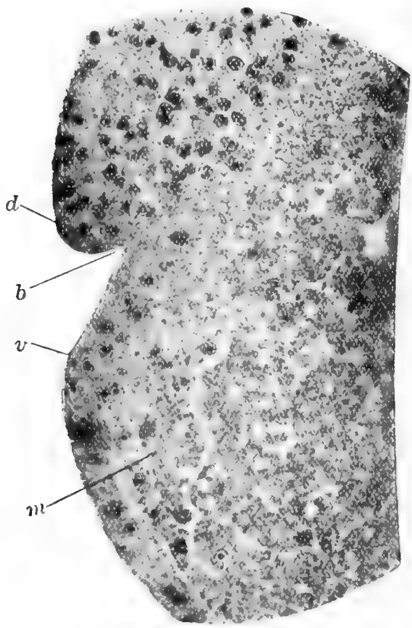
reduced and finally closed, is founded by further differentiation of one of the two layers brought about by the overgrowth. While the outer layer of the two, the ectoderm, thickens itself to the medullary plate, the inner layer, the entoderm, roofing over the archenteron, differentiates into the chorda and into the mesoderm. In the cephalic region, where the archenteric roof is broad enough to be folded, the mesoderm is formed by the folding of the layer, but, as the roof is narrower according to the narrowed lumen of the archenteron towards the hind extremity of the embryo, the lumen of the mesodermal pocket is gradually obliterated in this direction. In the posterior largest section of the body the mesodermal folding of the archenteric roof is performed by cell-proliferation taking place on either side of the rudiment of the chorda and is indicated merely by the position of the nuclear spindle of cell division which shows that the produced cells are being put into a layer folding, on cross-sections, like that done by the true folding. The mesectoderm, whether it is formed by folding or by proliferation, is wedged in between the enteroderm and the entoderm. The median part of the latter is thickened to the medullary plate, wherever this is pronounced. The hindmost portion of the peristomal mesoderm is, just before the complete closure of the blastopore, wedged in between the enteroderm, the yolk-cells, and the ectoderm forming the ventral blastoporic lip (Photogram 1*a*.)

Before the blastopore is completely closed, the hindermost portion of the peristomal mesoderm undergoes peculiar changes. The outer layer of the ventral blastoporic lip, which can now distinctly be designated as the ectoderm, sinks in and gives rise to a short, median, longitudinal slit, the *proctodaeum*. Now, the circular lip of the blastopore is divided by the dorsal notch and by the ventral proctodaeal indentation into the right and left wings. Then follows the stage, in which the wings are turned up, so as to be raised almost into horizontal position instead of the vertical which they had until then assumed. By this change the dorsal median notch on the lip is reduced so as to form the anterior corner of a fine slit. The hindermost portion of the peristomal mesoderm, which is put inquestion, is accordingly divided by the invaginated proctodaeum, and each half of it is contained in each wing. The wings are, as I assume, to be compared with the tail lobes of the Selachian embryos. The tail lobes remain for a time separated, as revealed on transverse sections, but they ultimately coalesce in the dorsal median line with each other, and the rudiment of the tail is produced by this process. The coalescence goes on from before backwards.

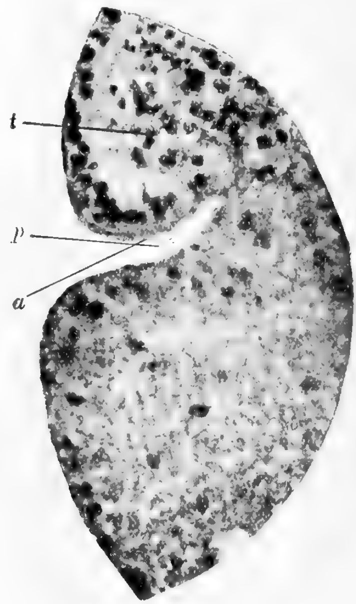
The assertion is, therefore, justified, that the slit separating the tail lobes corresponds to the *neurenteric canal* of other vertebrates, for it stands in direct connection with the *dorsal groove* in the medullary plate. Accordingly it may further be true, that the neurenteric canal does not occur only at the completion of gastrulation, but it exists during the whole process of gastrulation, being represented by the notch on the dorsal lip of the blastopore.

It is probably the coalescence of the tail lobes, that led Eyclethymer (02) and Selys-Longchamps (10–11) to the conclusion that in *Petromyzon* the concrescence occurs only in a small extent of the hindermost portion of the body. The conclusion is, however, not correct, the coalescence in question represents indeed the last phase of the growth of the blastoporic lips, by which the blastopore is closed. And this is the reason why the tail lobes which lie close to each other, are not at once fused together along their whole extent, but the coalescence is carried on from before backwards. In short, by the growth of the dorsal lip the notch or slit is obliterated. After the finished coalescence there is left, therefore, no suture which ought possibly to be marked at least by arrangement of the cells or by some other structural peculiarities, if the tail lobes were actually fused.

The hindermost portion of the proctodaeum persists as the *permanent anus*, while the remainder is closed from the exterior by re-fusion of the edge of the slit. The very short proctodaeum is, on one hand, communicated with the hind end of the enteric canal and, on the other, it opens exterior by the anus. At its junction with the enteric canal, the proctodaeum is widened to a bursa, which is subserved as the best criterion for the established prectodaeum and anus.



a



b

Photogram 1*a*. Median sagittal section through an embryo with 12 mesodermic somites.

Photogram 1*b*. Median sagittal section through an embryo with 17 mesodermic somites.

a. anus. *b*. blastopore. *d*. dorsal lip of blastopore. *m*. ventral part of peristomal mesoderm. *p*. proctodaeum. *t*. tail-bud. *v*. ventral lip of blastopore.

The changes standing in question are observable in an embryo of the fourth day, which is provided with about seventeen somites and can externally be distinguished from younger embryos by the following characteristics (Photogram 1). The dorsal portion of the hind end of the embryo, beyond which, in foregoing stages, the ventral portion protrudes (*a*), shows by this stage a characteristic feature in being produced posteriorly, so as to overhang the ventral portion and the anal opening, looking hindwards (*b*). *The produced hind extremity of the embryo, which is resulted from the coalescence of the tail lobes, constitutes the commencing postanal section of the body, i.e. the rudiment of the tail.*

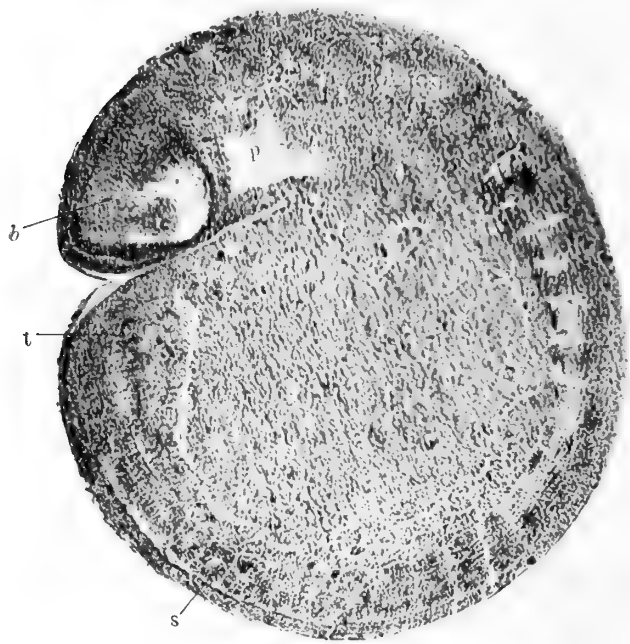
Since the publication of the notable paper by Max Schultze (56), all the previous observers of *Petromyzon* maintain the persistence of the blastopore as the permanent anus. Among them Goette (90) alone followed with great caution the development of the hind extremity of the embryo. But overlooked the ventral portion of the peristomal mesoderm as well as the changes of the structure in connection with the proctodaeum and with the rudiment of the tail, he comes again to the conclusion, that the hind corner of the blastopore remains unclosed and constitutes the permanent anus.

The produced dorsal lip of the anus remains for a very long time externally unchanged, until it begins on the fourteenth day to grow into the conical tail. Very peculiar and interesting is the development undergone in these ten days by the contents of the first rudiment of the tail, which will for the sake of convenience of reference be called the *tail bud.*

The tail bud is formed from the hindermost portion of the peristomal mesoderm which has now completely passed the dorsal surface of the enteric canal and constitutes the hindermost part of the above mentioned median stem of the inner micromeric layer. Anteriorly it passes into the chorda and is, on either side of it, continuous with the gastral mesoderm, while at the posterior end of the rudiment of the tail it is connected with the ectoderm which thickens to the medullary cord, and with the posterior extremity of the enteroderm, which differentiates into the epithelial postanal gut.

The differentiation, which the rudiment of the tail undergoes during the above mentionded ten days, is almost absolutely confined to its internal structure. Vigorous differentiation of the indifferent tissue of the tail bud is observed in the course of this long period. The products of the differentiation do not contribute to the development of the tail, but give rise to trunk somites and add to the length of the chorda in the trunk. The ectoderm and its medullary thickening undergo parallel growth with the mesoderm and chorda.

On the contrary the enteroderm in the mid- and hindgut region, the largest ventral part of which is in early stages nothing more than a spherical mass of the yolk-loaded cells, is very slow to be differentiated. This mass of yolk-cells in development lays much behind the above mentioned dorsal organs (such as the mesoderm, the chorda, and the medullary cord), so that this part of the em bryo when seen from the side is later almost completely surrounded by the narrow dorsal zone formed of the latter group of organs and so the anal opening is brought under the crooked head protuberance, so as to be concealed by the latter. This peculiar feature of the embryo is seen in early part of the fourth day. In such an embryo as that just mentioned, therefore, the body-axis describes a complete circle (Photogram 2). The spherical belly of the embryo is by degrees reduced in thickness, and the body is prolonged, so that the head is wound spirally and is found at last resting either on the right or on the left side of the body; the body-axis describes now a spiral line.



Photogram 2. Sagittal section through the proximal part of mesoderm of an embryo with 27 mesodermic somites.
b. fore brain. *p.* pharynx. *s.* mesodermic somite. *t.* tail-bud.

Subsequently the body is so prolonged as to be turned twice in spiral, until on the thirteenth day the embryo breaks the chorion and is hatched out. A just hatched embryo which lies flat on its right or left side on the bottom of the vessel, is bent in a large curve, except its hind end which is crooked like a hook as in a leech. The spiral winding of the body shown in later intrachorion life is accordingly caused very little by the unequal anteroposterior growth of the dorsal and ventral organs, but is due largely to the insufficient space enclosed by the chorion.

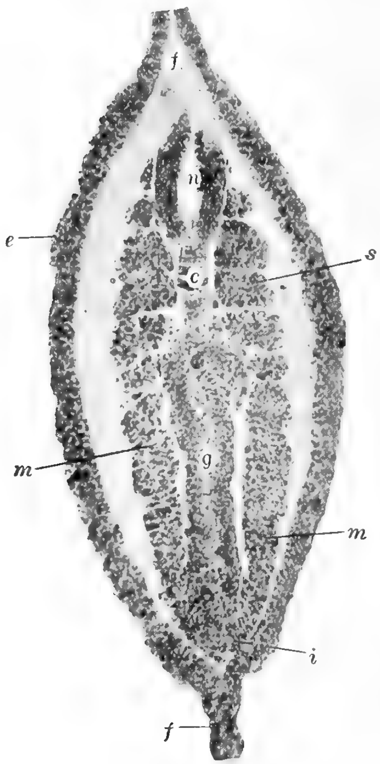
It is only on the fourteenth day, that the enteric canal formed of the enteroderm develops so as to be reduced into a slender tube and becomes equal in length to the dorsal series of organs. The body is now stretched out, and its axis straightened, while the rudiment of the tail no longer looks downwards, but projects posteriorly along the main axis of the body and commences to grow. Only the hindmost section of the enteric canal remains permanently bent downwards and is to be designated as the *anal gut*.

The assertion is, therefore, justified that the growth of the enteroderm, i.e. of the enteric canal, which has been delayed ever since the formation of the blastula (see Hatta, 07), is accelerated at about the fourteenth day. It follows that the more than twenty mesodermic somites which had been added in the course of the previous ten days (from the fourth to the fourteenth day), and the prolongation of the chorda, which took place in the same interval of time, are not caudal, though they appear to be the product of the tail bud, but belong from the first to the trunk. The mesodermic somites and the chorda belonging to the tail are formed only after this period. The account given by Goette (90) that the caudal somites are shifted into the trunk, is accordingly not correct; for they are not yet formed at the stage spoken of.

I mention in particular this fact, because between the mesodermic somites in the trunk and those in the tail there is at this stage a marked contrast: in the former series the pronephrotomes are converted either into the pronephric tubules or into the segmental duct (see Hatta, 00), whereas in thelatter series, which appears later, this is not the case.

By the fourteenth day the tail appears as an external growth. The medullary cord which comes first under consideration, is cut off already in the course of the thirteenth day from the epidermal ectoderm which is folded to give rise to the median fin, but retains its connection with the tail bud, from which it is sharply marked off by the protoplasm of its component cells less stained than that of the cells composing the latter.

The indifferent elements in the tip of the tail, which constitute the tail but, are differentiated into the chorda and the caudal somites. The cell division, by which the cells of the tail bud are multiplied, is by stages, diminished in its activity. Accordingly the somites and chorda formed out of them are diminished by stages, i.e. from before backwards, in thickness. In a larva about thirty days old, in which the postanal gut has a long time ago been altogether degenerated (see below), the tail bud attains almost its limit of growth; for in a larva a little further advanced, no trace of the tissue constituting the organ can any longer be detected.



Photogram 3: Frontal section through tail of a larva 14 days old.

c. chorda. *e.* ectoderm. *f.* fin-fold. *g.* gut. *i.* indifferent cell structure of tail-fold. *m.* mesoderm. *n.* neural canal. *s.* mesodermic somite.

It is, of course, not easy to say whether the last remnant of the tail bud (Photogram 3) represents the hindermost, unpaired somite or the indifferent tissue which is capable of being still further differentiated into the chorda and the somites. But there are facts which account for favour of the assumption that it is the mesoderm which constitutes the hindermost somite. In the first place, the chorda grows no longer by its distal extremity, so that the tissue in question is employed no more in the formation of the chorda. In the second place, the indifferent tissue is altogether resolved into free meseuchymatous cells, which migrate into the interior of the epidermal fold of the caudal fin and are transformed into the horny fin-rays and into the connective tissue and muscles of the fin. In short, the tissue is altogether used up in forming the *mesodermal* organs. In the third place and lastly, the similar structure is formed in front of the normal mesodermic somites and is designated as the first somite, because it is found in segmental correspondence with the foremost ganglion, the ophthalmic, and with the premandibular vascular arch which represents the foremost vasomere.

On the thirtieth to thirty-second day, the tail is finished with its development. The subsequent growth is carried on by differentiation and growth of the chorda, the mesodermic somites, and the medullary cord in the tail

From the history of the peristomal mesoderm above given, it is apparently to be suggested that the tail can not morphologically be distinguished from the remaining portion of the body lying in front of it. The differentiation of the enteroderm reveals, however, as it seems to me, the true nature of the tail.

Early in the development of the tail, the enteroderm forms a conical tube of epithelium, the postanal gut, which runs lengthwise beneath the chorda, and is separated from the latter by the first rudiment of the caudal artery. By its proximal end the postanal gut opens into the anal gut and at its distal end it stands in connection with the indifferent tissue of the tail bud. The highest development of the postanal gut is attained at about the sixteenth day, and thereafter it degenerates in the following way. The capillary vessels which stand in connection with the fore-runners of the caudal artery and vein running respectively above and below the postanal gut, develop at first around this gut and are later converted into a thick network which, absorbing the gut, occupies its position.

What interests us is that the anal gut which permanently retains its downward bending and is in these later stages almost vertical in position, communicates with the postanal gut by the whole height of its hind wall extending from its junction with the ectodermic proctodaeum to the curvature, at which this vertical section of the enteric canal passes over into the horizontal section.

On the other hand, the distal connection of the postanal gut with the tail but is not secondary, but primary, that is to say, it is retained ever since it was found round the blastoporic lips, which are drawn together so as to meet dorsal of the anus, when the proctodaeum is formed. It follows that the postanal gut is a *new formation*, in particular, secondarily grown out of the hind wall of the anal gut, which is morphologically the dorsal wall of the enteric canal.

This fact suggests that the dorsal series of organs in the tail, which are formed behind the blastopore in connection with the postanal gut, are also of a *new formation*, we are, therefore, justified in concluding that the tail which is in the Lamprey in length not beyond one eighth of the total body length, constitutes the section of the body, which was not represented in the ancestral form, but is formed secondarily. The fact particularly interests us that the formation of the tail stands in connection with that of the proctodaeum, which causes the blastoporic lip to be produced to the rudiment of the tail. Now, the tail is to be regarded as the *dorsal outgrowth* of the blastoporic lip.

The assumption above given is supported by the two distinct stages of development, which follow one after the other in such a way, that the development of the tail takes place only when the embryonic organs are established in the remaining portion of the body. The tail which is formed secondarily only in the postembryonic larval stages, can, therefore, chronologically be distinguished from the primary section of the body, the development of which occupies a very long lasting, principal period of the embryonic development.

My deepest indebtedness is due to Professor MacBride in the Imperial College of Science and Technology, London, for the courtesy which he has shown me in several ways.

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A Case of Prolapsus Recti in Dragonfly.

By

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In a collection of dragonflies made by one of our students last year, I found a specimen of *Somatochlora viridiaenea* Uhler which showed a curious white body hanging at the anal end. The collector stated that he caught the specimen near Sapporo while it was flying in a wood. The specimen was brought to me in the living state. At first I took the white body for exuviæ of the rectal tracheal gills, which remained attached to the nymphal skin after the last ecdysis. A closer examination, however, has revealed at once that that was not the case.

The pendant body was 6 mm. long and club-like in shape. It hung down perpendicularly from the anus with the thicker end below. With the naked eye the following three parts, marked off from one another by distinct constrictions, could be distinguished on it: firstly, a short, narrow, and cylindrical stalk-like part in direct attachment to the anus; secondly, a middle part thicker than the preceding and provided with several longitudinal furrows on the surface; and thirdly, the thickest and largest distal part, fleshy in appearance and showing numerous irregular folds on the surface (fig. 1).

The specimen, together with the peculiar body in question, was fixed in Gilson's mixture. The latter was then cut off at the point of attachment to the anal opening. It was afterwards imbedded in paraffin and laid out into sections for studying.

The facts gained under the microscope proved that we have here to do with the hind intestine of the dragonfly, torn off from the more anterior parts and evaginated through the anus.

As is generally known, the hind intestine of the dragonfly consists of the ileum and the rectum. In the adult, the ileum is much longer than the rectum and has folded mucous epithelium. On the other hand, the rectum has smooth epithelium, of which the distalmost part adjoining the anus is distinguished from the remaining parts in being composed of smaller cells and has been called the anal piece by some authors. The muscular wall of the hind intestine is thickest in the anteriormost parts of the ileum; it is also thickened at the junction with the rectum where rectal tracheal gills are attached. The hind intestine is invested in its entire length by

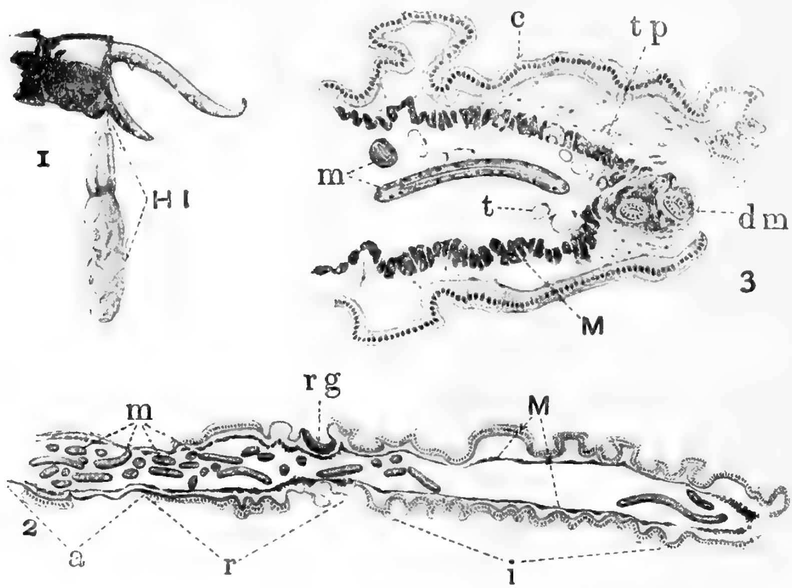

Fig. 1. Prolapsed hind intestine (HI) *in situ*. Enlarged. Fig. 2. Median sagittal section of the same. Fig. 3. Terminal part of the same.
a, anal piece; c, chitin intima; dm, duct of Malpighian tubule; i, ileum; m, Malpighian tubules; M, muscular layer; r, rectum; rg, rectal gill; t, trachea; tp, tunica propria.

Malpighian tubules which open into the anterior end of ileum, making their way through the thickened muscular wall of that part.

Now, to obtain an insight into the structure of the pendant organ in question, attention is called to fig. 2, which represents a median sagittal section of it. The distal end of the same section is shown in fig. 3 more highly magnified. The body presents itself as a tube with all the parts of the normal hind intestine in such relative positions as they should take, if this were turned inside out and protruded through the anus. In the lumen are found tubules which can without difficulty be recognized to be parts of Malpighian tubules. The tube wall exhibits internally the muscular layer and externally the mucous epithelium. It would be superfluous to go into details with regard to the histology of these layers in different parts. Suffice it to say that of the three parts before distinguished on the outside of the pendant body, that which directly adjoins the anus represents the terminal portion of the rectum characterized by having low epithelium known as the anal piece (fig. 2, *a*); the middle part is clearly the rectum proper with thin muscular layer and with epithelium made up of glandular cells (*r*); and the last and the largest part is the ileum characterized by having folded epithelium and the musculary layer thickened towards the free end of the body (*i*). Imbedded in the thickened muscular layer just mentioned are seen the conducting ducts of Malpighian tubules. Further, at the junction of the middle part with the last, there can be recognized some decomposing gill lamellæ attached to the epithelium, which at the place has become re-established after the ecdysis. At the free end the tubular body is open, the wall at the extreme end bearing indications of having been mechanically torn off.

It then lies beyond reach of doubt that the pendant body is nothing else than the hind intestine of the insect, torn off from the rest of the alimentary canal at the posterior end of the pylorus and completely evaginated through the anus.

So far as I am aware, a similar occurrence seems not to have been recorded before from dragonflies or indeed from any other group of insects. Evidently we have before us a case of very rare occurrence. It is certainly a difficult matter to determine the cause of the prolapsus, although one might speculate of its possible relation to the physiological state which leads to the ecdysis* of rectal tracheal gills during the metamorphosis.

* See my f rmerly published paper: On the rectal tracheal gills of a libellulid-nymph and their fate during the course of me'amorphosis. Berl. Ent. Zeitschr. Bd. LVIII, pp. 211–225 (1913).

Bird-infesting Mallophaga of Japan.
(Genus *Physostomum*)

By

Seinosuke Uchida.

Genus **PHYSOSTOMUM** Nitzsch.

Kellogg, Mallophaga, Genera Insectorum, 1908, Fasc. 66, p. 71; Mjöberg, Arkiv för Zoologi, 1910, Bd. 6, p. 58.

1. ***Physostomum mystax*** Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 241, pl. XXIII, fig. 6; Giebel, Insecta Epizoa, 1874, p. 254, Taf. XVIII, Fig. 2, 3; Piaget, Les Pediculines, 1880, p. 602, pl. L, fig. 2.

A single female collected by Mr. N. Kuroda from *Turdus fuscatus* in Tokyo.

2. ***Physostomum frenatum*** Nitzsch.

Giebel, Insecta Epizoa, 1874, p. 256, Taf. XVIII, Fig. 6.

Two females and two youngs collected from *Regulus regulus japonensis* in Prov. Shinano, April 4, 1914.

3. ***Physostomum diffusum*** var. ***pallidum*** Kellogg.

Kellogg, New Mallophaga II, 1896, p. 519.

One male specimen from *Montifringilla brunneinucha* collected in Prov. Shinano, Feb. 13, 1914.

The specimen, although a male, agrees perfectly with Kellogg's description of the female of the species, which was obtained from *Junco hyemalis* and *Junko* sp.

Measurements of the male specimen on hand :

	Length	Width.
Body, ...	3.23 mm.	.95 mm.
Head, ...	.67 mm.	.66 mm.
Prothorax, ...	.31 mm.	.52 mm.

4. ***Physostomum intermedium*** sp. nov. (Fig. 1)

Five females, two males and three youngs were collected from *Parus ater insularis* (Prov. Shinano, Feb. 27, 1914) and from *Parus atricapillus restrictus* (Prov. Shinano, May 10, 1914).

Measurements.

	♀	♀	♀	♀	♂	♂
Length of body...	mm. 2.9	mm. 2.9	mm. 2.9	mm. 2.9	mm. 2.2	mm. 2.2
Width of body	.86	.83	.82	.84	.70	.67
Length of head...	.56	.58	.57	.56	.48	.47
Width of head	.56	.57	.57	.55	.48	.47
Length of prothorax	.26	.26	.26	.25	.20	.20
Width of prothorax	.51	.51	.51	.47	.41	.40

Ground color of head pale brown, with blackish brown marking ; thorax and abdomen brown, with dark brown lateral band.

Female :—Head in front broad and rounded, with a few very fine hairs ; sides nearly straight ; palettes large and produced ; the last segment of palpi projecting beyond lateral margin of head ; one long and two short hairs on the margin and at the very slight ocular emargination ; two short hairs in front of antennal fossa ; temples produced backwards and acutely angled, each bearing one short and two long hairs ; occipital margin deeply re-entering, occiput slightly concave ; marking on head indistinct, except a blackish brown blotch on the margin of antennal fossa and the narrow occipital border of the same colour. Clypeal suture pale brown, with several short and six long hairs (four lateral and two submedian).

Prothorax hexagonal, nearly as wide as the head at temporal angles; with anterior and posterior margins concave; lateral angle distinct, with two spines and a long hair at apex; two spines on lateral margin in front of the lateral angle; one long hair and a spine near the posterior angle. Submarginal bands brownish.

Fig. 1.
Physostomum intermedium n. sp., female. ×30

Metathorax scarcely longer than prothorax, with anterior parts rounded and covered by prothorax; sides very slightly concave; posterior border truncate and as wide as the first segment of abdomen; four spines in the anterior part of lateral margin, and two longish hairs near posterior angles. Lateral bands dark drown; two indistinct transverse dark bands interrupted in the median line; Legs pale brownish with transverse whitish markings.

Abdomen with weakly convex and subparallel sides; last segment broad and rounded; a long hair and a very small spine on posterior angles of each segment; on the dorsal surface just inside of the coloured lateral bands, a double longitudinal row of weak hairs; four or six long and a few short hairs on the rounded margin of eighth segment. Lateral bands dark brown; posterior margin of each segment whitish.

Male:—Smaller than female; the last abdominal segment with a dusky, median transverse band, but without lateral bands; posterior margin truncate, with a brownish marginal band; genitalia distinct, racket-like in shape, reaching from sixth segment to the middle of eighth segment.

This species much resembles Kellogg's *Physostomum sucinaceum* as well as Carriker's *Ph. leptosomum*, but may be distinguished from either by the markings of metathorax, by distinct lateral angles of prothorax., etc.

5. ***Physostomum japonicum*** sp. nov.

Four females and a young taken from *Anthus spinoletta japonicus* collected in Prov. Shinano, Oct. 31, 1914.

Measurements

	mm.	mm.	mm.	mm.
Length of body	3.1	3.1	3.1	3.1
Width of body	.90	.90	.89	.89
Length of head	.64	.66	.67	.64
Width of head	.58	.59	.60	.60
Length of prothorax	.30	.32	.30	.30
Width of prothorax	.53	.54	.53	.51

This form is closely related to the preceeding species but can be distinguished by the following characters :

1. Size larger, head longer.
2. Ground colour of body paler.
3. Temples longer and more pointed.
4. Posterior angles of prothorax with two longish hairs.
5. Last abdominal segment of female more rounded.

6. ***Physostomum mugimaki*** sp. nov. (Fig. 2).

Four females and two youngs taken from *Muscicapa mugimaki* collected in Prov. Shinano, October 12, 1914.

Measurements.

	mm.	mm.	mm.
Length of body	3.25	3.25	3.30
Width of body	.83	.80	.84
Length of head	.69	.69	.69
Width of head	.60	.61	.60
Length of prothorax	.31	.32	.32
Width of prothorax	.55	.55	.55

Female :—Ground colour of head and thorax pale brown with blackish brown marking; abdomen yellowish; lateral bands blackish brown.

Head conical; front weakly convex with a few very fine hairs; sides of head straight; palettes medium-sized, laterally projecting; palpi projecting with the apical segment; ocular emargination small, with two short prickle-like hairs; temples produced backwards and acutely angled, with three hairs—a long hair anteriorly on the margin, and farther back a short and a long hair situated at a somewhat dorsal position.—Occipital margin deeply re-entering. Colour of head whitish; markings on border of antennal fossae and on occiput blackish brown, those of other parts brownish.

Fig. 2.
Physostomum mugimaki n. sp., female. ×28

Prothorax hexagonal, nearly as wide as the head at temples; anterior and posterior margins concave; two spines on lateral margin in front of the lateral angle which bears one long hair and two spines; a single long hair on each lateral margin near the posterior angle; lateral margins unevenly coloured dark brown; submarginal bands blackish brown.

Metathorax longer than prothorax; its anterior parts rounded and covered by prothorax; posterior margin straight; sides slightly swollen in the anterior third of its length, straight behind that swelling, four or five spines scattered along lateral margin; a long hair on each posterior angle; submarginal lateral bands narrow and blackish brown, outside which bands the margin of the posterior half of the segment is irregularly coloured with blackish brown. Legs long, rather slender and almost colourless.

Abdomen nearly parallel sided; with a long hair and a spine in posterior angles of segments; posterior margin of anterior seven segments with a short hair on each side ; eighth segment with evenly rounded sides, each with two short hairs ; vulva convex, fringed with fine hairs ; entire abdomen yellowish excepting the distinct blackish brown submarginal lateral bands, extending from the end of metathoracic bands to the middle of the eighth segment, the margins outside those bands being suffused with dark brown.

This species resembles Kellogg's *Physostomum pallens* as well as *Ph. invadens*, but differs markedly from either in size, markings, shape of head, etc.

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On a New Species of Frog Trematode
(*Enodiotrema rugocaudatum* n. sp.)

By

Sadao Yoshida.
Pathological Department, Osaka Medical Academy.

With Plate II.

Specimens of the new distome to be described in this paper were taken by me from the common frog, *Rana nigromaculata* Hallowel, on several occasions during September and October of year before last. Frogs infested with the parasite seem to be of pretty common occurrence in the neighborhood of Osaka. It is found in parts of intestine following the stomach, in a number of from one to eight or more at a time.

External features.

We have here to do with small, up to 3.2 mm. long, worms of a light yellowish color, excepting the parts occupied by the egg-filled uterus which presents as usual a dark brownish color. The body may be said to be in general of an elongate ovoid shape, somewhat flattened dorso-ventrally, broadest between the middle and posterior thirds of body-length, and rounded at both extremities. During life the worm is actively mobile in the anterior parts, which are now prolonged forwards and then withdrawn, while the posterior parts remain nearly the same in shape and bulk. Figs. 1 and 2, Pl. II, serve to show the extent of change in outline of the anterior body-end, which in the contracted state may take the shape and position indicated by the dotted line in those figures. A worm 1.6 mm. long in the contracted state was observed to stretch out to a length of 2.12 mm., and another from 1.7 mm. to 2.44 mm., in both cases the elongation being effected by the anterior body-parts only. Moreover, in the living state the posterior body-parts show irregular wrinkling on the surface, a characteristic feature from which I have named the species. In fixed specimens the wrinkles disappear altogether. Killing the worms with hot Schaudinn's solution, the body slightly contracts but preseves its general shape fairly well. Specimens so killed present cross-sections of an outline which is elongate oval in most parts, but nearly circular at either end of the body.

Length and greatest breadth of body as measured on living specimens: 3.2 × 0.84 mm.; 1.7—2.44 × 0.9 mm.; 2.3 × 0.9 mm.; 1.6—2.12 × 0.68 mm.; 1.6 (slightly contracted) × 1 mm.; 1.37 (contracted) × 0.7 mm.; 1.16 × 0.5 mm. (young); 1.0 × 0.36 mm. (young); 0.8 × 0.36 mm. (young). Same as measured on fixed specimens preserved in alcohol: 2.34 × 0.54 mm.; 2.2 × 0.48 mm.; 1.96 × 0.4 mm.; 1.88 × 0.54 mm.; 1.88 × 0.56 mm.; 1.88 × 0.5 mm. The broadest parts in all these cases were situated either nearly in the middle or at about the boundary between the middle and last thirds of body-length. Same as measured on specimens mounted in Canada balsam under cover-glass: 2.88 × 0.74 mm.; 2.4 × 0.7 mm.; 2.0 × 0.4 mm. (young); 2.0 × 0.5 mm. (yg); 1.2 × 0.1 mm. (yg).

Oral sucker subterminal, spherical or ellipsoidal, with aperture of varying width according to different states of contraction of the organ. Length and breadth of the sucker as measured in a living adult: 250μ × 287μ; same in a living young 150 × 213μ. Same as measured in specimens mounted in Canada balsam: 240 × 250μ (by 3.2 mm. body-length); 230 × 220μ (by 2.4 mm. body-length); 166 × 200μ (by 1.2 mm. body-length).

Ventral sucker usually spherical or nearly so, always much smaller than oral sucker of the same individual; with aperture more persistent in width than oral sucker. Length and breadth as measured in a living adult 125 × 150μ; in a young 125 × 166μ. Same as measured in mounted preparations: 88 × 88μ (by 3.2 mm. body-length); 120 × 120μ (by 2.4 mm. body-length); 99 × 90μ (by 1.20 mm. body-length).

Distance between oral and ventral suckers in fixed specimens: 500μ (by 2.3 mm. body-length); 420μ (by 2.2 mm. body-length); 600μ (by 1.88 mm. body-length); 540μ (by 1.88 mm. body-length). In fully extended state of body, the ventral sucker is situated nearly in, or slightly in front of, the middle of body-length (figs. 1 and 2).

Male and female genital apertures situated close together and side by side, immediately in front of ventral sucker.

Internal structure

Cuticula 10—15μ thick, homogeneous looking, with slightly undulating outer surface. It contains minute spines. These are closely situated in the anterior parts of body, but grow gradually thinner in distribution towards the posterior body-end.

Both oral and ventral suckers are of much the usual structure. In the parenchyma of anterior body-parts are found numerous large isolated cells, of which the significance can not be determined.

Prepharynx nearly entirely absent. Pharynx well developed, nearly spherical or distinctly broader than long, with slight indentations along anterior edge (fig. 4, *p*). Dimensions: 120 × 120μ (in an adult mounted in balsam); 75 × 125μ (in another mounted adult); 118 × 150μ (in a living adult); 89 × 125μ (ditto); 50 × 83μ (in a mounted young).

Oesophagus moderately long, 160—300μ in length, gradually somewhat broadening towards the bifurcation point which lies nearly midway, or slightly behind the middle, between the two suckers. Intestinal caeca reach behind to a level falling short of the posterior body-end by a distance equal to about $\frac{1}{4}$ or $\frac{1}{5}$ the length of body. They gradually widen posteriorly; their cross-section usually present an oval outline elongate in dorso-ventral direction (figs 5 and 6, *i*).

Excretory vesicle extends as far forwards as the testes, running dorsal to uterus, and finally divides into two short lateral branches. Further course of excretory canals are not easily traceable.

Sexual organs.—Ovary and testes situated somewhat close together in a space behind ventral sucker. Uterus in the median space between testes and posterior body-end. Yolk-glands in lateral areas along the margin, extending from about the level of testes posteriorly for a length equal to $\frac{1}{4}$—$\frac{1}{3}$ the body-length (see fig. 4).

The two testes (*h* in figs. 3, 4, 5, 6, 7. and 8) lie side by side behind ovary, but usually the one on the same side as the ovary situated somewhat, but not entirely, behind the other; subequal in shape and size; nearly spherical when still small, but commonly somewhat laterally compressed in fully mature state. In adult specimens, the length in antero-posterior direction may vary from 140μ to 260μ. Each testis sends forth, from a point of its anteromesial part, a vas deferens, which, after running a short distance obliquely forwards and inwards, joins with its fellow of the other side and forms the unpaired vas deferens. This, after taking again a short forward course, joins the posterior end of the cirrus pouch. The cirrus pouch is represented by a bent fusiform body of a compact appearance (figs. 7 and 8, *cb*); its broader postero-dorsal parts lie over, and to one side of, the ventral sucker; ventrally it descends nearly vertically right in front of the same, finally to terminate at the male genital pore. In the postero-dorsal parts of the body the lumen is dilated into a seminal vesicle (*s*), which in mature specimens is filled with spermatozoa. Antero-ventrally, the vesicle is continued as a narrow canal, which at first is somewhat tortuous but soon takes a straight downward course to the genital pore. The wall of the duct exhibits a cellular structure, possibly of glandular nature; close upon the lumen there exists a layer of muscular fibres which are best developed along the narrow and straight canalar passage (fig. 7, *c*) leading down to the external opening.

The single ovary lies on one side, either right or left, of the median line and in front of, and somewhat more dorsally than, one of the testes. Both in shape and size it is approximately the same as a testis in adult specimens, though in the young it is much smaller than the latter (fig. 3). In some adult specimens the ovary was seen to overlap with its posterior parts the anterior parts of the testis on the dorsal side (fig. 6). The short oviduct springs from mesial side of ovary and takes an oblique postero-mediad course.

The yolk-glands are ramified follicular bodies of the extent and position before indicated, reaching down on each side posteriorly to a short distance from the blind end of intestinal caecum. Some follicular branches may extend inwards so as to occupy a position ventral to intestinal caeca. Transverse yolk ducts (*dg*) arise from anterior parts of the glands. After running mediad, each of them crosses testis of the same side on the dorsal side, and the two unite together in the median line to form the common yolk-duct (figs. 6 and 7, *dg*). This proceeds antero-superiorly to meet the oviduct at the ootyp. It may be dilated in its course, forming a yolk reservoir.

Dorsally the ootyp is joined by the Laurer's canal, which is a slightly winding tube opening externally at a point in the dorsal median line between the two testes. Right close to its inner end, the Laurer's canal bears the seminal receptacle (figs. 4 and 8, *r*) of an ovoid or spherical shape. The receptacle occupies a position which is dorso-median to the ovary.

As usual the ootyp is continuous with the uterus, and is surrounded by numerous glandular cells, the so-called shell-gland. Beginning at the ootyp, the uterus runs posteriorly. It soon begins to exhibit eggs in the interior and at the same time to make convolutions. The closely winding and egg-filled uterus occupies a ventral position in the body, extending from the position of testes backwards, between intestinal caeca and farther beyond to the posterior body-end.

The external terminal part of uterus, i.e. the metraterm (fig. 7, *u*), shows a narrow lumen and muscular wall invested externally by a layer of cells. The female genital pore is situated close to one side, either right or left, of the male aperture.

The eggs (fig. 9) are of a light-brownish or yellowish color. The shell at one end shows an operculum, at the margin of which the egg outline is distinctly angular. Length 34—40μ; breadth 20—30μ; diameter of operculum 14μ.

The new frog-distome is apparently a hitherto unrecorded species. It bears some resemblance to *Styphlodora* Looss in the arrangement of genital organs. Still nearer it seems to stand to *Enodiotrema* Looss, without being identifiable with any of the known species of that genus. It differs from any species of the genus chiefly in three respects, viz. in the excretory system, in the large number of yolk-follicles and in the structure of cirrus-pouch. It shall go by the name of *Enodiotrema rugo-caudatum*.

Explanation of Plate II.

Abbreviations.

b. Ventral sucker.	*c. Cirrus.*	*cb. Cirrus-pouch.*
d. Yolk gland.	*dg. Yolk-duct.*	*e. Oviduct.*
g. Genital opening.	*h. Testes.*	*i. Intestinal caeca.*
k. Ovary.	*l. Laurer's canal.*	*m. Oral sucker.*
o. Oesophagus.	*p. Pharynx.*	*r. Receptaculum seminis.*
s. Seminal vesicle.	*sd. Shell gland*	*u. Uterus or metraterm.*
v. Vas deferens.	*w. Excretory canal.*	

Figs. 1, 2. *Enodiotrema rugocaudatum* in the living state. × 25.

Fig. 3. A young specimen prepared and mounted in Canada balsam. × 25.

Fig. 4. An adult specimen mounted in Canada balsam. × 30.

Fig. 5. Cross-section through the level of testes. Dorsal side below. × 60.

Fig. 6. Cross-section through the level of ovary and testes. Dorsal side below. × 60.

Fig. 7. Nearly median sagittal-section passing through the long axis of cirrus-pouch. × 105.

Fig. 8. Semidiagrammatic figure showing connections of the parts of genital organs. Ventral view.

Fig. 9. Ripe eggs. × 350.

Bird-infesting Mallophaga of Japan (II).*
(Genera *Goniodes* and *Goniocotes*)

By

Seinosuke Uchida,

College of Agriculture. Tokyo Imperial University.

ERRATA

to

Mr. S. Uchida's paper: Bird-infesting Mallophaga of Japan (II).

P. 86, instead of *Goniocotes macrocephalus*, read *Goniocotes megalocephalus*.

h.

get, Les Pediculines, 1880,

um, 1908, Fasc. 66, p. 47;

Mjöberg, Arkiv for Zoologi, 1910, Bd. 6, p. 102.

1. *Goniodes lativentris* sp. nov.

Five females, two males and two young individuals were cellected from a skin of Chinese turtle dove, *Turtur chinensis* (Formosa. Sept. 4, 1908).

Measurements.

	♂	♂	♀	♀	♀
	mm.	mm.	mm.	mm.	mm.
Length of body	1.27	1.37	1.50	1.53	1.53
Width of body	0.64	0.65	0.64	0.65	0.64
Length of Head	0.35	0.36	0.38	0.38	0.38
Width of head	0.39	0.40	0.45	0.45	0.45
Length of prothorax	0.12	0.12	0.12	0.12	0.12
Width of prothorax	0.25	0.26	0.26	0.27	0.26

* The first part of the contribution, dealing with the genus *Physostomum*, appeared in this volume of the "Annotationes", pp. 67—72.

This new species is characterized by the broad abdomen, which closely resembles that of *Goniocotes menadensis* Piaget from the cuckoo-dove, *Macropygia menadensis*. Ground colour of body clear fulvous, with pale brownish markings.

Male:—Head somewhat quadrilateral, with laterally projecting temples and very prominent, evenly rounded front; width across temples exceeding length of head. Front with one longish and five short hairs on each side; marginal band very narrow, terminating in long yellowish-brown antennal blotches. Antennæ like those of *Goniodes minor* Piaget, set in very deep emarginations; the first segment short, thick, extending only a little beyond antennal sinus; the second segment long and cylindrical, about as long as the third segment which is inwardly curved and somewhat broadened at end; both fourth and fifth segments rudimentary and appearing like small appendages of the third segment. Eyes clear and very prominent; behind them the sides of head are nearly subparallel and bear each a long hair; temporal angles laterally protruding and forming on each side a protuberance, which bears a small prickle and a strong hair; a little behind the latter another long hair present, followed by a weak prickle on the posterior border of temple; occipital margin concave; occipital band distinct, with two brownish blotches.

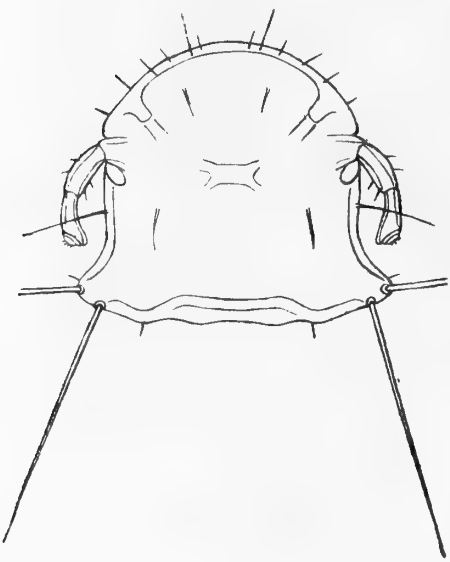

Fig. 1.
Goniodes lativentris n. sp.,
Head of female. ×100.

Prothorax small, quadrilateral; anterior margin slightly concave, posterior margin convex; sides nearly straight, diverging posteriorly, each forming an obtusely angular protuberance which bears a pustulated hair. Metathorax transverse, with rounded angles and with posterior margin pressed well into abdomen; two long pustulated hairs on each lateral side; two more hairs, one long and another short, on each side of the posterior margin. Legs short and stout, with a number of heavy spines.

Abdomen very broad, oval, widest at the second segment which is well developed; lateral margin of segments convex; lateral angle of second, third and fourth segments with two long hairs; that of fifth with two long and one short hairs, that of sixth with three long hairs, and that of seventh with two long and two short hairs; eighth segment small, semicircular, with two long hairs on each side. Dorsal posterior margin of segments second to seventh with a hair on each side, situated just inside the very broad and pale yellowish lateral band. Genitalia well chitinized, narrow and forked, reaching to first abdominal segment.

Fig. 2.
Goniodes lativentris n. sp., female. ×60.

Female:—Larger than male; antennæ ordinary; the first segment short, slightly longer than the adjacent trabecular angle; second segment longest, about as long as the two following segments taken together; the third and the fifth nearly equal; the fourth a little shorter; temple projecting laterally to a less degree than in male; hairs on side of head very short; abdomen somewhat more slender and the last segment broader than in male.

2. *Goniodes lativentris* var. *major* var. nov.

This new variety is founded on a single female specimen which was obtained from a skin of wood pigeon, *Columba pulchricollis* (Formosa, Jan. 1, 1913). While it closely agrees in main characters with typical *Goniodes lativentris*, there seem to exist sufficient differences to entitle it to a varietal rank within that species. In comparison with typical specimens, the form in question is larger with considerably wider abdomen. Measurements: Length 1.65 mm., width 0.81 mm. Head 0.44 mm. long, 0.54 mm. wide. Prothorax 0.16 mm. long, 0.29 mm. wide. Angle of temple more protruding than in male of typical form and postero-laterally directed, instead of laterally.

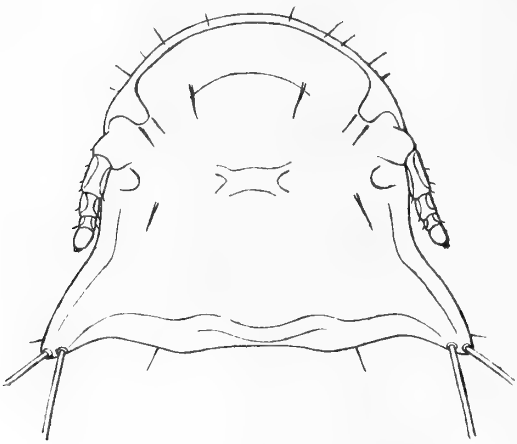

Fig. 3.
Goniodes lativentris var. *major* n. var.
Head of male. ×100.

3. *Goniodes stylifer* Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 156, pl. XII, fig. 2; Giebel, Insecta Epizoa, 1874, p. 200, Taf. XIII, Fig. 1; Piaget, Les Pediculines, 1880, p. 264, pl. XXII, fig. 1; Osborn, Bull. 5 (n. s.), Div. of Ent. U. S. Dep. Agr. Wash., 1896, p. 196, fig. 119.

Two females of this species were collected from a turkey in Tokyo.

4. *Goniodes dissimilis* Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 162, pl. XII, fig. 6; Giebel, Insecta Epizoa, 1874, p. 201; Piaget, Les Pediculines, 1880, p. 268, pl. XXII, fig. 3; Osborn, Bull. 5 (n. s.), Div. of Ent. U. S. Dep. Agr. Wash., 1896, p. 195, fig. 117; Kellogg and Paine, Rec. Ind. Mus., X, 1914, p. 229.

Numerous males and females were collected from skins of Hondo copper-pheasant (*Phasianus scintillans*) from Prov. Musashi and Prov. Shinano, of copper-pheasant (*Phasianus soemmeringi*) from Prov. Higo, and of Chinese ring-necked pheasant (*Phasianus torquatus*) from Corea.

5. ***Goniodes dispar*** Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 159, pl. XII, fig. 5; Giebel, Insecta Epizoa, 1874, p. 193, Taf. XII, Fig. 12, 13; Piaget, Les Pediculines, 1880, p. 246, pl. XX, fig. 1.

Three males, five females and five youngs of the species were collected from two skins of the common ptarmigan (*Lagopus mutus*) from Prov. Shinano, April 20, 1914, and from Mt. Norikura, July 27, 1894.

6. ***Goniodes minor*** Piaget.

Piaget, Les Pediculines, 1880, p. 256, pl. XXI, fig. 3.

Two specimens, both males, obtained from a skin of Chinese turtle-dove (*Turtur chinensis*) from Formosa, Sept. 4, 1908.

They are of somewhat larger dimensions than those given by Piaget.

Measurements:

	Length	Width
Body	1.80 mm.	0.81 mm.
Head	0.59 mm.	0.65 mm.
Prothorax	0.24 mm.	0.42 mm.

Genus **Goniocotes** Burmeister.

Burmeister, Handb. Ent., 1835, Vol. 2, p. 431; Giebel, Insecta Epizoa, 1874, p. 182; Piaget, Les Pediculines, 1880, p. 223; Kellogg, Mallophaga, Genera Insectorum, 1908, Fasc. 66, p. 31; Mjöberg, Arkiv för Zoologi, 1910, Bd. 6, p. 106.

1. ***Goniocotes macrocephalus*** sp. nov.

One female specimen from a skin of hazel-grouse, *Tetrastes bonasia*, collected in Saghalin, April 3, 1909.

Measurements :

	Length	Width
Body	1.28 mm.	0.57 mm.
Head	0.41 mm.	0.47 mm.
Prothorax	0.075 mm.	0.25 mm.

Female:—Ground colour of body pale yellowish, showing chestnut-brown blotches on head and curved yellowish brown marginal bands on abdomen.

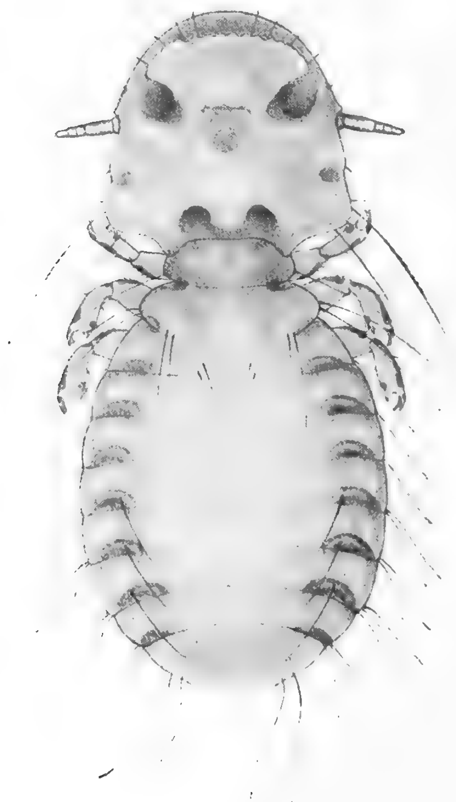

Fig. 4.
Goniocotes macrocephalus n. sp., female. ×70.

Head large ; front very broad, convex, with five fine hairs on each side ; marginal band brownish, broadest in the centre, the lateral ends bent inward in front of each antenna to form short but distinct chestnut-brown antennal blotches. Antennæ ordinary ; the first segment short and broad, the second longest, the third and fourth shortest, subequal ; the fifth about as long as the two preceeding segments taken together. Eyes very large, colourless, each with a short spine ; another short spine behind eye on lateral margin ; temples somewhat expanded, broadly rounded, each with two long hairs and a very fine prickle. Posterior parts of head slightly expanded, angulated; marginal band of a faint colour, broadened posteriorly; occiput sinuous, occipital margin straight, with marginal band darker on sides where it forms chestnut-brown occipital blotch.

Prothorax narrow, short, trapezoidal with lateral margins converging anteriorly, the posterior margin flatly convex; lateral posterior angles slightly produced, each bearing a long hair. Metathorax with rounded lateral angles, each with two long hairs; posterior margin convexly abutting on abdomen, with a long and a shorter hair nearer to lateral angle than to the middle on each side. Legs paler than body, with pale yellowish marginal marking and some scattered strong spines.

Abdomen broadly elliptical, posterior angles of I.—III. segments bearing one hair each; segments IV.—VII. laterally with two or three long hairs; the last segment broad, rounded, entire, bearing two long hairs on each side. Dorsal hairs present on IV.—VI. segments. Lateral band of a pale yellowisn brown colour; in each segment, it gradually broadens anteriorly and is bent inwards in a comma-like manner in the border of every two segments.

2. ***Goniocotes abdominalis*** Piaget.

Giebel, Insecta Epizoa, 1874, p. 238, Taf. XX, Fig. 9; Piaget, Les Pediculines, 1880, p. 238, pl. XX, fig. 9; Osborn, Bull. 5 (n. s.), Div. of Ent. U. S. Dep. Agr. Wash., 1896, p. 193; *Goniocotes hologaster*, Denny, Monogr. Anopl. Brit., 1842, p. 153, pl. XIII, fig. 4; *Goniocotes gigas*, Neumann, Traité des maladies parasitaires; 1892, p. 73, fig. 45.

Two female specimen obtained from a domestic fowl in Tokyo.

3. ***Goniocotes hologaster*** Nitzsch.

Giebel, Insecta Epizoa, 1874, p. 184; Piaget, Les Pediculines, 1880, p. 231, pl. XIX, fig. 6; Neumann, Traité des maladies parasitaires, 1892, p. 72, fig. 44; Osborn, Bull. 5 (n. s.), Div. of Ent. U. S. Dep. Agr. Wash., 1896, p. 192.

Numerous specimens of both sexes were collected from a domestic fowl in Tokyo.

4. ***Goniocotes aegypticus*** Kellogg & Paine.

Bull. of Entomol. Research, II, 1911, p. 148, pl. V, fig. 2.

Three female and one young specimens taken from a Japanese green pigeon, *Sphenocercus sieboldi*, captured in Prov. Shinano, May 31, 1915.

5. ***Goniocotes compar*** Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 152, pl. XIII, fig. 2; Giebel, Insecta Epizoa, 1874, p. 183, Taf. XII, fig. 10, 11; Piaget, Les Pediculines, 1880, p. 234, pl. XIX, fig. 10; Kellogg, New Mallophaga, II, 1896, p. 512, pl. LXIX, fig. 4; Osborn, Bull. 5 (n. s.) Div. of Ent. U. S. Dep. Agr. Wash. 1896, p. 193.

One male and one female specimens taken from a domestic pigeon in Prov. Shinano, June 14, 1914.

6. ***Goniocotes chrysocephalus*** Giebel.

Giebel, Insecta Epizoa, 1874, p. 189; Piaget, Les Pediculines, 1880, p. 232, pl. XIX, fig. 7; Kellogg and Paine, Rec. Ind. Mus., X, 1914, p. 220.

Four females and one male collected from a skin of copper pheasant, *Phasianus soemmeringi*, obtained in Prov. Higo.

7. ***Goniocotes asterocephalus*** Nitzsch.

Giebel, Insecta Epizoa, 1874, p. 182, Taf. XII, fig. 3, 4; Piaget, Les Pediculines, 1880, p. 226, pl. XIX, fig, 1 (juv.?)

One female and two youngs were taken from an eastern common quail, *Coturnix japonica*, killed in Prov. Shinano Jan. 25, 1915, and a male specimen from a sparrow hawk, *Accipiter virgatus*, killed in Prov. Shinano Feb. 25, 1915. The latter was probably a case of straggler from a quail captured by the hawk.

Tokyo, Aug. 11, 1915.

Notes on Oegopsid Cephalopods found in Japan.

By

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With Plate III.

In the present paper all the species of Oegopsid Cephalopods known from Japan are listed and noted on. My study of the group was done mainly on specimens preserved in the Science College, Tokyo; in the Sapporo Agricultural College; in the Takashima Fishery Experimental Institute, Hokkaido; and in the Namerikawa Fishery Institute, Etchu Prov. The species number twenty-nine in all, representing twenty-two genera. One of the latter seems to be new to science and presents some interesting features.

Division **Oegopsida** d'Orbigny 1839.

Fam. **Architeuthidæ** Pfeffer 1900.

Genus **Architeuthis** Steenstrup 1857.

1. ***Architeuthis japonica*** Pfeffer 1912.

Mitsukuri & Ikeda 1895, p. 39, pl. x (without name). Tateyama Bay, Awa Prov.

Architeuthus martensii, Berry 1912a, p. 433.

Architeuthis japonica, Pfeffer 1912, p. 27.

Of this species no other specimen than that which was described by Mitsukuri and Ikeda and is preserved in the Sci. Coll., has come under my observation.

2. *Architeuthis martensii* (Hilgendorf 1880).

Megateuthis martensii, Hilgendorf 1880, p. 65. Tokyo market.

Architeuthus martensii, Steenstrup 1882b, p. 157.——Berry 1912a, p. 433.

Architeuthis martensii, Pfeffer 1912, p. 31.

This species is possibly identical with *A. japonica* Pfeffer, but as Hilgendorf's original description of it is based on a defective specimen, a definite decision of the point must be left to the future.

Fam. **Onychoteuthidæ** Gray 1849.

Subfam. **Onychoteuthinæ** Pfeffer 1912.

Genus **Onychoteuthis** Lichtenstein 1818.

3. *Onychoteuthis banksii* (Leach 1817).

Local name : Tsumé-ika (Tokachi).

Loligo banksii, Leach 1817, p. 141.

Onychoteuthis banksii, Fér. et d'Orb. 1839, p. 330, Onychot. pls. i–v, vii, ix, pl. xii, figs. 1–9. ——Gray 1849, p. 53.——Goodrich 1896, p. 11. Sandheads, Bay of Bengal.——Pfeffer 1900, p. 159.——Hoyle 1904, p. 35. Tropical Pacific Ocean.——Hoyle 1904a, p. 19. ——Pfeffer 1908a, p. 65, figs. 71–77.——Pfeffer 1912, p. 70, pl. iii, figs. 13–25, pls. iv–vi. Many examples from the temperate and tropical regions of all the oceans and seas.——Berry 1914, p. 322, text-fig. 31. Laysan Island.

A single ♀ specimen captured by the Takashima Fishery Institute steamer "Tankaimaru" at Ōtsu, Tokachi Prov., Hokkaido, August 1, 1913. Mantle-length 283 mm. This widely distributed species has hitherto been known, so far as concern the Japanese waters, only from Formosa (Pfeffer 1912).

Genus **Moroteuthis** Verrill 1880.

4. *Moroteuthis robusta* Dall 1876.

Moroteuthis robusta Dall MS., Verrill 1876, p. 236. Iliulik, Unalaska.——Verrill 1880, pp. 195, 246, 395, pls. xxiii, xxiv.——Verrill 1882, pp. 275, 419, pls. xiii, xiv.——Pfeffer 1900, p. 161.——Pfeffer 1908a, p. 68, figs. 78, 79a, b.——Pfeffer 1912, p. 105.—— Ishikawa & Wakiya 1914, p. 435, pls. xliii, xliv. From stomach of a sperm whale caught in the open sea off to the south of the Strait of Tsugaru.

5. ***Moroteuthis lönnbergii*** Ishikawa & Wakiya 1914.

Local name : Kagi-ika (Sagami Prov.).

Moroteuthis lönnbergii, Ishikawa & Wakiya 1914a, p. 445, pls. xlv, xlvi. Hayama, Sagami Bay; Misaki.

Following specimens were examined by me.

Number of specimens	Mantle-length	Locality	Date	Where preserved
2 ♀	162; 170 mm.	Off Atami, Sagami	June 24, 1906	Sci. Coll.
1 ♀	210 „	Misaki	June 1895	do.
1 ♀	207 „	do.	August 11, 1896	do.

Fam. **Enoploteuthidæ** Pfeffer 1900.

Subfam. **Enoploteuthinæ** Chun 1910.

Genus **Enoploteuthis** Fér. et d'Orb. 1839.

6. ***Enoploteuthis chunii*** Ishikawa 1914.

Enoploteuthis chunii, Ishikawa 1914, p. 401, pls. xxxviii, xxxix. Toyama Bay.

Specimens examined by me.

Specimen	Mantle-length	Locality	Date	Where preserved
1 ♂	63 mm.	Uodzu, Etchu	April 24, 1913	Agr. Coll.
1 ♂	62 „	Namerikawa Etchu	April 25, 1913	do.
1 ♀	60 „	do.	May 1913	do.
1 ♀	81 „	do.	June 2, 1913	do.
1 ♀	87 „	do.	June 1913	do.

This cuttle-fish is often caught, mixed in large schools of *Watasenia scintillans* (Berry), on the coast of Etchu Prov. Prof. Ishikawa's type specimens of the species have come from that region. The hectocotylized arm is the right ventral arm, of which it is mainly the distal part that undergoes modification. In the terminal part but a short distance from the extremity, the narrow protective membranes of both sides are swollen and form two elongate semilunar membranes, as is commonly the case in species of the Enoploteuthidæ. The membranes are equal in size and length; only the ventral one is situated a little more proximally than the dorsal. The hooks on this arm number twenty-six, of which the distal six are placed opposite the ventral semilunar membrane. The terminal part of the arm, beyond the semilunar membranes, shows twenty-one small suckers, which fact apparently constitutes a characteristic feature of the species.

Genus **Abralia** Gray 1849.

7. ***Abralia andamanica*** Goodrich 1894.

Local name: Gumi-ika (Odawara).

Abralia andamanica, Goodrich 1896, p. 9, pl. ii, figs. 38–45. Andaman Sea.

Asteroteuthis andamanica, Pfeffer 1912, p. 137.

Two ♂ specimens (in alcohol) were collected at Odawara, June 1891 (Sci Coll.). Their principal dimensions are as follows:

Specimen No.	1.		2.	
Dorsal length of mantle	34 mm.		35 mm.	
Breadth of mantle...	14 "		13 "	
Length of fin	23 "		23 "	
Total breadth of fins	30 "		23 "	
Dorsal length of head	11 "		11 "	
Breadth of head	12 "		13 "	
	Left	Right	Left	Right
Length of first arm	20 mm.	20 mm.	20 mm.	20 mm.
" " second arm	25 "	24 "	24 "	24 "
" " third arm	20 "	21 "	21 "	21 "
" " fourth arm	22 "	22 "	22 "	22 "
Length of tentacle...	44 "	43 "	44 "	45 "
" " club	6 "	6 "	6 "	6 "
Length of gladius...	28 mm.		—	
Breadth of gladius...	6 "		—	

This is to my knowledge the first case of the species having been ever obtained after it was first described. Both the specimens deviate from Goodrich's original description, which is based on specimens from the Andaman Sea (1896), in the following points: (1) In the Japanese specimens, the second pair of arms is distinctly longer than others and that even than the fourth, while in the Andaman specimens the second is as long as the fourth, both being the longest of all. (2) The distal suckers of first, second and third arms are a little more numerous than as given by Goodrich. The numbers of hooks and suckers in the Japanese specimens are given in the following table :

		Right arms				Left arms			
		IV	III	II	I	I	II	III	IV
Sp. No. 1.	Hooks	13	13	14	13	12	13	13	14
	Suckers {Larger	15	11	11	10	10	12	11	0
	Suckers {Smaller... ...	0	26	26	25	25	24	24	0
Sp. No. 2.	Hooks	14	13	13	13	13	12	13	14
	Suckers {Larger	14	11	11	11	10	12	11	0
	Suckers {Smaller... ...	0	26	26	26	25	25	26	0

As the Andaman specimens were all females, the hectocotilized arm has not been known. I find it resembles in appearance very much that of *Abralia veranyi* (Rüpp.). The arm is the left ventral. It is provided, along the distal part a short distance from its extreme end, with two elongate semilunar membranes which are continuations of the narrow protective membranes of the proximal part. The ventral of the semilunar membranes is situated a little more proximally than the dorsal one. The hooks number fourteen, of which the three terminal ones are situated just opposite the ventral semilunar membrane. The terminal part of the arm beyond the semilunar membranes is smooth and without any sucker.

The luminous organs of the body surface are not uniform in appearance but may be classified into three kinds as in *A. veranyi* : (1) Those containing a large amount of pigment, occuring most commonly on the ventral surface of mantle, siphon, head and two ventral pairs of arms, and in a less number on dorsal connective ligaments of siphon. (2) Those of small size found on mantle intermixed among the first kind but less numerously than the latter; they occur also on other parts, though more sparsely than on mantle. (3) Those with a small amount of pigment, occurring most rarely of all and distributed uniformly among the preceding kinds.

Genus **Abraliopsis** Joubin 1896.

8. ***Abraliopsis nishikawæ*** Pfeffer 1912.

Abraliopsis sp., Nishikawa 1096a, pp. 310, 311 pl. vi, figs. 1–11. Aburatsubo, Misaki.

Abraliopsis (*Nepioteuthion*) *nishikawæ*, Pfeffer 1912, pp. 139, 140, 149.

Pfeffer (1912) has given the two kinds of larval cuttle-fishes previously described by Mr. Nishikawa under the name of *Abraliopsis nishikawæ*, considering the younger of the two as the *Nepioteuthion* stage and the older as the *Compthoteuthis* stage of the species. To me it seems doubtful if the two young individuals belong to one and the same species. Indeed, I am inclined to leave the younger specimen in *Abraliopsis nishikawæ* of Pfeffer, but to identify the older with *Watasenia scintillans* (Berry).

Genus **Watasenia** Ishikawa 1913.

9. ***Watasenia scintillans*** (Berry 1911).

Local name : Hotaru-ika, Matsu-ika, Ko-ika (Etchu Prov.)
Beni-ika, Gumi-ika (Odawara, Sagami Prov.)

Watase 1905, p. 119, 1 text-fig. (without name). Etchu Prov.

Abraliopsis sp. Nishikawa 1906a, pp. 311–312, pl. vi, figs. 13–15, Enoura, Suruga Prov.

Abraliopsis scintillans, Berry 1911, p. 93. Japan.——Berry 1912a, p. 424, pls. vii, viii, pl. ix, figs. 1–6.——Berry 1913, p. 591.

? *Abraliopsis* (*Compsoteuthis*) *nishikawæ*, Pfeffer 1912, pp. 150, 162.

Watasenia scintillans, Ishikawa 1913a, pp. 162, 336; 6 figs. Etchu Prov.——Sasaki 1914, p. 75, pls. i, ii. Etchu Prov.

Specimens examined by me :

Specimens	Mantle-length	Locality	Date	Collector	Where preserved
16♂	36–44 mm.	Nishimisaki, Awa	Feb. 16, 1891	—	Sci. Coll.
1♂	35 mm.	Okhotsk Sea	Fishing season of Cod (July ?), 1916	Mr. K. Kato	Mr. K. Tago
4♂	36–42 mm.	Hazamamura, Awa	Middle February, 1907	Prof. A. Oka	Sci. Coll.
87♂, 17 ♀	—	Odawara, Sagami	Eary March, 1907	—	do.
81♂	36–54 mm.	Shirahama, Awa	Feb. 9, 1908	—	do.
10♂, 23 ♀	—	Odawara	Middle March, year ?	—	do.
53♂, 132 ♀	35–50 mm. in ♂ 42–64 mm. in ♀	Namerikawa, Etchu	April 19—May 5, 1913	Author	Agr. Coll.
1♂, 2 ♀	42 mm. in ♂, 47 mm., 60 mm. in ♀	Uodzu, Etchu	April 24, 1913	Author	do.

Subfam. **Ancistrochirinæ** Pfeffer 1912.

Genus **Thelidioteuthis** Pfeffer 1900.

10. ***Thelidioteuthis alessandrinii*** (Vérany 1851).

Loligo alessandrinii, Vérany 1851. p. 99, pl. xxxv, figs. f-h. Nice.

Enoploteuthis polyonyx, Troschel 1857, p. 67, pl. iv, fig. 9. Messina.

Abralia megalops, Verrill 1883, p. 105, pl. iii, fig. 4. West India.——Verrill 1884, p. 143, pl. xxviii, fig. 2, pl. xliv, figs. 2, 2a. East coast of North America.

Enoploteuthis pallida, Pfeffer 1884, p. 18, figs. 23, 23a, 23b.

Calliteuthis alessandrinii, Appellöf 1889, p. 27, figs. 7–11. Messina.

Thelidioteuthis polyonyx, Pfeffer 1900, p. 167.

Thelidioteuthis alessandrinii, Chun 1910, p. 104, pl. vii, figs. 16, 17. Indian Ocean.——Pfeffer 1912, p. 178, pl. xviii, figs. 1–29. South-Atlantic Ocean, Messina, Society Isl.——Berry 1912a, p. 432. Kagoshima Bay.

The species has not come under the author's observation.

Subfam. **Octopodoteuthinæ** Pfeffer 1912.

Genus **Octopodoteuthis** Rüppell 1844.

11. ***Octopodoteuthis sicula*** Rüppell 1844.

Octopodoteuthis sicula, Rüppell 1844, p. 135 (fide Appellöf).——Gray 1849, p. 51. Sicily. ——Pfeffer 1884, p. 28. Messina.——Pfeffer 1900, p. 166.——Massy 1907, p. 381. South-western coast of Irland.——Pfeffer 1908, p. 74, fig. 81. Mediterranean Sea.——Pfeffer 1912, p. 213, pl. xix, figs. 1–16. Messina, North Atlantic.

Verania sicula, Krohn 1847, p. 38. Sicily.——Verany 1851, p. 86, pl. xxviii.——Weiss 1889, p. 87, pl. viii, figs. 1–3.——Appellöf 1899, p. 6, figs. 12–23. Messina.——Jatta 1896, p. 92, pl. vii, fig. 14, pl. xiii, figs. 1–12. Neapel.——Ficalbi 1899, p. 83.

Octopodoteuthis, Chun 1910, pp. 139, 144. pl. xvii. Sagamibai, Japan; Agulhasstrom; Binnenmeer von Westsumatra; Indischer Nordäquatorialstrom; Golf von Aden.

Material examined: One specimen (♀ ?) obtained by Prof. A. Oka, Tateyama, Awa Prov. April 1896 (Sci. Coll.). Dimentions: dorsal length of mantle 27 mm.; breadth of mantle 135 mm., breadth of head 12 mm., length of fin 21 mm., total breadth of fins 31 mm., length of first pair of arms 19 mm., length of second pair 19 mm., length of third pair 23 mm., length of fourth pair 18 mm. Tentacles are absent, as is usual in mature specimens. The eye-openings are ofan oval shape and, contrary to Pfeffer's statement (1912, p. 214), without any sinus at the anterior margin; terminal suckers on each arm can not be detected even under the microscope.

Fam. **Gonatidæ** (Hoyle 1886) Pfeffer 1900.

Genus **Gonatus** Gray 1849.

12. ***Gonatus fabricii*** (Lichtenstein 1818).

Onychoteuthis fabricii, Lichitenstein 1818, p. 13 (fide Pfeffer).

Onychoteuthis kamtschatica, Middendorff 1849, p. 186, pl. xii, figs. 1–6. Kamtschatka.

Gonatus amœna, Gray 1849, p. 68.——Adams 1858, p. 36, pl. iv, fig. 2.——Verrill 1881a, pp. 291, 388, 390, 428.

Gonatus amœnus, Sars 1878, p. 336, pl. xxxi, figs. 1–15, pl. xvii, fig. 2. Norway.

Lestoteuthis Kamtschatica, Verrill 1881, p. 251.

Gonatus fabricii, Steenstrup 1881, p. 9, pl. i. Davis Strait, Greenland, Iceland, Færös, Atlantic, Mediterranean, South of Cape of Good Hope.——Verrill 1880, p. 291, pl. xlv, figs. 1–1b, 2–2d. Off Seal Island, Nova Scotia, from stomach of a cod.——Verrill 1882, p. 289, pl. xv, figs. 1–1c, 2-2d.——Steenstrup 1882, p. 143, pl. i. Japan.——Hoyle 1886, pp. 41, 174. Lat. 58°45'N., Long. 48°39'W.——Hoyle 1889, p. 117-135, pl. xiii, xiv.——Appellöf 1892, p. 9. Jan Mayen.——Pfeffer 1900, p. 163.——Pfeffer 1908, p. 71, figs. 80-84.——Pfeffer 1912, p. 230, pl. xv, figs. 17–22. Greenland, Punta Arenas. ——Berry 1912, p. 308, pl. lii, figs. 1–4, pl. liii, pl. liv, figs. 1–4, pl. lv. Monterey Bay, California; off San Nicolas Island, Cal.; off North Coronado Island, Lower Cal.——Berry 1912a, p. 424.

Cheloteuthis rapax, Verrill 1881, p. 293, pl. xlix, fig. 1. 100 miles south of Newport, from stomach of a fish.——Verrill 1881a, p. 110, pl. ii, figs. 1–1f.——Verrill 1882, p. 286. pl. xv, figs. 3-3f, 4.

Lestoteuthis fabricii, Verrill 1880, pp. 291, 293, 387–390, 428, pl. xlv, figs. 1, 2, pl. xlix, fig. 1. pl. lv. fig. I.——Verrill 1882, p. 416, pl. xlv, figs. 1–1d.——Dall 1886, p. 209. Beringinsel.

Gonatus antarcticus, Lönnberg 1898, p. 51, pl. v, figs. 4, 5. Punta Arenas.

In the region of Japan and vicinity, specimens of the species are said to have been obtained in Shumshu Island, Kuril Group (Middendorff); in Bering Sea (Dall) and in Japan (Steenstrup). Japanese specimens have not yet come under the author's observation.

13. ***Gonatus magister*** Berry 1913.

Local name: Dosu-ika (Etchu Prov.).

Gonatus fabricii (?), Berry 1912, p, 310, pl. lii, figs. 1, 2, pl. liii, pl. liv, figs. 1-4, pl. lv, figs. 1, 3-7. Victoria, B.C.; Puget Sound, Wash.

Gonatus magister, Berry 1913a, p. 76.

Gonatus septemdentatus, Sasaki 1915a, p. 185. Etchu Prov.

The species is one which stands in very near relationship to *Gonatus fabricii* (Lichtenstein), but differs from this in the following respects:

Tentacles with very minute suckers only. Three dorsal pairs of arms with 2 marginal series of small suckers and 2 central series of hooks, except in basal and distal parts where there exist only suckers arranged in 4 series. Radula with 7 series of teeth; middle tooth tricuspid, lateral teeth bicuspid; both marginals unicuspid.

Fam. **Histioteuthidæ** Verrill 1881.

Genus **Stigmatoteuthis** Pfeffer 1910.

14. ***Stigmatoteuthis japonica*** Pfeffer 1912.

Calliteuthis reversa, Hoyle 1886, p. 183, pl. xxxiii, figs. 12–15. Hyalonema ground off Enoshima, Sagami Bay; New Zealand.

Stigmatoteuthis japonica, Pfeffer 1912, p. 234.

This species has not been rediscovered since it was first described.

15. ***Stigmatoteuthis dofleini*** Pfeffer 1912.

Local name : Kurage-dako (Awa).

Calliteuthis reversa, Chun 1906, pp. 747, 751, 752, figs. 2, 4, 5. Sagami Bay.

Calliteuthis ocellata, Chun 1910, pp. 147–169, 170, text-pl. i, figs. 1, 2, text-fig. 23a, b.—— Berry 1912a, p. 432.

Calliteuthis dofleini, Pfeffer 1912, p. 288.

Material examined: (i) One ♂ specimen with two hectocotylized arms, found by Mr. S. Takahashi in the stomach of a sperm-whale captured off the coast of Ibaraki Prefecture (lat. 36°14′N, long. 142°18′E), June 15, 1904 (Sci. Coll.). (ii) One ♂ specimen with one (left) hectocotylized arm, obtained at Yoshihama, Awa Prov., April 4, 1889 (Sci. Coll.). (iii) One ♀ specimen with perfect tentacles, obtained in Sagami Bay, date? (Sci. Coll.).

So far as I know, the above specimens are all that have ever been obtained of the species after the Doflein's specimen which served as type to Chun's description of the species. The latter was in so badly preserved condition that specific characters have not been fully known.

Measurements of the specimens examined by me :

Sp. No.	i		ii		iii	
Dorsal length of mantle	140 mm.		—		97 mm.	
Ventral length of mantle	120 „		190 mm.		85 „	
Breadth of mantle...	72 „		—		60 „	
Dorsal length of head	—		75 „		55 „	
Breadth of head	70? „		—		60? „	
Length of fin...	42 „		—		38 „	
Total breadth of fins	63 „		80 „		58 „	
Breadth of eye-opening	Left 32 mm.	Right 17 mm.	Left 37 mm.	Right 20 mm.	Left 36 mm.	Right 21 mm.
Length of first arm	376 „	370 „	380 „	—	250 „	250 „
„ „ second arm...	—	—	—	—	305 „	307 „
„ „ third arm	—	—	—	—	285 „	—
„ „ fourth arm	380 „	380 „	—	—	250 „	270 „
Length of tentacle	—	—	—	—	250 „	270 „
„ „ club	—	—	—	—	55 „	55 „
Diameter of largest sucker of first arm	6.5		7		5	
„ „ „ „ „ second arm	6.5		7		5	
„ „ „ „ „ third arm	6.5		7		5	
„ „ „ „ „ fourth arm	3		3		2.5	
„ „ „ „ „ tentacle ...	—		—		5	

Skin nearly choroidal, thickly beset with colorless warts. Mantle short, a little shorter than twice the breadth, tapering backward, acuminated behind, the dorsal anterior edge somewhat projecting in the middle and forming an obtuse angle, the ventral edge with a broad emargination laterally bounded by angular projections. Fins terminal, slightly projecting backward beyond posterior end of mantle ; both together of a transversely oval shape, slightly notched at the anterior attachment as well as in the middle of their combined posterior edge.

Head large, as broad as mantle-opening. Siphonal groove shallow, marked by a faint boundary fold ; neck with distinct boundary edge in front, and with a minute papillary organ on each side. Eyes large, eye-opening nearly round, with an indistinct shallow notch at the anterior edge ; left eye-opening very large, being twice as wide as the right. Siphon short, extending for about one-fourth the length of head, its dorsal connective ligaments imbedded under the skin of siphonal groove.

Arms very long, thick ; subequal, the order of length being 2>3>4>1 in the female specimen (no. iii) of 97 mm. mantle-length ; the longest pair about thrice as long as mantle. The umbrella in the same female specimen extends for a distance of 26 mm. from the angle between dorsal arms, 24 mm. between first and second pairs, 20 mm. between second and third pairs, 15 mm. between third and fourth pairs, and 10 mm. between ventral arms. Protective membrane of arms thick and choroidal, with zigzag edge-line, about half as broad as the suckers are high. Suckers nearly spherical, arranged in two series, the largest in the middle parts of arms and growing smaller towards both arm ends ; suckers of the fourth pair of arms much smaller than those of all other arms, being half as large in diameter as the latter. Horny rings with quadrangular teeth thickly arranged along their distal margin, the number of teeth in specimens Nos. i and ii varying from six to eleven, and in specimen No. iii from eight to nineteen. In the last specimen the horny rings often bear irregular horny masses, which sometimes entirely cover up the teeth.

Both the arms of dorsal pair are hectocotylized, their principal characteristics agreeing well with the account given by Chun (1906, 1910).

The tentacles of this species have hitherto been quite unknown. Their length is about equal to four times the mantle-length ; the stem in the distal parts is a little compressed, with a flat inner surface. Club lanceolate, of about one-seventh the length of the entire tentacle, provided with a web along the distal two-thirds of the length of its outer surface ;

proximally the web becomes broader, but finally terminates in a free, acute, retroverted point. A series of connective suckers, comprising about eleven suckers and fixing tubercles, begins to occur at about two-thirds the length of tentacle from base and reaches up to the proximal part of club.

Tentacular suckers, excluding the connective ones, may be divided into two groups, each consisting of about five series: (1) Suckers of the hand portion, which are highly variable in size, those of the median series being from six to twelve times as large as those of marginal series, while those of submedian series are about half as large as those of the median series. (2) Suckers of the distal portion, which are practically serial continuations of those of the hand portion and which are numerous, minute, and about equally sized, being smaller than marginal suckers of the hand portion.

Largest tentacular suckers short, pail-like in shape, with a very wide aperture; horny ring with about fifty or more fine, acute and inwardly directed teeth along the whole margin; interdental spaces nearly as wide as the teeth at base. Suckers of ventral submedian series and some proximal ones of the hand portion characteristically differ from all others in that they are of a somewhat quadrangular contour and the fundus of their hollow are raised to about the level of the aperture. Their horny ring is provided, along the entire edge, with about thirty, thick, triangular, outwardly directed teeth, the points of which inclose a space of a quadrangular shape, the four teeth at the corners of that space being thicker and longer than the rest.

The luminous organs of the mantle are not quite regular in distribution. Nevertheless, the edge of the mantle-opening always shows nine small luminous organs along the emarginated part, and more laterally four slightly larger ones on either side. For the rest, the ventral side of mantle is provided with about forty luminous organs, of which the posterior ten are smaller than those more anteriorly situated. On the dorsal side, there are found about as many luminous organs as on the ventral side, but all are smaller in size; especially small are the twenty-four situated in the median region.

Also on the head, the luminous organs are irregularly distributed. Its ventral surface exhibits about thirty-three large ones, of which eight are arranged in a series just in front of the siphonal groove. Besides the thirty-three, the margin of the right eye-opening shows a series of seventeen large organs, and that of the left eye-opening a series composed of five large ones in front and of four minute ones behind. The dorsal surface of head has five large and about eleven minute luminous organs.

The luminous organs of ventral arms are arranged, in the proximal half of their length, in three series; more distally, they occur in two series, and finally in the terminal parts they form a single series; the series of longest extent being the middle series made up of twenty-five organs. The luminous organs of first, second and third arm pairs consist of a single series of large organs on the ventral side, and of a single series of minute ones on the dorsal.

Buccal membrane broad, with seven ribs, projections and connective ligaments.

Radula with seven series of unicuspid teeth, which, as regards their length, show the following relations: median $\fallingdotseq$ lateral $\fallingdotseq$ 1/2 inner marginal $\fallingdotseq$ 1/3 outer marginal.

Inner surface of mantle, siphon, buccal membrane, branchial vessels and adductor muscles of siphon show a purplish brown hue, while the anterior parts of neck as well as of siphonal groove are tinged with a darkish brown color.

Remarks.—Doflein's original specimen of this species was first taken by Chun to be identical with *S. ocellata* (Owen 1906), but was later made by Pfeffer into a new species under the name of *S. dofleini*. The specimens now before me, as also the Doflein's specimen, do not quite agree with Owen's original description of *S. ocellata*. In his *S. ocellata*, the horny ring of arm-suckers should have "a finely spinous border," which is not the case in *S. dofleini*. Further, the former seems to have luminous organs more numerously on head but less so on mantle than in the latter species, while the arms are much shorter, being only a little longer than mantle.

Genus **Meleagroteuthis** Pfeffer 1900.

16. ***Meleagroteuthis separata*** Sasaki 1915.

Meleagroteuthis separata, Sasaki 1915, p. 131, text-figs. 1, 2. Misaki.

This is a species closely allied to *Meleagroteuthis hoylei* Pfeffer, but differs from it (1) in the suckers of the distal parts of tentacular club being equal, small and grouped together without continuity to the series of suckers of the hand-portion, (2) in the luminous organs of the ventral pair of arms being arranged in nine series in the proximal parts, and (3) in the horny tubercles of the back of mantle being seventeen in number and small in size.

Fam. **Ommastrephidæ** (Steenstrup 1861).

Subfam **Ommastrephinæ** (Gill 1871).

Genus **Ommastrephes** d'Orbigny 1835.

17. ***Ommastrephes sloani pacificus*** (Steenstrup 1880).

Local name : Surume-ika (Tokyo, Sagami, Settsu, Hokkaido), Ma-ika (Etchu, Kaga).

Todarodes pacificus, Steenstrup 1880, pp. 83, 90, etc. Hakodate.——Hoyle 1886, p. 163, pl. xxviii, figs. 1–5. Inland Sea.——Joubin 1897, p. 103. Vladivostok.

Ommastrephes pacificus, Appellöf 1886. p. 35, pl. iii, figs. 8–10. Nagasaki.

Ommatostrephes sagittatus var. *sloani,?* Wülker 1910, p. 21. Misaki; Todohokke, Hokkaido.

Ommastrephes sloani, Berry 1912a, p. 433, pl. vi, fig. 4. Tomakomai, Iburi Prov.; Hakodate; Tokyo; Misaki.

Ommatostrephes sloani pacificus, Pfeffer 1912, p. 456, pl. xxxiv, figs. 3–6. Japan.

Ommastrephes sloani pacificus, Ishikawa 1913, p. 586, 4 figs. Misaki; Niigata; Miye; Uodzu. Etchu Prov.; Iwami Prov.

This species is the commonest Oegopsid cuttle-fish found in Japan, and has a wide distribution extending from Kiushu to Hokkaido, on both the Sea of Japan and the Pacific Ocean sides. To it is referable the common dried cuttle-fish called "*Nibanzurume*" by the traders. The following is a list of specimens examined by the author.

No.	Specimens	Mantle-length	Locality	Date	Where preserved
i	1 ♀	244 mm.	Misaki	Dec. 13, 1908	Sci. Coll.
ii	1 juv.	50 mm.	Takashima, Hokkaido	June 10, 1907	Agr. Coll.
iii	1 juv.	47 mm.	Takashima	July 6, 1909	do.
v	3 ♂, 1 ♀	190–194 mm.	Oshoro, Hokkaido	July 15, 1910	do.
v	1 ♂, 2 ♀	155–175 mm.	Off Shakotan, Hokkaido	July 5, 1911	do.
vi	6 juv.	90–115 mm.	Kuwagasaki, Rikuchû Prov.	July 21, 1911	do.
vii	5 ♂, 5 ♀	210–255 mm.	Off Ohana-misaki, Hokkaido	Nov. 1, 1911	do.
viii	2 ♂, 1 ♀	163–170 mm.	Off Shakotan	July 5, 1912	Fish. Inst. Takashima, Hokkaido
ix	1 ♂, 1 juv.	158–170 mm.	Off Shakotan	July 13, 1912	do.
x	1 juv.	80 mm.	Atkeshi, Hokkaido	July ? 1912	Agr. Coll.
xi	1 ♂, 1 ♀	242 mm. in ♂ 255 mm. in ♀	Obuyu-saki, Hokkaido	Aug. 19, 1912	do.
xii	2 ♂, 1 ♀	180–195 mm.	Off Shakotan	Aug. 30, 1912	Fish. Inst. Takashima
xiii	3 ♀	218–235 mm.	Hakodate market	Nov. 26, 1912	Agr. Coll.
xiv	2 ♀	253–280 mm.	Namerikawa, Etchû Prov.	April 25, 1913	do.
xv	3 juv.	31– 36 mm.	Himi, Etchû	May 8, 1913	do.
xvi	1 juv.	80 mm.	Takashima	Sept. 3, year ?	Fish. Inst. Takashima
xvii	1 ♀	250 mm.	Usetsu, Noto	——	Agr. Coll.

18. ***Ommastrephes volatilis*** Sasaki 1915.

Local name: Tobi-ika (Sagami Prov.).

Ommastrephes volatilis, Sasaki 1915, p. 138, pl. iv, figs. 1–6, text-fig. 3. Off Atami, Sagami Bay.

The principal characters distinguishing it from other species of the genus are as follows:

Foveola of siphonal groove without longitudinal folds within, but smooth. Ratio of breadth to length of mantle: 16–19 to 100. Fins taken together distinctly longer than broad, attenuated posteriorly. Horny ring of arm-suckers varying in denticulation in different suckers of each arm; largest sucker of II arm provided with quadrangular supplemental teeth alternating with long sharp ordinary teeth. Horny ring of largest tentacular sucker with sharp teeth only and without any supplemental ones. Hectocotylus distinguished not only by degeneration of suckers and swelling of sucker-bases, but also by thickening and enlargement of the ventral protective membrane as well as by the sculpture of the outer surface consisting of pits and transverse grooves.

Subfam. **Stenoteuthinæ** Pfeffer 1912.

Genus **Stenoteuthis** Verrill 1880.

19. ***Stenoteuthis bartrami*** (Lesueur, 1821).

Loligo bartrami, Lesueur 1821, p. 90; pl. ii, fig. 1a–f (fide Pfeffer).

Ommastrephes bartrami, d'Orbigny, in Fér. et d'Orb. 1839, p. 347; Calmars pl. ii; pl xxi, fig. 5; Ommastrephes pl. ii, figs. 11, 12.——Gray 1849, p. 62.——Steenstrup 1880, p. 73 ff.; fig. 2, p. 76; fig. 3, p. 81.——Jatta 1896, p. 64, pl. x, figs. 1–16; text-figs. 8 (p. 10), 12 (p. 11), 36 (p. 19), 41 (p. 21). Neapel.

Stenoteuthis pteropus, Verrill 1880, p. 228, pl. xxvii, figs. 7, 7a; pl. xxvi, figs. 5–9. Bermuda. ——Verrill 1882, p. 317, pl. vii, fig. 2; pl. xvii, figs. 3–9.

Stenoteuthis bartrami, Verrill 1880, p. 223.——Verrill 1882, p. 322.——Pfeffer 1900, p. 180. ——Pfeffer 1908, pp. 97–100, figs. 109–115.——Pfeffer 1912, p. 465, pls. xxxv, xxxvi; pl xxxix, figs. 1, 2. Atlantic Ocean (Holland, Cap. Isl., Brazil, West-Ind., North Sea, Antilles, Campeche Bay, 13°N. 27°W, 20°N. 23°W), Mediterranean (Nizza, Agypt), Indian Ocean (Ceylon, Madagascar), Pacific Ocean (La Plata, China, Sagami Bay).

Material examined: One male and female specimens. Odawara, Sagami Prov., Nov. 1885 (Sci. Coll.). Mantle-length 240 mm. in ♂, 250 mm. in ♀.

Genus **Symplectoteuthis** Pfeffer 1900.

20. ***Symplectoteuthis oualaniensis*** (Lesson 1830).

Loligo oualaniensis, Lesson, in Lesson et Garnot 1826–'30, p. 240, pl. i, fig. 2. Oualan (fide Pfeffer).

Ommastrephes oualaniensis, d'Orbigny, in Fér. et d'Orb. 1835–'48, p. 351, Calmars pl. iii, pl. xxi, figs. 1, 2. Ommastrephes pl. i, figs. 14, 15.——Gray 1849, p. 63.——Hoyle 1886, p. 162. Coral Sea, North of the Admilalty Island.

Symplectoteuthis oualaniensis, Pfeffer 1900, p. 180.——Hoyle 1904, p. 32, text-fig. E. East of Cocos Isl.——Hoyle 1905, p. 982. South Nilandu Atoll.——Wülker 1910, p. 21. Misaki.——Pfeffer 1912, p. 502, pls. xl, xli, pl. xlii, figs. 1–4. Laysan, Ind. Oz., Okinawa, Japan, Oualan, Südsee.——Berry 1912a, p. 438.

Japanese specimens of this species have not come under observation of the author.

21. ***Symplectoteuthis luminosa*** Sasaki 1915.

Local name: Suji-ika (Sagami Prov.).

Symplectoteuthis luminosa, Sasaki 1915, p. 144, pl. iv, figs. 7–13, text-fig. 4. Off Misaki.

This is a species standing in very near relationship to *Smplectoteuthis oualaniensis* (Lesson), but differing from it in following respects:

Luminous organs present. Hectocotylized left ventral arm as thicsʀ k' but a little shorter than, the right ventral; provided with about 24 normal suckers in the proximal parts; protective membranes as broad and thick as those of the right arm; distal 1/3 of the length not naked, but with 34 minute tubercles each set on a swollen base. Horny ring of largest tentacular suckers with only a single large tooth on distalmost edge.

Fam. Thysanoteuthidæ Keferstein 1866.

Genus Thysanoteuthis Troschel 1857.

22. *Thysanoteuthis rhombus* Troschel 1857.

? *Sepioteuthis major*, Gray 1828, p. 3, pl. iv, fig. 1. (fide Fér. et d'Orb.)——Fér. et d'Orb. 1835, p. 305, Sepioteuthis pl. vii, fig. 12.——Gray 1849, p. 83.

Thysanoteuthis rhombus, Troschel 1857, p. 70, pl. iv, fig. 12, pl. v, figs. 1–4. Messina (fide Pfeffer).——Tryon 1879, p. 167.——Weiss 1889, p. 91. Neapel.——Jatta 1896, p. 56, pl. ix, figs. 1–13, textfig. 54. Neapel, Ischia, Pozzuoli Bay.——Pfeffer 1900, p. 182. ——Pfeffer 1912, p. 523, pl. xxvii, figs. 24–37. Mediterranean Sea, Atlantic Oc. ——Berry 1912a, p. 438.

The present species had been included, by mistake of some authors, in the Japanese fauna. However, the actual existence of the species in the Japanese archipelago is proved by the following three specimens :

i. One specimen, sex ?, caught by Mr. K. Aoki, off Atami, Sagami Prov. Sept. 23, 1905 (Sci. Coll.).

ii. One specimen, sex ?, caught by a fix-net on the coast of Namerikawa, Etchu Prov., Nov. 1908 (Fish Inst. Namerikawa).

iii. One ♀ specimen obtained at Usetsu, Noto (Agr. Coll.).

Principal measurements of the above specimens :

Sp. No.	i		ii		iii	
Dorsal length of mantle	180 mm.		685 mm.		290 mm.	
Breadth of mantle...	54 „		240 „		90 „	
Dorsal length of head	45 „		156 „		60 „	
Breadth of head	49 „		185 „		88 „	
Length of fin	175 „		674 „		290 „	
Breadth of fin altogether	157 „		637 „		300 „	
	Left	Right	Left	Right	Left	Right
Length of first arm	62 mm.	58 mm.	— mm.	150 mm.	100 mm.	100 mm.
„ „ second arm	75 „	77 „	—	160 „	120 „	120 „
„ „ third arm	123 „	127 „	—	240 „	196 „	186 „
„ „ fourth arm	70 „	71 „	—	170 „	106 „	108 „
Length of tentacle	160 „	157 „	—	500 „	235 „	230 „

Fam. **Chiroteuthidæ** Gray 1849.

Subfam. **Chiroteuthinæ** Chun 1908.

Genus **Chiroteuthis** d'Orbigny 1839.

Subgenus **Chirothauma** Chun 1910.

23. ***Chiroteuthis (Chirothauma) imperator*** Chun 1910.

Local name: Yûrei-ika, Mizu-ika (Sagami).

Cheiroteuthis macrosoma, Nishikawa 1906, p. 109, pl. iii. Off Shimo-osa Prov.

Chiroteuthis (Chirothauma) imperator, Chun 1910, pp. 240, 241, 281, pl. xxxviii; pl. xxxix, figs. 1–10; pl. xl, figs. 2–5, 7; pl. xli; pl. xlii, figs. 1–4; pl. xliii; pl. xliv, figs. 3, 6–16. Nias-Süd-Kanal, Sumatra; Sagami-Bai, Japan.

List of specimens examined:

Specimens	Mantle-length	Locality	Date	Where preserved
2, sex ?	110–140 mm.	Misaki	Sept. 1887	Sci. Coll.
3, much injured	——	Odawara, Sagami	May 1, 1891	do.
2 ♀	149–180 mm.	Misaki	Aug. 27, 1891	do.
1 ♀	245 mm.	Off Misaki, 350 fathoms	May 1, 1899	do.
1, ♀?	225 mm.	Misaki	Sept. 24, 1908	do.
1 ♀	100 mm.	Sembombana, Numazu	Sept. 1912	Agr. Coll.

In some badly preserved specimens, the neck region is narrowed as was stated by Goodrich for *Chiroteuthis macrosoma* from off the Kistna delta.

Subfam. **Idioteuthinæ** nov.

Genus **Idioteuthis** nov.

24. ***Idioteuthis latipinna*** sp. nov. Pl. III.

Diagnosis.—Body large, with thick choroidal integument; surface smooth in all parts. Mantle elongate-conical, being broadest anteriorly;

Mantle-opening wide and free along the entire margin, of which the dorsal median margin protrudes a little forwards, forming a short but broad triangular projection; lateral margins concave; ventral margin projecting beneath head, its median region slightly curving backwards. Fins very thick and large, the length being about equal to 5/6 of mantle-length, and taking both of them together, are nearly circular in shape, though acuminated posteriorly and slightly emarginated at the anterior attachment.

Head very large, being a little broader than mantle-opening; siphonal groove rather shallow, smooth within, and without sharp boundary edge at the anterior end. Eyes unequal in size and shape; right eye of usual shape, the eye-opening provided with a shallow sinus in front; left eye of a peculiar shape, with large eyeball and wide eye-opening twice as broad as that of the right side. Neck smooth, but with a minute semicircular membranous papilla on each side.

Siphon nearly conical, short, reaching to about the middle of head; dorsal siphonal connective ligaments in 2 pairs, entirely embedded in integument. Siphonal resisting cartilage oval in shape, becoming a little wider backwards, with a deep median groove which also becomes wider and deeper posteriorly; mantle cartilage about as long as the siphonal and of a crest-like shape, as high as long, and becoming higher backwards. Nuchal cartilage of a bisquit-like outline, narrowed in the middle, and provided with a longitudinal median ridge with a groove running along the crest. Buccal membrane thick and fleshy with finely wrinkled inner surface, with eight connective ligaments and with seven somewhat indistinct ribs and marginal projections. Outer lip thin; inner lip thick, with papillate margin.

Arms long and unequal, the formula of their length being $4>2>3>1$; longest arm a little shorter than mantle-length. First and second arms a little flattened laterally, with a keel along their outer surface. Second and fourth arms quadrangular in section, with a web along their ventral outer edge. Protective membranes of all arms as broad as length of suckers. Suckers nearly semicircular, with thin and narrow horny edge, which is sometimes thickened into an irregular shape ; papillary area very narrow and thin, surrounded by glandular radial muscles. Suckers in all arms thickly arranged in two series of about sixty-five each.

Tentacles slender, with cylindrical stalk, the distal half forming a thick club, which tapers gradually towards tip and is a little flattened in the proximal parts but distally changes into cylindrical ; protective membrane broad, supported by numerous distinct muscular ribs. Suckers depressed, oval, very obliquely attached ; aperture very wide, oval, with distal margin distinctly notched. Suckers in the proximal parts of club in oblique rows of four each ; distally the number of suckers in each row gradually increases up to about twenty-four. At the same time the suckers grow smaller ; while the proximal suckers are about as large as the largest sucker of arms, those at tip of club are very minute and scarcely visible to the naked eye. Horny ring with about ten, blunt, short, outwardly directed teeth along the distal edge ; often showing some horny noxes of varing sizes in some part of the margin. The noxes well developed in proximal suckers, generally covering up the entire edge as well as all the teeth ; especially so in largest suckers in which the noxes fuse together into an irregularly tubercled thick mass along the entire margin of horny ring (Pl. III, figs. 2–5).

In the mantle cavity, there exists a pair of elongate elliptical glandular organs in the middle of the inner surface of ventral mantle. This organ seems to constitute an important characteristic of this species ; it has, so far as I am aware, never been before noticed in any other known cuttlefish.

Color purplish brown all over.

Radula and gladius not examined.

The type specimen, preserved in alcohol, was captured by Mr. K. Aoki in Sagami Sea, outside the Okinosé bank from a depth of about 400 fathoms. The principal measurements are as follows :

Dorsal length of mantle	238 mm.
Ventral length of mantle	235 „
Breadth of mantle...	65 „

Length of head		80 mm.
Breadth of head		78 „
Length of fin		200 „
Total breadth of fins		210 „
	Left	Right
Length of first arm	140 mm.	— mm.
„ „ second arm	175 „	175 „
„ „ third arm	150 „	150 „
„ „ fourth arm	195 „	195 „
Length of tentacle...	390 „	349 „
„ „ club	240 „	230 „

Remarks.—The present species differs from all hitherto known Oegopsids in many respects. The choroidal nature of the body, the absence of hooks, the characters of neck and of its appendage, and the shape of fins seem to indicate that it stands in nearest relationship to the Chiroteuthidæ, though it lacks luminous organs. However, the final determination of the relationship may well be deferred until a more precise knowledge is gained of the anatomical character of the species.

Fam. **Cranchiidæ** Gray 1848.

Genus **Cranchia** Leach 1817.

25. ***Cranchia scabra*** Leach 1817.

Cranchia scabra, Leach 1817, p. 137. West Afrika (fide Pfeffer).——Fér. et d'Orb. 1839, p. 222; Cranchies, pl. 1. fig. 1; Rossia, pl. 1, figs. 1–5. Antillen.——Gray 1849, p. 38.——Pfeffer, 1900, p. 195.——Hoyle, 1904, p. 43, pl. x. fig. ii. North Pacific Ocean 960 miles from Guadalupe Island.——Chun, 1910, p. 328, pl. xlviii, figs. 1, 2; pls. xlix, l; pl. lx, figs. 1–6. Lat. 0°20′N., long. 6°45′W.; lat. 4°56′N., long. 78°15′O.——Pfeffer, 1912, p. 679. pl. xlviii, figs. 22–26. 10°S., 172°W; Pacif. Oz.; Ind. Oz.; Südsee (?); Südatlantischer Oz.

A single specimen from Misaki stood at my disposal for examination. Mantle length 13 mm.

Genus **Liocranchia** Pfeffer 1884.

26. ***Liocranchia reinhardti*** (Steenstrup 1856).

Leachia reinhardti, Steenstrup 1856, p. 200. Azoren [fide Pfeffer).

Loligopsis reinhardti, Tryon 1879, p. 165.

Cranchia reinhardti, Brock 1882, p. 605, pl. xxxvii, fig. 4.

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Liocranchia brockii, Pfeffer 1884, p. 25, figs. 33, 33a. Northern west coast of New Guinea.

Liocranchia cf. *reinhardti*, Pfeffer 1884, p. 29, fig. 35. China Sea.

Cranchia (*Liocranchia*) *reinhardti*, Hoyle 1886, p. 184, pl. xxxi, figs. 11–14; pl. xxxii, figs. 1–4. Tropical Atlantic. Oc.

Liocranchia reinhardti, Pfeffer 1900, p. 194.——Chun 1906, p. 84.——Issel 1908, p. 218, pl. ix, figs. 24–26; pl. x, fig. 27. Caraibische Meer.——Chun 1910, p. 336, pl. li, figs. 5–7. Guinea-Strom, Ausläufer des Benguelastromes, indischer Nordäquatorial stromes.——Pfeffer 1912, p. 667, pl. xlviii, figs. 1–3. Java-See, Küste von Neu Süd-Wales, Chili, China, New Guinea, Süd-See.

A single specimen obtained at Abratsubo, near Misaki, on Dec. 26, 1894 (Sci. Coll.), was studied by me. Mantle-length 19 mm.

27. ***Liocranchia*** sp. Berry, 1912.

Liocranchia sp., Berry 1912a, p. 438. Japan (very immature specimen impossible of determination).

Genus **Pyrgopsis** Rochebrune 1884.

28. ***Pyrgopsis pacificus*** (Issel 1908).

Zygænopsis pacifica, Issel 1908, p. 223, pl. x, figs. 33–44. Between Tahiti and Pango-Pango.

Euzygæna pacifica, Chun 1910, p. 354, pl. lii, figs. 1–3. Sagami Bay, Atlantic Oc.

Pyrgopsis pacificus, Pfeffer 1912, p. 661.

Material examined: (i) Three ♀ specimens, Misaki, date? (Sci. Coll.). Mantle-length 40–50 mm. (ii) One ♂ specimen, Entrance to Moroiso, Misaki, March 29, 1905 (Sci. Coll.). Mantle-length 42 mm.

Genus **Loligopsis** Lamarck 1812.

29. ***Loligopsis chrysophtalmos*** (Tilesius).

Sepia chrysophtalmos, Tilesius, pl. xxxviii, f. 32, 33. Japan (fide Fér. et d'Orb.).

Loligopsis chrysophtalmos, d'Orb., in Fer. et d'Orb. 1835–48, p. 324, Calmaret pl. i, figs. 2–4.

A species impossible of exact systematic determination. The genus itself is an uncertain one.

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Explanation of Plate III.

Idioteuthis latipinna gen. nov., sp. nov.

1. The type specimen in $\times 1/3$.
2. Largest sucker of third arm in $\times 1/4$.
3. Largest sucker of tentacle in $\times 1/6.5$.
4. A sucker from middle of the length of tentacular club in $\times 1/8$.
5. A sucker from the distal parts of tentacular club in $\times 1/20$.

A New Case of Brood-Caring in Holothurians.

By

Hiroshi Ohshima, *Rigakushi.*

Fifth High School, Kumamoto.

During my short stay last summer at Ushibuka, a fishing village on the west coast of Kiūshū, numerous specimens of *Pseudocucumis africanus* (SEMPER) were collected for study. The animal can easily be found within crevices of rocks between tide-marks, protruding the anterior part of its body among clusters of *Mytilus* and very often accompanied by a synaptid, *Polycheira rufescens*. Full-grown specimens, when well stretched out, measure above 80 mm. in length and 15 mm. in diameter, while the tentacles, which are short, scarcely exceed 15 mm. in length.

On July 29th, I have discovered that a full-grown specimen, previously captured and which has been kept living in a vessel, has given birth to a dozen young individuals. Subsequently, I have succeeded in finding, among my preserved material, two adult specimens containing some youngs inside their body. One of them, 60 mm. long and 11 mm. thick and which was collected on July 28th, contained twenty-seven youngs, and the other, 65 mm. long and 13 mm. thick and collected on August 9th, twenty-five. In both cases, all the youngs were found in the body-cavity of the mother. The three broods mentioned have yielded sixty-four youngs in all.

All the youngs obtained are practically in the same stage of development, the size varying from 1.4 mm. by 0.6 mm. to 10 mm. by 2.5 mm. The color is a light grayish violet, much lighter than in the adult but quite intense at the anterior end of body. The body-wall is thin and semi-transparent; it contains calcareous deposits in scattered distribution. Tentacles ten in number, all of the same size and shape, with a few branches, and containing supporting rods in their wall. Pedicels arranged in a double row along each radius; those of the three ventral radii markedly well developed and more numerous than those of dorsal radius.

Calcareous deposits of general perisome are either perforated plates or primary crosses; both rather delicate and beset near the centre with 2, 3 or 4 short pillars which often unite with one another at apex, thus forming a kind of rudimentary spire. The plates and crosses measure 0.1—0.2 mm. in diameter. The conical knobs so characteristic of the plates of adult animals have not yet appeared. Around the anus are found five anal plates about 0.2 mm. in length, irregular in perforation, and devoid of pillars. Pedicels have oblong perforated plates or rods in addition to end-plate.

A young taken out of the body-cavity of a female *Pseudocucumis africanus*, seen from the left side. Alcoholic specimen, ×12. One sees that the pedicels are larger and more numerous on the ventral side than on the dorsal. Besides are visible branched tentacles, coiled intestine, radial canals and scattered calcareous deposits.

Mouth is open and leads into a narrow œsophagus, which after a short run enlarges itself into a stomach. The intestine shows the typical coil. A pair of very short respiratory tree buds are given out near the end of intestine. Yolk granules can nowhere be found.

Each of the five radial canals gives out only a pair of tentacular canals, there being as yet no budding out of secondary tentacular canals. In this respect the young is of the Cucumarian type. Stone-canal ends near the body-wall with a primitive madreporic body. A single well developed Polian vesicle present. Five retractors are distinctly separated from radial muscles. No primordium of gential organ seems to be present.

With regard to the mode of fertilization of ova and the way in which the youngs escape from maternal body, I have no direct observation. However it seems assumable that some of the gential tubes produce each at the free end a single ripe ovum, which after liberation into the body-cavity, is fertilized by spermatozoa which may have entered there by penetrating through the wall of respiratory trees. Gential tubes in maternal body number about twenty-five pairs, i. e. about twice as many as the number of youngs found in the body-cavity. Gential duct occurs in a single number, opening externally by an orifice situated on a very inconspicuous prominence near the tentacular crown, as can be made out by examination of sections.

Numerous adult specimens other than the three referred to, were found, in spite of careful searches, to contain no young in their body. From the fact that the youngs discovered are in a quite advanced stage of development, it is probable that at the time of my stay at Ushibuka the majority of the species have already finished discharging their youngs.

After careful searches on the shore, I succeeded only once, on August 14th, in finding a young which seemed to have been born not very long before. It was hidden in a dead Oyster-shell attached to the underside of a large stone, at which spot several adult *Pseudocucumis* were also found. It measured, when fresh, 14 mm. in length and 3 mm. in diameter. Color deep grayish violet all over. Except in this coloring, the larger size of body and the increased number of pedicels, the little specimen in question does not differ in essential points from those youngs which were taken from maternal bodies. It is still in possession of only ten tentacles, and the respiratory trees remain in nearly the same state of development. The stomach contains but a trace of plankton organisms taken in as food. Remarkable is the exceedingly rare occurrence of newborn youngs in spots where adult animals abound. This, I suppose, is due to the fact that, as their power of attaching by means of pedicels is not yet very strong, they are easily swept off by waves and current to deeper parts of the water, where they start on their early lives.

Up to date, so far as I am aware, similar cases of brooding habit in dendrochirotes have been recorded only twice, i. e., in *Phyllophorus urna* (GRUBE)[1] of the Mediterranean and in *Thyone rubra* CLARK[2] of california.

In both cases, youngs were found contained in maternal body-cavity in a few number and they seem to have been at a younger stage of development than in the cases described by me. Of other holothurians, similar cases have been known from three synaptids, viz. *Synaptula hydriformis* (LESUEUR)[3] and *Chiridota rotifera* (POURTALÈS)[4] of Jamaica and adjacent regions, and *Leptosynapta minuta* (BECHER)[5] of Helgoland. In the former two species the youngs found in the body-cavity were very numerous, especially in the second species in which above 500 were counted by CLARK in one case; in the last species, which is of a very small size, only five were found.

As to the way in which the young escape from maternal body CLARK thought that a temporary rupture ocurring in the body-wall serves for that purpose, while BECHER[6] suggested that the abdominal pore, which he proved to exist in *Labidoplax buskii*, might serve to export the young.

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Jan. 15, 1916.

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On a New *Ichthyoxenus* (*I. opisthopterygium* sp. nov.) from Lake Biwa.

By

Shigemi Ishii, *Rigakushi.*

In the abdominal cavity of *Acheilognathus tabira* JORDAN & THOMPSON, collected at Hikone (Lake Biwa) last summer, I have found an apparently new *Ichthyoxenus* species which differs markedly from *Ichthyoxenus japonensis* RICHARDSON.[1] The new parasite will be called *Ichthyoxenus opisthopterygium*. It seems that the occurrence of the parasite is not unfrequent, as I have found ten cases of its occurrence out of sixty-nine individuals examined of the host-fish. In each case the parasite was present in a single number, thus giving me in all ten specimens of it, of which number three were males and seven females.

The manner of occurrence of *I. opisthopterygium* in the host body seems to be the same as that of *I. japonensis*, being found inclosed in a membranous sac which lies freely in the body-cavity and opens by an orifice situated close behind the pectoral fin of either side. Inasmuch as the tissue of the sac apparently belongs to the host and the parasite does not stand in direct contact with the latter's viscera, it is, strictly speaking, improper to say that the parasite is lodged in the visceral cavity itself.

The females lie in the sac usually with their head directed towards the postero-lateral side and their back turned towards the ventral side of the host-body. The males, on the other hand, take a somewhat vertical position, with their head directed more or less towards the dorsal side of the host. In both sexes, the tail-end is placed always near the orifice of

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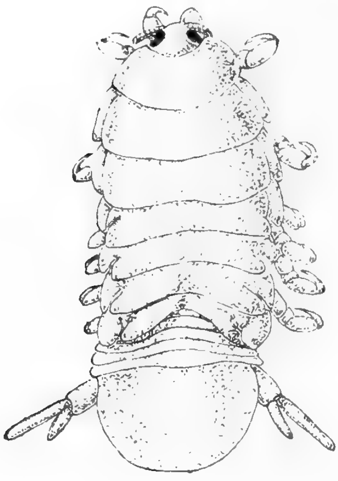
1) HARRIET RICHARDSON, "The Isopod genus *Ichthyoxenus* HERKLOTS, with description of a species from Japan," Proc U. S. Nat. Mus., Vol, 45, June, 1913.

the sac, which position probably stands in relation with the facility of respiration by means of the pleopods. In the living state, the pleopods are visible in constant motion near the orifice.



F ig. 1.
I. opisthopterygium, n. sp., ♀. Magn. about 5×.

Adult female (fig. 1).—Cephalon somewhat triangular in outline, a little wider than long; anterior end rounded, or more or less truncated. Antennule and antenna (fig. 2) short, the former being slightly longer and a little stouter than the latter. Both are usually eight-jointed. In the antenna, the second proximal joints short and thick; the third and fourth larger and of about equal size; the seventh and eighth, especially the latter, are small. In the antennule, each joint is a little broader than long, except the last one which is slightly longer than broad. Antennule somewhat flattened antero-posteriorly; 1.07 mm. long and 0.23 mm. broad in the middle. Antenna 0.98 mm. long and 0.14 mm. broad in the middle.

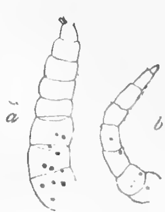


Fig. 2.
Antennule (a) and antenna (b) of ♀. Magn. about 24×.

Eyes approximately oval; anterior inner end slightly concave or nearly straight, posterior end rounded; those of females generally appreciably smaller than those of males (longest diameter: 0.53–75 mm. in ♀; 0.77–94 mm. in ♂).

Of the seven mesosome segments, the first is the longest; the second and third nearly equal with each other, but somewhat shorter than the first; the remaining four, especially the last, are markedly shorter than any preceding ones. Mesosome not widened to a pronounced degree, as it is in *I. japonensis*; hence, the breadth of body remains nearly the same for the most part.

Metasome segments slightly increase in length posteriorly, except the sixth or terminal segment which is very large, somewhat broader than long, nearly flat and half-moon-shaped.[1] The first two metasome segments are visible in the middle parts only, the lateral parts being covered over by the last mesosome segment.

Mandible (fig. 3) slender; anterior end narrow and rounded, with a short claw-like process; a comparatively large, internally directed process present near the end. A moderately large, 3-jointed palp on the outer side; proximal joint the largest, distal joint the smallest. The palp bears no hair, but shows a few (2 or 3) very minute processes, probably of sensory nature, at the free end. In both sexes, tips of palps visible from the dorsal side.

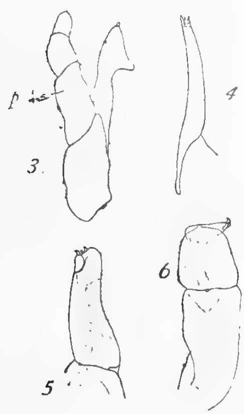


Fig. 3, Mandible. *p* palp.
Fig. 4, Maxillula.
Fig. 5, Maxilla.
Fig. 6, Maxilliped.
All from ♀. Magn. about 24×.

Maxillula (fig. 4) very simple, rod-like, distally slightly tapering, the tip provided with four claw-like processes, of which the largest is conspicuous on account of its brownish colour.

Maxilla (fig. 5) finger-like, much stouter than maxillula, with minute subterminal segment. Tip of maxilla bears a few (4 or 5) recurved hooks.

Maxilliped (fig. 6) also simple, consisting mainly of two joints, of which the proximal about twice as large as the distal. Dorsally, to tip of the latter, is attached a rudimentary joint, bearing at its inner end three or four conspicuous recurved hooks. No endite present on the proximal joint.

Thoracic legs divisible into anterior and posterior groups, the former consisting of three leg pairs and the latter of four pairs. In the anterior

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1) In *Ichthyoxenus japonensis*, the terminal segment is usually a little longer than broad, and more or less cup-like, the free margin being distinctly curved ventrally.

group, the legs are more or less anteriorly directed, while in the posterior they are posteriorly directed. In both groups, the foremost situated pair, i. e. the first and fourth pairs, are the smallest, and the remaining pairs in each group increase in size posteriorly. This feature is especially conspicuous in males. On the whole, the first pair is the smallest of all and the seventh pair the largest. All the legs are similarly constructed (fig. 7). Dactylus and propodus are more strongly developed in the present species than in *Ichthyoxenus japonensis;* carpus, meros and ischium are comparatively small and not inflated, unlike the same joints in the species just mentioned, in which they, but especially the meros, are much inflated ventrally.

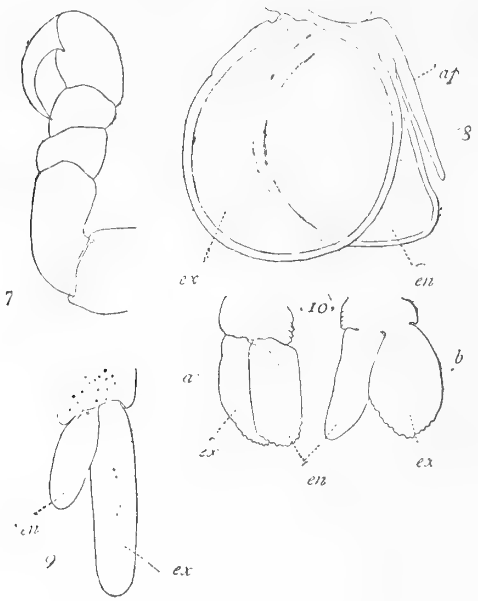

Fig. 7, Seventh thoracic leg, ♀. ×15.
Fig. 8, Second pleopod, ♀. ×15.
Fig. 9, Uropod, ♀. ×15.
Fig. 10, Second (a) and fifth (b) pleopods of larva. Magn. about 48×.
ap.—" Appendix masculina,"
en.—Endopodite, *ex.*—Exopodite.

Pleopods large, lamellar. Exopodite usually a little larger than endopodite, subcircular in outline; endopodite half-moon-shaped or reniform. Endopodite of second pair (fig. 8) with an " appendix masculina " in both sexes, not restricted to males only, as it is in *Ichthyoxenus japonensis.* The said appendix is moderately long, rod-like, slightly tapering towards free end, 1.57 mm. long and about 0.1 mm. broad in the middle. Third, fourth and fifth pairs of pleopods with a small knob-like projection at anterior inner edge of endopodite. In the first pair, however, no such projection present. Surface of pleopods covered with small clear spots arranged more or less regularly in transverse rows. Size of these spots a little coarser on exopodite than on endopodite. Endopodites are of a darker appearance than exopodites.

Uropods (fig. 9) prominently standing out bothways from terminal metasome segment. The uropod itself also distinctly branched; both rami rod-like, rounded at end, without hairs or tooth-like processes; exopodite always much longer than endopodite. Length of uropods approximately equal to or a little greater than, the length of terminal metasome segment.

Measurements of the body of typical adult female:

	Length	Breadth
Cephalon	1.16 mm.	1.87 mm.
Mesosome	7.39 "	5.52 "
Metasome	4.63 "	4.56 "
Total	13.18 "	

A number of adult females measured ranged in length of body 8–14½ mm. and in breadth 5–6 mm.

The posterior part of body in female is bent more or less to one side, either right or left. This feature is however not so much pronounced as in *I. japonensis*. It seems the bending stands in certain relation with the side of host body on which the dwelling sac opens: it takes place invariably towards the side of same denomination as that of the fish body on which the orifice is situated.

Adult male.—Males differ considerably from females in external appearance. They are of a more slender and symmetrical form than females, the bending of body being scarcely ever shown in this case.

The males usually have somewhat larger eyes than the females; they are situated decidedly more closely together in the former than in the latter. Thoracic legs usually better developed in males than in females. Mouth parts are of a similar structure in both sexes. The same may be said of pleopods; only, those of males are slightly narrower. The "appendix masculina" of second pleopod is comparatively longer, its free end almost reaching the posterior end of endopodite. The terminal segment of metasome is also comparatively longer.

Measurements of the body of typical adult male :

	Length	Breadth
Cephalon	1.25 mm.	1.87 mm.
Mesosome	5.93 ,,	4.81 ,,
Metasome	3.93 ,,	3.20 ,,
Total	11.11 ,,	

A number of adult males measured ranged in length of body 5–12 mm. and in breadth $2\frac{1}{2}$–5 mm. Comparing these measurements with those of adult females (p. 129), it will be seen that the males are on the whole smaller than the females.

Larva.—The larva of *Ichthyoxenus opisthopterygium* is of a darker colour than that of *I. japonensis*, the pigmentation growing denser towards the posterior parts of body. The general body form is somewhat more slender in the present species than in *I. japonensis*. The body is strictly symmetrical. Anterior end of cephalon narrow and truncated. Antennule usually eight-jointed, about 0.43 mm. long and 0.05 mm. broad. Antenna frequently nine-jointed, a little longer than antennule. Both antennule and antenna directed postero-laterally. Eyes oval, comparatively large, measuring 0.30 mm. in long diameter; the shortest distance between eyes 0.11 mm. There are only six pairs of thoracic legs as in ordinary Isopod larvæ. The legs are constructed similarly as in adults, excepting the fact that ischium and carpus are relatively small. Dactylus and propodus large and well developed. There is no constant occurrence of tooth-like processes on legs.[1] Of pleopods, the first and second pairs are of nearly the same shape : exopodite more or less oval in outline, endopodite slightly narrower, and both rami of a light colour (fig. 10, a). Sometimes, the first pair has apparently two-jointed rami, there existing a conspicuous constriction in each ramus. The third, fourth and fifth pairs show a different structure. In all these, the endopodite is more darkly coloured, markedly narrower and usually a little

1) In the larva of *I. japonensis*, there constantly occur on thoracic legs a few moderately long tooth-like processes.

longer than the exopodite (fig. 10, b). Posterior margin of both rami of first and second pairs, and also of the exopodite of the third, fourth and fifth pairs are minutely serrated, while the endopodite of the last three pairs show no such serration. Inner edge of the protopodite of each pleopod is also more or less serrated. No hairs present on all pleopods. Uropod is a little longer than the terminal metasome segment ; its exopodite somewhat longer than endopodite ; the former more or less lanceolate, and the latter elongate-oval in outline ; hairs absent on both. Terminal segment of metasome of a somewhat triangular shape, its posterior end narrow and rounded ; the posterior margin minutely serrated ; without hairs in any part.

Measurements of typical larva :

Length of dody, ...	2.88 mm.
Length of cephalon, ...	0.46 „
Length of metasome, ...	1.24 „
Length of terminal metasome segment, ...	0.49 „
Breadth of body (mesosome), ...	0.89 „
Breadth of metasome,...	0.53 „

Tokyo, Jan. 25, 1916.

Some New Additions to the Avifauna of Yunnan.

By

Seinosuké Uchida, *Jūigakushi,*

and

Nagamichi Kuroda, *Rigakushi.*

A fine collection of passerine birds, collected by Mr. H. Orii in Yunnan Province, China, during the years 1910–1911 and owned by Mr. T. Kobayashi of Yokohama, was placed in our hands for examination. We have referred the specimens to 39 genera and 146 species. Of the latter number, 46 are species which have not hitherto been recorded from Yunnan. Mr. Collingwood Ingram, in his paper on "The birds of Yunnan"*, has given 352 species as then known from that province, so that the number is now brought up to 398.

In the present collection we find none which seems to be new to science, except a form of *Anthus maculatus* previously known from Yunnan and Formosa and to which we are inclined to give subspecific rank under the appellation *A. maculatus yunnanensis.*

We let follow notes on the new subspecies just mentioned and on the 46 species new to the avifauna of Yunnan.

Family **Motacillidæ.**

1. ***Motacilla ocularis*** Sw.

Sharpe, Cat. B. Br. Mus., X, p. 471; Oates, Fauna Brit. Ind., Birds, II, p. 289; Dresser, Man. Palæarctic Birds, I, p. 202; Hartert, Vögel Paläarkt. Fauna, I, p. 307; Swinhœ, P. Z. S., 1871, p. 364; David et Oustalet, Ois. Chine, p. 299.

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* Novitates Zoologicae, Vol. XIX, pp. 269—310, 1912.

Five males (Feb. 18, 18; April 18, 18; July 17) and two females Feb. 18; April 18) from Mongtz.

2. ***Anthus maculatus yunnanensis*** subsp. nov.

Anthu trivialis maculatus, Ingram, Nov. Zool. XIX, p. 304; *Pipastes maculatus*, Anderson, Yunnan Exp., Aves, p. 608.

Six males (Jan. 15; Feb. 18; March 12; April 22; Nov. 20, 20) and two females (Feb. 18; Oct. 26) from Mongtz.

The Yunnan birds are without doubt referable to *Anthus maculatus* Jerdon, but seem to be constantly characterized by having bill distinctly shorter than in the typical species.

Mesurements of *Anthus maculatus* from Yunnan.

	♂	♂	♂	♂	♂	♂	♀	♀
Bill (from gape)	mm. 15	mm. 15.5	mm. 15	mm. 15	mm. 14.5	mm. 15.5	mm. 15	mm. 15
Culmen	14.5	15.5	14.5	14.5	14.5	15.5	14.5	14.5
Wing	85	83	80	78	79	85	82	84

For the purpose of comparison are appeared below measurements of *Anthus maculatus* from Japan.

Loc.	Suruga	Suruga	Suruga	Suruga	Suruga	Suruga	Suruga	Norikura	Norikura	Norikura	Norikura	Norikura	Norikura
Bill (from gape)	mm. 17	mm. 16.5	mm. 17	mm. 17	mm. 16	mm. 17	mm. 16.5	mm. 16	mm. 16	mm. 16	mm. 16.5	mm. 16.5	mm. 17
Culmen	16.5	16	17	16.5	15.5	16.5	16	16	16	16	16	16.5	16.5
Wing	82	84	79	85	83	81	82	83	83	83	85	85	84

The Formosan form, hitherto recorded as *Anthus maculatus*, agrees with the Yunnan form than with the typical species in the dimensions of bill, and may properly be identified with the former. Measurements of some specimens from Formosa :

Bill (from gape)	mm. 14.5	mm. 15	mm. 15	mm. 16
Culmen	14.5	14.5	14.5	15
Wing	80	80	81	79

3. ***Anthus cervinus*** (Pall.).

Sharpe, Cat. B. Br. Mus., X, p. 585 ; Oates Fauna Brit. Ind., Birds, II, p. 310; Dresser, Man. palæarctic Bds, I, p. 213; Hartert, Vögel Paläarkt. Fauna, I, p. 277; Swinhoe, P. Z. S., 1871, p. 365; David et Oustalet, Ois. Chine, p. 306.

One male (April 28) and one female (April 29) collected at Mongtsz.

4. ***Anthus striolatus*** Blyth.

Sharpe, Cat. B. Br. Mus., X, p. 568; Dresser, Man. Palæarctic Bds, I, p. 220; Hartert, Vögel Paläarkt. Fauna, I. p. 266; Oates, Fauna Brit. Ind. Bds, II, p. 308.

Four females (March 8 ; April 2 ; Aug. 1 ; Oct. 12) and two males (April 20 ; Oct. 7) from Mongtsz.

5. ***Oreocorys sylvanus*** (Hodgs.)

Sharpe, Cat. B. Br. Mus., X, p. 622; Oates, Fauna Brit. Ind., Bds., II, p. 313.

One male (June 5) and one female (Sept. 9) from Mongtsz.

Family **Henicuridæ.**

6. ***Henicurus maculatus*** (Vigors).

Sharpe, Cat. B. Br. Brit. Mus., VII, p. 317; Oates, Fauna Brit. Ind., Bds., II, p. 83; *Enicurus maculatus maculatus* Vig., Hartert, Vögel Paläarkt. Fauna, VI, p. 759.

One male (Jan. 31) and one female (Feb. 14) collected at Lon Kon Chai.

7. ***Henicurus schistaceus*** Hodgs.

Sharpe, Cat. B. Brit. Mus., VII, p. 315; Oates Fauna Brit. Ind., Bds., II, p. 84; David et Oustalet, Ois. Chine, p. 296; Swinhoe, P. Z. S., 1871, p. 365.

Two males (Dec. 9, 11) and two females (Jan. 31; Oct. 17) collected at Lon Kon Chai.

Family Timeliidæ.

8. *Myiophoneus caeruleus* (Scop.)

Sharpe, Cat. B. Brit. Mus., VII, p. 9; Swinhoe, P.Z.S., 1871, p. 368; David et Oustalet, Ois. Chine, p. 176, pl. 43; *Myiophoneus cærulea* (Scop.), Hartert, Vögel Paläarkt. Fauna, VI. p. 677.

Two males (March 3; April 12) from Mongtsz.

9. *Paradoxornis guttaticollis* David.

Sharpe, Cat. B. Brit. Mus., VII, p. 497; Oates, Fauna Brit. Ind. Bds., I, p. 62; David et Oustalet, Ois. Chine, p. 203, pl. 64.

Three males (Jan. 29; Feb. 13; Dec. 11) from Lon Kon Chai.

10. *Trochalopterum cineraceum* Godwin-Aust.

Sharpe, Cat. B. Brit. Mus., VII, p. 366.

One male (Feb. 6.) from Lon Kon Chai.

11. *Trochalopterum milni* David.

Sharpe, Cat. B. Brit. Mus., VII, p. 372; David et Oustalet, Ois. Chine, p. 200, pl. 58.

One male (Feb. 5.) and one female (Feb. 14) from Lon Kon Chai.

12. *Trochalopterum ripponi* Oates.

Oates, Bull. B. O. C., X, p. 10; Ibis, 1901, p. 529, pl. XI, fig. 1.

A young male (July 16) from Mongtsz and a male (Feb. 5) from Lon Kon Chai.

13. *Actinodura ramsayi* (Wald.).

Sharpe, Cat. B. Brit. Mus., VII, p. 464; Oates, Fauna Brit. Ind., Bds., I, p. 202.

Four males (Jan. 29; Feb. 1, 9; Dec. 16.) and two males (Feb. 7, 9) from Lon Kon Chai.

14. ***Alcippe davidi*** Styan.

Styan, Ibis, 1896, p. 310.

Three males (Jan. 30; Feb. 6; Sept. 6) and three females (Feb. 8, 8, 13) from Lon Kon Chai.

15. ***Schœniparus variegatus*** Styan.

Styan, Ibis, 1899, p. 299, pl. VI, fig. 2.

Three males (March 22; May 17; Nov. 20) and two females (March 22; Oct. 18) from Mongtsz; one female (Jan. 29) from Lon Kon Chai.

16. ***Suthora alphonsiana*** Verreaux.

Sharpe, Cat. B. Br. Mus., VII. p. 489; David et Oustalet, Ois. Chine, p. 210.

One specimen (Dec. 18) from Lon Kon Chai, Yunnan.

Family **Pycnonotidæ.**

17. ***Hemixus macclellandi*** (Horsf.)

Oates, Fauna Brit. Ind. Bds., I. p. 265; Swinhoe, P.Z.S. 1871, p. 369; *Hypsipetes macclellandi* Horsf., David et Oustalet, Ois. Chine, p. 135; *Iole macclellandi* (Horsf.), Sharpe, Cat. B. Brit. Mus., VI, p. 59.

Four males (Feb. 13, 14, 26; Dec. 20) from Lon Kon Chai.

18. ***Alcurus striatus*** (Blyth).

Sharpe, Cat. B. Br. Mus., VI, p. 91; Oates, Fauna Brit. Ind., Bds., I, p. 266.

One male (Feb. 5) and one female (Feb. 7) from Lon Kon Chai.

19. ***Criniger pallidus*** Swinh.

Sharpe, Cat. B. Br. Mus., VI, p. 81; Swinhoe, P.Z.S. 1871, p. 370; David et Oustalet, Ois. Chine, p. 138.

Three males (Feb. 5, 7, 12) and two females (Feb. 9, 12) from Lon Kon Chai.

20. ***Spizixus semitorques*** Swinh.

Sharpe, Cat. B. Brit. Mus., VI, p. 173; Swinhoe, P.Z.S. 1871, p. 370; David et Oustalet, Ois. Chine, p. 143, pl. 47; Grant, Ibis, 1900, p. 594.

A male specimen (Feb. 9) collected at Lon Kon Chai.

21. ***Spizixus canifrons*** Blyth.

Sharpe, Cat. B, Brit. Mus., VI, p. 172; Oates, Fauna Brit. Ind., Bds., I, p. 280; *Spizixus canifrons ?* Ingram, Nov. Zool., XIX, p. 285.

One female (Dec. 22) from Mongtsz.

Family **Muscicapidæ.**

22. ***Muscicapa mugimaki*** Temm.

Hartert, Vögel Palärkt. Fauna, IV, p. 492; *Erythrosterna luteola* (Pall.)., David et Oustalet, Ois. Chine, p. 121; Swinhoe, P.Z.S. 1871, p. 380; *Poliomyias luteola* (Pall.), Sharpe, Cat. B. Brit. Mus., IV, p. 201; *Muscicapa luteola* (Pall.), Dresser, Man. Palæarctic Bds., 1, p. 257.

One male (April 28) from Mongtsz.

23. ***Xanthopygia tricolor*** (Hartl.)

Sharpe, Cat. B. Brit. Mus, IV. p. 250; Swinhoe, P.Z.S. 1871, p. 380; Dresser, Man. Palæarctic Bds., 1, p. 260; David et Oustalet, Ois. Chine, p. 118, pl. 80; *Muscicapa narcissina zanthopygia* Hay, Hartert, Vögel Paläarkt. Fauna, IV, p. 490.

One male (Aug. 25) and one female (Aug. 25) from Mongtsz.

24. ***Hypothymis azurea*** (Bodd.)

Sharpe, Cat. B. Brit. Mus., IV, p. 274; Oates, Fauna Brit. Ind., II, p. 49; Anderson, Yunn. Exp. p. 655; *Myiagra azurea* (Bodd.), David et Oust., Ois. Chine, p. 114; Swinhoe, P.Z.S., 1871, p. 381.

One male (Sept. 6) and one female (Oct. 16) from Mongtsz.

25. ***Terpsiphone paradisi*** (L.)

Sharpe, Cat. B. Brit. Mus., IV, p. 346; Oates, Fauna Brit. Ind., II, p. 45; Dresser, Man. Palæarctic Bds., I, p. 260

Three males (April 27, 28; Sept. 16); and two females (Sept. 16, 27) from Mongtsz.

Family Turdidæ.

26. *Turdus obscurus* Gm.

Seebohm, Cat. B. Brit. Mus., V, p. 273; Oates, Fauna Brit. Ind., II, p. 134; Dresser, Man. Palæarctic Bds., 1, p. 13; Hartert, Vögel Paläarkt. Fauna, VI, p. 656; David et Oustalet, Ois. Chine, p. 153; Swinhoe, P.Z.S., 1871, p. 367.

Five males (Oct. 14, 18, 18; Nov. 20, 24) and one female (Oct. 18) from Mongtsz.

27. *Erithacus calliope* (Pall.).

Seebohm, Cat, B. Brit. Mus., V, p. 305; *Calliope camtschatkensis* (Gm.), Oates, Fauna Brit. Ind., Bds., II, p. 102; Swinhoe, P.Z.S. 1871, p. 359; Dresser, Man. Palæarctic Bds, 1, p. 65; David et Oustalet, Ois. Chine, p. 235; *Luscinia calliope* (Pall.); Hartert, Vögel Palärkt. Fauna, VI, p. 738; Anderson, Yunn. Exp. p. 615.

Five males (April 29; May 3, 5, 5; Aug. 20) and one female (April 30) from Mongtsz.

28. *Acrocephalus stentoreus* (Hempr. & Ehrb.)

Seebohm, Cat. B. Brit. Mus., V, p. 98; Oates, Fauna Brit. Ind., Bds., I, p. 356; Dresser, Man. Palæarctic Bds., 1, p. 120; *Acrocephalus stentorea stentorea* (Hempr. & Ehrb.), Hartert, Vögel Paläarkt. Fauna, V, p. 559.

Two males (April 28; Aug. 27) from Mongtsz.

29. *Cisticola cisticola* (Temm.)

Sharpe, Cat. B. Brit. Mus., VII, p. 259; *Cisticola cursitans* (Frank), Dresser, Man. Palæarctic Bds., 1, p. 140; Oates, Fauna, Brit. Ind., Bds., 1, p. 374; *Cisticola schœnicra* Bp., Swinhoe, P.Z.S. 1871, p. 352; David et Oustalet, Ois. Chine, p. 256; *Cisticola cisticola cisticola* (Temm.), Hartert, Vögel Paläarkt. Fauna, V, p. 610.

Three males (March 11; April 18, 29) and three females (March 12; April 29; July 1.) from Mongtsz.

30. *Phylloscopus coronatus* (T. & S.)

Seebohm, Cat. B. Brit. Mus., V., p. 49; Dresser, Man. Palæarctic Bds., I, p. 105; *Acanthopneuste* *coronatus* (T. & S.), Oates, Fauna Brit. Ind., Bds., I. p. 417; *Phyllopneuste coronata* (T. & S.); Swinhoe, P.Z.S., 1871; p. 356; David et Oustalet, Ois. Chine, p. 269; *Phylloscopus occipitalis coronata* (T. & S.), Hartert, Vögel Paläarkt. Fauna, V, p. 521.

Three males (Aug. 12, 23, 23); and one female (Aug. 23) from Mongtsz.

31. ***Phylloscopus subviridis*** (Brooks).

Seebohm, Cat. B. Br. Mus., V, p. 74; Oates, Fauna Brit. Ind., Bds., I, p. 409; Dresser, Man. Palæarctic Bds., 1, p. 107; Hartert, Vögel Paläarkt. Fauna, V, p. 520.

A male specimen (Sept. 16) collected at Mongtsz.

32. ***Suya atrigularis*** Hodgs.

Sharpe, Cat. B. Brit. Mus., VII, p. 180; Oates, Fauna Brit. Ind., Bds., I, p. 445.

Five males (Jan. 31; April 27; May 12; Aug. 1, 23.) and two females (Aug. 11, 27) from Mongtsz.

Family **Hirundinidæ.**

33. ***Hirundo erythrogastra*** Bodd.

Sharpe, Cat. B. Brit. Mus., X, p. 137; Oates, Fauna Brit. Ind., B., II, p. 279; Dresser, Man. Palæarctic Bds., 1, p. 266.

Three males (Dec. 4, 4, 4.) and two females (Dec. 4, 4) from Mongtsz.

34. ***Hirundo striolata*** (T. & S.)

Oates, Fauna Br. Ind., Bds., II, p. 281; Swinhoe, P.Z.S., 1871, p. 346; Dresser, Man. Palæarctic Bds., I, p. 268; *Cecropis striolata* T. & S., David et Oustalet, Ois. Chine, p. 127; *Hirundo japonica* Bp., Sharpe, Cat. B. Brit. Mus., X, p. 162; *Chelidon daurica striolata* (T. & S.), Hartert, Vögel Palaärkt. Fauna, VI, p. 806.

Four males (June, 19, 19, 19, 19.) from Lon Kon Chai.

Family **Campephagidæ.**

35. ***Campophaga melanoschista*** (Hodgs.).

Oates, Fauna Brit. Ind., Bds., I, p. 491; *Campophaga lugubris* (Sundev.), Sharpe, Cat, B. Br. Mus., IV, p. 65; *Volvocivora melanoschista* Hodgs., David et Oustalet, Ois. Chine, p. 103.

Two females (Oct. 3, 18) from Mongtsz.

36. ***Pericrocotus cantonensis*** Swinh.

Sharpe, Cat. B. Brit. Mus., IV, p. 84; Oates, Fauna, Brit. Ind., Bds., I, p. 490; Swinhoe, P.Z. S., 1871, p. 378; David et Oustalet, Ois. Chine, p. 107.

Four males (April 8, 10, 24, 24) and two females (April 24; Oct. 21) from Mongtsz.

37. ***Graucalus macii*** Lesson.

Sharpe, Cat. B. Brit. Mus., IV, p. 34; Oates, Fauna Brit. Ind. Bds., I. p. 496; Anderson, Yunnan Exp., p. 647.

One male specimen (March 3) from Chih Ping.

Measurements.

Culmen	Wing	Tail	Tarsus
1.1 mm.	7.5 mm.	5.65 mm.	1.05 mm.

The specimen before us differs in some details of character from the typical species. Besides being somewhat larger, it shows no distinct white edge on secondaries, nor a distinct transverse line of grey on the edge of wing.

Family **Dicruridæ.**

38. ***Dicrurus leucogenys*** (Walden).*

Sharpe, Cat. B. Brit. Mus., III, p. 251; Oates, Fauna Brit. Ind., Bds., I, p. 317; *Buchanga leucogenys* Wald., David et Oustalet, Ois. Chine, p. 108 pl. 77; Swinhoe, P. Z. S., 1871, p. 378.

One male (Oct. 9) and one female (Oct. 14) collected at Mongtsz.

Family **Laniidæ.**

39. ***Pteruthius melanotis*** Hodgs.

Oates, Fauna Brit. Ind., Bds., I, p. 226; *Petrerythrius melanotis* (Hodgs.) Gadow, Cat. B. Br. Mus., VIII, p. 117.

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* Sharpe and Oates have stated that the range of distribution of this species extends to Japan, but, to our knowledge it seems to have never yet been obtained in that country.

One male (Feb. 8.) and one female (Feb. 9.) from Lon Kon Chai.

40. ***Lanius fuscatus*** Less.

Gadow Cat. B. Brit. Mus., VIII, p. 263; Oates Fauna Brit. Ind., Bds., I, p. 465; Swinhoe, P.Z.S., 1871, p. 375; David et Oustalet, Ois. Chine, p. 96.

A male specimen (Dec. 1.) from Mongtsz.

Family **Paridæ.**

41. ***Parus major minor*** T. & S.

Hartert, Vögel Paläarkt. Fauna, I, p. 345; *Parus minor* T. & S., Gadow, Cat. B. Brit. Mus., VIII, p. 15; Dresser, Man. Palæarctic Bds., I, p. 162; Oates, Fauna Brit. Ind., Bds., I, p. 48; Swinhoe, P.Z.S., 1871, p. 361; David et Oustalet, Ois. Chine, p. 278.

Three males (March 10, April 30; Sept. 10) and two females (March 6; Nov. 22) from Mongtsz.

Family **Sturnidæ.**

42. ***Spodiopsar sericeus*** (Gm.).

Sharpe, Cat. B. Brit. Mus., XIII, p. 44; *Sturnus sericeus* Gm., Swinhoe, P.Z.S, 1871, p. 384; David et Oustalet, Ois. chine, p. 362, pl. 87.

One male (Feb. 20) from Lin Ngan Fu.

Family **Zosteropidæ.**

43. ***Zosterops simplex*** Sw.

Gadow, Cat. B. Brit. Mus., IX, p. 166; Oates Fauna Brit. Ind., Bds., I, p. 215; Swinhoe, P.Z.S., 1871, p. 349; David et Oustalet, Ois. Chine, p. 85.

Three males (Jan. 17; July 29; Sept. 24) and three females (April 28; July 28; Aug. 1) from Mongtsz.

Family **Nectariniidæ.**

44. ***Arachnothera magna*** (Hodgs.)

Gadow, Cat. B. Brit. Mus., IX, p. 105; Oates Fauna, Brit. Ind., Bds., II, p. 369.

Three males (Jan. 31; Feb. 13, 14) and two females (Feb. 8, 13) from Lon Kon Chai.

Family **Dicæidæ.**

45. ***Dicæum olivaceum*** Wald.

Oates, Fauna Brit. Ind., Bds., II, p. 380; *Dicæum inornatum* (Hodgs.), Sharpe, Cat. B. Brit. Mus., X, p. 45.

Three males (Oct. 5, 12, 16) from Mongtsz.

Family **Fringillidæ.**

46. ***Loxia himalayana*** Hodgs.

Oates, Fauna Brit. Ind., Bds., II. p. 208; Swinhoe, P.Z.S., 1871, p. 387; Dresser, Man. Palæarctic Bds., I, p. 340; David et Oustalet, Ois. Chine, p. 360; *Loxia curvirostra* L. (part.), Sharpe, Cat. B. Brit. Mus., XII, p. 435; *Loxia curvirostra himalayensis* Blyth, Hartert, Vögel Paläarkt. Fauna, I, p. 121, fig. 26.

One male (March 20) from Mongtsz.

Family **Emberizidæ.**

47. ***Emberiza rutila*** Pall.

Sharpe, Cat. B. Brit. Mus., XII, p. 514; Dresser, Man. Palæarctic Bds., I, p. 348. Oates, Fauna Brit. Ind. Bds., II, p. 263, Hartert, Vögel Paläarkt. Fauna, I, p. 172; *Euspiza rutila* (Pall.), Swinhoe, P.Z.S., 1871, p. 387; David et Oustalet, Ois. Chine, p. 331.

One male (April 22) one female (April 28) from Mongtsz and one male (Jan. 27) from Lon Kon Chai.

Some New Scale Insects of Japan.

By

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With Plate IV.

Protopulvinaria japonica, sp. nov.

(Plate IV, figs. 1–4)

Adult female:—Broadly pyriform, more or less narrowed in front. Flat, five obscure ridges radiating from center to margin. Color of dried examples straw brown to light brown with a broad, well-defined, chestnut brown marginal zone. Ovisac indicated externally only by a very narrow fringe of cottony secretion. Anal cleft deep. Antennæ with eight segments; third and eighth segments subequal in length and longer than any other segment. Formulæ of four cases of antenna:

(3, 8), 2, (4, 5), 1, 7, 6.
(3, 8), 2, 4, 5, 1, 7, 6.
3, 8, 2, 4, 5, 1, 7, 6.
8, 3, 2, (4, 5), 1, 7, 6.

Legs small; tarsus shorter than tibia. Stigmatic spines three, in a shallow cleft; median spine much longer than the others, stout but shorter than marginal hairs. Marginal hairs long, simple but seldom forked. Anal plates very long, their bases much longer than four times length of their outer edges; length equal to one-eighth that of entire insect.

Length 3–4 mm., width $2\frac{1}{2}$–$3\frac{1}{2}$ mm.

Habitat:—On *Fatsia japonica* D. et P. (Yatsude); Nagasaki city. Collected by Y. Horikawa, September 1912.

Note :—Prof. E. E. Green, Way's end, Camberley in Surrey, to whom I have shown specimens of this species, has kindly supplied me with the following remark : "I have compared your specimens with typical examples of both *P. longivalvata* and *P. pyriformis*. Your insect appears to take a place intermediate between these two species. I note the following characters that serve to distinguish the Japanese form :—The antennæ are much longer than in either. Limbs approximately same size as *P. longivalvata* Green, but rather longer than those of *P. pyriformis* Ckll. Stigmatic spines smaller than those of *P. longivalvata*, but considerably larger than those of *P. pyriformis*. Marginal hairs very long and stout, much larger than those of either of the other two species. Anal operculum shorter than that of P. *longivalvata*, but longer than that of P. *pyriformis*."

Asterolecanium bambusicola, sp. nov.

(Plate IV, figs. 5 and 6)

Test of adult female :—Elongate, narrowed towards posterior end, strongly convex. Pale straw to pale greenish yellow in color ; in the anterior half an umber-colored patch, representing the dead body of the insect. Marginal fringe of a bright pink color very conspicuous.

Length $2\frac{1}{2}$–2.7 mm., width about 1 mm.

Adult female :—Elongate, narrowed behind. Dark green in color. Rostrum conspicuous, pyriform. Antennæ with three short spines. Scattered series of minute pores connecting spiracles with the margin. Anal lobes not prominent, each with a long stout seta at apex and two or more (usually three) strong spines near base. Anal ring with six stout hairs which project slightly beyond the margin. Margin with a continuous series of 8-shaped glands with inner-marginal simple pores.

Length of insect in the extended state about $2\frac{1}{2}$ mm., width about 1 mm.

Habitat :—On stem and branches of bamboo, in Tokyo and other parts of Japan. Collected by the writer and others, April 1913.

Note :—With regard to this species, Prof. Green has given me the following remark : "This resembles *A. bambusæ* Bdv. superficially, but differs from that species in several important particulars. In the first place the marginal fringe is of a bright pink color. I note that the marginal series of paired glands is single on the abdomen but irregularly double on the thorax. There are numerous simple circular glands immediately within the paired series, and bands of similar pores connect the stigmata with the margin. There are no supplementary paired glands on the dorsum." The writer should state here that he has not been able to recognize the double series of paired glands on thorax, mentioned by Prof. Green.

Asterolecanium hemisphæricum, sp. nov.

(Plate IV, fig. 7)

Test of adult female :—Oval, bluntly pointed behind, very strongly convex in dorsal aspect. Color of dried examples pale straw to pale greenish yellow, with a dark brown patch in the anterior parts representing the dead body of the insect. Marginal fringe pale yellow to almost colorless.

Length $1\frac{1}{2}$–$2\frac{1}{2}$ mm., width 1.7 mm.

Adult female :—Subcircular in outline. Rostrum large, well developed; rostral loop long. Anal lobes not prominent, each bearing a long seta and two or more rather long spines near base. Anal ring with six prominent hairs which project beyond the margin. Chitinous lip of anal aperture dense and conspicuous. Marginal series of 8-shaped glands double, except close to end of abdomen, where it becomes single ; inner series of simple marginal pores well-defined and very numerous.

Length of insect in the extended state about 2 mm., width about $1\frac{1}{2}$ mm.

Habitat :—On stem and branches of bamboo, in Tokyo and other places of Japan. Collected by the writer, September 1910.

Note :—In a letter to me, Prof. Green has remarked : "This insect approaches *A. bambusæ* Bdv., but shows the following differences. The puparium is much more strongly convex. It apparently lacks supplementary paired glands on the dorsum, but the examples that you send are not in very good condition. In all other characters it agrees with typical *bambusæ*." The writer should add here that the present species may readily be distinguished from *A. bambusæ* Bdv. by the regular double series of paired glands and by the presence of numerous simple glands.

Asterolecanium masuii, sp. nov.

(Plate IV, figs. 8 and 9)

Test of adult female :—Long and narrow, broadest in front, flattish. Dorsum with a slight median carina. Color pale straw to fresh yellow, with a dark brown patch in the anterior half representing the body of the insect. Fringe rather long, pale yellow in color.

Length about $2\frac{1}{2}$–3 mm., width about 1 mm.

Adult female :—Oblong, slightly narrowed towards posterior end. Rostrum prominent, pyriform. Abdominal cleft rather deep. The lobes are not well-defined; each lobe with a stout seta and one or two spines near its base. Anal ring with six stout hairs which do not project beyond the margin. Marginal 8-shaped glands conspicuous; inner series of simple glands rather few in number.

Length of insect in the extended state about 1.3 mm., width 0.7 mm.

Habitat :—On leaves of bamboo; Tokyo and Nagasaki. Collected by the writer and others, July 1912. Named after Mr. Yoshizo Masui, who is now working on Japanese Coccidæ under the writer's direction.

Note :—Prof. Green's remark on this species in a letter to me runs: "I note that the puparium is flattish, oblong, about three times as long as it is broad, with a slight median carina. Fringe comparatively long. The marginal paired glands are conspicuous; inner series of simple glands few. A single paired gland, of large size, on the dorsum near anterior extremity, is noticeable on one example only. The specimens have been much injured by a parasitic fungus. None of these examples agree with *A. delicatum* Green, nor are they at all nearly allied to *A. miliaris* Bdv."

Asterolecanium litseæ, sp. nov.

(Plate IV, figs. 10 and 11)

Test of adult female:—Subcircular, posterior extremity slightly produced; dorsal surface moderately convex, with obscure carina. Very pale straw color, transparent, revealing the form of the insect and eggs beneath. Marginal fringe conspicuous, pale pinkish. In fresh examples, numerous long, glassy filaments present on dorsum.

Diameter 1.2–1½ mm.

Adult female:—Subcircular or broadly oval. Pale lemon or pale greenish yellow in color. Anal cleft not conspicuous. Anal lobe with a long seta. There exist two or three small spines at base of anal seta. Chitinous lip of anal aperture dense and conspicuous. Anal ring with six long hairs projecting beyond the margin. Inner-marginal simple pores well developed, not numerous. There occur further 8-shaped glands slightly larger than those of the margin, scattered over the dorsal area.

Diameter about 1 mm.

Habitat:—On leaves and the smaller branches of *Litsea glauca* Sieb. (Shirodamo), Matsudo in Chiba-Ken. Collected by the writer, January 1914.

Note:—This new insect resembles *A. thespesiæ* Green superficially, but is readily distinguishable from it by rather inconspicuous abdominal lobes of the female.

Asterolecanium tokyonis, sp. nov.

(Plate IV, fig. 12)

Test of adult female:—Approximately circular, abdominal extremity slightly produced. Rostrum nearly central. Parastigmatic glands extending in a narrow band to the margin. On the ventral surface of the last few segments are a number of circular simple pores. Dorsal tubular pores very numerous. Anal lobes not prominent; each with a sharp and rather short seta with two short spines near the base. Chitinous lip of anal aperture very prominent. Anal ring with six long hairs which extend just beyond the margin. Marginal series of 8-shaped glands double except close to end of abdomen, where it becomes single. A single series of inner-marginal simple pores very prominent. There is a series of short spines just inside of the inner-marginal simple pores.

Diameter 1–1½ mm.

Habitat :—On *Pasania cuspidata* Oerst. (Shii) ; Nishigahara, Tokyo. Collected by the writer, June 1912.

Note :—Allied to *A. variolosum* Ratz., but distinguishable from it by the 8-shaped glands being double instead of being single. The ventral surface of the last 3 and 4 segments provided with a number of circular pores and a few minute spine.

Nipponorthezia, gen. nov.

Adult female partly covered with cereous lamellæ ; antennæ of three segments ; legs with the tibio-tarsal segment united. Larva with antennæ made up of three segments.

Nipponorthezia ardisiæ, sp. nov.

(Plate IV, figs. 13–23)

Adult female :—Brown or yellowish brown ; antennæ and legs yellowish brown ; cereous lamellæ and marsupium snow white. Frontal lamella is short, not much projecting ; lateral lamellæ are five in number ; the first four lamellæ broad, flat, rounded on front edge ; the fifth greatly elongated, placed along the sides of marsupium ; caudal lamella arising just at anal orifice, lying low in the middle groove of marsupium. Dorsal aspect naked, segmentation plainly discernible ; in the middle of each segment a pair of longitudinal, narrow, white, lamellate projections ; of these the three pairs near anal extremity are large and prominent. Marsupium varying in length, its margin nearly straight, slightly narrowed towards apex ; its upper side longer than the lower ; longitudinally carinated; posteriorly curved upwards, with rounded apex. Denuded female after treatment with potash, ovate, slightly narrowed in front. Gland-tracts corresponding in position to external cereous plates; glandiferous spines comparatively short and bluntly pointed; dermis between gland-tracts with spiny hairs and simple spinnerets. Antennæ spinous, three-segmented; the third segment longest, much longer than first and second segments taken together; apical spine long, pointed. Eyes prominent, not close to antennæ, tuberculate. Mentum biarticulate, slender, apical segment more than three times longer than the basal. Legs subequal, long and rather stout, strongly spinous; tibio-tarsal segment either straight or slightly curved; claw large, sharp, with a pair of slender basal spines. Anal orifice with six short spiny hairs.

Length of body 1.6 mm., width about 1.3 mm.

Length of marsupium about 1.7 mm., width about 1.3 mm.

Larva:—Ovate after treatment with potash. Antennæ of three segments, spinous, the third segment longest, with a long apical spine. Legs about the same as those of adult female.

Habitat:—On the root of *Ardisia japonica* Bl. (Yabu-kōji); Yokohama. Collected by Mr. T. Yamamura, Feb. 1914.

Note:—This new Orthezinæ is closely allied to the genus *Ortheziola*, though quite distinct from it. In this species the antennæ are constantly three-segmented and the eyes are widely separated from the basal segment of antennæ, while in *Ortheziola* the antennæ are four-segmented and the eyes are situated very close to the basal segment.

In conclusion the writer begs to thank Prof. E. E. Green for his courtesy in examining the specimens and for the assistance given him in the determination.

Explanation of Plate IV.

(All figure much enlarged)

Protopulvinaria japonica.

Figure 1. Antenna of adult female.

Figure 2. Stigmatic spines and marginal hairs of same.

Figure 3. Leg of same.

Figure 4. Anal plate of same.

Asterolecanium bambusicola.

Figure 5. Abdominal extremity of adult female.

Figure 6. Marginal fringe of test of same.

Asterolecanium hemisphæricum.

Figure 7. Abdominal extremity of adult female.

Asterolecanium masuii.

Figure 8. Abdominal extremity of adult female.

Figure 9. Marginal fringe of test of same.

Asterolecanium litseæ.

Figure 10. Abdominal extremity of adult female.

Figure 11. Marginal fringe of test of same.

Asterolecanium tokyonis.

Figure 12. Abdominal extremity of adult female.

Nipponorthezia ardisiæ.

Figure 13. Old adult female with fully developed marsupium (dorsal view).

Figure 14. Same (ventral view).

Figure 15. Adult female after treatment with potash, showing gland-tracts (dorsal view).

Figure 16. Terminal segments of same (ventral view).

Figure 17. Antenna of adult female.

Figure 18. Fore leg of same.

Figure 19. Middle leg of same.

Figure 20. Hind leg of same.

Figure 21. Mentum of same.

Figure 22. Anal orifice of same.

Figure 23. Antenna of larva.

Preliminary Descriptions of some Japanese Triclads.

By

Isao Ijima, *Rigakuhakushi*,

and

Tokiö Kaburaki, *Rigakushi*.

Maricola.

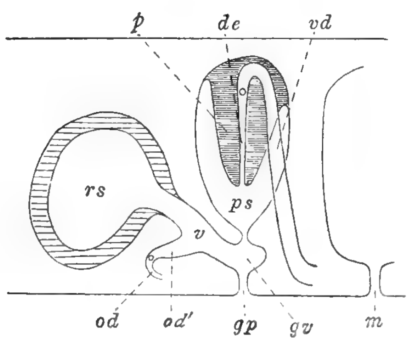
1. *Procerodes lactea*, n. sp.

Woodcuts 1 and 2.

Frontal margin subtruncate, slightly crenate, being gently arched in the middle parts. Tentacles moderately long, rounded at end, antero-laterally directed. Trunk indistinctly separated from head by a slight neck-like narrowing, elongate, slender, being in most parts of a nearly uniform breadth, rounded at posterior end.

1

2



1. *Procerodes lactea*, n. sp. Outline of body in the creeping state. about 17×.
2. Same. Diagram of sexual organs.

de ductus ejaculatorius, *gp* genital pore, *gv* genital vestibulum, *m* mouth, *od* oviduct, *od'* unpaired common oviduct, *p* penis, *ps* penis sheath, *rs* receptaculum seminis, *v* vagina, *vd* vas deferens.

Specimens fixed with sublimate solution measure 2–4 mm. long by about 1 mm. across in the broadest part.

Color milky white; digestive tracts appearing reddish or brownish.

Eyes two, crescentic in shape, situated well behind frontal margin, separated from each other by a space somewhat longer than the distance of either eye from lateral body margin of the same side.

Mouth opening somewhat behind the beginning of the posterior third of body. Pharynx extending posteriorly from about the end of the anterior third of body, somewhat longer than one-third the body-length. Anterior gut trunk provided with 7 or 8 pairs of branches; posterior gut trunks with 14–18 outwardly directed branches.

Genital aperture at a distance behind mouth equal to about one-fifth that between the latter and the posterior body-end. Genital atrium divided into penis sheath and vestibulum by a constriction. Testes extremely numerous, spherical, dorsally situated in two lateral zones beginning from ovarian region and extending behind nearly to end of body. Vasa deferentia united into a slender ejaculatory duct in the bulbous part of penis; without vesicula seminalis. Penis comparatively small, conical, vertical. Ovaries two, situated ventrally between first and second branches of anterior gut trunk. Oviducts opening directly into a small outbulging of vagina at the postero-inferior aspect. Receptaculum seminis large, spherical, situated behind penis. Vagina running anteriorly and obliquely downward to join vestibulum from behind.

The species is apparently very closely related to *Pr. ulvæ* (Oersted), but differs from it in the absence of pigments and in the oviducts opening directly into the vaginal outbulging, instead of after uniting into an unpaired terminal duct.

Locality:—Beneath stones on the beach between Yukanki and Meleya in Saghalin. Ijima coll., July 1906.

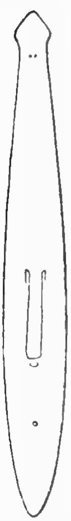
2. ***Procerodes trigonocephala***, n. sp.

Woodcuts 3 and 4.

Anterior end triangular, without tentacles. Trunk gradually widening behind, broadest in the region of genital organs, then tapering to the posterior body-end which is somewhat rounded or obtusely pointed.

Large specimens in the creeping state 4 mm. long and 1 mm. broad; commonly smaller.

3



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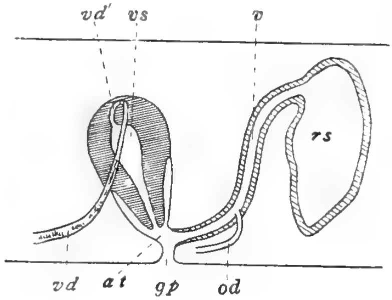


3. *Procerodes trigonocephala*, n. sp. Outline of body in the creeping state. about 16×.

4. Same. Diagram of sexual organs.

at atrium, *vd'* common vas deferens,
vs vesicula seminalis.
Other letters as in woodcut 2.

Body translucent, generally somewhat whitish; frontal margin and the region of eyes darkish; central region of head whitish; alimentary tracts appearing brownish, reddish or orange in color.

Eyes two, small, each surrounded by a clear space, situated far behind anterior body-end, the distance being more than three times that between the eyes. The latter distance is about equal to one-half that between either eye and lateral body margin of the same side.

Mouth at about the hind end of the middle third of body. Pharynx inserted a short distance behind the middle of body. Anterior gut trunk with 7–9 pairs of branches; each posterior gut trunk with about 10 branches on both sides, those of inner sides being very short.

Genital aperture situated half-way between mouth and posterior body-end. Atrium simple. Testes numerous, small, situated ventrally in body and arranged on both sides of lateral nerve-cords from close behind ovaries to insertion of pharynx, but farther behind only on the outer side of same, ceasing altogether to exist at about the level of mouth. Vasa deferentia uniting in penis bulb into a short common duct, which soon opens into moderately wide and smooth-walled vesicula seminalis; the latter narrowed inferiorly into ductus ejaculatorius terminating at tip of penis, which is of a conical shape and subvertically disposed. Ovaries two, lying ventrally between fourth and fifth pairs of gut branches. Oviducts of both sides opening separately into vaginal canal. Receptaculum seminis situated behind penis, giving rise at its antero-superior part to vaginal canal, which runs down to open into genital atrium from behind.

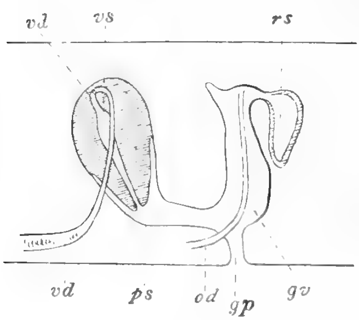
Locality :—Estuary of a rivulet in Oginohama Port, Rikuzen Province. Collected by Ijima 1887 and by Kaburaki 1915.

3. ***Procerodes limuli***, n. sp.

Woodcut 5.

Body in the preserved state lanceolate, pointed anteriorly, rounded posteriorly, convex above, flat below. Without pigments, but brownish due to the color of guts. Dimensions of large specimens $3\frac{1}{2}$–5 mm. long, $1\frac{3}{4}$–$2\frac{1}{2}$ mm. broad ; usually smaller.

5



5. *Procerodes limuli*, n. sp. Diagram of sexual organs.
Index letters as in woodcuts 2 and 4.

Eyes two, small, crescentic. Mouth opening nearly between middle and posterior thirds of body. Pharynx inserted a short distance in front of the middle of body. Anterior gut trunk with 8–10 pairs of lateral branches; posterior trunks usually united at hind end, each with at least 16 lateral branches.

Genital aperture in front of the middle of the posterior third of body. Genital atrium divided into two chambers ; the vestibule vertically ascending, wide, laterally outbulging. Testes numerous, situated ventrally along both sides of anterior gut trunk, extending from ovaries to the dividing point of gut trunks. Vasa deferentia united in the upper part of penis bulb. Vesicula seminalis not wide, passing below into slender ejaculatory duct. Intromittent part of penis conical, subvertical. Ovaries two, spherical, occupying ventral position between first and second pairs of gut branches. Oviducts open separately into genital vestibulum at the upper end, where the small receptaculum also opens by a short stalk (vagina) from behind.

Possibly the species deserves to be made into a new genus, chiefly on account of the dorsal prolongation of genital vestibulum, of the oviducts opening separately into it without uniting into an unpaired common duct, and of the very short vagina.

Locality :—Numerous specimens of this species were collected in 1889 at Ajino, Prov. Bizen, by Professor Kishinouye. The worms occur in abundance on *Limulus longispina*, attached on the hard surface of the proximal segments of cephalothoracic appendages, especially of the last three pairs of these.

Paludicola.

4. ***Bdellocephala annandalei***, n. sp.

Woodcuts 6—8.

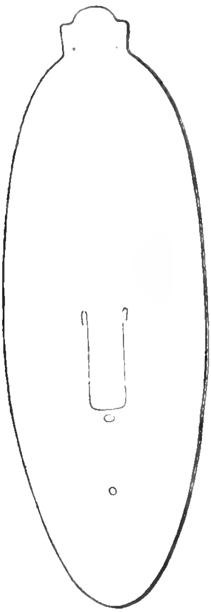
Body large, thick, elongate-ovate. Head lobe narrow and distinctly marked off from trunk; when in motion, less than one-third as broad as the broadest part of trunk. Frontal margin of head-lobe crenate; median convexity strongly arched, exhibiting some small adhesive folds on the inferiorly turned swollen edge (woodcut 7); close behind that edge a groove-like depression; lateral lobes not prominent. Trunk thick, convex above, flat beneath, rounded at posterior end. Commonly very large, reaching 40 mm. in length and 15 mm. in breadth at the pharynx region.

Color of dorsal surface variable, but usually reddish brown; the positions of pharynx and copulatory organs indicated by nearly colorless spaces. Color of ventral surface much lighter than that of dorsal.

Eyes two, widely apart, each surrounded by a clear space, situated at the hind border of head lobe.

Mouth slightly behind the hind end of the middle third of body. Pharynx comparatively short, inserted at about the middle of body, and of about one-sixth the length of entire body. Anterior gut trunk provided with about 11 pairs of lateral branches; each posterior trunk with about 18 of same.

6



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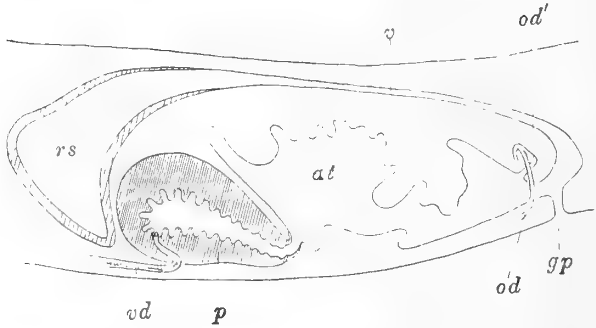


6. *Bdellocephala annandelei*, n. sp. Body shape in the creeping state. 2×.

7. Same. Head end, to show adhesive folds and groove.

8. Same. Diagram of sexual organs.

od′ unpaired common oviduct.
Other letters as in woodcuts 2 and 4.

Genital opening situated a short distance in front of the middle between mouth and posterior body-end. Atrium spacious, prolonged, with irregularly folded wall, expanding forwards over penis. Testes numerous, situated ventrally in body on both sides of anterior gut trunk, extending from close behind ovaries posteriorly to insertion of pharynx. Penis pear-shaped, saccular, with strongly muscular wall, entirely imbedded in parenchyma, the internal cavity opening on the floor of the anterior part of atrium. Vasa deferentia make a forward turn just before entering penis; they open separately into the cavity of the latter. Ovaries two, small, placed between third and fourth pairs of gut branches. Oviducts open into the vestibular part of atrium by a short common duct coming from above. Receptaculum seminis situated close in front of penis. Vaginal canal slender, long, runs over entire length of atrium and opens into the vestibular part of atrium behind unpaired oviduct and just within genital pore.

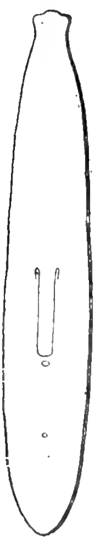
Locality :—Lake Biwa, on muddy bottom at a depth of 30–45 fathoms. Collected by Dr. N. Annandale and Mr. T. Kawamura, Oct. 1915.

5. ***Bdellocephala brunnea***, n. sp.

Woodcuts 9—11.

Body moderately large, rather slender. Head indistinctly marked off from trunk by a gentle neck-like narrowing of body. Frontal margin crenate ; median lobe weakly arched, thrown into some adhesive folds on the inferiorly turned swollen edge (woodcut 10) ; behind that edge a groove-like depression present ; lateral lobes but little projecting. Breadth of frontal margin in the creeping state of the worm, less than half the greatest breadth of trunk. Trunk dorsally convex, ventrally flat, very gradually broadening posteriorly from neck to about the region of sexual organs ; posterior extremity of body rather rounded.

9



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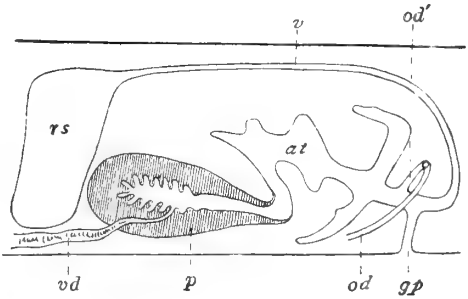


11

9. *Bdellocephala brunnea*, n. sp. Body shape in the creeping state. 3×.

10. Same. Underside of the head end, showing adhesive folds and groove.

11. Same. Diagram of sexual organs.

Index letters as in woodcuts 2, 4 and 8.

Body in the creeping state commonly 20–26 mm. long and 3–4 mm. broad ; ratio of breadth and length 1 : 5–6½.

Color of body olive-brown, sometimes blackish, velvety ; the parts containing guts usually darker than elsewhere.

Eyes two, each surrounded by a white space ; distance between them about twice as long as that between either of them and the nearest point in the front margin or that in the lateral head margin.

Mouth situated at about the posterior end of the middle third of body. Pharynx insertion at about the middle of body. Anterior gut trunk with 7–9 pairs of branches; each posterior gut trunk usually with 13 lateral branches and about as many, but very short, inwardly directed branches.

Genital aperture nearly in the middle of the posterior third of body. Genital organs essentially as in the preceding species. Atrium an irregular prolonged space with wall thrown into folds; with an extensive annular space in front of the junction of oviduct. Testes numerous, small, arranged in two lateral longitudinal zones running along lateral body edges, from behind ovaries to close the posterior body-end; mostly lying ventral to the ends of lateral gut branches. Penis an elongate, muscular-walled, sack-like organ, opening behind into the anterior part of atrium on the floor; vasa deferentia opening into vesicula seminalis separately and without making a forward turn. Ovaries two, situated behind first (or second?) pair of gut branches. Oviducts united into a short unpaired duct before opening into the posterior part of genital atrium from above. Receptaculum seminis large, lying between penis and pharyngeal chamber. Vagina slender, traversing behind close under dorsal epidermis, at the end bending forward to join atrium from behind.

Localities:—Cool running brooks at following places: Yamada and Kanazuchi in Prov. Rikuzen, Koiwai in Prov. Rikuchu and Inawashiro in Prov. Iwashiro. Collected by Ijima 1887 and by Kaburaki 1915.

6. ***Planaria gonocephala*** Dugès.

Woodcuts 12 and 13.

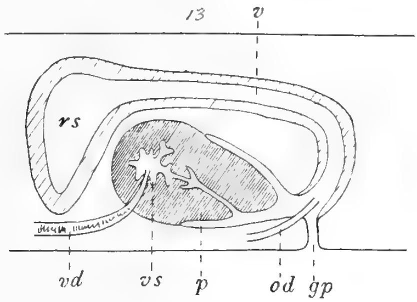
Head triangular, with lateral auricular processes, the sides forming in front a somewhat rounded median angle of approximately 60°. The body is broadest at the auricular processes. Trunk slender, with lateral margins even and nearly parallel for a large part of the length, but in the hind parts tapering to the bluntly pointed posterior extremity.

Commonly 20–33 mm. long and $2\frac{1}{2}$–4 mm. broad in the pharynx region. Ratio of breadth and length 1 : 7–10.

Color of body very variable. As seen on the dorsal side, full-grown individuals are generally of an olive-brown color, sometimes but not always with two darkish longitudinal bands running from behind eyes to posterior parts of body. Younger individuals are paler and the greater parts of body may present various sorts of hues—not unfrequently reddish, brownish, yellowish or greenish—according to varying coloration of the guts.

12

13



12. *Planaria gonocephala* in the creeping state. about 4×.
13. Same. Diagram of sexual organs. Index letters as in woodcut 2.

Eyes two, lying slightly in front of the line connecting the apices of auricular processes; each lying in an oval colorless area. Besides the usual pair, one or two adventitious eyes may sometimes occur. Auricular sense organ slenderly reniform.

Mouth situated at a point somewhat behind the middle of body or even at about the commencement of posterior body third. Pharynx rather short. Anterior gut trunk with 8–12 pairs of branches; each posterior gut trunk with 13–18 outer branches and about as many, but much shorter, inner branches.

Genital aperture slightly in front of the middle of the posterior body third. Atrium simple. Testes numerous, placed close together in dorsal parts of body and arranged in two longitudinal zones which run from behind ovaries to nearly the posterior end of body. Vasa deferentia entering the bulbous end of penis separately and on the sides. Vesicula seminalis wide, with more or less folded wall. Ejaculatory duct narrow, opening externally on the underside of penis, not at the tip. In its course, the ejaculatory duct shows an obliquely anteriorly directed annular outbulging; it consequently brings about a small, conical, posteriorly directed process which projects into the said outbulging and which is axially traversed by a part of the duct. Intromittent part of penis conical, massive, nearly horizontal. Ovaries two, placed ventrally between second and third gut branches. Oviducts open separately into the outer end of the rather wide vaginal canal, not directly into atrium. Receptaculum seminis moderately large, situated in front of penis.

Localities :—Under sunken objects in running as well as stagnant waters in various parts of Hondo. This species, which is also known from Europe and North America, is the commonest and the most widely distributed freshwater planarian in Japan.

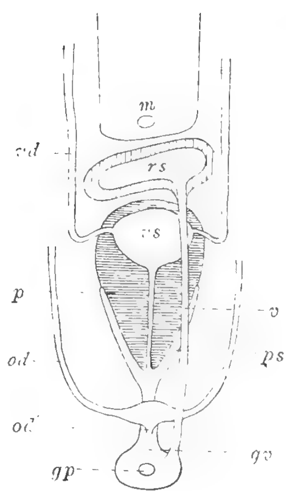
7. ***Planaria papillifera***, n. sp.

Woodcuts 14 and 15.

Frontal margin subtruncate, weakly crenate; lateral lobes rounded, not produced into tentacles. Head indistinctly marked off from trunk by a slight neck-like constriction. Trunk slender, nearly uniformly broad down to about the region of copulatory organs, then gradually tapering to the rounded hind end. Characteristic is the presence of a linear series of small, low and truncate papillae in the mid-dorsal line. The papillae number 20–25 in all; epidermis on them thickly set with rhabdites. The series of papillae commences sometimes in front of, and at other times behind, the eyes.

14

15



14. *Planaria papillifera*, n. sp. in the creeping state. Dorsal papillae indicated by dots in the median line. 9×.

15. Same. Diagram of sexual organs. Index letters as in woodcuts 2, 4 and 8.

Dimensions of largest specimens in the creeping state: 7–8 mm. long and 1–1⅓ mm. broad. Ratio of breadth to length 1 : 6–7.

General color of dorsal surface in the larger specimens somewhat grayish, due to scanty development of pigments; lighter in the median zone, in which the dorsal papillae again frequently appear as blackish spots. Young and small individuals quite or nearly colorless.

Eyes two, each surrounded by a colorless area, situated in the region of neck; distance between them less than that between either of them and lateral neck margin, and very much less than that between them and frontal margin.

Mouth opening between middle and posterior thirds of body. Pharynx inserted at about the middle of body length. Anterior main gut provided with 8–9 pairs of branches; posterior trunk with 14–17 external branches and with about as many, very small, internal branches.

Genital aperture at about the middle of the posterior third of body. Testes numerous, found on both sides of anterior gut trunk and also outside of posterior gut branches; mostly in ventral, but some in dorsal, parts of body. Vasa deferentia entering penis separately on the sides. Vesicula seminalis very wide, smooth-walled; ductus ejaculatorius narrow, and opening at tip of penis. Intromittent part of penis conical, horizontally lying. Ovaries two, situated in front of the first pair of gut branches in ventral position. A pair of large and lobed paraovaries present in front of ovaries. Oviducts unite into a single short duct before opening into elongate atrial passage on the dorsal side. Receptaculum seminis large, irregular-shaped, dorsally situated in front of penis, sending out vagina posteriorly over penis.

Locality:—The species was first discovered in November, 1889, by Professor Shishido in an old unused well in Tokyo (Ichigaya Ward). Subsequently, on several occasions, specimens were obtained by him and given to Ijima. In May, 1890, a number of cocoons apparently belonging to the species were collected in the same well. They contained embryos of about 2 mm. length.

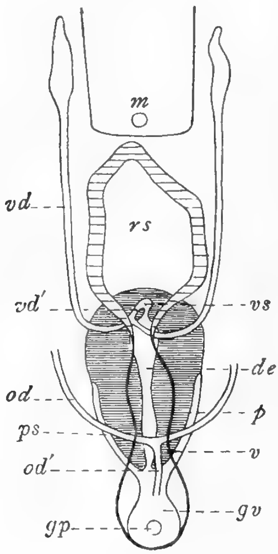
8. ***Planaria vivida***, n. sp.

Woodcuts 16 and 17.

Frontal margin subtruncate, gently arched in the middle, laterally passing into front margin of moderately long, obtusely pointed tentacles. Head flat, not marked off by a neck-like narrowing of body. Trunk slender, only weakly convex above, nearly uniformly broad in the greater part of its length; hind end obtusely pointed, sometimes rounded.

16

17



16. *Planaria vivida*, n. sp. in the creeping state. 4×.
17. Same. Diagram of sexual organs.
Index letters as in woodcuts 2, 4 and 8.

Length of large specimens in the creeping state may reach 22 mm. in length and 4 mm. in breadth at pharynx region; usually smaller. Ratio of breadth to length 1 : 8–10.

Color on dorsal side usually blackish or dark olive-brown, especially dark in dorsal median parts. Small individuals, in which the pigments are not densely developed, may reveal the guts more or less distinctly in various colors. Ventral surface much paler than dorsal surface.

Eyes two, reniform, each in a half-moon-shaped colorless spot. Distance between them equal to about one-fourth their distance from frontal margin, and somewhat less than the distance of either eye from lateral margin of the same side.

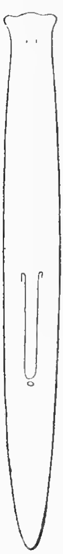
Mouth opening situated at about the commencement of the posterior third of body. Pharynx inserted a short distance in front of the middle of body. Anterior gut trunk with 4–6 pairs of branches; posterior gut trunk with usually 12–14 lateral branches and about as many inwardly directed, very short branches.

Genital aperture behind mouth at a distance equal to about one-third that between mouth and posterior body-end. Testes numerous, about 60 in total number, situated ventrally in body. Sometimes they begin to exist from before ovaries. More usually they are found from close behind these backwards on both sides of anterior gut trunk but laterally to posterior gut trunks down to the level of genital pore, and behind this point, between the gut trunks. Vasa deferentia swollen along posterior one-fourth of pharynx, united into a short common duct in the antero-superior part of penis bulb before opening into the small vesicula seminalis. Ductus ejaculatorius wide, slightly narrowed in the middle parts. Intromittent part of penis conical, horizontally lying. Ovaries two, situated ventrally between first and second branches of anterior gut trunk. Oviducts unite into a single duct before opening into genital atrium from above. Receptaculum seminis very large. Vagina unusually wide, gently constricted in the middle of its course.

In external habitus the species closely resembles *Pl. alpina* Dana.

Localities :—Cool running waters in following places : Nikko ; Usui mountains ; hilly districts in provinces Rikuchu, Mutsu, Ugo, Iwashiro, &c. The species is the commonest in mountain streams of the parts of Japan indicated above.

18



18. *Planaria pellucida*, n. sp. Outline of body in the creeping state. about 7×.

9. ***Planaria pellucida***, n. sp.

Woodcut 18.

In shape this species closely resembles the preceding. Frontal margin subtruncate, weakly crenate. Rounded auricular lobes scarcely prolonged into tentacles, anyway shorter than in *Pl. vivida*.

Large specimens in the creeping state measured 10 mm. long by about $1\frac{1}{2}$ mm. across in the broadest part.

Body colorless, translucent, but with digestive tracts showing themselves in a milky white or a somewhat yellowish or a darkish color.

Eyes two, situated far behind frontal margin ; distance between them shorter than distance of either eye from lateral body margin of the same side. Mouth at about the hind end of the middle third of body. Pharynx insertion at about the middle of body. Anterior gut trunk with 10–11 pairs of branches; each posterior gut trunk with about 20 lateral branches.

In all the specimens we have examined, sexual organs were not developed.

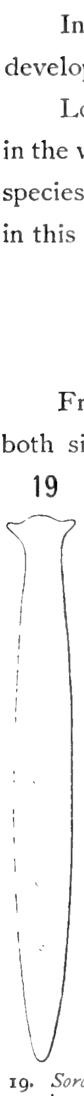
Locality :—Beneath stones and fallen leaves in a cool running stream in the wooded hills to the east of Toyohara (Vladimirofka), Saghalin. The species was collected together with *Polycelis karafto* described further on in this paper. Collected by Ijima, June 1906.

10. ***Sorocelis sapporo***, n. sp.

Woodcuts 19 and 20.

Frontal margin subtruncate, with a gentle median convexity; head on both sides produced into moderately distinct tentacles rounded at end. Trunk in the creeping state slender, being for the most part of a nearly uniform breadth; obtusely pointed at the posterior extremity.

19



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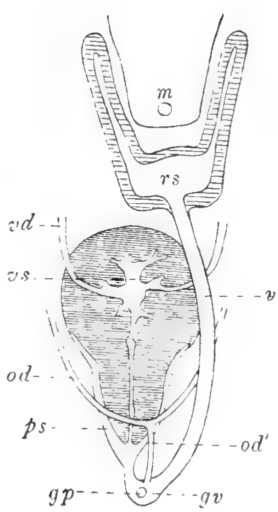


19. *Sorocelis sapporo*, n. sp. in the cleeping state. about 4×.
20. Same. Diagram of sexual organs. Index letters as in woodcuts 2, 4 and 8.

Large specimens in the creeping state measure 17 mm. in length and 2 mm. in breadth at pharynx region; mostly smaller; breadth and length in the proportion of 1 to 6–8.

Nearly colorless and translucent, but digestive tracts revealing themselves in milky white, yellowish, brownish, darkish or even pinkish color.

Eyes extremely small, numerous, increasing in number with growth of body, but never quite reaching 100 in total number; distributed in two longitudinal zones which converge and meet in front and thus form a horseshoe-shaped tract, situated a considerable distance apart from head margin both in front and laterally; posteriorly the tract extends to about the third pair of gut branches.

Mouth situated at about between middle and posterior thirds of body. Pharynx inserted at about the middle of body or slightly in front of it. Anterior gut trunk with 8 or 9 pairs of branches; each posterior gut trunk with 18–20 lateral branches and about as many, but extremely short, innerly directed branches.

Genital pore situated behind mouth at a distance equal to about one-third that between mouth and posterior body-end. Atrium divided into two cavities. Testes about 18–22 in number on either side, lying ventrally along both sides of anterior gut trunk, extending from ovarian region to the insertion of pharynx. Vasa deferentia opening separately into vesicula seminalis on the sides. Wall of the latter thrown into irregular folds. Ejaculatory duct narrow, opening at tip of penis. Penis bulb spherical; intromittent part of penis conical, horizontally directed. Ovaries two, placed ventrally between first and second, sometimes between second and third, branches of anterior gut trunk. Oviducts unite into an unpaired common duct on the dorsal side of penis sheath; the unpaired duct opens into genital vestibulum dorsally and to the left of vagina. Receptaculum seminis dorsally situated, U-shaped and clasping from behind the posterior end of pharyngeal chamber. Vagina runs over penis sheath somewhat to the right of median line, at the end passing into genital vestibulum from above.

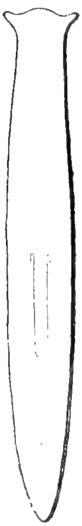
Locality:—Common in the clear brook flowing through the grounds of Sapporo Agricultural College in Hokkaido. Collected by Ijima, Oct. 1913.

11. ***Polycelis auriculata***, n. sp.

Woodcuts 21 and 22.

Frontal margin subtruncate, with a gentle median convexity. Head end produced laterally into moderately distinct tentacles, rounded at tip and slightly anteriorly directed. Body slender, superiorly convex, inferiorly flat, in the creeping state with lateral margins running nearly parallel for the most part; posterior body-end rather rounded than obtusely pointed.

21



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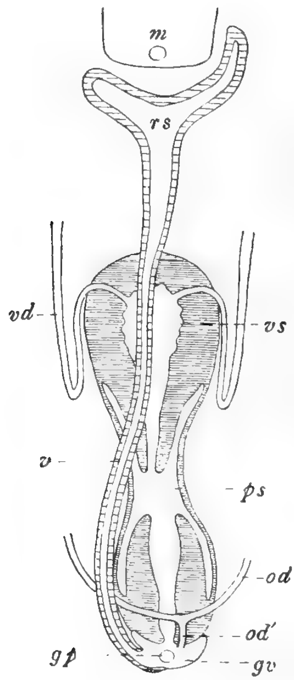


21. *Polycelis auriculata*, n. sp. in the cleeping state. about 4×.
22. Same. Diagram of sexual organs.
Index letters as in woodcuts 2, 4 and 8.

Exceptionally large specimens in the fully extended state reach 25 mm. in length and about 3½ mm. in breadth; commonly smaller, 10–15 mm. long by 1–1½ mm. broad in the creeping state; breadth and length in the ratio of 1 : 7–10.

Color of dorsal surface generally sepia-brown, the guts indistinctly showing themselves in a dark brownish color or in a variety of other colors incidental to gut contents. Ventral surface of a pale color.

Eyes extremely small, numerous, numbering 30–73 on either side, distributed in a horseshoe-shaped tract close to head margin, there existing in the width of that tract commonly more than one eyes and only occasionally a single eye. The tract may extend posteriorly for a length equal to about one-eighth or one-sixth the entire body-length.

Mouth situated at about the hind end of the middle third of body. Pharynx inserted at about the middle of body-length. Anterior gut trunk giving off 6–9 pairs of branches; each posterior trunk with usually 10–17 lateral branches, those inwardly directed being either very small or, as is frequently the case, joining together the two trunks.

Genital aperture at about the middle of the posterior third of body. Atrium divided into two chambers, the penis sheath and the vestibulum, separated by a strongly muscular and tubular diaphragm, the free end of which is retroverted into the former. Penis sheath with muscular wall continuous with that of penis and thickest on the dorsal side. Testes numbering about 19–21 on either side of body, occupying ventral position on both sides of anterior gut trunk and limited in their distribution to between ovaries and pharynx insertion. Vasa deferentia in the posterior parts make forward turn, rising upward at the same time, before they open separately into penis. Vesicula seminalis wide, with somewhat folded wall, passing gradually into wide ejaculatory duct which opens at tip of penis. Intromittent part of penis conical, horizontal. Ovaries two, spherical, placed ventrally between first and second pairs of gut branches. Oviducts united at the end into a short single duct at a point dorsal to atrial diaphragm, opening into vestibulum just behind the latter. Receptaculum seminis simply tubular at an early stage of development ; later the anterior blind end becomes bent to the right or branches somewhat in the shape of Y. Vagina opening dorsally into vestibulum on the left of median line.

Localities :—Both running and standing waters at following localities : Nikko ; Mt. Iwate in Prov. Rikuchu ; Towada Lake in Prov. Mutsu ; Ōzawa in Prov. Ugo ; Mt. Bantai in Prov. Iwashiro, Collected by Ijima, 1886, and by Kaburaki, 1914 and 1915.

12. ***Polycelis karafto***, n. sp.

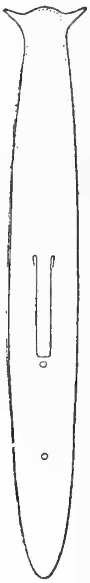
Woodcuts 23 and 24.

Head end shaped nearly as in the preceding species, but tentacles somewhat longer and more pointed at end. Trunk slender, nearly uniformly broad in most parts, obtusely pointed at posterior end.

A large specimen in the creeping state measured 12 mm. in length and 2 mm. in greatest breadth. Commonly smaller, breadth equalling about one-fifth or one-sixth the length.

Color of dorsal surface dark brown ; showing two, longitudinally running, ill-defined darker bands. Ventral surface lighter; the course of longitudinal nerve-cords indicated by two dark lines.

23



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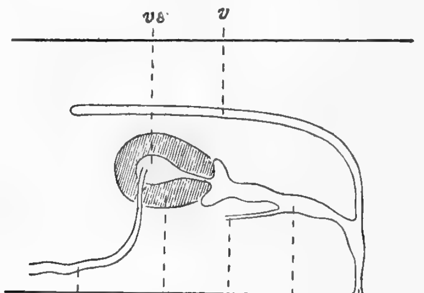

23. *Polycelis karafto*, n. sp. in the cleeping state. about 7×.

24. Same. Diagram of sexal organs. Index letters as in woodcuts 2, 4 and 8.

Eyes small, numerous, found along and close to margins of head, on both sides extending behind to about the second pair of gut branches. They are arranged in a single row in the smaller specimens; but in the larger ones, they may be increased to such a number that several are found in the width of the occellated zone, especially in the anterior parts of head. A gap in the zone may occur in the middle of frontal margin, separating it into right and left zones.

Mouth at about the hind end of the middle third of body. Pharynx insertion situated a short distance in front of the middle of body. Anterior gut trunk with 5–7 pairs of branches; posterior gut trunks each with about 15 lateral branches.

Genital aperture situated nearly midway between mouth and hind end of body, leading into long and canalar atrium. Testes numerous, situated ventrally along both sides ot anterior gut trunk and extending from ovarian region to insertion of pharynx. Vasa deferentia opening separately into moderately wide vesicula seminalis, which passes behind into slender ejaculatory duct. Penis small, its muscular wall not sharply defined from surrounding mesenchyme; horizontally disposed, the free end but little projecting into the widened anterior end of canalar atrium. Ovaries two, placed ventrally in front of the first pair of gut branches. Course of oviducts could not be distinctly traced in the few mature or nearly mature specimens on hand ; a short stretch of a longitudinal canal, running along the ventral side of atrium and joining this at a point about midway between penis tip and the junction of vagina with atrium, probably represents the unpaired terminal part of united oviducts. Receptaculum seminis tubular, slender, running over penis and extending a short distance beyond this anteriorly.

Localities :—Cool running brooks in the wooded hills to the east of Toyohara (Vladimirofka), Saghalin, found together with *Planaria pellucida*. Also obtained in a spring near Tretia Padi, north of Korsakoff, Saghalin. Ijima coll., June 1906.

Notes on *Aphrocallistes beatrix* Gray, particularly with reference to the form occuring in East Asiatic seas.

By

Isao Ijima, *Ph. D.*

In the "Valdivia" Report, F. E. Schulze ('04, pp. 146, 147) has ably pointed out that *Aphrocallistes beatrix* Gray '58, *A. bocagei* Wright '70 and *A. ramosus* F. E. Schulze '87 are not specifically separable, but represent one species which should go by the oldest name of *A. beatrix*. The same author further remarked to the effect that Topent's *A. azoricus* (Tops. '01 p. 455 ; '04, p. 48), if this really be an *Aphrocallistes*, may possibly belong within the range of *A. beatrix*. I entirely concur with him in the above opinion. *A. beatrix* is then to be considered as an exceedingly variable species, widely distributed in the Pacific, Indian and Atlantic Oceans. Now, from my studies I have come to entertain the idea that that species, as it occurs along the Japanese coasts and in more southern seas of the Western Pacific,—i.e. the same form of *Aphrocallistes* which F. E. Schulze ('87, Chall. Rep.) had erstwhile referred in part to *A. bocagei* Wright and in part made into his *A. ramosus*,—is characterized by certain common and fairly constant features by which it may be distinguished in a way from the form or forms occurring in other parts of the world, though the differentiation can be of no more taxonomic significance than varietal or subspecific. For the sake of convenience I will refer to the form of the East Asiatic seas by the name of *A. beatrix orientalis*.

Now, the following is a summary account of the form just mentioned, coupled with remarks in comparison with what is known of specimens from some other parts of the world. It should be noted that the descriptions in this paper refer in particular to *A. beatrix orientalis,* unless otherwise referred to in special. The notes were drawn up with the view of creating a basis of comparison to be utilized in my forthcoming report on the hexactinellids collected by the "Siboga" in the Malayan seas. It may as well be mentioned here that, of the rich material of *A. beatrix orientalis* collected by me in the Sagami Sea, I have subjected more than a dozen different stocks to specially close studies for the purpose of determining the range of individual variations. Further stood at my disposal some specimens of the same form from the Suruga Bay, the Gulf of Kagoshima, the China Sea and the Philippine Islands.

In general habitus the oriental form exhibits the same extensive range of variation as is ascribed to the entire species. What may be considered as an individual is either an irregular, dichotomously branching, simple tube ("ramosa" type), or consists of an erect axial calyx bearing a number of radial tubo-branches at different heights between the base and the upper end. The tubes, be these parts of individuals of the "ramosa" type or branches of axial calyx, measure generally 4—8 mm. in diameter, seldom reaching up to 10 mm. The calyx may reach 80 mm. or thereabout in height, more or less widening superiorly up to 25 mm. or more across. The wall, irrespective of the configuration of the parts it belongs to, is generally from 0.6 mm. to nearly 1 mm., seldom up to 1.4 mm., thick. The honeycomb-like radial canals of the wall skeleton measure 0.6—0.8 mm. in diameter. It is unnecessary to go into further details of the macroscopic structure, as this agrees in all essential points with what is already known of it. Only it should be pointed out that, as regards the dimensions of parts, the oriental specimens fall considerably short of the maxinum attained by some of the Indomalayan specimens, in which the ramose tubes are frequently nearly as thick as one's finger, the wall fully 2 mm. thick or even thicker, and the radial canals 1 mm. or more wide.

Dictyonal beams of the skeleton vary in different individuals from being only sparsely tubercled and at places quite smooth to being profusely tubercled throughout. This may be due in a measure to the age of the sponge, as was pointed out by F. E. Schulze. The intercanalar dictyonal septa, in the parts between the radial lines of their junction with one another, are thin, but not quite flat and even. In them the dictyonal beams do not run all in the same plane, nor always in a single regular tier as seen in sections; so that, the septa in sections present an appearance more like that of a thin sheet of an irregular three-dimensional framework than of a single-layered network evenly spread out. This stands somewhat at variance with the evenly complanated state of the septal dictyonalia as figured by F. E. Schultze ('04, pl. XI. fig. 2) from a specimen taken in Siberut Strait on the SW. coast of Sumatra, or as I myself have found in many of the Malayan specimens collected by the Siboga. The dictyonal nodes are but slightly or not at all swollen.

The rough spikes growing out from both dermal and gastral edges of intercanalar septa vary much in their development according to individuals. Spikes on the surface of the septa are of but exceptional occurrence,—another fact which seems to be noteworthy in view of their apparently frequent and numerous presence in that position—all pointed towards the external opening of the canals—in Malayan as well as Indoceanic specimens.

Free oxyhexactins occur in very varying numbers. In the oriental form I find them to fluctuate from 50μ to 100μ in length of rays. The rays are rough, but scarcely ever distinctly spiny.

The uncinates offer no important points of characterization which might likely be utilized for the differential purpose within the species. The same may be said of the rough diactine gastralia (up to 1.4 mm. long in the oriental form).

The dermalia exhibit some points which seem worth while to call attention to. In the oriental form they are both pentactins and hexactins, of which the latter have the distal ray in various stages of development towards acquiring a plumose character (hexactine pinules). In some of the specimens the hexactine dermalia are decidedly rare, while in others they are well in evidence, though not in numerical predominance over the pentactins. In other words, the dermalia are generally mostly pentactine. Irrespective of their being pentactine or hexactine, the dermalia measure in the length of tangential rays from about 80μ up to 120μ, 150μ, 175μ, 230μ or even 290μ in different individuals, the proximal ray being about as long as, or either somewhat longer or shorter than, the tangentials of the same spicule. In a single case (Sc. Coll. sp. No. 279) of Sagami Sea specimens, certain large pentactine dermalia, amongst others of much smaller dimensions, were found to possess exceptionally long proximal ray, which, measuring fully 600μ in length, extended nearly right through the entire thickness of the sponge wall.

In pentactine dermalia there usually exists a low swelling or a knot in place of the atrophied distal ray. In some other dermalia the knob is prolonged to a short stumpy peg, and in still others this may be slightly swollen towards the outer end and may here bear a few short spiny processes. The last condition leads over to those cases of hexactine dermalia in which the distal ray has, so to say, fairly started on the way of assuming, but has not yet quite reached, a plumose state of development, and on that account may well be designated subplumose. In some of the specimens the subplumose distal ray never exceeds 80μ or even half that in length, thus presenting quite a stunted appearance. In still other specimens the same ray is found to reach a length of 130μ, 150μ or even 185μ; in these cases the shaft slightly thickens distally, remains smooth or only sparsely tubercled in the proximal half of its length, and then commences to bear short, obliquely distally directed spines, which more distally grow somewhat longer but are neither so long nor numerous as to give to the parts a decidedly feather-like appearance. The above subplumose or imperfectly feather-like state of the distal rays represents about the highest limit of development reached by hexactine dermalia or pinules in the great majority of the specimens. An exception to the rule was found in the single case of a specimen from Kōzushima (Sc. Coll. Sp. No. 552), in which some, but by no means all, of the hexactine dermalia present exhibited a fairly plumose appearance in the distal parts of their distal rays (up to 150μ long; breadth of the plumose parts up to 24μ; longest lateral spine up to 16μ).—To sum up: The dermalia in *A. beatrix orientalis* consist largely of pentactins, with admixture, in variable proportions, of hexactins in which the distal ray may be spineless and simply peg-like, or spined and subplumose, but is rarely quite plumose. The said distal ray seems not to exceed 185μ in length, generally standing very considerably under that length.

Somewhat a reverse of the above rule as regards the dermalia seems to obtain in specimens from other parts of the world. For the dermalia of these only hexactins were given by authors, indicating either absence or only insignificant presence of any other, but particularly pentactine, form amongst them; and the distal ray of those hexactine dermalia has always been described to be "feather-like," "fir-tree-like" or "poplar-like." Thus, the Atlantic form ("*A. bocagei*") of the species is known to have unequivocally feather-like or fir-tree-like distal rays to dermal hexactins (Carter '73, p. 450, pl. XV. fig. 9.—F. E. Schulze '87, p. 315, pl. LXXXIV. fig. 8). My own observations on a sample, kindly presented to me by Professor F. E. Schulze, from the Mid-Atlantic specimen which was obtained by the "Challenger" (Stat. 344, off Ascension Island) and which was identified by him as *A. bocagei* Wright, have shown that the dermalia in that speeimen are predominantly or nearly exclusively well-developed pinular hexactins, as were indeed given to be by him in the Challenger Report. I have found the plumose distal ray to be 182—231μ long and up to 40μ broad; the lateral spines up to 28μ long; tangential rays on an average 133μ long and the proximal ray always somewhat shorter.—In the type specimen of *A. beatrix* from Malacca the dermalia were described by F. E. Schulze ('87, p. 312) to be hexactins "in which the distal ray bears numerous narrow, curved, fir-tree-like, lateral prickles."—For the Bay of Bengal specimens, collected by the "Investigator" and reported on by F. E. Schulze ('02) as *A. beatrix* Gray, the author describes the dermal hexactins in essentially the same strain, comparing the appearance of their free distal rays to that of an Italian poplar and giving the length of those rays to be 100—200μ.—Finally, among the *Aphrocallistes* brought back by the "Siboga" from the Malayan seas, I have found specimens from certain stations of hers to possess dermalia which are provided with distinctly plumose distal rays, though not always agreeing in details of the appearance of these.—In comparison with the specimens referred to above, the generality of the oriental form of *A. beatrix* in the extended sense may be said to stand markedly backward in the development of the distal ray of dermal hexactins,—not only as a pinular ray simply, but also as regards its absolute dimensions and the numerical proportion of the spicules provided with it in relation to those in which it is entirely or nearly entirely suppressed.

Scopules are present in the sponge wall but on the dermal side only, either in a single form or in two forms. In the former case they are all of a slim appearance and may well be called the leptoscopule; in the latter case there occcurs, besides the same leptoscopule, the second form of a thicker and markedly different development, which may be distinguished by calling it the pachyscopule. The constantly occurring leptoscopule is of very variable length (f.i., 230–320μ, about 360μ, 400–464μ long in three different stocks). It is provided with usually 4 (sometimes 3 or 5) terminal branches (60–80μ, 75–90μ, 88–100μ long), which distinctly diverge from the point of their origin and are gently outwardly bent, each terminating with a knob-like or bulb-like swelling. The branches may be somewhat geniculate in the basal parts as was given for "*A. ramosus*" by F.E. Schulze in the Challenger Report, but that state is by no means of general or common occurrence. The terminal swelling is invariably small and is beset with whorls of minute barbs; it never seems to develop into the shape of a moderately large convex disc with toothed margin, as was represented by Carter ('73, pl. xv. fig. 1) from a Portuguese specimen of "*A. bocagei*" or by F.E. Schulze ('02, pl. xv. fig. 2; pl. xvi. fig. 4) from "*A. beatrix*" and "*A. bocagei*" from the Bay of Bengal.

The pachyscopule, which in some specimens does not seem to occur at all, though in some others may take the upper hand over the leptoscopule in numerical proportion of occurrence, is readily distinguishable from this in having distinctly thicker shaft and terminal branches, which latter usually number four, stand out nearly parallel with one another or diverge but very little, and are scarcely or but indistinctly swollen at the tip. Moreover, both the shaft and the branches are very minutely and fairly uniformly tubercled all over. In length the pachyscopule is about equal to, or somewhat longer than, the leptoscopule in the same stock.

The hexasters are exceedingly variable as regards their characters as well as in number, and in case they occur in more than one distinguishable varieties, in the numerical proportion of these also. The variation refers not only to different stocks, but also in a measure to different parts of one and the same stock. The hexaster varieties to be ascribed to *A. beatrix orientalis* as a whole are both discohexaster and oxyhexaster, each of which may again be divided into a regularly developed (" synstigme ") form and an elongate hemihexasterous (" syngramme " form), thus giving in all four varieties of hexasters. Not necessarily all the four occur together in the same stock; but any one or two or even three of them may be found to be missing in spite of careful searches. In twelve Japanese specimens which I have studied with special care as regards their hexasters, the four varieties were found distributed in the manner indicated in the following table.

Number of specimens examined	A Regular disco-hexaster	B Regular oxy-hexaster	C Elongate hemi-discohexaster	D Elongate hemi-oxyhexaster
6	+	+	+	+
2	+	+	○	+
1	+	○	○	+
1	+	○	+	○
1	+	○	○	○
1	○	○	+	○

+ denotes presence, and ○ apparent absence, of the hexaster variety they relate to.

A) From the above table it will be seen that the regular discohexaster is apparently the most constantly occurring variety. In a specimen from Doketsba it constituted the only kind of hexaster to be found and was met with in great abundance. In certain other specimens it was rare, requiring a long search to find one. In one specimen it was missing altogether. The discohexaster in question is a small form between 20 and 50μ in diameter, the size fluctuating in the same stock to the extent that the smallest is of about half the diameter of the largest. Each short principal bears 3–5 terminals, which in the smaller examples are quite fine, delicate and minutely capitate, but in the larger ones may be moderately strong and terminate with a small disk bearing a few, not always distinct, recurved claws on the margin. However, in no case of the oriental specimens have I found the claws to be of such a development as might induce one to call the spicule an onychaster, as F. E. Schulze found them to be in some specimens from the Indian Ocean. Usually the terminals are nearly straight and spread out radiatingly from the end of principals; but variation again occurs in this respect, for, in a specimen or two I have found the terminals to each principal form separately a more or less distinctly bell-shaped or perianth-like group. Occasionally the discohexaster in question, but especially the larger examples of it, may be found in the form of a hemi-discohexaster, in which none of the principals are specially elongated.

B) The regular oxyhexaster was met with in many specimens, but again in varying numbers. In only four specimens, out of the twelve, I have found none of it. The oxyhexaster is of much the same appearance as the above regular discohexaster, except of course in the manner of ending of the terminals. Diameter 32–80μ (representative fluctuations in different stocks: 32–56μ, 35–40μ, 56–80μ). Occasionally the oxyhexaster likewise takes the form of a simple hemioxyhexaster.

C) The elongate hemidiscohexaster and D) the elongate hemioxy-hexaster often occur together, as do the regular discohexaster and oxyhexaster, in the same stock in varying numerical proportion; but sometimes either of the elongate varieties, and more rarely both of them, may be missing. Both may measure up to 80μ in total length, though in some stocks the length seemed not to exceed 60μ, while in one stock it reached 76μ as regards C and well up to 100μ as regards D. In breadth both the varieties are about equal to the diameter of the larger examples of regularly developed and non-elongate hexasters found in the same specimen. It seems the elongate hexasters in the oriental specimens never attain the same large size and the same strength in the development of both shaft and rays as the corresponding spicules in some Indo-Malayan specimens of the species. The figures, given by Carter ('73, pl. iii. fig. 20) and F.E. Schulze ('87, pl. lxxxiv. figs. 9 & 10), of the elongate oxyhexaster from the type specimen of *A. beatrix* Gray (from Malacca) represent that spicule very much larger and more strongly developed than I have ever observed in the oriental form. Also the figures given by F.E. Schulze ('02, pls. xv & xvi) of the same spicule from specimens collected by the "Investigator" in the Bay of Bengal, distinctly indicate the same fact. That author gave for "*A. beatrix*" from that region that the spicule may reach 150μ in length, a size which I have never yet seen attained by the identical spicule in the oriental form.—In the elongate hemidiscohexaster, the terminals end either with a minute pin-head-like swelling or with a small marginally toothed disc, similarly as in the regularly developed discohexaster. In the oriental form I have so far not discovered a case which might properly be called an elongate onychaster, such as F. E. Schulze has reported from certain Indoceanic specimens of the species.

There can scarcely be a doubt that the above two varieties of hemihexasters (C and D) were derived respectively from the two regular hexasters before noted on (A and B), but particularly from the hemihexasterous form of these, simply by marked elongation of either one or two opposite principals. The prolonged principal or principals constitute the straight axial shaft (up to 12μ or 24μ long), which usually bears at its each end a number (3–5) of terminals in a radiating conical tuft. Rarely the tuft at one end of the shaft is represented by a single terminal standing out in straight line with the shaft. The spicular center lies of course in the shaft, but either in the middle of its length or nearer to its one end than to the other, according to whether two opposite principals or a single principal have undergone elongation. The four, equally short, lateral principals, arising from the center at right angles to the shaft as well as to one another, are in most cases all uniterminal, each of them with its single terminal presenting the appearance of a simple ray. It is only very seldom that one or more, though probably never all, of the lateral principals are found each with two or three terminals in a radiating group. Sometimes one meets with cases in which the shaft shows terminals at its each end but is apparently without the cruciate lateral rays. However, it will not take long before the observer is convinced of the fact that he has before him a case of hemihexaster, in which only a single principal is prolonged while all the others remain extremely short, and in which the four lateral rays really exist but appear, owing to the proximity of the spicular center to one extremity of the shaft, to constitute a single radiating group of rays in association with the terminals properly belonging to that shaft end.

In conclusion, it may be stated that *A. beatrix orientalis*, subject as it is to very considerable individual variations both as regards its general habitus and the spiculation, on the whole exhibits differentiations in, or tendencies to differentiate toward, the following characters: 1) A somewhat diminutive development of macroscopic body parts, in that the body tubes measure generally only 4–8 mm. and seldom 10 mm. in diameter, the body wall under 1 mm. in thickness, and the radial canals of skeleton 0.6–0.8 mm. in width; 2) Dictyonal septa between radial canals not evenly complanated, a fact which may be correlated with the small caliber of the canals; 3) Spikes on the surfaces of dictyonal septa only occasionally present; 4) Dermalia largely pentactine and in part hexactine, the hexactins with distal rays which are commonly more or less abortively pinular or are of such a rudimentary development as makes the hexactins gradually merge into the pentactins; 5) Leptoscopules with terminal swelling of their branches always small, bulb-like and beset with whorls of minute barbs; and 6) Elongate forms of hemihexasters not over 100μ in length.

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Ancyrobdella biwae n.g. n.sp., ein merkwürdiger Rüsselegel aus Biwa-See.

Von

Dr. **Asajiro Oka,** Tokio.

(Mit 1 Figur)

Die Gelegenheit, die hier kurz geschilderte höchst eigenartige Hirudinee zu untersuchen, verdanke ich Herrn Dr. N. Annandale, Calcutta, der sie während seines Aufenthaltes in Japan im Herbst 1915 erbeutete. Eine ausführliche Beschreibung mit Abbildungen nebst Notizen über andre asiatische Hirudineen wird demnächst in den "Memoirs of the Asiatic Society of Bengal" veröffentlicht werden; hier möchte ich nur die hauptsächlichen Punkte ihrer Organisation bekannt machen.

Herrn Dr. Annandale sei auch an dieser Stelle für die liebenswürdige Überlassung des wertvollen Materials herzlich gedankt.

Ancyrobdella[1] ***biwae,*** n.g. n.sp.

Dieser zierliche Rüsselegel bietet besonderes Interesse aus zweifachem Grunde, erstens wegen seiner sonderbaren Eigenshaften, durch welche er von allen andern Hirudineen stark abweicht, und zweitens deswegen, weil er überhaupt die einzige Blutegelart darstellt, die bisher aus den Tiefen eines japanischen Binnensees heraufgebracht worden ist. Er stammt nämlich von Biwa-See, dem grössten und wohl tiefsten Süsswassersee Japans, und zwar aus einer Tiefe von ca. 80 m, und ist durch den Besitz dreier, schräg nach hinten gerichteter Widerhaken, die den vordersten Teil des überaus langen Proboscis bewaffnen, charakterisiert. Auf dieses Merkmal bezieht sich eben der Gattungsname, den ich unserm Tier gegeben habe.

Gestalt und Grösse. In ihrem äusseren Habitus erinnert diese Art mehr an die Ichthyobdelliden als an die Glossiphoniden, denen sie in Wirk-

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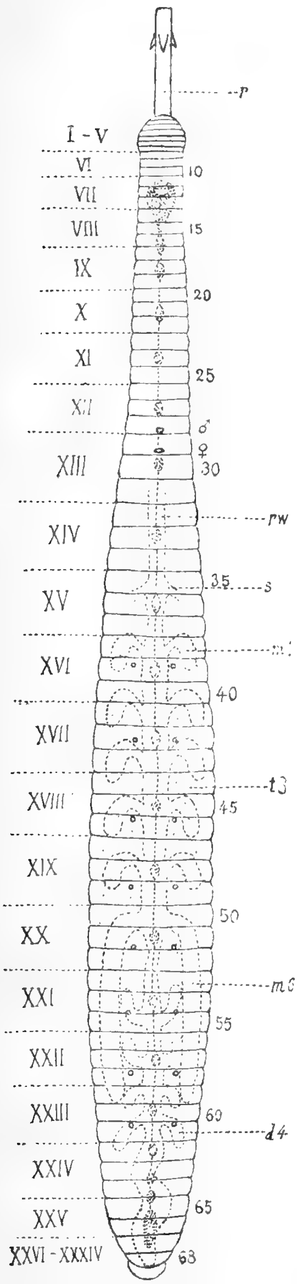
1) ἄγκυρα Anker, βδέλλα Blutegel; mit einem Anker versehener Blutegel.

lichkeit angehört. Die schlanke, nur wenig abgeplattete Form des Körpers, an dem man, wenn auch undeutlich, eine Hals- und Rumpfregion unterscheiden kann, die schwache Verjüngung im Niveau der Geschlechtsöffnungen, die unregelmässige Querrunzelung der Haut, die verhältnismässig breite Kopfscheibe, der ganz kleine hintere Saugnapf — das alles sind Charaktere, die geeignet sind, unser Tier eher als eine Pontobdellide erscheinen zu lassen. Auch ich glaubte zunächst eine solche vor mir zu haben, erst nach eingehender Untersuchung gewann ich die Überzeugung, dass man hier nicht etwa mit einer Süsswasser-Ichthyobdellide, sondern mit einer eigentümlich modifizierten Glossiphonide zu tun hat.

Alle mir vorliegenden Exemplare — vier an der Zahl — sind mehr oder weniger gekrümmt, aber keineswegs kontrahiert im Gegensatz zu den übrigen Glossiphoniden, die sich in Alcohol immer stark zusammenziehen. Das grösste Individuum weist folgende Dimensionen auf: Länge 17 mm, grösste Breite 1.6 mm, grösste Dicke 1.2 mm, Breite der Kopfscheibe 0.7 mm, Durchmesser des hinteren Saugnapfes 0.5 mm. Die andern sind wenig kleiner, zeigen aber ganz dieselben Verhältnisse. Wie aus diesen Messungen ohne Weiteres ersichtlich, ist unser Wurm mehr als zehn Mal so lang als breit, eine Körpergestalt, die man sonst bei keiner Gossiphonide antrifft. In dieser Beziehung kommt er der Gattung *Piscicola* unter den Ichthyobdelliden entschieden näher, die, wenn völlig ausgestreckt, fast zwanzig Mal so lang als dick wird. In der Halsregion, die zwischen dem Kopf und den Geschlechtsöffnungen liegt und ungefähr ein Viertel der Gesamtlänge einnimmt, ist der Körper nur wenig abgeplattet und zeigt im Querschnitt einen annähernd kreisförmigen Umriss. Der Hinterkörper ist etwas mehr abgeflacht, aber immerhin als sehr dick zu nennen, da sich die Breite zur Dicke wie 4 : 3 verhält. Die Seitenränder lassen sich jederseits die ganze Länge hindurch als eine deutliche, wenn auch ganz stumpfe, Längskante erkennen, was weder bei *Pontobdella* noch bei *Piscicola* der Fall ist.

Äussere Charaktere. Die Haut ist im allgemeinen glatt, indem Papillen oder sonstige Auswüchse nirgends zur Ausbildung gelangen. Dagegen kommen zwischen den regelmässigen interannularen Furchen zahlreiche unregelmässige Querrunzeln — meist 3–5 auf einem Ringe — vor, welche stellenweise jene vortäuschend die Zählung der Ringe bedeutend erschweren. Die Farbe im Alkohol ist gleichmässig aschgrau; nach mündlicher Mitteilung vom Dr. Annandale war das Tier im Leben hellrötlich, einfarbig.

Am Körper zählt man 68 Ringe vor dem hinteren Saugnapfe. Da es keine äusserlichen Merkmale giebt, nach denen man die Grenzen der Somite bestimmen kann, so müssen letztere erst durch das Studium des anatomischen Baues festgestellt werden. Eine sorgfältige Untersuchung des Nervensystems, die ich an einem der Exemplare vorgenommen habe, worauf ich aber hier nicht eingehen kann, ergab nun folgendes: auf Somit I, II und III kommt je 1 Ring, auf Somit IV und V je 2, auf Somit VI bis XXIV, welche die typischen sind, je 3, auf Somit XXV wieder 2, auf Somit XXVI und XXVII wieder je 1. Die fünf ersten und die zwei letzten Annuli sind nicht zum vollständigen Ring ausgebildet, da ihre ventrale Fläche im Bereich des vordern resp. hintern Saugnapfes einbegriffen wird.



Schematische Darstellung der Organisation von *Ancyrobdella biwae.*

Links sind die Somite, rechts die Ringe numeriert. *d4* Darmblindsack, 4. Paar. *m 1*, *m 6* Magenblindsack, 1. und 6. Paar. *r* Rüssel. *rw* Hinterer Teil des Rüssels. *s* Eintritt der Speicheldrüren in den Rüssel. *t 3* Testis, 3. Paar. Winzige, paarweise gezeichnete Kreise in den Somiten XVI–XXIII zeigen die Position der Nephridialkapseln.

Der Kopf setzt sich aus 7 Ringen (Somit I–V) zusammen. Er ist merklich breiter als die darauf folgende Halsregion und erscheint in der Flächenansicht dem der Gattung *Hemiclepsis* ganz ähnlich. Die Somite I–IV sind an der Ventralseite zum oralen Saugnapfe umgebildet, während das V. Somit mit seinen beiden Ringen (6. und 7.) die hintere Lippe desselben darstellt. Die Mundöffnung befindet sich in der Mitte der seicht ausgehölten Mundscheibe.

Die Augen fehlen vollständig. Weder am ganzen Tiere noch auf Schnittpräparaten konnte jede Spur von einem darauf hindeutenden Gebilde wahrgenommen werden.

Bei drei Exemplaren streckt sich ein Teil des Rüssels aus der Mundöffnung hervor, so dass die unserm Genus charakteristischen Wiederhaken ohne Weiteres beobachtet werden können. Diese — in Dreizahl vorhanden — sind kleine Auswüchse von regelmässig konischer Gestalt, die schräg nach hinten gerichtet dem vordern Ende des Rüssels in radiärer Anordnung aufsitzen. Der eine liegt dorso-median, die andern ventro-lateral. Sie sind alle von gleicher Grösse; an der Aussenseite gemessen beträgt ihre Länge ca. 0.25 mm. Da der Rüssel, auf dem sie sitzen, nur 0.2 mm dick ist, fallen diese an sich ganz winzigen Gebilde unter dem Mikroskope durch ihre Grösse auf und verleihen dem Tiere ein recht sonderbares Aussehen. Die scharf zugespitzte Form und schräg nach hinten gerichtete Lage deuten auf ihre Funktion als Befestigungsorgan hin; wozu sie aber in Wirklichkeit dienen mögen, ist schwer zu sagen, zumal unser Wurm, aus dem Darminhalt zu schliessen, kein parasitisches Leben zu führen scheint.

Die Geschlechtsöffnungen befinden sich um ein Somit weiter nach hinten als bei der Mehrzahl der Gossiphoniden. Die männliche Öffnung liegt im hintern Teil des 28. Ringe, d.i. dicht vor der Furche zwischen dem XII. und XIII. Somit; die weibliche um einen Ring weiter nach hinten, d.i. dicht vor der Fuche zwischen dem 1. und 2. Ringe des XIII. Somits. Beide sind ganz unscheinbar, da sie äusserlich von keinen ins Auge fallenden Merkmalen, wie z.B. besonderer Erhöhung, gefärbtem Hofe etc. begleitet sind. Ein Clitellum war bei keinem mir vorliegenden Exemplare ausgebildet.

Die Nephridialporen, die wahrscheinlich in der Furche zwischen dem 1. und 2. Ringe der Somiten XVI-XXIII liegen, lassen sich bei äusserlicher Betrachtung nicht wahrnehmen.

Der hintere Saugnapf ist ganz klein, flach, kreisförmig. Sein Durchmesser erreicht nicht einmal ein Drittel der Breite des schlanken Körpers. Er richtet sich schräg nach unten und hinten, und ist an der Unterseite der zwei letzten Rumpfsomiten, hauptsächlich aber des letzten, direkt angeheftet. Der Anus liegt an der Dorsalseite des Saugnapfes unmittelbar hinter dem letzten Ringe.

Innere Organisation. Der Darmkanal fällt vor allem durch die ausserordentliche Länge des Rüssels auf, der bei einem darauf untersuchten Individuum eine Länge von ca. 7.5 mm, also annähernd die halbe Körperlänge erreicht. Unter den Glossiphoniden, bei denen die Proboscislänge sonst gewöhnlich nur bis ein Sechstel der Körperlänge beträgt, bildet unsre Form zweifellos eine ganz seltene Ausnahme. Bei den Ichthyobdelliden ist der Rüssel bekanntlich noch viel kürzer. Er ist nicht zugespitzt, wie es vielfach für die Gossiphoniden angegeben wird, sondern weist die ganze Länge hindurch fast dieselbe Dicke auf; auch sein Vorderende erscheint wie abgestutzt. Was den inneren Bau betrifft, stimmt er der Hauptsache nach mit dem der andern Glossiphoniden überein, abgesehen natürlich von den Widerhaken, die diesen abgehen. Die Art und Weise, wie die im Vorderkörper zerstreut liegenden einzelligen Speicheldrüsen ihre langen Ausführgänge in den Rüssel einsenden, bietet auch keine Besonderheiten. Am hintersten Teil des Rüssels bilden diese jederseits einen dicken Bündel und drücken den Innenraum zu einer schmalen Längsspalte zusammen.

Der Magen liegt grössenteils in den Somiten XVI–XX und ist jederseits mit sechs einfachen Blindsäcken ausgestattet, von denen der letzte bedeutend grösser als andre ist und sich weit nach hinten bis in das XXII. Somit erstreckt. Der Darm, der zwischen diesen beginnt, besitzt jederseits vier kurze Blindsäcke, von denen zwei vordere schräg nach vorn, zwei hintere schräg nach hinten gerichtet sind. Wahrscheinlich entsprechen die sechs Paare Magenblindsäcke den Somiten XXI–XX, die vier Paare

Darmblindsäcke den Somiten XXI–XXIV. Wie bei allen Rhynchobdelliden der Fall, ist der ganze Darm samt den Blindsäcken in einer sackartig erweiterten Partie des dorsalen Blutgefässes eingeschlossen. Der Enddarm macht einige schwache Krümmungen und mündet an der dorsalen Seite des hinteren Saugnapfes durch die kleine schlitzförmige Analöffnung nach aussen.

Bei einem Exemplar, welches ich in Schnitte zerlegte, enthielt der Magen nur Detritus pflanzlicher Herkunft, Diatomeenschalen, Fragmente von Pflanzengewebe, etc., aber keine Spur von geronnenem Blut oder sonstigen Substanzen, die auf eine tierische Kost hindeuten dürften. Dies frappierte mich um so mehr, als die Rhynchobdelliden mit ihrem dünnen röhrenförmigen Rüssel offenbar weit weniger geeignet sind, geformte Nahrungsstoffe zu sich zu nehmen, als die Kieferegel, deren Mehrzahl allerlei keines Getier verzehren. Wenn der oben genannte Darminhalt der normale wäre, so müssten wir unser Tier als Schlammfresser bezeichnen, in der Familie der Glossiphoniden gewiss ein ganz isoliert dastehender Fall. Allerdings ist nicht ausgeschlossen, dass der Wurm beim Gefangenwerden den Darminhalt ausgeworfen und etwas Bodensatz verschluckt hat; wahrscheinlich ist es jedenfalls nicht.

Die Geschlechtsorgane sind im ganzen nach dem Glossiphonidentypus gebaut, zeigen jedoch einige Abweichungen in Einzelheiten. So besteht der männliche Apparat aus nur 5 Paar Testes, die jederseits mit einem Vas deferens kommunizieren. Sie liegen in den Somiten XVI–XX, die des erstens Paares sind ein wenig kleiner, die des letzten dagegen merklich grösser als die dazwischen befindlichen. Jedes Paar liegt unterhalb und etwas nach hinten von den Magenblindsäcken des betreffenden Somites. Der Samenleiter verläuft zunächst gerade nach vorn, bildet einen förmlichen Knäuel in den Somiten XV-XVII und mündet, zusammen mit dem der andern Seite in die männliche Öffnung im XII. Somit aus. Das weibliche Organ ähnelt dem der andern Glossiphoniden in fast jeder Beziehung. Die Ovarien sind länglich ovoide Säcke, die hinten bis in das XXI. Somit reichen. Der kurze Ovidukt, der nichts anders als eine direkte Fortsetzung des Ovarialsackes ist, verläuft gerade nach vorn und mündet in Gemeinschaft mit dem der andern Seite in die weibliche Öffnung aus. Besondere Kopulationsorgane kommen nicht zur Ausbildung.

Auch das Blutgefässsystem zeigt ganz dieselben Verhältnisse wie bei andern Gossiphoniden. Am Dorsalgefäss beobachtet man fünfzehn aufeinander folgende Kammer, deren letzte unmittelbar in die sackartige, den ganzen Darm einschliessende Erweiterung übergeht. Jede Kammer besitzt verdickte Wandungen und ist am hintern Ende mit einem Klappenorgan versehen. Die Zahl sowie der Verlauf der Seitenzweige, welche das Rücken- und Bauchgefäss an beiden Körperenden mit einander verbinden, sind genau dieselben, wie wir sie bei andern Gossiphoniden vorfinden. Auf Schnitten fallen die Hauptstämme durch ihre grosse Dicke auf, die vielfach einem Fünftel der Körperbreite gleich kommt.

In der Beschaffenheit der Leibeshöhle, die uns in Form eines komplizierten Lakunensystems entgegentritt, stimmt die neue Form mit dem Genus *Glossiphonia* nicht nur im Prinzip sondern auch in Einzelheiten überein. Man unterschiedet hier wie beim letzteren eine dorsale, ein ventrale und zwei Seitenlakunen, die durch zahlreiche Verbindungskanäle somitenweise in Verbindung stehen. Die Seitenlakunen sind überall wohl entwickelt, entbehren aber jeder muskulösen Wandung. Gefässartige, mit deutlicher Wandung versehene Seitenstämme, wie sie die Ichthyobdelliden besitzen, kommen nicht vor; ebensowenig die pulsierenden Seitenbläschen resp. segmentale Erweiterungen der Seitenlakunen. Aus ihrer Grösse und Lageverhältnissen zu schliessen, scheinen die Seitenlakunen bei der Atmung unsres Tieres eine Hauptrolle zu spielen.

Der Nephridien sind nur acht Paare vorhanden, die den Somiten XVI-XXIII angehören. Jedes Organ bildet selbständiges Gebilde, wie es bei den Glossiphoniden die Regel ist; ein Zusammenfliessen benachbarter Organe etwa zu einem Plectonephridium, wie es vielfach bei den Ichthyobdelliden stattfindet, habe ich nirgends beobachten können. Soviel ich aus Schnittpräparaten ermitteln konnte, zeigt der Kanal denselben Verlauf wie bei *Glossiphonia*. Er mündet ebenfalls in eine Hauteinstülpung, ohne vorher eine Harnblase zu bilden. Entsprechend den Nephridien kommen auch acht Paare Kapseln mit Flimmerorgane vor, die unmittelbar dem proximalen Ende eines jeden Nephridiums aufsitzen. Sie liegen in der Regel zu beiden Seiten des Nervenganglions, jedoch sind die vordern etwas mehr nach vorn, die hintern etwas mehr nach hinten verschoben. Die Lage der Kapsel, die sich an die letzte Nephridialzelle dicht anschliesst, legt die Vermutung nahe, dass diese Gebilde, trotz der gegenteiligen Behauptung mancher Autoren, doch etwas Gemeinsames in ihrer Funktion haben mögen.

Das Nervensystem weicht von dem der andern Rhynchobdellen nur insofern ab, dass an der Bauchkette die vorderste und letzte Ganglienmasse je ein Ganglion mehr enthalten. Man zählt bei unserm Tier zwischen diesen anstatt 21 nur 19 getrennte Ganglien, so dass man schon im voraus annehmen darf, dass die zwei anscheinend fehlenden Ganglien in den Endganglienmassen verborgen sind. Eine sorgfältige Analyse ergab nun, dass die vordere aus 7, die hintere aus 8 Ganglien zusammengesetzt ist. In betreff der Zusammendrängung der Ganglien an beiden Körperenden steht also unser Wurm, trotz seiner äusserst schlanken Gestalt, auf einer höheren Stufe als die übrigen Gattungen. In der Halsregion, wo der Körper eine nur geringe Dicke besitzt, erscheint die Ganglienmasse ungemein gross, indem sie beinahe den ganzen Raum innerhalb des Hautmuskelschlauches ausfüllt.

Über das Bindegewebe und Muskelsystem verspare ich Angaben, da sich diese von den entsprechenden Strukturen der andern Formen nicht wesentlich verschieden zeigen.

Fundort. Biwa-See, Station 8 Annandale; Tiefe ca. 260 jap. Fuss. 1.-3. Okt. 1915. 4 Exemplare.

Systematische Stellung. Wie oben angegeben, stimmt die neue Gattung in allen wesentlichen Punkten des inneren Baues mit den Glossiphoniden überein. Die grosse Ähnlichkeit zu den Ichthyobdelliden, die zunächst ins Auge fällt, stellt sich bei genauerer Untersuchung als eine scheinbare heraus, indem sie auf äusseren Habitus beschränkt ist. Unter den inneren Organen ist es vor allem das Lakunensystem, das unser Tier als eine echte

Glossiphonide kennzeichnet ; dasselbe ermangelt nämlich der beiden gefäss-artigen, mit muskulöser Wandung ausgestatteten Seitenstämme, die den sämtlichen Ichthyobdelliden eigen sind. Auch der einfache Bau der Geschlechtsorgane steht im Gegensatz zu denen der letzteren, die meist eine viel kompliziertere Struktur aufweisen. Die Gestalt des Darmkanals ist gleichfalls dem der Glossiphoniden durchaus ähnlich. Kurz, *Ancyrobdella biwae* ist dem Körperbaue nach unbedingt als eine Glossiphonide aufzufassen, die sich um den Lebensbedingungen am Boden des Süsswassersees anzupassen eigentümlich modiziert hat. Ob die Ähnlichkeit zu den Ichthyobdelliden auf ein Stehenbleiben auf dem primitiven Zustande zurückzuführen ist, oder einen neu erworbenen Charakter darstellt, lässt sich aber nicht ohne Weiteres entscheiden.

Als Gegenstück zu unsrer japanischen Form möchte ich die amerikanische Gattung *Actinobdella*[2] mit den Arten *inequiannulata* und *annectens* erwähnen, die bei äusserlicher Betrachtung ebenfalls den Ichthyobdelliden sehr ähnlich sieht. J. Percy Moore, der diese Gattung aufgestellt hat, hielt sie zunächst für eine Ichthyobdellide und veröffentlichte sie als solche, erkannte aber bald nachher, dass er eine aberrante Glossiphonide vor sich hatte. Diese Gattung besitzt, im Gegensatz zu unserm Genus zwei grosse Augen und aus sechs ungleichen Ringen bestehende Somite. Der Bau des Darmkanals sowie die Grösse des hintern Saugnapfes sind auch verschieden. Über die Lebensweise dieser merkwürdigen Hirudineen ist nichts bekannt, obwohl es höchst wahrscheinlich ist, dass sie Blut saugen. Ein Exemplar von *Actinobdella inequiannulata* wurde aus dem Boden von Lake Pepin, Minnesota, gepumpt.

14. Februar 1917.

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2) The Leeches of Minnesota. 1912.

Three New Species of Termites from Caroline Islands.

By

Masamitsu Oshima, *Rigakushi.*

Institute of Science, Government of Formosa.

With 3 figures in text.

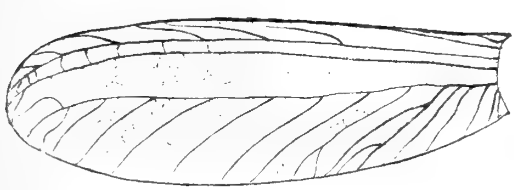
In the present paper is given a record of three new species of termites from Caroline Islands, which were collected by Mr. R. Kanehira, expert of the Forestry Station of the Government of Formosa, in the year 1915. Here I beg to express my sincere thanks to him for kindly offering me the interesting specimens for examination.

Calotermes* (*Neotermes*) *Kanehirae nov. sp.

Imago. — Head and pronotum reddish brown; abdomen somewhat paler; antennæ yellow; legs brownish yellow. Head and pronotum very sparsely provided with spiny hairs; wing-stumps pilose; abdominal tergites coarsely pilose due to spiny hairs mingled with minute ones.

Head quadrate, sides converging anteriorly, anterior border straight, posterior border rounded; basal portion of clypeus very short, nearly one-fifth as long as broad, yellow in apical parts; labrum tongue-shaped, longer than broad; eyes large; ocellus approximated to eye, yellow and oval; antennæ 19-jointed, 2nd. joint longer than 3rd., 4th. joint shorter than 3rd.;

a



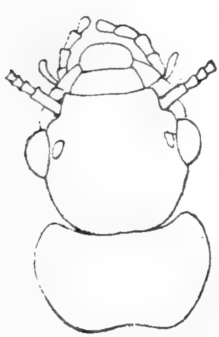


Fig. 1.

Calotermes Kanehirae.

Imago.

a, anterior wing,

b, head and pronotum.

fontanelle indistinct; pronotum much broader than head, quadrate, strongly vaulted above, anterior border straight, posterior border slightly curved at middle, postero-lateral corners rounded; posterior border of mesonotum and metanotum nearly straight, the former narrower than the latter; anterior wing-stumps very large, entirely covering the posterior; wing pale brown, darker anteriorly; veins (except cubitus) reddish brown, subcostal nerve very short, radius united with costal at the basal two-fifths of the wing, radius-sector with six branches, median nerve running near and parallel to the former, apical half of the two nerves connected with each other; cubitus running through middle of wing, with ca. 14 branches, of which the proximal ones are stronger (anterior wing); in the posterior wing median nerve starting from the proximal one-fourth of radius-sector.

Length of body with wing	17,50 mm.
Length of body without wing	10,50 mm.
Length of head	1,71 mm.
Width of head	1,78 mm.
Width of pronotum	2,28 mm.
Length of pronotum	1,31 mm.
Length of anterior wing	13,00 mm.

Habitat. — Palao Island; collected on March 26, 1915.

Remarks. — The nearest relative of this species appears to be *Calotermes (N.) militaris* from Ceylon. However, it differs from that species in having much narrower head and pronotum.

Arrhinotermes ponapiensis nov. sp.

Imago. — Head pale reddish brown; thorax and abdomen somewhat paler; antennæ and legs dark yellow. Head very sparsely provided with spiny hairs; outer border of pronotum with a series of hairs; posterior border of abdominal tergites with a series of minute hairs mingled with long spiny hairs.

Head round, flattened; fontanelle distinct, directed upwards; from the

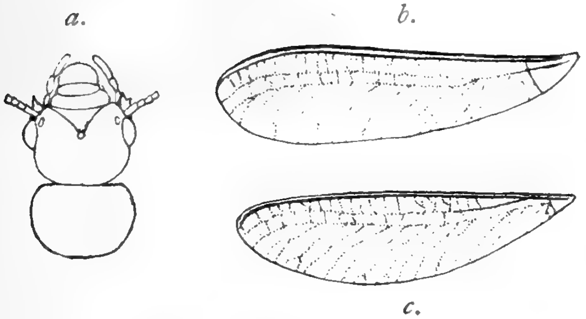


Fig. 2. *Arrhinotermes ponapensis.*
Imago. *a*, head and pronotum. *b*, anterior wing. *c* posterior wing.

fontanelle runs a shallow trumpet-like depression, widening anteriorly and reaching to posterior border of clypeus; basal portion of clypeus swollen, slightly shorter than half the width; eyes prominent; ocellus approximated to eye; antennæ 19-jointed, 2nd. joint nearly as long as 3rd., 4th. joint shorter than 3rd.; pronotum kidney-shaped, anterior border weakly bilobed, posterior border broadly rounded, antero-lateral corners depressed; mesonotum and metanotum narrower than pronotum, their posterior border nearly straight; wings hyaline, with yellowish costal margin, costal and radius nerves reddish brown, other nerves transparent; radius nerve of anterior wing not branched, running near and parallel to the costal; proximal parts of median and cubitus nerves united, the former without branch but connected with radius and cubitus by numerous irregular veins; cubitus with 15 branches, reaching to tip of wing; median nerve of posterior wing starting from proximal part of radius, connected with radius and cubitus by numerous short veins; cubitus with ca. 14 branches, running near and parallel to median nerve; anterior wing-stumps covering the posterior.

Length of body with wing	11,00 mm.
Length of body without wing	5,50 mm.
Length of head	1,15 mm.
Width of head	1,25 mm.
Width of pronotum	1,13 mm.
Length of pronotum	1,31 mm.
Length of anterior wing	9,00 mm.

Habitat. — Ponapi Island, collected on Jan. 27, 1915.

Eutermes* (*Grallatotermes*) *brevirostris nov. sp.

Imago. — Head chestnut brown, shiny ; thorax somewhat paler ; abdomen dark brown ; mouthparts, antennæ and legs brownish yellow. Head, pronotum, wing-stumps and abdominal tergites densely covered with minute hairs ; mesonotum and metanotum nearly smooth.

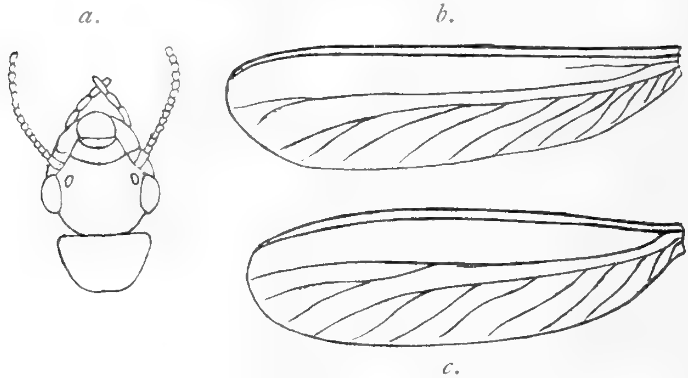


Fig. 3. *Eutermes brevirostris*.
Imago. *a*, head and pronotum. *b*, anterior wing. *c*, posterior wing.

Head round, slightly vaulted above; eyes very large prominent; ocellus separated from eye by a distance less than half the diameter of the latter ; fontanelle indistinct ; basal parts of clypeus short, nearly one-fourth as long as wide ; antennæ 15-jointed, 2nd. joint very slightly longer than 3rd., 4th. joint as long as 3rd.; pronotum semilunar with rounded antero-lateral corners, anterior border straight, slightly elevated, posterior border broadly rounded ; wing-stumps subequal, anterior one not covering the posterior ; wings brownish, nerves yellowish brown ; radius nerve of anterior wing running near and parallel to costal ; median nerve running nearer to cubitus than to radius, giving off three branches at the tip ; cubitus not reaching to tip of wing, with 8 branches, of which the proximal four are stronger ; in the posterior wing median nerve starting from radius, cubitus with ca. 12 branches.

Length of body with wing..................	15,00 mm.
Length of body without wing	7–8,00 mm.
Length of head	1,25 mm.
Width of head	1,18 mm.
Width of pronotum..........................	1,28 mm.
Length of pronotum	0,78 mm.

Soldier (the larger form). — Head blackish brown, tip of rostrum reddish brown; abdominal tergites darker; antennæ and legs pale yellowish brown. Head very sparsely pilose; abdominal tergites provided with microscopical hairs, posterior three segments with spiny hairs along the posterior border.

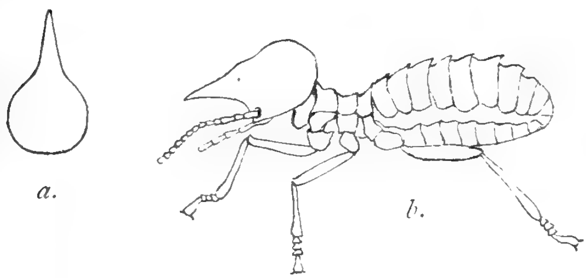


Fig. 4. *Eutarmes brevirostris*. Soldier. *a*, shape of head. *b*, lateral view.

Head round, with short conical rostrum, its anterior surface making a weak curve with upper surface of head; antennæ 13-jointed, 3rd. joint about twice as long as 4th. and longer than 2nd.; pronotum saddle-shaped, short, anterior border rounded; legs slender, elongate.

Length of body	4,00 mm.
Length of head with rostrum	1,63–1,69 mm.
Length of head without rostrum	1,03–1,09 mm.
Width of head	1,09 mm.
Width of pronotum	0,56–0,62 mm.

Soldier (the smaller form).—Colour and hairiness as in the larger form. Antennæ 13-jointed, 2nd. joint as long as 4th., 3rd. joint much longer than 2nd.

Length of body	3,00 mm.
Length of head with rostrum	1,59–1,63 mm.
Length of head without rostrum	1,03 mm.
Width of head	1,03–1,09 mm.
Width of pronotum	0,50–0,56 mm.

Worker (the larger form).—Head dark brown, paler anteriorly; antennæ, legs and abdomen yellowish brown. Head and abdominal tergites densely provided with microscopical hairs; on the posterior two or three abdominal tergites long spiny hairs present in addition.

Head round, sutures distinct, whitish ; transversal band rather long ; basal parts of clypeus nearly half as long as broad, slightly swollen ; antennæ 14-jointed, 3rd. joint slightly longer than 2nd. and about twice as long as 4th.; pronotum saddle-shaped, anterior border indented at middle.

Length of body	5,10 mm.
Width of head	1,25 mm.
Width of pronotum	0,69 mm.

Worker (the smaller form). — Head yellowish brown, rather pale ; antennæ, legs and abdomen yellowish white. Hairiness as in the larger form.

Head round ; basal parts of clypeus shorter than half the width ; antennæ 14-jointed, 2nd. joint longer than 3rd., 4th. joint ring-shaped and half as long as 3rd.; pronotum saddle-shaped, anterior border strongly elevated, slightly intended at middle.

Length of body	3,80 mm.
Width of head	0,87 mm.
Width of pronotum	0,47 mm.

Habitat. — Ponapi Island ; collected on Jan. 26, 1915. Palao Island ; collected on March 12, 1915.

Remarks. — This new species is very closely allied to *Eutermes (G.) luzonicus* Oshima from Luzon, but the rostrum in the soldier is shorter than in that species.

Bird-infesting Mallophaga of Japan (III).*
(Genus *Lipeurus*)

By

Seinosuke Uchida, *Jūigakushi.*

With 3 figures in text.

Genus **Lipeurus** Nitzsch.

Nitzsch, Germ. Mag. f. Insekt., III, 1818, p. 292; Denny, Monogr. Anopl. Brit., 1842, p. 164; Giebel, Insekta Epizoa, 1874, p. 206; Piaget, Les Pediculines, 1880, p. 284; Taschenberg, Die Mallophagen, 1882, p. 102; Kellogg, Mallophaga, Genera Insectorum, 1908, Fasc. 66, p. 36; Mjöberg, Arkiv för Zoologi, 1910, Bd. 6, p. 83 (Part.).

1. ***Lipeurus densus*** Kellogg.

Kellogg, New Mallophaga, I, 1896, p. 114, pl. VII, figs. 1 & 2, (female juv.); Kellogg, New Mallophaga III, 1899, p. 28, pl. III, fig. 2, (male).

One male, three females and eight youngs of the species were collected from two skins of Audubon's albatross, *Diomedea nigripes*, collected in the Bonin Is., 1892, and in Prov. Sagami, March 27, 1884. Further, a young specimen was obtained from a skin of Steller's albatross, *Diomedea albatrus*, taken in Prov. Awa, Feb. 19, 1888.

The females on hand do not quite agree with Kellogg's description and figure, probably owing to the fact that the specimen described by him was in the immature state.

Adult female:—Very similar to the male except in having much more slender but shorter antennæ which are gradually tapering distally; the first segment rather short and about equal to the third, the second longest and

* The two previous papers, treating of the genera *Physostomum*, *Goniodes* and *Goniocotes*, appeared in this volume of the "Annotationes", pp. 67–72, 81–88.

as long as the last three segments taken together, the fifth shortest and equal to two-thirds the fourth in length. Hairs in the uncoloured elliptical space near the posterior angles of metathorax number five, as in the male.

Young individuals 4–4.5 mm. long and of the same stage of development as the female described by Kellogg, show three hairs at each of the posterior angles of metathorax, while still younger individuals of 2–2.7 mm. length have only a single hair at each of the same positions. In a specimen which was collected in the moulting condition, there are to be seen at that position three hairs in the exuvia, but five hairs in the emerging insect. Probably the number of the hairs increase at each moulting, there appearing five of them at the last ecdysis.

Measurements of adult females as follows :

	mm.	mm.
Length of body...	5.78	6.17
Width of body	1.32	1.50
Length of head	1.25	1.28
Width of head	1.12	1.04
Length of thorax	1.58	1.60
Width of thorax	1.25	1.29
Antenna	0.68	0.70

2. ***Lipeurus confidens*** Kellogg.

Kellogg, New Mallophaga, III, 1899, p. 26, pl. III, fig. 1 (female only).

Four males and ten females of this species were taken from three skins of the Audubon's albatross, *Diomedea nigripes*, from the Sagami Bay (March 27, 1884), Bonin Is (1892) and Tiausu Id., Loo-choo (May, 1900). Further, one male, three females and two young specimens were obtained from a skin of the Steller's albatross, *Diomedea albatrus* from Prov. Awa (Feb. 19, 1888.)

Description of the male:—Smaller than female ; body 3.3 mm. long, 0.78 mm. wide. Head somewhat slender, 0.77 mm. long, 0.61 mm. wide ; temporal margins just behind eyes more rounded than in female, trabeculæ wanting ; first segment of antennæ very large, without appendage, but with

Fig. 1.
Lipeurus confidens Kellogg, male. × 30

a very slight elevation nearer to base than to distal end of the segment; second segment small, about one-third as long as the first; third segment smaller than the second, with a claw-like extremity; fourth and fifth segments cylindrical, the fifth longer than the fourth; tip of third segment light brown, rest of antennæ colourless.

Prothorax with sides more expanded than in the female. Abdomen relatively small, 1.65 mm. long (in the female 2.35 mm.); postero-lateral angles of each segment much protruded; genitalia indistinct, long and slender, reaching from fifth segment to the middle of eighth segment; markings of abdomen very different from those of female; ground colour whitish, with very narrow and clear lateral bands which send out expanding process inwards at the posterior end; lateral blackish blotches round in segment I, elongate in segments II–VI, again round but smaller in segments VII and VIII; the last segment conical, almost colourless, asymmetrical, the summit slightly turned to the right side and with three prickles on both sides.

3. ***Lipeurus macilhennyi*** Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Acad. Nat. Sci., 1900, p. 155, pl. VII, fig. 3.

Five females and a young were collected from specimens of Audubon's albatross, *Diomedea nigripes* (Tiausu Id., Loo-choo, May 1900; Bonin Is., 1892; Prov. Awa, March 19, 1894.). One more female from a specimen of Steller's albatross, *Diomedea albatrus* (Prov. Awa, March 19, 1884).

4. ***Lipeurus concinnus*** Kellogg and Chapman.

Kellogg and Chapman, New Mallophaga, III, 1899, p. 97, pl. VII, fig. 2.

Two males and two females collected from *Diomedea albatrus* taken in Formosa, March, 1897 ; and a male and a female from *Diomedea nigripes* obtained in Tiausu Id., Loo-choo, May, 1900.

5. ***Lipeurus ferox*** Giebel.

Giebel, Insecta Epizoa, 1874, p. 235 ; Piaget Les Pediculines, 1880, p. 333 ; Kellogg, New Mallophaga, I, 1896, p. 127, pl. IX, figs. 1 & 2. *Lipeurus diomedæ,* Dufour, Ann. Soc. Ent. France, 1834, IV, p. 669, figs. 1 & 2 ; Giglioli, Quart. Journ. Micr. Sci., 1864, IV, N.S., p. 19, pl. I, figs. 1 & 2.

Two males and three females of this species were obtained from the skins of *Diomedea nigripes* (Bonin Is., 1892 ; Formosa, Feb. 1897 ; and Tiausu Id., Loo-choo, May 1900).

6. ***Lipeurus annuliventris*** sp. nov.

This new species is founded on a single male specimen which was obtained from a skin of the grey fork-tailed petrel, *Oceanodroma furcata* (Misaki, Prov. Sagami, March 1907).

It is allied to **Lipeurus clypeatus* Giebel from *Pachyptila coerulea*, but is distinguished from it by the smaller size, narrower head, being especially narrow at the temples, by the shape and chætotaxy of the thorax and by the shape of the last abdominal segment.

Description of the male:—Body 2.17 mm. long, 0.36 mm. wide ; ground colour of head and thorax clear brownish, with reddish brown markings ; abdomen brownish with lateral dark brown bands.

Head 0.55 mm. long, 0.30 mm. wide ; elongate conical ; front narrowly parabolic, with three marginal hairs near suture and three prickles behind it ; clypeal region colourless, expanded in front of the suture , trabeculæ

* Giebel, Insecta Epizoa, 1874, p. 236; Taschenberg, Die Mallophagen, 1882, p. 154, Taf. V, Fig. 2, 2a, 2b.

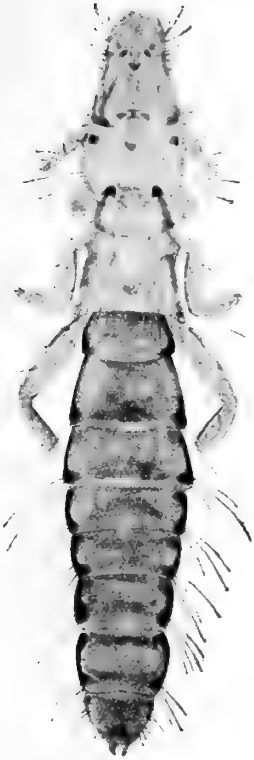


Fig. 2.
Lipeurus annuliventris n. sp., male. ×45.

very small, a short hair in front of each; antennæ with the first segment longest, the second about three-fourths as long; the third short, with a dorsal angular projection at distal end, the fourth shortest; and the fifth slightly longer than the fourth. Eyes clear, with a short prickle at the posterior margin of each; temporal margin rounded, with two long hairs and two prickles; occipital margin sinuous. Signature shield-shaped, anteriorly pale-coloured, posteriorly sharp-angled, with a median clear suture and one dark-coloured blotch at posterior margin on each side. Antennal bands reddish brown, bending inwards in front of the base of antennæ; round ocular blotches reddish brown; occipital blotches blackish brown.

Prothorax 0.13 mm. long, 0.24 mm. wide, hexagonal; anterior lateral angles obtuse; each posterior lateral angle with a protuberance and a hair; posterior angles each with a stout hair; posterior margin truncate in the middle part. Colour clear brownish, with reddish brown lateral borders which posteriorly extend on each side along the postero-lateral angles and a short way inwards and in the anterior third of their length send out a branch.

Metathorax 0.23 mm. long, 0.31 mm. wide, quadrilateral; sides nearly straight, diverging posteriorly, each with a long stout hair near the posterior angle; anterior lateral angles slightly extended, each forming a pointed protuberance; posterior lateral angles posteriorly prolonged, rather acute at end; posterior margin nearly straight with five hairs along each lateral third of its length, middle parts of lateral margin edged with reddish brown. Legs paler than body, dorsally dark edged.

Abdomen slender, elongate; the first segment much narrower than thorax at the articulation ; I–III segments widening posteriorly, the remaining segments gradually growing narrower to the last segment; lateral margins nearly straight in segments I–III, convex in segments IV–VIII ; segments IV–V shorter than any other ; posterior angle of segments I–VII with one to four hairs ; segment VIII with several short hairs on lateral margin and four short hairs on posterior margin ; segment IX small, conical and deeply emarginate behind.

Ground colour of abdomen darker than either head or thorax ; lateral band of segments dark brown, with rounded posterior end ; transverse bands complete, smoky brown, narrower on segments IV–VI ; stigmatal spots paler than the band.

7. ***Lipeurus exiguus*** Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Wash. Acad. Sci., IV, 1902, p. 479, pl. XXX, fig. 2, (female).

Six males, three females and several youngs were taken from the skins of Siebold's shearwater, *Puffinus leucomelas* (Tiausu Id., Loo-choo, May 9, 1900 ; River Sai, Prov. Shinano, Nov. 13, 1915); and further two males from a skin of the Japanese petrel, *Oestrelata longirostris* (from Prov. Mutsu). The male of this species was hitherto unknown.

Measurements :

	♂	♂	♂	♂	♂	♂	♂	♀	♀	♀
Length of body ...	mm. 2.48	mm. 2.54	mm. 2.54	mm. 2.54	mm. 2.45	mm. 2.45	mm. 2.65	mm. 2.75	mm. 2.79	mm. 2.70
Width of body ...	.31	.32	.32	.32	.31	.29	.32	.33	.35	.34
Length of head ...	.56	.59	.59	.59	.57	.57	.59	.63	.64	.61
Width of head... ...	.29	.31	.32	.32	.31	.31	.31	.33	.34	.33
Length of thorax ...	.47	.48	.47	.47	.45	.44	.49	.50	.50	.49
Width of thorax ...	.26	.28	.29	.30	.29	.28	.30	.31	.32	.31

Description of the male:—Very similar to female, differing only in the smaller but slightly thicker antennæ which have the I segment longest, the

II–IV segments successively shorter than the one preceding, the V segment longer than the IV and about equal to the III. (In the female, the antennæ have the II segment longest, the I nearly but not quite as long as the II, the III and the IV subequal and shortest of all, and the V slightly longer than the IV).

8. ***Lipeurus longicornis*** Piaget.

Piaget, Les Pediculines, 1880, p. 334, pl. XXVII, fig. 3.

Eight males, nine females and three youngs were collected from the Temminck's cormorant, *Phalacrocorax capillatus*, shot in Prov. Shinano.

9. ***Lipeurus hebraeus*** Nitzsch.

Giebel, Insecta Epizoa, 1874, p. 226, Taf. XVI, figs. 5, 6; Piaget Les Pediculines, 1880, p. 326, pl. XXVII, fig. 2; Taschenberg, Die Mallophagen, 1882, p. 130, Taf. IV, Fig. 4, 4a.

This species has previously been known only from several species of cranes (*Grus*). It is a remarkable fact that I obtained a female specimen from the mallard, *Anas boschas*, captured in Prov. Shinano. The measurements of my specimen agree well with those given by Taschenberg, but are considerably larger than those given by Piaget. It may be that the latter auther had before him an immature specimen.

Measurements :

	Piaget	Taschenberg	Uchida
	♀, mm.	♀, mm.	♀, mm.
Length of body	3.50	5.24	5.25
Width of body...	0.90	1.37	1.46
Length of head	0.84	1.08	1.08
Width of head	0.70	1.04	0.97
Length of thorox	0.70	1.06	0.94
Width of thorax	0.65	1.08	1.10
Antenna	0.35	——	0.48

10. ***Lipeurus squalidus*** Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 176, pl. XIV, fig. 5 ; Giebel, Insecta Epizoa, 1874, p. 241, Taf. XVI, fig. 1 ; Piaget, Les Pediculines, 1880, p. 344, pl. XXX, fig. 5 ; Kellogg, New Mallophaga, I, 1896, p. 132, pl. X, figs. 6, 7 ; Kellogg, New Mallophaga, III, 1899, p. 102.

Three male and two female specimens of this species were collected by Mr. N. Kuroda from a widgeon (*Mareca penelope*), from a falcated teal (*Eunetta falcata*) and from a Mallard (*Anas boschas*), all which birds were captured at Haneda in the suburb of Tokyo. Further were obtained a young male from a skin of Hooper swan (*Cygnus musicus*, collected in Seoul, Korea, March 1895) and a single female from a Japanese green pheasant (*Phasianus versicolor*, from Prov. Iwashiro). Probably the latter case was one of a straggler, transmitted from the game-bag in which the host bird was carried.

This common and very widely distributed species is exceedingly variable. With regard to the dimensions of body and the number of long hairs in the posterior angles of metathorax, the specimens before me closely resemble the form which was obtained by Professor Kellogg from *Charitonetta albeola*, *Anas boschas*, and *Erismatura rubida*. Their measurements are as follows :—

	♀	♀	♂
	mm.	mm.	mm.
Length of body	3.48	3.43	2.86
Width of body	0.66	0.66	0.48
Length of head	0.65	0.65	0.65
Width of head	0.45	0.44	0.43

11. ***Lipeurus temporalis*** Nitzsch.

Nitzsch, Germar's Mag. Ent., III, 1818, p. 292 ; Denny, Monogr. Anopl. Brit., 1842, p. 175, pl. xiv, fig. 7 ; Giebel, Insecta Epizoa, 1874, p. 239 ;

Piaget, Les Pediculines, 1880, p. 350, pl. XXXI, fig. 1, Kellogg, New Mallophaga, I, 1896, p. 130, pl. X, fig. 1.

Ten specimens, all female, were collected by Mr. N. Kuroda from a red breasted merganser, *Mergus serrator*, taken at Haneda near Tokyo, 1915.

This species differs from the preceding only in being smaller and in having the ground colour of body deeper brown with somewhat indistinct blackish markings. As has been pointed out by Professor Kellogg,* the two forms from *Anas* and *Merganser* may be regarded to be the same specifically, but it seems they should be distinguished, on account of the above differences, as varieties or subspecies.

Measurements of the specimens on hand are as follows :—

	♀	♀	♀	♀	♀	♀	♀	♀	♀	♀
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Length of body ...	3.06	3.27	3.27	3.27	3.27	3.38	3.27	3.27	3.27	3.06
Width of body ...	.55	.58	.60	.62	.55	.52	.60	.62	.62	.55
Length of head ...	.58	.60	.61	.61	.61	.61	.61	.61	.61	.58
Width of head ...	.42	.46	.46	.46	.45	.45	.45	.45	.46	.44

12. ***Lipeurus intermedius*** Piaget.

Piaget, Les Pediculines, 1880, p. 368, pl. XXIX, fig. 7.

One male, five females and two youngs were collected from a *Phasianus versicolor*, shot in Prov. Iwashiro. Feb. 18, 1916. Six males and five females were taken from skins of *Phasianus scintillans* collected in Prov. Shinano and in Prov. Musashi, Jan. 10, 1903 ; and one male, two females and four youngs from a skin of *Gennaeus swinhoii* from Formosa.

* Kellogg, New Mallophaga III, p. 102.

Measurements.

	♀	♀	♀	♀	♀	♀	♀	♀	♀	♂	♂	♂	♂	♂	♂
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Length of body ...	2.86	3.00	2.91	2.72	2.91	2.72	2.93	2.64	2.68	2.47	2.40	2.47	2.44	2.48	2.28
Width of body ...	.65	.75	.67	.66	.62	.62	.63	.53	.53	.50	.51	.53	.51	.58	.53
Length of head ...	.58	.67	.61	.63	.62	.62	.63	.53	.53	.55	.53	.55	.54	.58	.53
Width of head ...	.40	.45	.44	.43	.46	.43	.47	.33	.31	.34	.33	.35	.34	.39	.31
Length of thorax...	.51	.53	.53	.47	.53	.47	.54	.46	.45	.48	.45	.49	.47	.53	.45
Width of thorax ...	.42	.51	.45	.46	.50	.44	.50	.37	.35	.39	.39	.41	.39	.45	.35
Antenna...	.31	.32	.33	.31	.31	.31	.33	.28	—	.41	.39	.43	.41	.41	—

The specimens differ from typical *L. intermedius* from *Euplocamus ignitus* in having larger head and wider body, and in the male being larger. For the sake of comparison I append below Piaget's measurements of the typical specimens :

	♀	♂
	mm.	mm.
Length of body	2.95	2.20
Width of body	0.56	0.40
Length of head	0.55	0.50
Width of head	0.35	0.29

13. ***Lipeurus heterographus*** Nitzsch.

Giebel, Insecta Epizoa, 1874, p. 218 ; Piaget, Les Pediculines, 1880, p. 360, pl. XXIX, fig. 2 ; Taschenberg, Die Mallophagen, 1882, p. 169; Osborn, Bull. 5 (n. s.), Div. Ent. U. S. Dep. Agr. Wash., 1896, p. 197.

Eight females and ten males from a domestic fowl at Komaba near Tokyo ; and five females from *Phasianus versicolor*, killed in Prov. Iwashiro, Feb. 8, 1916.

14. ***Lipeurus variabilis*** Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 164, pl. XV, fig. 6; Giebel, Insecta Epizoa, 1874, p. 219, Taf. XVI, fig. 3; Piaget, Les Pediculines, 1880, p. 364, pl. XXIX, fig. 4.

A male and a female from a *Phasianus versicolor*, killed in Prov. Iwashiro, April 1914; one female from a domestic fowl in Tokyo; and two females from a specimen of *Gennaeus swinhoii* obtained in Formosa.

The specimens possess at each of the posterior angles of metathorax a long hair, and adjoining this, a white space with four long hairs; on the abdomen they show two longitudinal submedian rows of weak hairs. In these points, the specimens seem to approach Kellogg's *Lipeurus introductus**; but in all other respects they agree quite closely with Piaget's description of *Lipeurus variabilis*.

15. ***Lipeurus formosanus*** Uchida.

Uchida, Journ. Coll. Agr., Tokyo Imp. Univ., Vol. III, No. 4, 1917, p. 179, fig. I.

Three female and four young individuals were taken from the skins of the following birds, all collected in Formosa: *Arboricola crudigularis*, *Bambusicola sonorivox* and *Gennaeus swinhoii*.

Measurements:

	♀	♀	♀
	mm.	mm.	mm.
Length of body	2.02	2.00	2.00
Width of body	0.42	0.42	0.40
Length of head	0.52	0.52	0.52
Width of head...	0.40	0.39	0.40
Length of thorax	0.37	0.37	0.37
Width of thorax	0.31	0.31	0.31
Antenna	0.26	0.26	0.26

* Kellogg, New Mollophaga II, p. 501, pl. LXVIII, figs. 1 & 5.

16. ***Lipeurus cinereus*** Nitzsch.

Giebel, Insecta Epizoa, 1874, p. 221; Piaget, Les Pediculines, 1880, p. 353, pl. XXVIII, fig. 5.

A male, three females and four youngs of this species were collected by Mr. N. Kuroda from a specimen of *Coturnix japonica*, shot at Numazu, Prov. Suruga, Feb. 26, 1916. Three more females were taken from a skin of the same bird killed in Prov. Shinano, Jan. 25, 1915.

All the specimens agree well with the descriptions given by Giebel and Piaget, except in the fact that they are somewhat larger. Measurements of the specimens (those in parenthesis are Piaget's):

	♀	♀
	mm.	mm.
Length of body	2.13 (1.8)	1.85 (1.5)
Width of body	0.61 (0.52)	0.40 (0.31)
Length of head	0.56 (0.44)	0.51 (0.42)
Width of head	0.42 (0.32)	0.34 (0.25)
Length of thorax	0.28 (0.33)	0.28 (0.28)
Width of thorax...	0.36 (0.31)	0.33 (0.25)
Antenna	0.18 (0.14)	0.25 (0.21)

According to Piaget, the species is very variable in size; a female measured by him reached 2.2 mm. in length.

17. ***Lipeurus comstocki*** Kellogg and Chapman.

Kellogg and Chapman, Journ. New York Ent. Soc. Vol. X, 1902, p. 23, pl. III, fig. 2.

A female specimen of the species was found on a Siberian ruddy crake (*Porzana fusca*) from Tokyo, and a female on eastern water rail (*Rallus aquaticus indicus*) killed in Prov. Tosa.

18. ***Lipeurus turturis*** sp. nov.

A single female specimen was taken from an eastern turtle-dove

(*Turtur orientalis*), shot at Morioka, Prov. Rikuchū, July 15, 1916. This new species belongs to the group *clypeati sutura indistincta*, and resembles Paine's *L. baculoides** from the mourning dove, *Zenaidura macroura*, but differs from it in size, chætotaxy, shape of temples, etc.

Description of the female: — Body 1.63 mm. long, 0.39 mm. wide; ground colour of body pale brownish, with brownish markings on head and thorax; lateral bands of abdomen reddish brown.

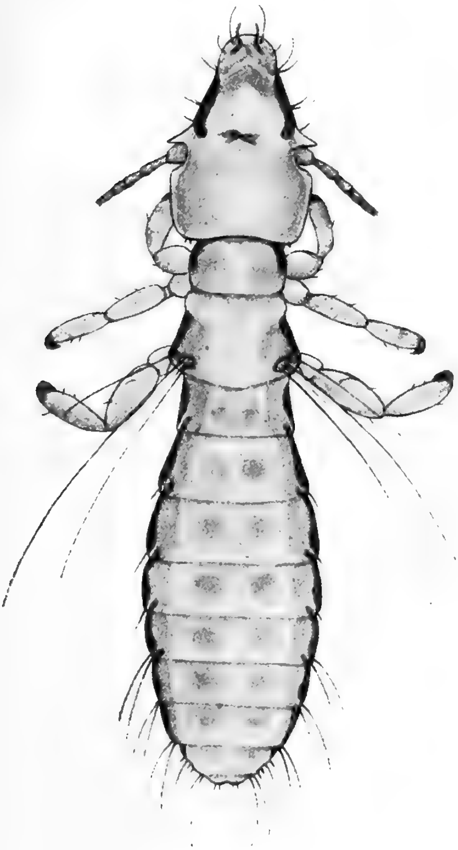


Fig. 3.
Lipeurus turturis n. sp. Female, ×60.

Head 0.43 mm. long; 0.27 mm. wide; widest through eyes; head in front of antennæ triangular, longer than the parts behind antennæ, which parts are of a quadrangular shape; clypeus rounded, expanded, with a pair of long and another pair of short clavate appendages on the frontal part; marginal hairs five on each side, two of them standing at the clypeal suture and the rest in front of trabeculæ; four dorsal hairs on clypeus; trabeculæ large, conical; antennæ long, the first segment thick and as long as the third segment, the second longest, the last coming next in length, and the fourth shortest; eye angular with a very fine hair; temporal margin straight, somewhat converging posteriorly; two very small prickles on each temporal angle; occipital margin slightly concave.

* Paine, Report Laguna Mar. Lab. I, 1912, p. 174, Fig. 95.

Ground colour of head pale brownish ; antennal bands broad, conspicuous, dark brown, interrupted by a colourless, distinct and λ-shaped broad suture ; posterior ends of the bands somewhat bent inwards in front of each antenna ; ocular blotch small, rounded, dark brown ; temporal band narrow, pale brownish, broadened just below eye, gradually narrowing towards the angle.

Prothorax 0.1 mm. long, 0.19 mm. wide ; short, quadrangular ; lateral margins nearly straight and very slightly diverging posteriorly ; posterior margin somewhat convex ; posterior angles rounded, each bearing a short spine ; lateral bands brown. Metathorax 0.2 mm. long, 0.27 mm. wide ; quadrilateral, widest at the posterior angles ; sides nearly straight, diverging posteriorly ; anterior lateral angles slightly extended ; posterior lateral angles rounded, each with a short spine ; a long pustulated hair, two very long hairs and a weak hair on a pustule near each lateral angle ; posterior margin convex ; marginal bands narrow, brown. Legs paler than thorax, with pale indistinct marginal markings.

Abdomen 0.9 mm. long, 0.39 mm. wide ; elongate oval ; segments widening to the fourth and then gradually narrowing to the ninth ; segments II and III longer than any other ; posterior angles a little extended, each bearing one short hair on segments II–IV ; two long hairs on segments V–VII ; segment VIII with a slight emargination on each side, bearing three long and a few short hairs ; the last segment small, rounded, slightly emarginated at tip, bearing four very short hairs. Ground colour of abdomen whitish ; segments I–VII with reddish brown lateral bands which extend anteriorly into preceding segment, each side of segments I–VII brown ; all segments with a pair of pale yellowish brown blotches forming two submedian rows.

19. ***Lipeurus baculus*** Nitzsch.

Denny, Monogr. Anopl. Brit., 1842, p. 172, pl. XIV, fig. 3 ; Giebel, Insecta Epizoa, 1874, p. 216 ; Piaget, Les Pediculines, 1880, p. 303, pl. XXV, fig. 2 ; Taschenberg, Die Mallophagen, 1882, p. 123 ; Osborn, Bul.

No. 5 (n. series), Div. Ent. U. S. Dept. Agr., 1896, p. 199, fig. 121 ; Kellogg, New Mallophaga, II, p. 506, pl. LXVIII, figs. 4 & 6 ; Mjöberg, Arkiv för Zoologi, Bd. VI, 1910, p. 85. *Pediculus columbæ* Linné, Systema Naturæ, 36, 1767, p. 2920 ; Fabricius, Systema Entmologiæ, 1775, p. 809 ; *Lipeurus bacillus*, Giebel, Insecta Epizoa, p. 215.

Two males and five females were collected from a domestic pigeon in Prov. Shinano, April 14, 1915 ; and three more specimens, all male, were taken from the Chinese turtle dove (*Turtur chinensis*) and the Formosan green pigeon (*Sphenocercus formosæ*), both from Formosa.

Tokyo, Oct. 30, 1916.

A Collection of Birds from Tonkin.

By

Nagamichi Kuroda, *Rigakushi.*

An interesting collection of bird-skins, made by Mr. S. Tsuchiya in French Tonkin in 1911–1912 and owned by Mr. T. Kobayashi of Yokohama, was placed in my hand for examination. The collecting was done at two localities in the northern part of that country, viz., at Yen-bai (sometimes spelt Yen-bay) and Lao-kay, both situated on the river Song Koi or Red River. A part of the material was since acquired by me and is now preserved in my own collection.

The specimens I have referred to 35 families, 101 genera and 130 species and subspecies, including an undescribed species of a green woodpecker which I propose to call by the name of *Gecinus rubripectus*.

Fam. ARDEIDÆ.

1. ***Ardeola bacchus*** (Bonap.).

Chinese Pond Heron.

Sharpe, Cat. B. Br. Mus., XXVI, p. 211 ; Blanford, F. Brit. Ind., Bds., IV, p. 394 ; Grant, P. Z. S., 1900, p. 494 ; Ingram, Nov. Zool., XIX, p. 274; *Ardeola prasinosceles* Swinhoe, P. Z. S., 1871, p. 413 ; David et Oust., Ois. Chine, p. 443 ; *Ardea bacchus* Bp., Dresser, Pal. Bds., II, p. 572.

One young male (Nov. 19, 1911) and two young females (Oct. 27; Nov. 19, 1911) from Yen-bai.

Fam. ANATIDÆ.

2. ***Nettopus coromandelianus*** (Gmelin).

Cotton Teal or White-bodied Goose-Teal.

Salvadori, Cat. B. Br. Mus., XXVII, p. 68 ; Blanford, F. Brit. Ind., Bds., IV, p. 433 ; Grant, P. Z. S., 1900, p. 492 ; Ingram, Nov. Zool., XIX, p. 275;

Nettapus coromandelianus (Gm.), David et Oust., Ois. Chine, p. 501; Barker, Ind. Ducks, p. 191.

One female (Oct. 27, 1911) from Yen-bai.

Fam. FALCONIDÆ.

3. ***Astur palumbarius*** (Linn.).

Goshawk.

Sharpe, Cat. B. Br. Mus., I, p. 95; Swinhoe, P. Z. S., 1871, p. 341; David et Oust., Ois. Chine, p. 23; Blanford, F. Br. Ind., Bds., III, p. 397; Dresser, Pal. Bds., II, p. 529.

One young male (Dec. 25, 1911) from Lao-kay.

4. ***Milvus ater govinda*** Sykes.

Common Pariah kite.

Milvus govinda Sykes, Sharpe, Cat. B. Br. Mus., I, p. 325; Swinhoe, P. Z. S., 1871, p. 341; David et Oust., Ois. Chine, p. 16; Blanford, F. Br. Ind., Bds., III, p. 374.

One male (Jan. 16, 1912) from Lao-kay.

5. ***Pernis cristatus*** (Cuv.).

Crested Honey-Buzzard.

Blanford, F. Br. Ind., Bds., III, p. 406; *Pernis ptilonorhynchus* (Temm.), Sharpe, Cat. B. Br. Mus., I, p. 347.

One young male (Nov. 16, 1911) from Lao-kay.

6. ***Microhierax melanoleucus*** (Blyth).

White-legged Falconet.

Sharpe, Cat. B. Br. Mus., I, p. 368; Blanford, F. Br. Ind., Bds., III, p. 433.

One male of this little falcon (Dec. 15, 1911) from Lao-kay.

The specimen is somewhat smaller than the measurements given by Sharpe and Blanford.

Fam. PHASIANIDÆ.

7. ***Gallus bankiva*** Temm.

Red Jungle-Fowl.

Gallus gallus (L.), Ogilvie-Grant, Cat. B. Br. Mus., XXII, p. 344; Grant, P. Z. S., 1900, p. 504; *G. ferrugineus* (Gm.), Swinhoe, P. Z. S., 1871, p. 399; David et Oust., Ois. Chine, p. 420; Anderson, W. Yunnan, II, p. 669; Blanford, F. Br. Ind., Bds., IV, p. 75; Ingram, Nov. Zool., XIX, p. 271.

Two young males (Oct. 30; Nov. 4, 1911) from Yen-bai, and one young male (Jan. 21, 1912) from Lao-kay.

8. ***Phasianus elegans*** Elliot.

Stone's Pheasant.

Ogilvie-Grant, Cat. B. Br. Mus., XXII, p. 329; Blanford, F. Br. Ind., Bds., IV, p. 81; Ingram, Nov. Zool., XIX, p. 271; *Phasianus sladeni* Anderson, W. Yunnan, II, p. 671; Swinhoe, P.Z.S., 1871, p. 398; David et Oust., Ois. Chine, p. 411.

An adult male (Mar. 16. 1912) from Lao-kay.

Fam. RALLIDÆ.

9. ***Gallinula chloropus*** (Linn.).

Water-Hen.

Sharpe, Cat. B. Br. Mus., XXIII. p. 169; Swinhoe, P.Z.S., 1871, p. 414; David et Oust., Ois. Chine, p. 485; Blanford, F. Br. Ind., Bds., IV, p. 175; Anderson, W. Yunnan, II, p. 692; Grant, P. Z. S., 1900, p. 500; Dresser, Pal. Bds., II, p. 715; *G. chloropus orientalis* Horsf., Ingram, Nov. Zool., XIX, p. 272.

Three males (Oct. 27; Nov. 12, 14, 1911) and three females (Oct. 30; Nov. 2, 14, 1911) from Yen-bai.

10. ***Amaurornis phœnicurus*** (Penn.).

White-breasted Water-hen.

Sharpe, Cat. B. Br. Mus., XXIII, p. 156; Blanford, F. B. Ind., Bds., IV, p. 173; *A. phœnicura* (Forst.), Ingram, Nov. Zool., XIX, p. 272; *Gallinula phœnicura* (Penn.), Swinhoe, P.Z.S., 1871, p. 414; *Erythra phœnicura* David et Oust., Ois. Chine, p. 486.

One male (Nov. 13, 1911) from Yen-bai; another male (Dec. 1911) and a female (Jan. 10, 1912) from Lao-kay.

The male specimen from Yen-bai seems to be unusually small, the measurements being as follows: —

Bill from Gape	Wing	Tail	Tarsus
35.5 mm.	158.5 mm.	64 mm.	52.5 mm.

Fam. CHARADRIIDÆ.

11. ***Charadrius fulvus*** Gm.

Eastern Golden Plover.

Swinhoe, P. Z. S., 1871, p. 403; David et Oust., Ois. Chine, p. 424; Blanford, F. B. Ind., Bds., IV, p. 234; *Ch. dominicus fulvus* Gm., Ingram, Nov. Zool., XIX, p. 273; *Ch. dominicus* P. L. S. Müll., Sharpe, Cat. B. Br. Mus., XXIV, p. 195; Grant, P. Z. S., 1900, p. 495; Dresser, Pal. Bds., II, p. 732.

One young male (Nov. 25, 1911) from Lao-kay.

12. ***Ægialitis cantiana dealbatus*** Swinh.

Eastern Kentish Plover.

Ægialitis dealbatus Swinhoe, P.Z.S., 1871, p. 404; David et Oust., Ois. Chine, p. 431; *Charadrius cantianus dealbatus* Sw., Hartert & Jackson, Ibis, 1915, p. 526–534; *Æ. alexandrina* Sharpe, Cat. B. Br. Mus., XXIV,

p. 277 (part.); Blanford, F. Br. Ind., Bds., IV, p. 240 (part.); Grant, P. Z. S. 1900, p. 495 (part.); *Æ. cantiana* Dresser, Pal. Bds., II, p. 737 (part.).

One young female (Dec. 19, 1911) from Lao-kay.

13. ***Ægialitis dubia dubia*** (Scop.).

Southern Little ringed Plover.

Ægialitis dubius (Scop.), Swinhoe, P.Z.S., 1871, p. 404; David et Oust., Ois. Chine, p. 429; Anderson, W. Yunnan, II, p. 676; Ingram, Nov. Zool., XIX, p. 273; *Charadrius dubius dubius* Scop., Hartert & Jackson, Ibis, 1915, p. 526–534; *Æ. dubia* Sharpe, Cat. B. Br. Mus., XXIV, p. 263 (part.); Blanford, F. B. Ind. Bds., IV, p. 241 (part.); Grant, P.Z.S., 1900, p. 495 (part.).

One young male (Dec. 29, 1911) from Lao-kay.

The bill in this southern form is distinctly longer and stronger than in *Æ. dubia minor*. Exposed culmen 15 mm., wing 113 mm.

14. ***Ægialitis dubia minor*** (Wolf & Meyer).

Little ringed Plover.

Ægialitis curonica (Gm.), Dresser, Pal. Bds., II, p. 740; *Charadrius dubius curonicus* Gm., Hartert & Jackson, Ibis, 1915, p. 526–534; *Æ. dubia* Sharpe, Cat. B. Br. Mus., XXIV, p. 263 (part.); Blanford, F. B. Ind., Bds., IV, p. 241 (part.).

Three adult males (Nov. 13; Dec. 20, 22, 1911) from Lao-kay.

Measurements of their bill and wing as follows:

Exp. culm.	Wing
13 mm.	111 mm.
13.9 mm.	109 mm.
14 mm.	111 mm.

The bill is smaller and shorter than in the preceding form.

15. ***Tringoides hypoleucus*** (Linn.).

Common Sandpiper.

Sharpe, Cat. B. Br. Mus., XXIV, p. 456; Swinhoe, P.Z.S., 1871, p. 406; David et Oust., Ois. Chine, p. 467; Blanford, F. B. Ind., Bds., IV, p. 260; Grant, P.Z.S., 1900, p. 497; *Totanus hypoleucus* (L.), Dresser, Pal. Bds., II, p. 791; *Tringa hypoleuca* (L.), Ingram, Nov. Zool., XIX, p. 273.

One young female (Oct. 24, 1911) from Lao-kay.

16. ***Gallinago stenura*** (kuhl).

Pintail Snipe.

Sharpe, Cat. B. Br. Mus., XXIV, p. 619; David et Oust., Ois. Chine, p. 478; Blanford, F. B. Ind., Bds., IV, p. 289; Grant, P. Z. S., 1900, p. 499; Dresser, Pal. Bds., II, p. 761; *Gallinago horsfieldi* (G. R. Gray), Swinhoe, P.Z.S., 1871, p. 407.

One female (Oct. 27, 1911) from Yen-bai.

17. ***Gallinago gallinago*** (L.).

Common Snipe.

Sharpe, Cat. B. Br. Mus., XXIV, p. 633; Grant, P. Z. S., 1900, p. 499; Ingram, Nov. Zool., XIX, p. 274; *G. cœlestis* (Frenzel), Blanford, F. Br. Ind., Bds., IV, p. 286; Dresser, Pal. Bds., II, p. 759; *G. scolopacina* Bp., Swinhoe, P.Z.S., 1871, p. 407; David et Oust., Ois. Chine, p. 478.

One male (Oct. 27, 1911) from Yen-bai.

Fam. COLUMBIDÆ.

18. ***Turtur tigrinus*** (Temm.).

Burmese Spotted Dove.

Solvadori, Cat. B. Br. Mus., XXI, p. 440; Anderson, W. Yunnan, II, p. 665; Blanford, F. Br. Ind., Bds., IV, p. 44; *Streptopelia suratensis tigrina* (Temm.), Baker, Ind. Pigeons & Doves, 1913, p. 210, Pl. 21.

One male (Jan. 6, 1912) from Lao-kay.

19. ***Turtur orientalis*** (Latham).

Rufous Turtle Dove.

Salvadori, Cat. B. Br. Mus., XXI, p. 403; Anderson, W. Yunnan, II, p. 661; Blanford, F. Br. Ind., Bds., IV, p. 40; Grant, P.Z.S., 1900, p. 502: Ingram, Nov. Zool., XIX, p. 271; *Turtur rupicola* (Pall), Swinhoe, P. Z. S., 1871, p. 397; David et Oust., Ois. Chine, p. 385; *Streptopelia turtur orientalis* (Lath.), Barker, Ind. Pigeons & Doves, 1913, p. 196.

One female (Jan. 8, 1912) from Lao-kay.

Fam. CUCULIDÆ.

20. ***Hierococcyx sparverioides*** (Vigors).

Large Hawk-Cuckoo.

Shelley, Cat. B. Br. Mus., XIX, p. 232; Blanford, F. Br. Ind., Bds., III, p. 211; *H. sparveroides* (Vig.), Dresser, Pal. Bds., I, p. 473; *Cuculus sparverioides* (Vig.), Hartert, Vög. Pal., II, 953; *Cuculus sparveroides* (Vig.), Swinhoe, P. Z. S., 1871, p. 394; David et Oust., Ois. Chine, p. 63.

A young female (Oct. 24, 1911) from Yen-bay.

Shelley and Blanford have stated that the tail-feathers of the species number 8–10, but the number in the specimen on hand is 12.

21. ***Centropus sinensis*** (Steph.).

Chestnut Coucal.

Shelley, Cat. B. Br. Mus., XIX, p. 343; Swinhoe, P.Z.S., 1871, p. 393; David et Oust., p. 58; Blanford, F. Br. Ind., Bds., III, p. 239; Grant, P.Z.S., 1900, p. 485; Ingram, Nov. Zool., XIX, p. 279.

Two adult females (Nov. 9, 12, 1911), three young males (Nov. 12, 13, 13) and one young female (Nov. 1) from Yen-bai; and one male (Mar. 10, 1912) from Lao-kay.

All these specimens agree with the so-called *Centropus intermedius* of Hume in the interscapulars being of a chestnut colour.

22. ***Centropus bengalensis*** (Gmelin).
Lesser Coucal.

Shelley, Cat. B. Br. Mus., XIX, p. 352 ; Swinhoe, P.Z.S., 1871, p. 393; David et Oust., Ois. Chine, p. 59; Blanford, F. Br. Ind., Bds., III, p. 243.

Two young females (Oct. 27; Nov. 13, 1911) from Yen-bai, and one young female (Dec. 27, 1911) from Lao-kay. All these immature birds agree well with *C. lepidus* of Horsfield.

23. ***Rhopodytes tristis*** (Lesson).
Large Green-billed Malkoha.

Shelley, Cat. B. Br. Mus., XIX, p. 386 ; Blanford, F. Br. Ind., Bds., III, p. 232; Grant, P.Z.S., 1909, p. 485; *Zanclostomus tristis* (Less.), Swinhoe, P.Z.S., 1871, p. 393; David et Oust., Ois. Chine, p. 58.

Two males (Oct. 24; Nov. 14, 1911) and three females (Oct. 17, 24 ; Nov. 9) from Yen-bay one male (Dec. 6) from Lao-kay.

Fam. ALCEDINIDÆ.

24. ***Halcyon smyrnensis fusca*** (Bodd.).
Smirna Kingfisher.

Hartert, Vög. Pal., II, p. 884 ; Ingram, Nov. Zool., XIX, p. 277 ; *Halcyon smyrnensis* Sharpe, Cat. B. Br. Mus., XVII, p 222 (part.); Swinhoe, P.Z.S., 1871, p. 347 (part.); Blanford, F. Br. Ind., Bds., III, p. 132 (part.) ; Grant, P.Z.S., 1900, p. 488 (part.); Dresser, Man. Pal. Bds., I, p. 461 (part.); *Entomobia smyrnensis* David et Oust., Ois. Chine, p. 76 (part.).

Three males (Nov. 28 ; Dec. 25, 1911; Jan. 5, 1912) from Lao-kay. Two other specimens without labels occur in the collection.

25. ***Alcedo ispida bengalensis*** Gmelin.
Eastern Common Kingfisher.

Hartert, Vög. Pal., II, p. 882 ; Ingram, Nov. Zool., XIX, p. 277 ;

Alcedo bengalensis Gm., Swinhoe, P.Z.S., 1871, p. 347 ; David et Oust., Ois. Chine, p. 74, *A. ispida* Sharpe, Cat. B. Br. Mus., XVII, p. 141 (part.); Blanford, F. B. Ind., Bds., III, p. 122 (part.) ; Dresser, Man. Pal. Bds., I, p. 458 (part.); Grant, P.Z.S., 1900, p. 487 (part.).

Three males (Nov. 29 ; Dec. 26, 1911 ; Jan. 22, 1912) from Lao-kay, and three females (Oct. 24, 29, 30, 1911) from Yen-bai.

26. ***Ceryle rudius varia*** Strickl.
Indian Pied Kingfischer.

Sharpe, Cat. B. Br. Mus., XVII, p. 112 ; *Ceryle varia* Strickland, Blanford, F. Br. Ind., Bds., III, p. 119; Grant, P.Z.S., 1900, p. 487.

One male (Nov. 22, 1911) from Lao-kay.

Fam. MEROPIDÆ.

27. ***Nyctiornis athertoni*** (Jard. & Selby).
Blue-bearded Bee-eater.

Sharpe, Cat. B. Br., Mus., XVII, p. 88; Blanford, F. B. Ind., Bds., III, p. 115, Fig. 32; Grant, P.Z.S., 1900, p. 486.

One female (Oct. 21, 1911) from Yen-bai ; another female (Jan. 3, 1912) from Lao-kay.

Sharpe has stated that the tail-feathers in the Meropidæ number 10, while Blanford has given the same to be 12. I find that one of the specimens on hand has 12 and the other 14 tail-feathers.

Fam. BUCEROTIDÆ.

28. ***Anthracoceros albirostris*** (Shaw & Nodd.).
Indo-Burmese Pied Hornbill.

Blanford, F. Br. Ind., Birds., III, p. 145, Fig. 41; *A. malabaricus* (Gm.), Ogilvie-Grant, Cat. B. Br. Mus., XVII, p. 365.

One adult male (Nov. 13, 1911) and one female (?) (Nov. 13) from Yen-bai.

Fam. STRIGIDÆ.

29. ***Ninox scutulata*** (Raffl.).

Brown Owlet.

Sharpe, Cat. B. Br. Mus., II, p. 156; Blanford, F. Br. Ind., Bds., III, p. 309; Dresser, Man. Pal. Bds., I, p. 495; *Ninox japonica* T. & S., Swinhoe, P.Z.S., 1871, p. 343; David et Oust., p. 36; Grant, P.Z.S., 1900, p. 488.

One female (Nov. 14, 1911) from Yen-bai. The first primary shows no bars, unlike the Yunnan specimen which was described by Anderson.

30. ***Scops lettia erythrocampa*** (Swinh.).

Swinhoe's Collared Scops Owl.

Scops erythrocampa (Sw.), Sharpe, Cat. B. Br. Mus., II, p. 89; *Otus lempiji erythrocampa* (Sw.), Ingram, Nov. Zool., XIX, p. 277.

One male in the rufous (Jan. 30, 1912) and one female in the grey phase (Mar. 23), both from Lao-kay.

31. ***Scops giu gymnopodus*** Gray.

Gray's Scops-Owl.

Scops gymnopodus Gray, Sharpe, Cat. B. Br. Mus., II, p. 65; *S. giu* Blanford, F. B. Ind., Bds., III, p. 291 (part.); Dresser, Man. Pal. Bds., I, p. 486–487 (part.).

One female (Nov. 16, 1911) from Lao-kay.

Dimensions of the specimen :

T. L.	Wing.	Tail	Tarsus
177 mm. (about)	133 mm.	58.5 mm.	20.5 mm.

Sharpe gave for this subspecies : total length 6.7 in. (=169 mm.), wing 5.1 in. (=129 mm.), tail 2.5 in. (=63 mm.), tarsus 0.85 in. (=22 mm.), the feathered part in front of tarsus 0.45 in. (=11.5 mm.), the bare part in front of same 0.4 in. (=10.5 mm.).

In the specimen before me the bare part of tarsus in front measures only about 0.25 in. (=5.5 mm.), *i.e.*, much shorter than was given by Sharpe, and consequently the feathered part is much longer. Possibly Dresser was quite right in making the statement: "*S. gymnopodus*, Gray, appears to be merely a specimen which had accidentally lost the feathers of the lower tarsus."

Fam. TROGONIDÆ.

32. ***Harpactes erythrocephalus*** (Gould).

Red-headed Trogon.

Ogilvie-Grant, Cat. B. Br. Mus., XVII, p. 488; Blanford, F. B. Ind., Bds., III, p. 200.

Two males (Nov. 13, 14, 1911) from Yen-bai.

Fam. CAPITONIDÆ.

33. ***Cyanops davisoni*** (Hume).

Davison's Blue-throated Barbet.

Shelley, Cat. B. Br. Mus., XIX, p. 65; Blanford, F. B. Ind., Bds., III, p. 93; Ingram, Nov. Zool., XIX, p. 279.

One male (Nov. 9, 1911) and one young male (Oct. 27) from Yen-bai. Three males (Mar. 7, 11, 12, 1912) and two females (Mar. 6, 8) from Lao-kay.

Fam. PICIDÆ.

34. ***Sasia ochracea*** Hodgs.

Rufous Piculet.

Hargitt, Cat. B. Br. Mus., XVIII, p. 555; Blanford, F. B. Ind., Bds., III, p. 77.

Three adult males (Oct. 21; Nov. 13, 17, 1911) from Yen-bai, and one male (Jan. 17, 1912) from Lao-kay.

35. ***Iyngipicus scintilliceps kaleensis*** (Sw.).
Swinhoe's Pigmy Woodpecker.

Iyngipicus kaleensis (Sw.), Hargitt, Cat. B. Br. Mus., XVIII; p. 315; Grant, P. Z. S., 1900, p. 483; Uchida, Annot. Zool. Japon., 1912, p. 174; *Yungipicus kaleënsis* Swinhoe, P.Z.S., 1871, p. 392; *Iyngipicus scintilliceps* Dresser, Man. Pal. Bds., I, p. 450 (part.).

Two males (Oct. 16; Nov. 18, 1911) and two females (Nov. 13, 15) from Yen-bai. Two males (Jan. 12, 25, 1912) and one female (Jan. 19) from Lao-kay.

36. ***Micropternus phæoceps brachyurus*** (Vieill.).
Malay Rufous Woodpecker.

Hargitt, Cat. B. Br. Mus., XVIII, p. 396; Blanford, F. B. Ind., Bds., III, p. 57.

One males (Nov. 18, 1911) from Yen-bai, and two males (Mar. 6, 11, 1912) from Lao-kay.

37. ***Pyrrhopicus pyrrhotis*** (Hodgs).
Red-eared Bay Woodpecker.

Blanford, F. Br. Ind., Bds., III, p. 50, Fig. 14; *Lepocestes pyrrhotis* (Hodgs.), Hargitt, Cat. B. Br. Mus., XVIII, p. 380.

One male (Jan. 8, 1912) from Lao-kay.

38. ***Gecinus rubripectus*** sp. nov.
Red-breasted Green Woodpecker.

♂ (Type of species). Forehead, crown and hind head almost uniform dark green, with dusky stripes to the center of the feathers, so that the crown of head is decidedly darker than any other upper parts, excepting the wings and tail; lores dull rufous, with buffy base to the feathers; ear-coverts greyish, faintly tinged with olive; a short and narrow buffy white eyebrow extending from above the eye backwards to upper edge of ear-coverts; nape between ear-coverts bright crimson, which is laterally prolonged into a band along the lower border of ear-coverts; mantle, back, rump and upper tail-coverts uniform deep grass-green, somewhat paler on rump and upper tail-coverts; primaries almost black with about five white small spots on the outer web and some larger ones on the inner web; bastard wing and primary-coverts blackish; secondaries black, the outer webs in most parts with bronzy olive-green lustre; the inner webs with white large spots as in the primaries; all upper wing-coverts similar in colour to the outer webs of secondaries; a white patch on the edge of wing; tail-feathers blackish, mostly with olivaceous margin; shafts of tail-feathers deep black; a faint and almost obsolete maler stripe of vinous red and dusky; chin dusky; throat dusky yellowish, paler than any other lower parts; upper breast with a broad crescent-shaped band of mottled vinous red on yellowish olive ground, the lateral ends of the band proceeding forwards to join the crimson along the lower border of ear-coverts; lower breast, abdomen and flanks dull greenish yellow, with numerous squamate markings of yellowish white and light olive-green, the markings most distinct on the abdomen; under tail-coverts dusky blackish with olive green tips; thigh greyish, very obscurely tinged with olive; under surface of wings, including axillaries and under wing-coverts, varied with black and white; the under wing-coverts tinged very weakly with yellowish green; upper mandible almost black, lower mandible paler; feet and toes in the dried state blackish with bluish tinge. Culmen 36 mm., wing 140 mm., tail 103.5 mm., tarsus 27 mm.

The type specimen of this new green woodpecker was collected at Yen-bai, Tonkin, on Nov. 13th, 1911. It is now preserved in my own collection.

Fam. EURYLÆMIDÆ.

39. ***Serilophus lunatus*** (Gould).

Gould's Broadbill.

Sclater, Cat. B. Br. Mus., XIV, p. 460; Blanford, F. B. Ind., Bds., III, p. 9.

Three males (Jan. 24, 25, 30, 1912) and three females (Jan. 24, 24, 29) from Lao-kay. This is probably the first record of the species from Tonkin.

40. ***Psarisomus dalhousiæ*** (Jameson).

Long-tailed Broadbill.

Sclater, Cat. B. Br. Mus., XIV, p. 458; Blanford, F. Br. Ind., Bds., III, p. 11.

One male (Jan. 9, 1912) from Lao-kay.

Fam. PITTIDÆ.

41. ***Pitta nepalensis*** (Hodgs.).

Blue-naped Pitta.

Sclater, Cat. B. Br. Mus., XIV, p. 414; Oates, F. Br. Ind., Bds., I, p. 389.

One female (Jan. 4, 1912) from Lao-kay.

Fam. MOTACILLIDÆ.

42. ***Motacilla alba leucopsis*** Gould.

White-faced Wagtail.

Motacilla leucopsis Gould, Sharpe, Cat B. Br. Mus., X. p. 482; Oates, F. Br. Ind., Bds., II, p. 288; Hartert, Vög. Pal., I, p. 304; Dresser, Man. Pal. Bds., I, p. 198; Ingram, Nov. Zool., XIX, p. 304; Grant, P.Z.S., 1900, p. 467.

One male (Nov. 13, 1911) from Lao-kay.

43. ***Motacilla alba hodgsoni*** Gray.

Hodgson's Pied Wagtail.

Hartert, Vög. Pal., I, p. 307; Ingram, Nov. Zool., XIX, p. 304; *Motacilla hodgsoni* Gray, Sharpe, Cat. B. Br. Mus., X, p. 486, Pl. V, fig. 1, 2; Swinhoe, P.Z.S., 1871, p. 363; David et Oust., Ois. Chine, p. 298; Oates,

F. Br. Inds., Bds., II, p. 291; Dresser, Man. Pal. Bds., I, p. 199.

An adult male (Nov. 4, 1911) from Lao-kay.

44. ***Anthus maculatus yunnanensis*** Uchida & Kuroda.

Short-billed Eastern Tree-Pipit.

Uchida & Kuroda, Annot. Zool. Japon., 1916, p. 134–135; *A. tribialis maculatus* (nec Hodgs.), Ingram, Nov. Zool., XIX, p. 304; *Pipastes maculatus* (nec Hodgs.), Anderson, Yunnan Exp., Aves, p. 608.

One male (Nov. 17, 1911) from Yen-bai; two males (Dec. 11, 1911; Mar. 3, 1912) and one female (Mar. 8) from Lao-kay. This subspecies, hitherto known from Yunnan, China and Formosa, is here recorded for the first time from Tonkin.

45. ***Anthus spinoletta japonicus*** T. & S.

Eastern Water Pipit.

Hartert, Vög. Pal., I, p. 282; *Anthus japonicus* T. & S., Sharpe, Cat. B. Br. Mus., X, p. 598; Oates, F. B. Ind., Bds., II, p. 312; Dresser, Man. Pal. Bds., I, p. 215.

One young female (Dec. 19, 1911) from Lao-kay.

Fam. HENICURIDÆ.

46. ***Henicurus leschenaulti*** (Vieill.).

Leschenault's Forktail.

Sharpe, Cat. B. Br. Mus., VII, p. 313; David et Oust, Ois. Chine, p. 295; Oates, F. B. Ind., Bds., II, p. 86; *Enicurus sinensis* Swinhoe, P. Z. S., 1871, p. 365 (part.).

One male (Nov. 15, 1911) from Yen-bai. In this specimen, the outermost tail-feathers are shorter than the penultimate pair by only about 7 mm. The species is slightly smaller than Gould's *H. sinensis* from China, and moreover, in that species the outermost tail-feathers are shorter than the penultimate by about 50 mm.

Fam. TIMELIIDÆ.

47. ***Dryonastes chinensis*** (Scop.).
Black-throated Laughing-Thrush.

Sharpe, Cat. B. Br. Mus., VII, p. 455 ; Oates, F. Br. Ind., Bds., I, p. 74.

Four males (Dec. 5, 21, 27, 1911 ; Feb. 17, 1912) and one female (Jan. 16, 1912) from Lao-kay.

48. ***Dryonastes sannio*** (Swinhoe).
White-browed Laughing-Thrush.

Sharpe, Cat. B. Br. Mus., VII, p. 459 ; Oates, F. Br. Ind., Bds., I, p. 76; Ingram, Nov. Zool., XIX, p. 287; *Garrulax sannio* Sw., P.Z.S., 1871, p. 371; David et Oust, Ois. Chine, p. 192 ; Anderson, Yunnan Exp., Aves, p. 627.

One male (Mar. 1, 1912) and four females (Dec. 4, 8, 20, 26, 1911) from Lao-Kay. One specimen without label.

49. ***Dryonastes lugens*** Oust.
Laos Laughing-Thrush.

Oustalet, Bull, Soc. Zool. Fr., 1890, XV, pp. 155–157.

One male (Nov. 7, 1911) from Yen-bai and one male (Dec. 3) and one female (Dec. 15) from Lao-kay.

This is probably the first record of the species from Tonkin. It has hitherto been known only from Laos.

50. ***Garrulax leucolophus belangeri*** Less.
Burmese White-crested Laughing-Thrush.

Garrulax belangeri Lesson, Sharpe, Cat. B. Br. Mus., VII, p. 436 ; Oates, F. Br. Ind., Bds., I, p. 79.

Two males (Nov. 9, 12, 1911) and one female (Nov. 8) from Yen-bai.

51. ***Garrulax leucolophus diardi*** (Less.).
Siamese White-crested Laughing-Thrush.

Garrulax diardi (Lesson), Sharpe, Cat. B. Br. Mus., VII, p. 437 ; Oates, F. Br. Ind., Bds., I, p. 79.

Four males (Jan. 30; Mar. 3, 8, 9, 1912) from Lao-kay.

52. ***Trochalopterum canorum*** (Linn.).
White-browed Laughing-Thrush.

Sharpe, Cat. B. Br. Mus., VII, p. 376; Grant, P.Z.S , 1900, p. 475.

Six males (Nov. 29 ; Dec. 10, 17, 27, 1911 ; Jan. 7, 11, 1912) from Lao-kay.

53. ***Pomatorhinus ruficollis styani*** Seeb.
Styan's Rufous-necked Scimitar Babbler.

Hartert, Vög. Pal., I, p. 639 ; Ingram, Nov. Zool., XIX, p. 287 ; *P. ruficollis* Anderson, West. Yunnan, p. 633 (part.).

Four males (Oct. 17, 24 ; Nov. 15, 16, 1911) from Yen-bai, and three males (Dec. 18, 1911; Feb. 27; Mar. 11, 1912) from Lao-kay.

54. ***Pomatorhinus macclellandi gravivox*** David.
David's Scimitar Babbler.

David et Oust., Ois. Chine, p. 183; Hartert, Vög. Pal., I, p. 638; Ingram, Nov. Zool., XIX, p. 286; *P. macclellandi* Sharpe, Cat. B. Br. Mus., VII, p. 431 (part.); Oates, F. Br. Ind., Bds., I, p. 125 (part.).

One male (Mar. 2, 1912) from Lao-kay.

55. ***Pomatorhinus tickelli*** Blyth.
Tickell's Scimitar Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 429; Oates, F. Br. Ind., Bds., I, p. 127.

One male (Nov. 17, 1911) from Yen-bai.

56. ***Timelia pileata*** Horsf.
Red-capped Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 507; Oates, F. Br. Ind., Bds., I, p. 132.

One female (Oct. 24, 1911) from Yen-bai; three males (Dec. 11, 1911; Feb. 27; Mar. 11, 1912) and one female (Mar. 7) from Lao-kay.

57. ***Gampsorhynchus torquatus*** Hume.
Ring-necked Shrike-Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 387; Oates, F. Br. Ind., Bds., p. 136.

Four young males (Jan. 11; Feb. 19; Mar. 8, 9, 1912) and one young female (Mar. 12) from Lao-kay. In all these young birds, the white on head is confined to the forehead only; a very complete black band across the chest which is incomplete or absent in adult; the wing is without a white spot.

58. ***Pyctorhis sinensis*** (Gmelin).
Yellow-eyed Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 510; Oates, F. Br. Ind., Bds., I, p. 137; Ingram, Nov. Zool., XIX, p. 287.

Three males (Dec. 9, 18, 1911; Mar. 10, 1912) from Lao-kay.

59. ***Drymocataphus tickelli*** (Blyth).
Tickell's Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 557; Oates, F. Br. Ind., Bds., I, p. 146.

One male (Nov. 18, 1911) from Yen-bai. Three males (Dec. 11, 1911; Jan. 10; Feb. 27, 1912) and one female (Feb. 21) from Lao-kay.

60. ***Thringorhina guttata*** (Tickell).
Tickell's Spotted Babbler.

Oates, F. Br. Ind., Bds., I, p. 155; *Stachyrhis guttata* (Tick.), Sharpe, Cat. B. Br. Mus., VII, p. 535.

One male (Nov. 18, 1911) and one female (Oct. 17) from Yen-bai. Four males (Nov. 7, 1911; Feb. 21, 29; Mar. 6, 1912) from Lao-kay.

61. ***Alcippe morrisoniana*** Swinhoe.

Morrisonian Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 621; Ogilvie-Grant, P. Z. S., 1900, p. 477; *Alcippe morrisonia* Swinhoe, P.Z.S., 1871, p. 374; Uchida, Annot. Zool. Japon., 1912, p. 180.

Three males (Oct. 16; Nov. 17, 18, 1911) and one female (Nov. 17, 1911) from Yen-bai.

This is the first time the species is recorded from Tonkin. I cannot find any difference between Formosan and Tonkin specimens.

62. ***Stachyrhis nigriceps*** Hodgs.

Black-throated Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 532; Oates, F. B. Ind., Bds., I, p. 162; Anderson, Yunnan Exp., Aves, p. 636; Ingram, Nov. Zool., XIX, p. 288.

One male (Feb. 21, 1912) and three females (Feb. 23, 29; Mar. 14, 1912) from Lao-kay.

63. ***Stachyrhidopsis ruficeps*** (Blyth).

Red-headed Babbler.

Sharpe, Cat. B. Br. Mus., VII, p. 598; Oates, F. Br. Ind., Bds., I, p. 164; Grant, P.Z.S., 1900, p. 476; Subsp., Ingram, Nov. Zool., XIX, p. 288; *S. præcognitus* (Sw.), P.Z.S., 1871, p. 373; David et Oust., Ois. Chine, p. 224; Uchida, Annot. Zool. Japon., 1912, p. 181.

Three males (Dec. 13, 14, 1911; Feb. 25, 1912) from Lao-kay. Three females (Oct. 16, 22; Nov. 17, 1911) from Yen-bai.

64. ***Schœniparus rufigularis*** (Mandelli).

Red-throated Tit-Babbler.

Oates, F. B. Ind., Bds., I, p. 170; *Minla rufigularis* Mandelli, Sharpe, Cat. B. Br. Mus., VII, p. 610.

Two males (Oct. 22; Nov. 18, 1911) from Yen-bai.

Fam. PYCNONOTIDÆ.

65. ***Chloropsis chlorocephala*** (Walden).
Burmese Green Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 28; Oates, F. Br. Ind., Bds., I, p. 237.

One male (Nov. 14, 1911) from Yen-bai; and two males (Mar. 3, 12, 1912) from Lao-kay.

66. ***Chloropsis hardwickii*** Jard. & Selby.
Orange-bellied Green Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 18; Oates, F. Br. Ind., Bds., I, p. 236; Ingram, Nov. Zool., XIX, p. 284.

One young male (Feb. 4, 1912) from Lao-kay.

67. ***Æthorhynchus lafresnayii*** (Hartl.)
Great Iora.

Sharpe, Cat. B. Br. Mus., VI, p. 14; Oates, F. Br. Ind., Bds., I, p. 228.

A male in non-breeding plumage (Nov. 17, 1911) from Yen-bai. Another specimen in non-breeding plumage (Nov. 19, 1911), unsexed and without statement of locality, exists in the collection.

68. ***Criniger gutturalis*** (S. Müll.).
Malayan White-throated Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 80; Oates, F. Br. Ind., Bds., I, p. 256; *Criniger pallidus* Swinhoe, Sharpe, Cat. B. Br. Mus., VI, p. 81; Swinhoe, P. Z. S., 1871, p. 370; David et Oust., Ois. Chine, p. 138; Grant, P. Z. S., 1900, p. 478; Uchida & Kuroda, Annot. Zool. Japon., 1916, p. 137.

Two females (Oct. 21; Nov. 12, 1911) from Yen-bai. Three males (Jan. 26, 26; Feb. 19, 1912) and one female (Dec. 25, 1911) from Lao-kay.

69. ***Hypsipetes concolor*** Blyth.
Burmese Black Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 38; Oates, F. Br. Ind., Bds., I, p. 261; Ingram, Nov. Zool., XIX, p. 284; *H. yunnanensis* Anderson, Yunnan Exp., Aves, p. 656, pl. 50; Swinh., P. Z. S., 1871, p. 369; David et Oust., Ois. Chine, p. 137.

Two females (Feb. 5 ; Mar. 9, 1912) from Lao-kay.

70. ***Hypsipetes leucocephalus*** (Gmelin).
White-headed Black Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 41 ; Swinhoe, P. Z. S., 1871, p. 369; David et Oust., Ois. Chine, p. 136; Ingram, Nov. Zool., XIX, p. 284.

Two males (Mar. 9, 10, 1912) from Lao-kay.

71. ***Hemixus hildebrandi*** Hume.
Hildebrand's Brown-eared Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 50; Oates, F. Br. Ind., Bds., I, p. 264.

A male specimen (Oct. 21, 1911) from Yen-bai.

72. ***Otocompsa jocosa*** (L.).
Bengal Red-whiskered Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 157; *Otocompsa emeria* (L.), Anderson, Yunnan Exp., Aves, p. 657; Oates F. Br. Ind., Bds., I, p. 276.

One male (Oct. 29, 1911) from Yen-bai, and two males (Nov. 12, 1911; Mar. 7, 1912) from Lao-kay.

73. ***Otocompsa flaviventris*** (Tickell).
Black-crested Yellow Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 161; Oates, F. Br. Ind., Bds., I, p. 278; Ingram, Nov. Zool., XIX, p. 285.

Two males (Dec. 18, 24, 1911) from Lao-kay.

74. ***Pycnonotus nigripileus*** Blyth.
Tenasserim Red-vented Bulbul.

Sharpe, Cat. B. Br. Mus., VI, p. 125.

Three females (Dec. 13, 19, 1911; Jan. 26, 1912) from Lao-kay.

One of the specimens has the breast mottled, the feathers being light ashy brown with dark brown centers. The two others do not distinctly show the mottling. Except in this respect, all the three agree very well with one another. Those without the mottling on breast come very near to *P. atricapillus* (Vieill.) from Yunnan.

Fam. MUSCICAPIDÆ.

75. ***Muscicapa parva albicilla*** Pall.
Eastern Red-breasted Flycatcher.

Hartert, Vög. Pal., I, p. 487; *Muscicapa albicilla* Pall., Sharpe, Cat. B. Br. Mus., IV, p. 162; Grant, P. Z. S., 1900, p. 480; *Siphia albicilla* (Pall.), Oates, F. Br. Ind., Bds., II, p. 10; *Erythrosterna albicilla* (Pall.), Swinhoe, P.Z.S., 1871, p. 380; David et Oust., Ois. Chine, p. 120.

One young male (Dec. 3, 1911) from Lao-kay, and one female (Nov. 15) from Yen-bai.

76. ***Culicicapa ceylonensis*** (Swains.).
Grey-headed Flycatcher.

Sharpe, Cat. B. Br. Mus., IV, p. 369; Oates, F. Br. Ind., Bds., II, p. 38; Hartert, Vög. Pal., I, p. 495; Ingram, Nov. Zool., XIX, p. 282.

One male (Oct. 22, 1911) from Yen-bai, and one male (Mar. 10, 1912) from Lao-kay.

77. ***Niltava macgrigoriæ*** (Burton).
Small Niltava.

Sharpe, Cat. B. Br. Mus., IV, p, 465; Oates, F. Br. Ind., Bds., II, p. 42.

Two males (Jan. 5; Feb. 21, 1912) and one young male (Mar. 5.) from Lao-kay.

78. ***Cryptolopha burkii tephrocephala*** (Anders.).

Anderson's Warbler Flycatcher.

Hartert, Vög. Pal., I, p. 496; Ingram, Nov. Zool., XIX, p. 282; *Culicipeta tephrocephala* Anderson, P. Z. S., 1871, p. 213.

One female of this fine flycatcher (Dec. 16, 1911) collected at Lao-kay. This specimen was sent to Dr. Hartert in Tring Museum for identification, and I am obliged to him for the above name. In his letter to me he has remarked: "It is interesting to find this form in Tonkin, and not the Chinese subspecies."

79. ***Rhipidura albicollis*** (Vieill.).

White-throated Fantail Flycatcher.

Sharpe, Cat. B. Br. Mus., IV, p. 317; Oates, F. Br. Ind., Bds., II, p. 53; Grant, P. Z. S., 1900, p. 481; Hartert, Vög. Pal., I, p. 473; Ingram, Nov. Zool., XIX, p. 282.

Three males (Dec. 5, 1911; Jan. 11, Feb. 27, 1912) and three females (Jan. 3, 14; Feb. 29, 1912) from Lao-kay.

Fam. TURDIDÆ.

80. ***Turdus merula mandarinus*** Bp.

South-Chinese Ouzel.

Ingram, Nov. Zool., XIX, p. 293; *Merula mandarina* (Bp.), Seebohm, Cat. B. Br. Mus., V, p. 238; Grant, P. Z. S., 1900, p. 472; *Merula sinensis* (Cuv.), Swinhoe, P. Z. S., 1871, p. 367.

One male (Nov. 9, 1911) from Yen-bai and one female (Dec. 20) from Lao-kay.

81. ***Monticola solitarius philippensis*** (P. L. S. Müll.).

Eastern Blue Rock-thrush.

Hartert, Vög. Pal., I, p. 675; *M. solitaria* (Müll.), Seebohm, Cat. B.

Br. Mus., V, p. 319; David et Oust., Ois. Chine, p. 161; Dresser, Man. Pal. Bds., I, p. 23; *M. solitaria* (Müll.), Grant, P. Z. S., 1900, p. 473.

One young male (Dec. 17, 1911) from Lao-kay.

82. ***Copsychus saularis*** (L.).

Magpie-Robin.

Sharpe, Cat. B. Br. Mus., VII, p. 61; Swinhoe, P. Z. S., 1871, p. 359; David et Oust., Ois. Chine, p. 174; Oates, F. Br. Ind., Bds., II, p. 116; Grant, P.Z.S., 1900, p. 474; *Copsychus saularis saularis* (L.), Ingram., Nov. Zool., XIX, p. 296.

One male (Oct. 29, 1911) and one female (Nov. 9) from Yen-bai; and three males (Dec. 1, 1911; Feb. 28; Mar. 12, 1912) and two females (Dec. 22, 1911; Jan. 12, 2912) from Lao-kay.

83. ***Notodela leucura*** (Hodgs.).

White-tailed Blue Robin.

Sharpe, Cat. B. Br. Mus., VII, p. 23; Oates, F. Br. Ind., Bds., II, p. 112; Ingram, Nov. Zool., XIX, p. 296.

One male (Jan. 14, 1912) and one female (Jan. 14) from Lao-kay.

84. ***Calliope calliope*** (Pall.).

C mmon Ruby-throat.

Calliope camtschatkensis (Gm.), Oates, F. Br. Ind., Bds., II, p. 102; Swinhoe, P.Z.S., 1871, p. 359; David et Oust., Ois. Chine, p. 235; Dresser, Man. Pal. Bds., I, p. 65; *Erithacus calliope* (Pall.), Seebohm, Cat. B. Br. Mus., V, p. 305; Grant, P.Z.S., 1900, p. 473; Uchida & Kuroda, Annot. Zool. Japon., 1916, p. 139; *Luscinia calliope* (Pall.), Hartert, Vög. Pal., I, p. 738; Anderson, Yunn. Exp., p. 615.

An adult male (Nov. 7, 1911) collected at Yen-bai.

85. ***Ruticilla aurorea*** (Pall.).

Daurian Redstart.

Seebohm, Cat. B. Br. Mus., V, p. 345; Swinhoe, P.Z.S., 1871, p. 358; David et Oust., Ois. Chine, p. 170; Oates, F. Br. Ind., Bds., II, p. 93; Grant, P.Z.S., 1900, p. 473; Dresser, Man. Pal. Bds., I, p. 52; *Phoenicurus aurorea aurorea* (Pall.), Hartert, Vög. Pal., I, p. 725.

A female specimen (Dec. 29, 1911) from Lao-kay.

86. ***Oreicola ferrea*** (Gray).

Dark-Grey Bush-Chat.

Sharpe, Cat. B. Br. Mus., IV, p. 266; Oates, F. Br. Ind., Bds., II, p. 66; *O. ferrea ferrea* (Gray), Hartert, Vög. Pal., I, p. 711; *Pratincola ferrea* Hodgs., Swinhoe, P.Z.S., 1871, p. 360; David et Oust., Ois. Chine, p. 168.

One male in winter plumage (Dec. 24, 1911) from Lao-kay. This single example agrees well with typical *O. ferrea.* Tail-feather reaches 65 mm. and wing 70 mm. in length.

87. ***Oreicola ferrea haringtoni*** Hartert.

Harington's Dark-Grey Bush-Chat.

Hartert, Vög. Pal., I, p. 711; Ingram, Nov. Zool., XIX, p. 296.

Two adult males in winter dress (Nov. 7, 9, 1911) and one young male (Nov. 7) from Yen-bai. Seven males in winter plumage (Dec. 3, 11, 28, 1911; Jan. 23; Feb. 1, 17, 23, 1912) and five females (Dec. 10, 17, 19, 1911; Feb. 25; Mar. 5, 1912) collected at Lao-kay. In all the specimens, the tail-feathers do not exceed 61.5 mm. length.

88. ***Oreicola jerdoni*** Blyth.

Jerdon's Bush-Chat.

Sharpe, Cat. B. Br. Mus., IV, p. 264; Oates, F. Br. Ind., Bds., II, p. 66.

An adult male (Dec. 16, 1911) collected at Lao-kay.

89. ***Pratincola maura*** (Pall.).

Indian Stone Chat.

Sharpe, Cat. B. Br. Mus., IV, p. 188; Oates, F. Br. Ind., Bds., II, p. 61; Grant, P.Z.S., 1900, p. 474; Dresser, Man, Pal. Bds., I, p. 46; *Pratincola indica* Blyth, Swinhoe, P.Z.S., 1871, p. 360; David et Oust., Ois. Chine, p. 167; *P. torquata indica* Blyth, Ingram, Nov. Zool., XIX, p. 296; *P. torquata stejnegeri* Parrot, Hartert, Vög. Pal., I, p. 708.

Two males (Dec. 16, 1911; Jan. 12, 1912) collected at Lao-kay.

90. ***Cisticola tytleri*** Blyth.

Yellow-headed Fantail-Warbler.

Oates, F. Br. Ind., Bds., I, p. 372; *Cisticola exilis* Sharpe, Cat. B. Br. Mus., VII, p. 269 (part.).

A male in winter dress (Feb. 19, 1912) collected at Lao-kay.

91. ***Megalurus palustris*** Horsf.

Striated Marsh-Warbler.

Sharpe, Cat. B. Br. Mus., VII, p. 123; Oates, F. Br. Ind., Bds., I, p. 383; Ingram, Nov. Zool., XIX, p. 297.

Four males (Dec. 3, 18, 1911; Feb. 23; Mar. 7, 1912) and one female (Mar. 1, 1912) from Lao-kay.

92. ***Lusciniola fuscata*** (Blyth).

Dusky Willow-Warbler.

Seebohm, Cat. B. Br. Mus., V, p. 127; Grant, P.Z.S., 1900, p. 471; Dresser, Man. Pal. Bds., I, p. 125; *Phylloscopus fuscatus* (Blyth), Oates, F. Br. Ind., Bds., I, p. 405; *Phylloscopus fuscata* (Blyth), Hartert Vög. Pal., I. p. 528; *Phyllopneuste fuscata* Blyth, Swinhoe, P.Z.S., 1871, p. 356; David et Oust., Ois. Chine, p. 267.

Two females (Dec. 20, 1911; Feb. 19, 1912) obtained at Lao-kay.

93. ***Phylloscopus superciliosus*** (Gm.).
Crowned Willow-Warbler.

Seebohm, Cat. B. Br. Mus., V, p. 68; Anderson, Yunn. Exp., Aves, p. 625; Oates, F. Br. Ind., Bds., I, p. 409; Grant, P.Z.S., 1900, p. 470; *P. superciliosus superciliosus* (Gm.), Hartert, Vög. Pal., I, p. 518; Ingram, Nov. Zool., XIX, p. 298; *Reguloides superciliosus* (Gm.), Swinhoe, P.Z.S., 1871, p. 357; David et Oust., Ois. Chine, p. 273.

Two males (Nov. 1, 9, 1911) from Yen-bai; one male (Dec. 8) and one female (Dec. 15) from Lao-kay.

94. ***Horeites cantans canturians*** (Sw.).
Chinese Bush-Warbler.

Hartert, Vög. Pal., I, p. 532; *Horornis canturiens* (Sw.), Oates, F. Br. Ind., Bds., I, p. 438; Uchida, Annot. Zool. Japon., 1912, p. 192; *Cettia canturiens* (Sw.), Seebohm, Cat. B. Br. Mus., V, p. 141; Grant, P.Z.S., 1900, p. 471; *Herbivox canturiens* (Sw.), P.Z.S., 1871, p. 353; *Homochlamys canturiens* (Sw.), David et Oust., Ois. Chine, p. 243.

Two males (Nov. 9, 13, 1911) from Yen-bai. Three males (Dec. 6, 1911; Feb. 23; Mar. 14, 1912) from Lao-kay

95. ***Burnesia flaviventris*** (Deless.).
Yellow-bellied Wren-Warbler.

Sharpe, Cat. B. Br. Mus., VII, p. 204; *Prinia flaviventris* (Deless.), Oates, F. Br. Ind., Bds., I, p. 449.

One male in winter dress (Feb. 23, 1912) from Lao-kay.

96. ***Burnesia socialis*** (Sykes).
Ashy Wren-Warbler.

Sharpe, Cat. B. Br. Mus., VII, p. 208; *Prinia socialis* Sykes, Oates, F. Br. Ind., Bds., I, p. 450.

Three male specimens (Dec. 2, 1911; Feb. 21, 23, 1912) collected at Lao-kay, and a female (Oct. 27) at Yen-bai.

Fam. CAMPEPHAGIDÆ.

97. ***Pericrocotus speciosus*** (Lath.).
Indian Scarlet Minivet.

Sharpe, Cat. B. Br. Mus., IV, p. 71; Swinhoe, P. Z. S., 1871, p. 379; David et Oust., Ois. Chine, p. 106; Oates, F. Br. Ind., Bds., I, p. 479.

One male (Nov. 16, 1911) and one female (Nov. 17) from Yen-bai. Five males (Nov. 27; Dec. 1, 1911; Jan. 12, 23, 29, 1912) and five females (Nov. 27, 27; Dec. 1, 1911; Feb. 7; Mar. 3, 1912) from Lao-kay. One male bird without label.

98. ***Pericrocotus brevirostris*** (Vigors).
Short-tailed Minivet.

Sharpe, Cat. B. Br. Mus., IV, p. 79; Swinhoe, P. Z. S., 1871, p. 379; David et Oust., Ois. Chine, p. 104; Oates, F. Br. Ind., Bds., I, p. 483; Ingram, Nov. Zool., XIX, p. 283; Hartert, Vög. Pal., I. p. 462.

Two males (Dec. 10, 12, 1911) and a female (Dec. 10) collected at Lao-kay.

99. ***Pericrocotus brevirostris neglectus*** Hume.
Hume's Minivet.

Pericrocotus neglectus Hume, Sharpe, Cat. B. Br. Mus., IV, p. 80; Oates, F. Br. Ind., Bds., I, p. 484.

An adult male, date and exact locality unknown. This form is smaller and more brightly coloured than the typical species, and the black of throat reaches much further down the fore-neck.

100. ***Pericrocotus roseus*** (Vieill.).
Rosy Minivet.

Sharpe, Cat. B. Br. Mus., IV, p. 81; Oates, F. Br. Ind., Bds., I, p. 486; Ingram, Nov. Zool., XIX, p. 283.

An adult male (Oct. 15, 1911) from Yen-bai. One young male (Mar. 16, 1912) and a female (Mar. 18) from Lao-kay.

101. ***Pericrocotus cinereus*** Lafr.
Ashy Minivet.

Sharpe, Cat. B. Br. Mus., IV, p. 83 ; Swinhoe, P. Z. S., 1871, p. 378 ; David et Oust., Ois. Chine, p. 107 ; Oates, F. Br. Ind., Bds., I, p. 489 ; Grant, P.Z.S., 1900, p. 479 ; Hartert, Vög. Pal., I, p. 466.

A single female bird (Oct. 16, 1911) obtained at Yen-bai.

Fam. DICRURIDÆ.

102. ***Buchanga cineracea*** (Horsf.).
Grey Drongo.

Sharpe, Cat. B. Br. Mus., III, p. 250 ; Grant, P. Z. S., 1900, p. 465 ; *Dicrurus cineraceus* (Horsf.), Oates, F. Br. Ind., Bds., I, p. 318.

Three adult males (Dec. 15, 16, 30, 1911) and a male (juv. ?) (Dec. 2.) from Lao-kay. The latter has under tail-coverts with broad white tips and the tail somewhat shorter than in the adult. Probably it is a young. Its measurements as follows : culmen 27 mm., wing 144 mm., tail 131 mm., tarsus 19 mm.

103. ***Dissemurus paradiseus*** (L.).
Larger Racket-tailed Drongo.

Sharpe, Cat. B. Br. Mus., III, p. 258 ; Oates, F. Br. Ind., Bds., I, p. 325; Grant, P.Z.S., 1900, p. 465.

Two specimens (Nov. 13, 1911), both unsexed, captured at Yen-bai. One of them has white tips to under wing-coverts and axillaries ; the other without the white spots.

Fam. ARTAMIDÆ.

104. ***Artamus fuscus*** Vieill.
Ashy Swallow-Shrike.

Sharpe, Cat. B. Br. Mus., XIII, p. 11 ; Swinhoe, P.Z.S., 1871, p. 377 ;

David et Oust., Ois. Chine, p. 101; Oates, F. Br. Ind., Bds., I, p. 498, Fig. 146; Grant, P.Z.S., 1900, p. 470.

One male (Oct. 15, 1911) from Yen-bai. One male (Nov. 14) and two females (Nov. 8; Dec. 2) from Lao-kay.

Fam. LANIIDÆ.

105. ***Lanius schach*** Linn.

Chinese Rufous-backed Shrike.

Gadow, Cat. B. Br. Mus., VIII, p. 261; Swinhoe, P.Z.S., 1871, p. 375; David et Oust., Ois. Chine, p. 95; Grant, P.Z.S., 1900, p. 469.

Four male specimens (Dec. 6, 14, 1911; Jan. 3; Mar. 11, 1912) captured at Lao-kay; and two males (Oct. 29; Nov. 19) at Yen-bai.

106. ***Tephrodornis pelvicus*** (Hodgs.).

Nepal Wood-Shrike.

Oates, F. Br. Ind., Bds., I, p. 473; *Tephrodornis pelvica* (Hodgs.), Sharpe, Cat. B. Br. Mus., III, p. 276; Swinhoe, P.Z.S., 1871, p. 377; David et Oust., Ois. Chine, p. 101; Grant, P.Z.S., 1900, p. 470.

An adult male (Dec. 9, 1911) and an immature female (Dec. 9) from Lao-kay.

107. ***Hemipus picatus capitalis*** (McClell.)

Brown-backed Pied Shrike.

Hemipus capitalis (McClell.), Sharpe, Cat. B. Br. Mus., III, p. 306; Anderson, Yunnan Exp., Aves, p. 647; Oates, F. Br. Ind., Bds., I, p. 472; Ingram, Nov. Zool., XIX, p. 300.

One female specimen (Feb. 27, 1912) obtained at Lao-kay. Dr. Hartert, whom the specimen was shown for examination, identified it with the above form.

Fam. ORIOLIDÆ.

108. ***Oriolus indicus*** Jerd.

Black-naped Oriole.

Oates, F. Br. Ind., Bds., I, p. 502, Fig. 147; Dresser, Man. Pal., Bds., I, p. 278; Hartert, Vög. Pal., I, p. 53; Ingram, Nov. Zool., XIX, p. 309; *Oriolus diffusus* Sharpe, Cat. B. Br. Mus., III, p. 197; Grant, P.Z.S., 1900, p. 465; *O. chinensis* Gm., Swinhoe, P.Z.S., 1871, p. 374; *O. cochinchinensis* Briss., David et Oust., Ois. Chine, p. 132.

A male bird (Oct. 16, 1911) from Yen-bai; four males (Mar. 12, 12, 17, 18, 1912) and a female (Mar. 17) from Lao-kay.

109. ***Oriolus trailii*** (Vigors).

Maroon Oriole.

Sharpe, Cat. B. Br. Mus., III, p. 222; Oates, F.Br. Ind., Bds., I, p. 508; Ingram, Nov. Zool., XIX, p. 308.

An immature female (Oct. 16, 1911) from Yen-bai.

Fam. CORVIDÆ.

110. ***Cissa chinensis*** (Bodd.).

Green Magpie.

Sharpe, Cat. B. Br. Mus., III, p. 85; Oates, F. Br. Ind., Bds., I. p. 28.

Three males (Nov. 2, 9, 14, 1911) and one female (Oct. 15) from Yen-bai.

It has often been remarked that the colour of this bird changes from green to blue after death. I have also observed this change to take place.

111. ***Dendrocitta himalayensis*** Blyth.

Himalayan Tree-pie.

Sharpe, Cat. B. Br. Mus., III, p. 79; Oates, F. Br. Ind., Bds., I, p. 32; Ingram, Nov. Zool., XIX, p. 310.

One male (Mar. 3, 1912) from Lao-Kay.

112. ***Dendrocitta frontalis*** McClell.

Black-browed Tree-pie.

Sharpe, Cat. B. Br. Mns., III, p. 78; Oates, F. Br. Ind., Bds., I, p. 33, Fig. 12.

Two males (Oct. 17, 17, 1911) and a female (Oct. 16) collected at Yen-bai.

113. ***Crypsirhina varians*** (Lath.).

Black Racket-tailed Magpie.

Sharpe, Cat. B. Br. Mus., III, p. 83 ; Oates, F. Br. Ind., Bds., I, p. 35, Fig. 13.

Two males (Oct. 30 ; Nov. 5, 1911) and one female (Nov. 13) from Yen-bai.

114. ***Temnurus temnura nigra*** (Styan).

Cut-tailed Black Magpie.

Hartert, Nov. Zool., XVII, 1910, p. 251–252, Pl. V ; *T. nigra* (Styan), Grant, P.Z.S., 1900, p. 464.

Three males (Nov. 12, 13, 13, 1911) from Yen-bai ; one male (Dec. 24) from Lao-kay.

It is very doubtful whether this form is really different from *T. temnura* (Temm.)=*T. truncatus* Lesson of Cochin China. This is for the first time that this form is recorded from Tonkin. It also occurs in Hainan.

Fam. STURNIDÆ.

115. ***Eulabes intermedia*** (A. Hay).

Indian Grackle.

Oates, F. Br. Ind., Bds., I, p. 511 Fig. 149 ; *Mainatus intermedius* (Hay), Sharpe, Cat. B. Br. Mus., XIII, p. 104.

One female specimen (Mar. 14, 1912) obtained at Lao-kay.

116. ***Graculipica nigricollis*** (Payk.)

Black-necked Myna.

Sharpe, Cat. B. Br. Mus., XIII, p. 77 ; Oates, F. Br. Ind., Bds., I, p. 534; *Gracupica nigricollis* (Payk.), Swinhoe, P.Z.S., 1871, p. 384; David et Oust., Ois. Chine, p. 364; Ingram, Nov. Zool., XIX, p. 308 ; *Sturnopastor nigricollis* (Pyk.), Anderson, Yunnan Exp. Aves, p. 595.

A male bird (Dec. 27, 27, 1911) obtained at Lao-kay.

117. ***Æthiopsar cristatellus*** (Gm.).

Crested Grackle.

Ingram, Nov. Zool., XIX, p. 308; *Acridotheres cristatellus* (Gm.), Sharpe, Cat. B. Br. Mus., XIII, p. 92; Swinhoe, P.Z.S., 1871, p. 384; David et Oust., Ois. Chine, p. 364; Grant, P.Z.S., 1900, p. 463.

Three males (Oct. 21; Nov. 9, 1911; Mar. 12, 1912) obtained at Lao-kay.

Fam. ZOSTEROPIDÆ.

118. ***Zosterops palpebrosa simplex*** Swinh.

Swinhoe's White-eye.

Zosterops simplex Sw., Gadow, Cat. B. Br. Mus., IX, p. 166; Swinhoe, P.Z.S., 1871, p. 349; David et Oust., Ois. Chine, p. 85; Oates, F. Br. Ind., Bds., I, p. 215; Uchida & Kuroda, Annot. Zool. Jap., IX, 1916, p. 142.

One male (Feb. 19, 1912) and one female (Feb. 21) from Lao-kay.

Fam. NECTARINIIDÆ.

119. ***Æthopyga seheriæ*** (Tick.), subsp.?

Æthopyga seheriæ (pt.) Gadow, Cat. B. Br. Mus., IX, pp. 18–21; Oates, F. Br. Ind., Bds., II, p. 348.

Eight males (Oct. 27, 27, 30; Nov. 1, 7, 8, 8, 15, 1911) and two females (Nov. 1, 18) from Yen-bai. Two males (Feb. 23, 25, 1912) and one female (Feb. 21) from Lao-kay. Six males without label.

Measurements:

Sex	Culmen	Wing	Tail	Tarsus	Difference of length between the middle and the next tail-feather
16 ♂s	18–20 mm.	52.5–74 mm.	44–53 mm.	13–14.5 mm.	3.5–7.5 mm.
3 ♀s	17.5–19 mm.	45.5–48.5 mm.	32–36 mm.	13 mm.	——

All the males before me have the greater part of crown bright metallic green. In one of them, this green of crown is tinged with violet. In eight of them, the entire hind part of crown is metallic violet. In all the males the hind part of head and the entire nape are brownish, either uniformly or with reddish or yellowish olive margin to the feathers, the nape being crimson in none. The exposed parts of closed tail are metallic green suffused with violet, except in two males, in which the tail may be said to the metallic violet nearly without the green hue. Chin, throat, chest and fore-breast crimson; hind breast ashy grey; abdomen and flanks pale yellowish olive; under tail-coverts yellowish white with dusky centre to the feathers; under wing-coverts and axillaries ashy white, some of both tinged with very pale yellow.

The female examples before me have the abdomen and sides of body clear pale yellow and under wing-coverts as well as axillaries almost white tinged with very pale yellow. The edge of wing yellow and the lateral tail feathers blackish, tipped very obscurely with white.

There are known four allied forms of *Æ. scheriae*, *viz.*:

(i). *Æ. scheriæ scheriæ* (Tick.), Himalayan region.
(ii). „ „ *andersoni* Oates, Bhámo, Burmah.
(iii). „ „ *cara* Hume, Tenasserim.
(iv). „ „ *labecula* (McCll.), Assam.

The more important differential characters of the males of these forms may be tabulated as follows:

	Colour of Crown.	Colour of Nape.	Colour of visible parts of closed tail-feathers.	Colour of abdomen.	Culmen.	Wing.	Tail.	Tarsus.	Difference of length between the middle and the next tail-feather.	
♂ (i)	Metallic green.	Brownish green.	Metallic green, outer feathers suffused with violet	Slaty greenish yellow.	20 mm.	56 mm.	68.5 mm.	14 mm.	25.5 mm.	Gadow & Oates
♂ (ii)	Metallic lilac.	Brown.	Metallic lilac.	Olive yellow.	18 mm.	51 mm.	61 mm.	—	—	„

♂ (iii)	Metallic green tinged with violet.	Crimson	Metallic violet.	Grey and slightly olive.	18 mm.	51–56 mm.	38–53.5 mm.	13 mm.	5 mm.	Gadow & Oates
♂ (iv)	—	"	—	Olive grey.	20 mm.	56 mm.	66 mm.	—	—	Gadow

Now, it may be pointed out that the males of the Tonkinese form in the present collection do not agree quite with those of any of the above forms. They differ from *Æ. seheriæ seheriæ* in having the tail much shorter and the difference of length between the middle and the next lateral tail-feather also distinctly smaller; from *Æ. seheriæ andersoni* by the shorter tail and in the majority having the visible parts of the closed tail metallic green suffused with violet, instead of being lilac; from *Æ. seheriæ cara* in having the nape never crimson; and from *Æ. seheriæ labecula* in the shorter tail as well as in the nape which is not crimson.

As regards the females of the Tonkinese form, they are somewhat nearer to the same sex of *Æ. seheriæ seheriæ* than of *Æ. seheriæ cara*. However, they differ from the former by the tail being decidedly shorter. Moreover, the under wing-coverts and axillaries are not so clear pale yellow as in *cara*.

120. ***Arachnothera magna*** (Hodgs.).

Larger Streaked Spider-hunter.

Gadow, Cat. B. Br. Mus., IX, p. 105; Oates, F. Br. Ind., Bds., II, p. 369; Uchida & Kuroda, Annot. Zool. Japon., 1916, p. 142.

A single male (Dec. 5, 1911) from Lao-kay.

121. ***Arachnothera magna aurata*** Blyth.

Smaller Streaked Spider-hunter.

A. aurata Blyth, Gadow, Cat. B. Br. Mus., IX, p. 105; Oates, F. Br. Ind., II, p. 370.

Three males (Jan. 10, 11, 27, 1912) from Lao-kay; and two males (Nov. 15, 19, 1911) from Yen-bai.

This form is much smaller than the typical *A. magna*. Exposed culmen 38–40 mm., wing 83.5–89 mm.

129. ***Arachnothera longirostris*** (Lath.).

Little Spider-hunter.

Gadow, Cat. B. Br. Mus., IX, p. 103; Oates, F. Br. Ind., Bds., II, p. 371. One male (Nov. 12, 1911) frcm Yen-bai ; two males (Dec. 7, 28) from Lao-kay.

Fam. DICÆIDÆ.

123. ***Dicœum cruentatum*** (L.).

Scarlet-backed Flower-pecker.

Sharpe, Cat. B. Br. Mus., X, p. 15 ; Swinhoe, P.Z.S., 1871, p. 349; David et Oust., Ois. Chine, p. 83 ; Oates, F. Br. Ind., Bds., II. p. 376; Grant, P.Z.S., 1900, p. 468.

Four males (Nov. 14, 15, 16, 16, 1911) from Yen-bai.

Fam. PLOCEIDÆ.

124. ***Munia topela*** Swinhoe.

Swinhoe's Munia.

Sharpe, Cat. B. Br. Mus., XIII, p. 351; Swinhoe, P.Z.S., 1871, p. 385 ; David et Oust., Ois. Chine, p. 343; Grant, P.Z.S., 1900, p. 465; Ingram, Nov. Zool., XIX, p. 307.

An adult male (Jan. 20, 1912), an immature male (Jan. 20), and three immature females (Jan. 20, 20, 20) collected at Lao-kay. One adult female (Nov. 1, 1911) from Yen-bai.

125. ***Uroloncha acuticauda*** (Hodgs.).

Hodgson's Munia.

Sharpe, Cat. B. Br. Mus., XIII, p. 356 ; Oates, F. Br. Ind., Bds., II, p. 184; *Munia acuticauda* Hodgs., Swinhoe, P.Z.S., 1871, p. 385 ; David et Oust., Ois. Chine, p. 343; Ingram, Nov. Zool., XIX, p. 307.

An adult male (Feb. 28, 1912) from Lao-kay; one immature male (Nov. 15, 1911) from Yen-bai.

Fam. FRINGILLIDÆ.

126. ***Carpodacus erythrinus*** (Pall.).

Scarlet Finch.

Sharpe, Cat. B. Br. Mus., XII, p. 391; Swinhoe, P.Z.S., 1871, p. 387; David et Oust., Ois. Chine, p. 350; Oates, F. Br. Ind., Bds., II, p. 219; Dresser, Man. Pal. Bds., I, p. 321; *Carpodacus erythrina erythrina* (Pall.), Hartert, Vög. Pal., I, p. 106.

A single female specimen (Jan. 13, 1912) from Lao-kay.

127. ***Emberiza fucata*** Pall.

Grey-headed Bunting.

Sharpe, Cat. B. Br. Mus., XII, p 493; Swinhoe, P.Z.S., 1871, p. 388; David et Oust., Ois. Chine, p. 325; Oates, F. Br. Ind., Bds., II, p. 252; Dresser, Man. Pal. Bds., I, p. 360; Grant, P.Z.S., 1900, p. 467; *E. fucata fucata* Pall., Hartert, Vög. Pal., I, p. 187.

An adult female (Jan. 5, 1912) from Lao-kay.

128. ***Emberiza pusilla*** Pall.

Dwarf Bunting.

Sharpe, Cat. B. Br. Mus., XII, p. 487; Swinhoe, P.Z.S., 1871, p. 389; David et Oust., Ois. Chine, p. 323; Oates, F. Br. Ind., Bds., II, p. 254; Anderson, Yunn. Exp., Aves, p. 603; Hartert, Vög. Pal., I, p. 188; Dresser, Man. Pal. Bds., I, p. 363; Ingram, Nov. Zool., XIX, p. 306.

One male (Jan. 24, 1912) and one female (Dec. 17, 1911) from Lao-kay.

129. ***Emberiza rutila*** Pall.

Chestnut Bunting.

Sharpe, Cat. B. Br. Mus., XII, p. 514; Oates, F. Br. Ind., Bds., II, p.

263; Hartert, Vög. Pal., I, p. 172; Dresser, Man. Pal. Bds., I, p. 348; Uchida & Kuroda, Annot. Zool. Japon., 1916, p. 143; *Euspiza rutila* (Pall.), Sw., P.Z.S., 1871, p. 387; David et Oust., Ois. Chine, p. 331.

One male (Nov. 16, 1911) from Yen-bai.

130. ***Melophus melanicterus*** (Gm.).
Crested Bunting.

Sharpe, Cat. B. Br. Mus., XII, p. 568; Swinhoe, P.Z.S., 1871, p. 387; David et Oust., Ois. Chine, p. 333; Oates, F. Br. Ind., Bds., II, p. 265; Ingram, Nov. Zool., XIX, p. 307.

One immature male (Nov. 16, 1911) and one adult female (Nov. 18) from Yen-bai. One adult male (Mar. 10, 1912), four immature males (Feb. 17, 27; Mar. 7, 7) from Lao-kay. Further, one adult male without label.

Notes on Formosan Birds, with Description of a New Bullfinch.

By

Nagamichi Kuroda, *Rigakushi.*

The following notes on Formosan birds are based in part on the collection I have made on the occasion of my visit to the island during April and May of last year, and in part on specimens preserved in some other collections, but chiefly in the museums of Taihoku and Tainan. Mr. Uchida, in his "Hand-list of Formosan Birds" (Annot. Zool. Jap., vol. VIII, pt. 1, 1912) has given 290 species and subspecies; further, the same auther has added in his "Nihon Chōrui Zusetsu" (The Birds of Japan, 1915) 11 more forms to the list. To the number I am now able to add still 30 more, bringing up the total number of forms in the Formosan avifauna to 331. One of the new additions is a species of *Pyrrhula*, which I will call *P. uchidai*, the type of which is contained in the collection of the Science College, Tokyo Imperial University.

In the preparation of this paper, Mr. Uchida has favoured me with much valuable advice. Mr. M. Oshima of the Taihoku Museum and Mr. T. Kazano of the Tainan Museum have given me exceptional facilities in the examination of the specimens under their care. Messrs. M. Hayakawa and Y. Kikuchi of Taihoku have both rendered me very useful help to my collecting work. To all the above gentlemen my best thanks are due.

Family PODICIPEDIDÆ.

1. *Podicipes fluviatilis philippensis* (Bonnaterre).

Kaitsuburi.

Ogawa, Annot. Zool. Japon., 1908, p. 337; *P. philippensis* (Bonn.), Grant, Cat. B. Br. Mus., XXVI, p. 511; Uchida, Annot. Zool. Japon., 1912, p. 141; *Podiceps philippensis* (Bonn.); Tada, Taiwan Chōrui Ippan, 1899, p.

91; Swinh., P.Z.S., 1871, p. 415; *Podiceps minor* (nec Gm.), Tada, Taiwan Chōrui Ippan, p. 90.

Specimens collected at Suisha, Nantō Distr.: 2 ♂s æst. & 1 ♀ æst., May 2; 1 ♂ æst. & 2 ♀s æst., May 3. A group of the bird in breeding plumage was observed in Teishiryōshō, Tainan Distr.

Family PROCELLARIIDÆ.

2. *Bulweria bulweri pacifica* Mathews & Iredale.

Ō-anadori.

Mathews & Iredale, Ibis, 1915, p. 609; *Bulweria bulweri* (nec Jard. & Selby), Ogawa, "Dōbutsugaku Zasshi" (Tokio Zoological Magazine), 1904, p. 30; Uchida, Annot. Zool. Japon., Vol. VIII, Part I, 1912, p. 142.

A specimen of this subspecies, collected at Ajinkōto, Keelung, Mar. 1905, is preserved in the Taihoku museum.

Family PELECANIDÆ.

3. *Pelecanus crispus* Bruch.

Garanchō

Grant, Cat. B. Br. Mus., XXVI, p. 468; Blanford, F. Brit. Ind., Bds., IV, p. 335; Dresser, Pal. Bds., II, p. 563; Izuka & Kuroda, "Dōbutsugaku Zasshi" (Tokyo Zoological Magazine), 1916, pp. 182–184.

An adult specimen, taken at Takoshō, Tainan Distr., Dec. 23, 1911, is preserved in the Tainan Museum. A juvenile specimen is in my own collection; it was obtained at Jurin, Taihoku Distr., Nov. 10, 1912.

Family ARDEIDÆ.

4. *Herodias garzetta* (Linn.).

Kosagi, Shirasagi.

Blanford, F. B. Ind., Bds., III, p. 387; Grant & La Touche, Ibis, 1907, p. 262; *Ardea garzetta* L., Tada, Taiwan Chōrui Ippan, p. 76; Dresser, Pal. Bds., II, p. 568; Uchida, Annot. Zool. Japon., 1912, p. 144; *Garzetta garzetta*, Sharpe, Cat. B. Br. Mus., XXVI, p. 118; *Garzetta egretta* (Briss.), Swinhoe, P.Z.S., 1871, p. 412.

A female obtained at Kansaishō, Tainan Distr., May 10. This species is very common on the island, except in the mountainous parts.

5. ***Bubulcus coromandus*** (Bodd.)

Amasagi, Shōjōsagi.

Sharpe, Cat. B. Br. Mus., XXVI, p. 217; Swinhoe, P.Z.S., 1871, p. 412; Blanford, F. B. Ind., Bds., IV, p. 389; Grant & La Touche, Ibis, 1907, p. 263. *Ardea coromanda* (Bodd.), Tada, Taiwan Chōrui Ippan, p. 75; Uchida Annot. Zool. Japon., 1912, p. 143.

Kanseishō, Tainan Distr.: 2♂s & 1♂ jin., May 10; Shintengai, Taihoku Distr.; 1♂ & 2♀s, May 19. The species occurs in abundance on dry fields, mostly on insects.

6. ***Phoyx manillensis*** (Meyen)

Murasakisagi.

Sharpe, Cat. B. Br. Mus., XXVI, p. 63, Pl. I; Uchida, Annot. Zool. Japon., 1912, p. 145; *Ardea manillensis* Blanf., F. B. Ind., Bds., IV, p. 381; *Pyrrherodia manilensis* (Meyen), McGregor, Man. Phil. Bds. I, p. 162.

Suisha, Nantō Distr.: 1♂ jur., May 2. This heron is but very rarely procurable in Formosa.

7. ***Nycticorax nycticorax*** (Linn.).

Goisagi.

Sharpe, Cat. B. Br. Mus., XXVI, p. 149; Swinhoe, P.Z.S., 1871, p. 413; Tada, Taiwan Chōrui Ippan, p. 77; Grant and La Touche, Ibis, 1907. p. 263; Grant, Ibis, 1908, p. 606; Uchida, Annot. Zool. Japon., 1912, p. 145; *N. griseus* Blanford, F. Brit. Ind., Bds., IV, p. 397, fig. 96.

Suisha: 3♂s & 4♀s, May 3; Shintengai, Taihoku Distr.: 3♂s, May 19. The species is not uncommon in the woods near ponds and rivers.

8. ***Butorides javanica amurensis*** (Schrenk).

Sasagoi, Minogoi.

Ogawa, Annot. Zool. Japon, 1905, p. 214; *Butorides amurensis*(Schrenk), Sharpe, Cat. B. Brit. Mus., XXVI, p. 181; McGregor, Phil. Bds., I, p. 176; Ogawa, Annot. Zool. Japon., 1908, p. 344; *Ardetta javanica* (nec Horsf.), Dresser, Pal. Bds., II, p. 575.

Suisha, Nantō Distr.: 1 ♀, May 2; 2 ♂s May 3. Pretty common about streams and lakes. *B. javanica* (Horsf.) is also found in Formosa, but could not be obtained. Both specimens are preserved in the Taihoku museum.

9. ***Ardetta cinnamomea*** (Gmelin).

Riukiuyoshigoi, Akabaneyoshigoi.

Swinhoe, P.Z.S., 1871, p. 413; Sharpe, Cat. B. Br. Mus., XXVI, p. 236; Blanford, F. B. Ind., Bds., IV, p. 402; Dresser, Pal. Bds., II, p. 577; Grant and La Touche, Ibis, 1907, p. 263; Uchida, Annot. Zool. Japon., 1912, p. 145; *Ixobrychus cinnamomeus* (Gm.), McGregor, Phil. Bds., I, p. 179; *Nannocnus ijimai* Ogawa, Annot. Zool. Japon., 1905, p. 215.

Enteishō, Tainan Distr.: 1 ♀ juv., May 9. This bittern is somewhat less common than the foregoing species.

10. ***Nannocnus eurythmus*** (Swinh.).

Ō-yoshigoi.

Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 345; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), I, 1913, p. 170, Pl. IV, fig. 18; *Ardetta eurythma* Swinh., (Sharpe), Cat. B. Br. Mus., XXVI, p. 242; Dresser, Pal. Bds., II, p. 578.

A fine adult female is kept in cage in the Nursery of Plants, Taihoku city. This bird was captured near Taihoku.

Family CICONIIDÆ.

11. ***Ciconia boyciana*** Swinh.

Kōnotori.

Sharpe, Cat. B. Br. Mus., XXVI, p. 302; Dresser, Pal. Bds., II, p. 581; Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 346; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japon), I, 1913, p. 111, Pl. III, fig. 4.

An adult bird is preserved in the Tainan Museum. It was obtained at Gyoon, Tamian Distr., Dec. 10, 1911.

12. ***Ciconia nigra*** (Linn.).

Nabekō.

Sharpe, Cat. B. Br. Mus., XXVI, p. 303; Blanford, F. Brit. Ind., Birds, IV, p. 369; Dresser, Pal. Bds., II, p. 581; Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 345; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), I, 1913, p. 112.

A juvenile specimen of this species is in my collection. It was captured at Tamsui, Taihokn Distr., September, 1915.

Family IBIDIDÆ.

13. ***Ibis melanocephala*** (Latham).

Kurotoki, Nabekaburi.

Sharpe, Cat. B. Br. Mus., XXVI, p. 7; Blanford, F. Brit. Ind., Bds., IV, p. 361; Dresser, Pal. Bds., II, p. 584; Ogawa, Hand. Bds. Jap., Annot. Zool. Japon, 1908, p. 346; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japon), I, 1913, p. 114, Pl. III, fig. 5.

A juvenile specimen in the Taihoku museum (Tōkō, Feb. 29, 1909), and another in the Tainan Museum.

Family ANATIDÆ.

14. ***Melanonyx segetum serrirostris*** (Sw.).

Hishikui.

Alphéraky, Geese of Europe & Asia, 1904, p. 123, Pl. XII; Kuroda, "Sekai no Gan to Kō" (Geese and Swans of the World), Ornith. Societ. Jap., 1913, p. 62, Pl. I; *Anser serrirostris* (Gould, MS.), Salvadori, Cat, B. Br. Mus., XXVII, p. 101; *Anser segetum serrirostris* Sw., Stejneger, Bull. U. S. Nat. Mus., 1885, No. 29, p. 144.

An adult specimen in the Taihoku museum (Tamsui, Apr. 23, 1909). A second specimen, also an adult, in the Tainan Museum.

15. ***Cygnopsis cygnoides*** (Linn.).

Sakatsura-gan.

Alphéraky, Geese of Europe & Asia, 1904, p. 176, Pl. XXI; Salvadori, Cat. B. Br. Mus., XXVII, p. 107; Kuroda, "Sekai no Gan to Kō" (Geese and Swans of the World), Ornith. Societ. Jap., 1913, p. 32, Pl. I & III; *Anser cygnoides* Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 351; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), I, p. 152, Pl. IV, fig. 15; David et Oust., Ois. Chine, p. 493. Dresser, Pal. Bds., II, p. 593.

Three specimens, obtained at Ratō, Giran Distr., in the Ratō school for the natives.

Family VULTURIDÆ.

16. ***Vultur monachus*** Linn.

Hagewashi.

Sharpe, Cat. B. Br. Mus., I, p. 3; Blanford, F. Brit. Ind., Bds., III, p. 317; Dresser, Pal. Bds., II, p. 500; Swinhoe, P.Z.S., 1871, p. 338.

An adult bird in the Taihoku museum (Ōkei, Sankakuyū, Oct. 4, 1913). Another adult in the Tainan museum (Kagi Distr., Dec. 28, 1910).

Family FALCONIDÆ.

17. ***Accipiter affinis*** Hodgson.

Taiwantsumitaka.

Grant and La Touche, Ibis, 1907, p. 257; Uchida, Annot. Zool. Japon., 1912, p. 150; *Accipiter virgatus* (Temm.), Swinhoe, P.Z.S., 1871, p. 342; McGregor, Phil. Bds., I, p. 220; Sharpe, Cat. B. Br. Mus., I, p. 150 (part); Blanford, F. B. Ind., Bds., III, p. 404 (part); Tada, Taiwan Chōrui Ippan, p. 72; *Accipiter sp.*, Tada, op. cit. p. 72, No. 123.

An adult female obtained at Shikyōtōsho, Nantō Distr., May 4.

18. ***Haliaëtus albicillus*** (Linn.).

Ojirowashi.

Sharpe, Cat. B. Br. Mus., I, p. 302; Swinhoe, P.Z.S., 1871, p. 339; Blanford, F. Brit. Ind., Bds., III, p. 369; Dresser, Pal. Bds., II, p. 524; Ogawa, Hand. Bds., Jap., Annot. Zool. Japon., 1908, p. 354; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), I, p. 168.

Two specimens preserved in the Taihoku museum, and three in the Tainan museum.

19. ***Spilornis cheela*** (Latham).

Ō-kammuriwashi.

Sharpe, Cat. B. Brit. Mus., I, p. 287; Swinhoe, P.Z.S., 1871, p. 340; Blanford, F. B. Ind., Bds., III, p. 357, fig. 90; Tada, Taiwan Chōrui Ippan, p. 72; Grant & La Touche, Ibis, 1907, p. 258; Uchida, Annot. Zool. Japon., 1912, p. 150; *Spilornis melanotis* (Jerdon), Sharpe, Cat. B. Br. Mus., I, p. 289; Grant, P.S.Z., 1900, p. 491.

An adult female obtained at Funpōshō, Nantō, Distr., May 4. The species is not uncommon in the wooded parts.

20. ***Pernis apivorus*** (Linn.).

Hachikuma.

Sharpe, Cat. B. Br. Mus., I, p. 344; Swinhoe, P.Z.S., 1871, p. 341;

Dresser, Pal. Bds., II, p. 538; Ogawa, Hand. Bds. jap., Annot. Zool. Japon., 1908, p. 355; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), I, 1913, p. 175, Pl. VII, fig. 4.

A juvenile bird, obtained near Taihoku, is in my collection.

21. ***Milvus ater govinda*** Sykez.
Himetombi.

Milvus govinda Sykes, Swinhoe, P.Z.S., 1871, p. 341; Sharpe, Cat. B. Br. Mus., I, p. 325; Blanford, F. Brit. Ind., Bds., III, p. 374, fig. 93; *Milvus melanotis* (nec T. & S.), Tada, Taiwan Chōrui Ippan, p. 70; *M. ater melanotis* (nec T. & S.), Uchida, Annot. Zool. Japon., 1912, p. 151.

Specimens collected at Gyochi, Nantō Distr.: 1 ♂, May 2; Horisha, Nantō Distr.: 1 ♀, May 10; Enteishō, Tainan: 1 ♀, May 9. This is a rather common bird in Formosa. I could not determine if the Large Indian Kite, *Milv. ater melanotis* T. & S., also occurs on the island.

22. ***Falco peregrinator*** Sundev.
Muneaka-hayabusa.

Sharpe, Cat. B. Br. Mus., I, p. 382; Blanford, F. Brit. Ind., Bds., III, p. 415.

A specimen of this beautiful falcon was obtained at Horisha, Nantō Distr., Nov. 1912; and is preserved in the Taihoku Museum, and another specimen in the Tainan Museum. Further, a young specimen is in my collection; it was obtained at Horisha, September, 1915.

Family PANDIONIDÆ.

23. ***Pandion haliaëtus*** (Linn.).
Misago.

Sharpe, Cat. B. Br. Mus., I, p. 449; Swinhoe, Ibis, 1871, p. 340; Tada, Taiwan Chōrui Ippan, p. 73; Blanford, F. Brit. Ind., Bds., III, p. 314; Grant, P.Z.S., 1900, p. 491; Grant & La Touche, Ibis, 1907, p. 256; McGregor, Man. Phil. Bds., I, p. 245; Dresser, Pal. Bds., II, p. 554; Uchida, Annot. Zool. Japon., 1912, p. 152.

An adult male obtained at Tamsui, Toihoku Distr., May 22.

Family PHASIANIDÆ.

24. ***Calophasis mikado*** Ogilvie-Grant.
Mikado-kiji, Futufutu.

Grant, Bull. B. O. C., XVI, 1906, p. 277; Grant & La Touche, Ibis, 1907, p. 277; Grant, op. cit., 1908, pp. 606–608, Pl. XIII. (♂ ♀) & text-fig. 7; Uchida, Annot. Zool. Japon., 1912, p. 155; Grant, Ibis, 1912, pp. 654–657; *Phasianus mikado* (Grant), Rothschild, Bull. B.O.C., XXI, 1907, p. 22.

I have had the good fortune of collecting four specimens of this rare pheasant, with the aid of district officials and of native boys, on an altitude of about 8000 ft. avove sea-level, on Mt. Arisan, Kagi Distr. The specimens obtained are: 1♂ ad., May 10; 1♂ ad., May, 11; 2♀s ad., May 13.

The two males are very closely alike in colours of plumage, except the fact that, while in one of them the white bars on tail-feathers stand out from the quill quite or nearly opposite both ways on the two webs, in the other specimen the same bars stand alternately, — a variation which is also observable in *Phasianus sæmmerringi* Temm. The gloss on the mantle is not so strongly reddish purple as is represented in Ogilvie-Grant's figure (Ibis, 1908, Pl. XIII). Nor is the head of so pale in colour. Tertiaries and scapulars have no distinct white margin.

The females are both less reddish brown than in Grant's figure, but not to the same degree in the two specimens, one of these being, on the whole somewhat darker than the other. It seems the plumage colour is much more variable in the female than in the male.

My notes on the colour of soft parts in the four specimens run as follows:

♂ ad. Upper mandible horny black; lower mandible olivaceous horn colour; feet, toes and claws dark grey; spurs greyish horn colour; iris reddish brown; or pale brownish red; fleshy face carmine red; lower eyelid pale reddish white.

♀ ad. Bill, feet, toes and claws nearly as in the males, though somewhat paler. Iris pale brown; fleshy face red, but not carmine red.

The measurements are as follows:

Sex	Total L.	Bill from Gape	Wing	Tail	Tarsus
♂ ad.	855 mm.	33.5 mm.	225 mm.	490 mm.	67.5 mm.
♂ ad.	893 mm.	32 mm.	230 mm.	525 mm.	67.5 mm.
♀ ad.	530 mm.	31 mm.	215 mm.	200 mm.	60 mm.
♀ ad.	525 mm.	28 mm.	215 mm.	215 mm.	61 mm.

The stomach contents consisted of some well digested substance, besides a number of pebbles. The crops were filled with vegetable matter, among which Dr. B. Hayata has recognized parts of such plants as ferns, *Pteris Aster, Tsuga, Coptis,* etc. In the crop of one female there were found, besides, some twenty one larvæ of the Tipulidæ. It may be mentioned that, according to informations from the natives, the Mikado Pheasant is found of the fruit of the wild berry (*Rubus arisanensis* Hay.), the red seeds of "Fukūhyō" (*Clerodendron* sp.), etc.

25. ***Gennæus swinhoii*** (Gould).

Sakei, Owakei, Seiban-kiji.

Grant, Cat. B. Br. Mus., XXII, p. 309; Grant and La Touche, Ibis, 1907, p. 276; Uchida, Annot. Zool. Japon., 1912, p. 154; *Euplocamus swinhoii* Gould, Swinhoe, P.Z.S., 1871, p. 399; Tada, Taiwanchōrui Ippan, p. 93.

Horisha, Nantō Distr.: 1 ♂ & 1 ♀, Ap. 29; Arisan: 1 ♀, May 12. This beautiful pheasant was met with not uncommon in the mountainous parts of the Nantō Distr., at an elevation of 4–6000 ft. On Arisan it was rare above 8000 ft. altitude.

26. ***Arboricola crudigularis*** (Swinh.).
Miyama-tekkei. Ankatekkei.

Grant, Cat. B. B. Mus., XXII, p. 211; Grant and La Touche, Ibis, 1907, p. 275; Uchida, Annot. Zool. Japon., 1912, p. 153; *Oreoperdix crudigularis* Swinhoe, P.Z.S., 1871, p. 400; Tada, Taiwan Chōrui Ippan, p. 94.

Specimens obtained at: Horisha, Nantō Dist.: 1♂ & 1♀, Ap. 29; Arisan: 1♂, May 14. The tree-partridge was met with on Arisan together with the Mikado Pheasant.

27. ***Bambusicola sonorivox*** Gould.
Tekkei.

Swinhoe, P.Z.S., 1871, p. 400; Grant, Cat. B. Br. Mus., XXII, p. 259; Tada, Taiwan Chōrui Ippan, p. 92; Grant and La Touche, Ibis, 1907, p.276; Uchida, Annot. Zool. Japon., 1912, p. 154.

Horisha, Nantō Distr.: 1♀, Ap. 29; Suisha, Nantō: 1♂, May 2; Shiyōtō, Nantō: 4♂,s & 2♀s, May 4. The species was found to be common in the mountains of Nantō District, at an altitude of 4–6000 ft. above sea-level.

Family RALLIDÆ.

28. ***Porzana fusca*** (Linn.).
Hikuina.

Dresser, Pal. Bds., II, p. 710; Uchida, Annot. Zool. Japon., 1912, p. 155; *Limnobænus fuscus* (L.), Sharpe, Cat. B. Br. Mus., XXIII, p. 146; McGregor, Man. Phil. Bds., I, p. 74; *Amaurornis fuscus* (L.), Blanford, F. B. Ind., Bds., IV, p. 170; Grant and La Touch, Ibis, 1907, p. 272.

Suisha, Nantō Distr.: 2♂s, May 3.

Family CHARADRIIDÆ.

29. ***Charadrius fulvus*** Gmelin.
Munaguro.

Swinhoe, P.Z.S., 1871, p. 403; Tada, Taiwan Chōrui Ippan, p. 83; Blanford, F. B. I., Bds., IV, p. 234; McGregor, Man. Phil. Bds., I, p. 104; Uchida, Annot. Zool. Japon., 1912, p. 157; *Charadrius dominicus* P. L. S. Müll., Sharpe, Cat, B. Br. Mus., XXIV, p. 195; Dresser, Man. Pal. Bds., II, p. 732; Grant & La Touche, Ibis, 1907, p. 265.

Enteishō, Tainan Distr.: 1 ♂ æst., May 9. The single specimen obtained was in breeding plumage.

30. ***Ægialitis dubia*** (Scop.)

Minami-kochidori.

Grant & La Touche, Ibis, 1907, p. 265; Sharpe, Cat. B. Br. Mus., XXIV, p. 263, (part); Grant, P.Z.S., 1900, p. 495; *Ægialites dubius* (Scop.), Swinhoe, P.Z.S., 1871, p. 404; *Charadrius dubius dubius* Scop., Hartert & Jackson, Ibis, 1915, pp. 526–534.

Horisha, Nantō Distr.: 1 ♀ ad., May 12.

The bill in this species is somewhat longer (exp. culm. 14–15.6 mm.) than in *Æ. dubia minor* Wolf. & Meyer (exp. culm. 11.8–14.5 mm.). The latter form is also found in Formosa, though rarely.

31. ***Ægialitis cantiana dealbatus*** Swinh.

Shirochidori.

Ægialites dealbatus Swinh., P.Z.S., 1871, p. 404; *Ægialtis dealbata* Sw., Sharpe, Cat. B. Br. Mus., XXIV, p. 282; Grant & La Touche, Ibis, 1907, p. 265; *Charadrius alexandrinus dealbatus* (Sw.), Hartert & Jackson, Ibis, 1915, pp. 526–534; *Charadrius cantianus* (nec Lath.), Tada, Taiwan Chōrui Ippan, p. 84; Uchida, Annot. Zool. Japon., 1912, p. 158; *Ægialitis alexandrina* (L.), part, Grant, P.Z.S., 1900, p. 495; Ogawa, Annot. Zool. Japon., 1905, p. 219; McGregor. Man. Phil. Bds., I, p. 112.

Two adult males obtained at Tamsui, Taihoku Distr., May 22.

This subspecies is distinguished from the typical form of the species by the larger bill, which is 16–19 mm., instead of 14–15 mm., long. Both the forms occur in Formosa as well as in southern Japan, though the typical form is the much less commoner of the two.

32. ***Ochthodromus geoffroyi*** (Wagl.)

Ōmedai-chidori.

Sharpe, Cat. B. Br. Mus., XXIV, p. 217; Grant, P.Z.S., 1900, p. 495; McGregor, Man. Phil. Bds., I, p. 106; *Ægialites geoffroyi* (Wagl.), Swinhoe, P.Z.S., 1871, p. 404; *Ægialitis geoffroyi* (Wagl.), Blanford, F. B. Ind., Bds., IV, p. 237; Dresser, Man. Pal. Bds., II, p. 735; Grant & La Touche, Ibis, 1907, p. 265; *Charadrius geoffroyi* (Wagl.), Tada, Taiwan Chōrui Ippan, p. 83; Uchida, Annot. Zool. Japon, 1912, p. 137.

Two females obtained at Tamsui, Taihoku, Distr., May 22.

33. ***Ochthodromus mongolicus*** (Pall.).

Medai-chidori.

Grant, P.Z.S., 1900, p. 495; *Ochth. mongolus* Pall., Tada, Taiwan Chōrui Ippan, p. 84; McGregor, Man. Phil. Bds., I, p. 107; *Ægialitis mongola* (Pall.), Dresser, Pal. Bds., II, p. 734; *Ægialitis mongolica* (Pall.), Blanford, F. Brit. Ind., Bds., IV, p. 238; *Ægialitis mongolus* (Pall.), Swinhoe, P.Z.S., 1871, p. 404; *Charadrius mongolicus* Pall., Uchida, Annot. Zool. Japon., 1912, p. 157.

Specimens collected: Enteishō, Tainan Distr.: 1 ♂ œst. & 1 ♀ œst., May 9; Teishiryōshō, Tainan, Distr.: 2 ♀s, May 10; Tamsui, Taihoku Distr.: 1 ♂ juv., May 22. The species is very common on fish-culture ponds with partially exposed bottom and at mouth of rivers.

34. ***Limosa melanura melanuroides*** Gould.

Oguro-shigi.

Stejneger, Proc. U. S. Nat. Mus., Vol. X, 1887; Styan, Ibis, 1893, p. 437; Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 362; *Limosa limosa* (L.), part., Sharpe, Cat. B. Brit. Mus., XXIV, p. 381; *Limosa belgica* (Gmel.) part., Dresser, Pal. Bds., II, p. 798; Blanford, F. Brit. Ind., Bds., IV, p. 254; *Limosa melanura* Leisl. part., Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), I, p. 235, Pl. XVII, fig. 4 & 5.

Two specimens in breeding plumage are preserved in the Tainan Museum.

35. ***Tringoides hypoleucus*** (Linn.).

Isoshigi, Mushibami.

Swinhoe, P.Z.S., 1871, p. 406; Sharpe, Cat. B. Br. Mus., XXIV, p. 456; Grant, P.Z.S., 1900, p. 497; Grant & La Touche, Ibis, 1907, p. 267; *Totanus hypoleucus* (L.), Blanford, F. B. Ind., Bds., IV, p. 260; Dresser, Man. Pal. Bds., II, p. 791 ; Tada, Taiwan, Chōrui Ippan, p. 83 ; Uchida, Annot, Zool. Japon., 1912, p. 160; *Actitis hypoleucos* (L.), McGregor, Man. Phil. Bds., I, p. 126.

Horisha, Nantō Distr.: 1 ♂, May 2; Konsaishō, Tainan Distr.: 1 ♂, May 10. This Sandpiper was seen at Tamsui, Taihoku, Distr.

36. ***Limonites ruficollis*** (Pall.).

Tōnen.

Sharpe, Cat. B. Br. Mus., XXIV, p. 545; *Tringa ruficollis* Pall., Blanford, F. B. Ind., Bds., IV, p. 274; Grant, P.Z.S., 1900, p. 498; Dresser, Man. Pal. Bds., II, p. 771 ; Grant & La Touche, Ibis, 1907, p. 268 ; Uchida, Annot. Zool. Japon., 1912, p. 161 ; *Tringa salina* Pall., Swinhoe, P.Z.S., 1871, p. 409; *Pisobia ruficollis* (Pall.), McGregor, Man. Phil. Bds., I, p. 135; *Tringa minuta* (nec Leisl.), Tada, Taiwan Chōrui Ippan, p. 85.

Specimens obtained at Enteishō, Tainan Distr.: 12 ♂s & 6 ♀s, May 9; Teishiryōshō, Tainan : 4 ♀s, May 10. This species with rafescent neck was found to be very common in the Tainan District.

37. ***Limonites subminuta*** (Middend.).

Hibarishigi.

Tringa subminuta Midd., Blanford, F. B. Ind., Bds., IV, p. 275; Dresser, Pal. Bds., II, p. 772; *Tringa damacensis*, pt., (Horsf.), Swinhoe, Ibis, 1871, p. 409; Ogawa, Annot. Zool. Japon., 1908, p. 365; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), I, 1913, p. 254; *Limonites damacensis*, pt., (Horsf.), Sharpe, Cat. B. Br. Mus., XXIV, p. 553. *Pisobia damacensis*, pt. (Horf.), McGregor, Man. Phil. Bds., I, p. 136.

One male and two females obtained at Enteishō, Tainan Distr., May 9. This species has never before been recorded from Formosa.

38. ***Tringa crassirostris*** T. & S.

Obashigi.

Sharpe, Cat. B. Br. Mus., XXIV, p. 600; Blanford, F. Brit. Ind., Bds., IV, p. 277; Dresser, Man. Pal. Bds., II, p. 776; Grant, P.Z.S., 1900, p. 498; Ogawa, Annot. Zool. Japon., 1908, p. 365; McGregor, Man. Phil. Bds., I, p. 141; Uchida, "Nihon Chōrui Zusetsu," I, 1913, p. 255; *Tringa tenuirostris* (nec Horsf.), Swinhoe, P.Z.S., 1871, p. 408.

A male obtained at Tamsui, Taihoku Distr., May 22. This is the first specimen of the species that was ever obtained in Formosa.

39. ***Tringa canutus*** Linn.

Ko-obashigi.

Sharpe, Cat. B. Br. Mus., XXIV, p. 593; Swinhoe, P.Z.S., 1871, p. 408; Dresser, Pal. Bds., II, p. 775; Ogilvie-Grant, P.Z.S., 1900, p. 498; Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 366; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan) I, 1913, p. 254.

A specimen of this bird in breeding plumage is to be found in the Tainan Museum.

40. ***Ancylochilus subarquatus*** (Güldenstädt).

Saruhama-shigi.

Sharpe, Cat. B. Br. Mus., XXIV, p. 586; *Tringa subarquata* (Güld.), Swinhoe, P.Z.S., 1871, p. 409; Blanford, F. B. Ind., Bds., IV, p. 278, fig. 64; Tada, Taiwan Chōrui Ippan, p. 87; Grant, P.Z.S., 1900, p. 498; Dresser, Pal. Bds., II, p. 774; Uchida, Annot. Zool. Japon., 1912, p. 161; *Erolia ferruginea* (Brün.), McGregor, Man. Phil. Bds., I, p. 139.

Enteishō, Tainan Distr.: 1 ♂ œst. & 1 ♀ œst., May 9; Teishiryōshō, Tainan: 1 ♀ œst., May 10. This Sandpiper is rather common in the Tainan District.

41. ***Heteropygia acuminata*** (Horsf.).
Uzurashigi.

Sharpe, Cat. B. Br. Mus., XXIV, p. 566; Ogawa, Annot. Zool. Japon., 1905, p. 220; *Tringo acuminata* (Horsf.), Swinhoe, P.Z.S., 1871, p. 409; Blanford, F. B. Ind., Bds., IV, p. 276; Dresser, Man. Pal. Bds., II, p. 767; Grant & La Touche, Ibis, 1907, p. 268; Uchida, Annot. Zool. Japon, 1912, p. 161, *Heteropygia aurita* (Lath.), McGregor, Man. Phil. Bds., I, p. 138.

Four adult females obtained at Teishiryōshō, Tainan Distr., May 10.

42. ***Phalaropus hyperboreus*** (Linn.).
Akaeri-hireashishigi.

Sharpe, Cat. B. Br. Mus., XXIV, p. 698; Blanford, F. B. Ind., Bds., IV, p. 281, fig. 65; Dresser, Man. Pal. Bds., II, p. 754; Grant & La Touche, Ibis, 1907, p. 269; Uchida, Annot. Zool. Japon., 1912, p. 161; *Lobipes hyperboreus* (L.), Swinh., P.Z.S., 1871, p. 408; *Lobipes lobatus* (L.), McGregor, Man. Phil. Bds., I, p. 149.

Enteishō, Tainan Distr.: 1 ♂ œst., May 9. The specimen was found mixed in a flock of other waders. A number of the same bird were observed swimming in the Keelung harbour, May 25.

Family LARIDÆ.

43. ***Sterna melanauchen*** Temm.
Eriguro-ajisashi.

Saunders, Cat. B. Br. Mus., XXV, p. 126; Ogilvie-Grant, P.Z.S., 1900, p. 500; Blanford, F. B. Ind., Bds., IV, p. 322; Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 370; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan) I, p. 293, Pl. XIV, fig. 1.

The specimens of the species are preserved in the Taihoku Museum.

Family COLUMBIDÆ.

44. ***Turtur humilis*** (Temm.).

Benibato.

Swinhoe, P. Z. S., 1871, p. 397; David & Oust., Ois. Chine, p. 388; Salvadori, Cat. B. Br. Mus., XXI, p. 434; Tada, Taiwan Chōrui Ippan, p. 63; Grant, P. Z. S., 1900, p. 502; Grant & La Touche, Ibis, 1907, p. 273; Uchida, Annot. Zool. Japon., 1912, p. 166; *Turtur tranquebaricus* (nec Herm.), Dresser, Man. Pal. Bds., II, p. 651; *Œnopopelia humilis* (Temm.), McGregor, Man. Phil. Bds., I, p. 50; *Oenopopelia tranquebarica humilis* (Temm.), Baker, Ind. Pigeons & Doves, 1913, p. 234; Pl. 23.

An adult male obtained at Enteishō, Tainan Distr., May 9. This dove is very common in the southern parts of Formosa, while in the region of Taihoku none of it came under observation.

45. ***Turtur chinensis*** (Scop.)

Kanoko-bato.

Swinhoe, P.Z.S., 1871, p. 397; Salvadori, Cat. B. Br. Mus., XXI, p. 439; Tada, Taiwan Chōrui Ippan, p. 64; Grant, P.Z.S., 1900, p. 502; Grant & La Touche, Ibis, 1907, p. 274; Grant, op. cit., 1908, p, 606; Uchida, Annot. Zool. Japon., 1912, p. 166.

Specimens collected at: Horisha, Nantō: 1 ♀ ad., May 1; Gyochi, Nantō: 1 ♂ ad., May 2; Airyōshō, Nantō: 1 ♀ ad., May 4; Shikyōtōshō, Nantō: 1 ♀, May 4. Common in all parts of the island.

46. ***Chalcophaps indica*** (Linn.)

Kin-bato.

Swinhoe, P.Z.S., 1871, p. 397; Blanford, F.B. Ind., Bds., IV, p. 26, fig. 6; Tada, Taiwan Chōrui Ippan, p. 65; Grant, P.Z.S., 1900, p. 502; Grant & La Touche, Ibis, 1907, p. 274; McGregor, Man. Phil. Bds., I, p.59; Uchida, Annot. Zool. Japon., 1912, p. 167; Barker, Ind. Pigeons & Doves, 1913, p. 121, Pl. 11; *Chalcophaps formosana* Swinhoe, Ibis, 1871, p. 397.

Specimens obtained at: Horisha, Nantō Distr.: 1 ♂ ad., Ap. 29; Shikyō-tōshō, Nantō Distr.: 1 ♂ & 2 ♀s, May 4. Seen only in the southern parts of the island.

47. ***Sphenocercus sororius*** Swinh.

Taiwan-awobato.

Swinhoe, Ibis, 1871, p. 396; Salvadori, Cat. B. Brit. Mus., XXI, p. 13; Tada, Taiwan Chōrui Ippan, p. 67; Grant & La Touche, Ibis, 1907; Grant, op. cit., 1908, p. 606; Uchida, Annot. Zool. Japon., 1912, p. 168.

One adult female obtained at Suisha, Nantō Distr., May 4. Found in forests at 4000 to 5000 ft. altitude above sea-level.

Family CUCULIDÆ.

48. ***Cuculus saturatus*** Hodgs.

Tsutsudori.

Blanford, F. B. Ind., Bds., III, p. 207; Dresser, Man. Pal. Bds., I, p, 470; McGregor, Man. Phil. Bds., I, p. 372; Grant & La Touche, Ibis, 1907, p. 196; Uchida, Annot. Zool. Japon., 1912, p. 169; *Cuculus striatus* (nec Drapiez), Swinhoe, P.Z.S., 1871, p. 395; *Cuculus intermedius* (nec Vahl.), Shelly, Cat. B. Brit. Mus., XIX, p. 252; Tada, Taiwan Chōrui Ippan, p. 58.

A male secured at Horisha, Nantō Distr., May 2. This, the Himalayan Cuckoo, is not uncommon in the spring. Its peculiar notes, sounding like *hon-hon* or *pon-pon*, were frequently heard in the country. The common Cuckoo, *C. canorus* (L.), was never heard. Nor have I ever come across a specimen of it that was obtained in Formosa, so that, I think, the common Cuckoo does not occur in the island.

49. ***Eudynamis honorata*** (Linn.).

Onikakkō.

Shelley, Cat. B. Br. Mus., XIX, p. 316; Blanford, F. B. Ind., Bds., III, p. 228; Ogilvie-Grant, P.Z.S., 1900, p. 484.

A female specimen obtained at Tokoshō, Tainan District, Dec. 11, 1905, is preserved in the Tainan Museum.

50. ***Centropus javanicus*** (Dumont).

Banken.

Shelley, Cat. B. Br. Mus., XIX, p. 354; Grant & La Touche, Ibis, 1907, p. 169; Grant, op. cit., 1908, p. 905; McGregor, Man. Phil. Bds., I, p. 384; Uchida, Annot. Zool. Japon., 1912, p. 169; *Centropus bengalensis* (Gm.), Swinhoe, P.Z.S., 1871, p. 393; Shelley, Cat. B. Br. Mus., XIX, p. 352; Tada Tainan Chōrui Ippan, p. 58; Blanford, F. B. Ind., Bds., III, p. 243; Grant, P.Z.S., 1900, p. 485.

An adult female obtained at Horisha, Nantō Distr., May 15. The Javan Coucal is rather common. It comes into view most frequently in early morning.

Family ALCEDINIDÆ.

51. ***Alcedo ispida bengalensis*** Gm.

Kawasemi, Sōbin.

Tada, Taiwan Chōrui Ippan, p. 61; *Alcedo bengalensis* Gmelin, Swinhoe, P.Z.S., 1871, p. 347; McGregor, Man. Phil. Bds., I, p. 306; Uchida, Annot. Zool. Japon., 1912, p. 170; *Alcedo ispida* (nec Linn.), Sharpe, Cat. B. Br. Mus., XVII, p. 141; Blanford, F. B. Ind., Bds., III, p. 122, fig. 35; Dresser, Man. Pal. Bds., I, p. 458; Grant & La Touche, Ibis, 1907, p. 197; Grant, op. cit., 1908, p. 685.

Horisha, Nantō Distr.: 1 young, Ap. 29; 1 ♂ & 1 ♀, May 2; Suisha, Nantō: 2 ♂s, May 3; Kansaishō, Tainan Distr.: 1 ♀, May 10.

Common along streams, and on the shores of ponds and lakes.

Family UPUPIDÆ.

52. ***Upupa epops*** Linn.

Yatsugashira.

Salvin, Cat. B. Br. Mus., XVI, p. 4; Blanford, F. B. Ind., Bds., III, p.

159; Dresser, Pal. Bds., I, p. 467; Ogawa, Hand. Bds. Jap. Annot. Zool. Japon., 1908, p. 378; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), II, p. 337, Pl. XXXI, fig. 4.

An adult specimen, obtained in Giran Distr. Sep. 5, 1912, is to be seen in the Taihoku Museum.

Family STRIGIDÆ.

53. ***Ketupa flavipes*** (Hodgson).

Uwo-mimizuku.

Sharpe, Cat. B. Br. Mus., II, p. 5; Blanford, F. Brit. Ind., Bds., III, p. 282.

This is a very rare species in Formosa. One specimen in the Taihoku Museum and another in my collection; both obtained at a valley near Horisha, Nantō District.

54. ***Scops semitorques pryeri*** Gurney.

Praier-zuku.

Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), II, 1914, p. 346; III, 1915, p. 176; *Scops pryeri* Gurn., Ogawa, Annot. Zool. Japon., 1908, p. 381; ? [*Scops sp.*, Tada, Taiwan Chōrui Ippan, p. 68.]

Horisha, Nantō Distr.: 2 youngs, Ap. 29; Shikyōtōshō, Nantō: 1 young, May 4.

55. ***Syrnium indranee*** (Sykes).

Ō-fukuro.

Grant & La Touche, Ibis, 1907, p. 255; Uchida, Annot. Zool. Japon., 1912, p. 171; *Syrnium indrani* (Sykes), Blanford, F. B. Ind., Bds., III, p. 275; *Syrnium newarense* (Hodgs.), Sharpe, Cat. B. Br. Mus., II, p. 281; *Bulaca newarensis* (Hodgs.), Swinhoe, P.Z.S., 1871, p. 344; Tada, Taiwan Chōrui Ippan, p. 69.

Arisan: 1 ♀ ad., May 12. This is a very rare species in Formosa, occurring in the mountains of over 7000 ft. elevation. This specimen obtained was shot by a native savages in the forest of Arisan, 8000 ft. above the sea-level.

56. ***Asio otus*** (Linn.).

Torafuzuku.

Sharpe, Cat. B. Br. Mus., II, p. 227; Blanford, F. Brit. Ind., Bds., III, p. 270; Dresser, Pal. Bds., I, p. 483; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), II, p. 350, Pl. XX, fig. 5; *Otus vulgaris* Fleming, Swinh., P.Z.S., 1871, p. 344; *Strix otus* Linn., Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 379.

A specimen (Horisha, July 22, 1908) is preserved in the Taihoku museum. A second specimen in the Tainan museum. This seems to be a rare bird in Formosa.

57. ***Asio accipitrinus*** (Pall.).

Komimizuku.

Sharpe, Cat. B. Br. Mus., II, p. 234; Blanford, F. B. Ind., Bds., III, p. 271; Dresser, Pal. Bds., I, p. 484; Ogilvie-Grant, P. Z. S., 1900, p. 489; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan), II, p. 351, Pl. XX, fig. 1; *Otus brachyotus* (L.), Swinh., P.Z.S., 1871, p. 344; *Strix brachyotus* Forster, Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 379.

A specimen in the Taihoku Museum, obtained near the city of Taihoku Feb. 20, 1909, This also seems to be rare in Formosa.

58. ***Cyanops nuchalis*** (Gould).

Goshiki-dori.

Tada, Taiwan Chōrui Ippan, p. 57; Grant & La Touche, Ibis, 1907, p. 195; Grant, op. cit., 1908, p. 605; Uchida, Annot. Zool. Japon., 1912, p. 173.

Suirikō, Nantō Distr.: 2♂s, Ap. 29; Suisha, Nantō: 2♀s, May 3; 1♂, May 4. Found everywhere among the foliage in forests. The cry of this bird is very peculiar and sounds like *korokorokoro*, repeated several times in succession.

Family PITTIDÆ.

59. ***Pitta nympha*** T. & S.

Yairo-chō.

Sclater, Cat. B. Br. Mus., XIV, p. 425; Tada, Taiwan Chōrui Ippan, p. 34; Grant & La Touche, Ibis, 1907, p. 194; Ogawa, Annot. Zool. Japon., 1908, p. 386; Uchida, op. cit., 1912, p. 175; *Pitta oreas* Swinhoe, P.Z.S., 1871, p. 375.

Horisha, Nantō Distr.: 1 ♀, May 1. This Pitta is a migrant in Formosa, coming from the continent in the spring. It breeds in the forests of the island. Its loud cry, sounding somewhat like *pao-pao*, is oftenest heard in evenings.

Family ALAUDIDÆ.

60. ***Alauda gulgula sala*** Swinhoe.

Taiwan-hibari.

Sharpe, Cat. B. Br. Mus., XIII, p. 575; Hartert, Vög. Pal., I, p. 250; *Alauda sala* Swinhoe, P.Z.S., 1871, p. 389; Tada, Taiwan Chōrui Ippan, p. 48; Grant & La Touche, Ibis, 1907, p. 165; Uchida, Annot. Zool. Japon., 1912, p. 175; *Alauda wattersi* Swinhoe, Ibis, 1871, pp. 389–390; Tada, Taiwan Chōrui Ippan, p. 48; Grant & La Touche, Ibis, 1907, p. 165; Mc Gregor, Man. Phil. Bds., II, p. 674.

Horisha, Nantō Distr.: 1 ♀, May 2; Enteishō, Tainan Distr.: 1 ♂ & 2 ♀s, May 9; Kansaishō, Tainan: 1 ♂, May 10. Common in all parts of the island.

Family MOTACILLIDÆ.

61. ***Motacilla boarula melanope*** Pall.

Kisekirei.

Ogawa, Annot. Zool. Japon., 1905, p. 200; op. cit., 1908, p. 385; *M. melanope* Pall., Sharpe, Cat. B. Br. Mus., X, p. 497; Oates, F. B. Ind., Bds, II, p. 293 ; Tada, Taiwan Chōrui Ippan, p. 43 ; Dresser, Man. Pal. Bds., I, p. 202 ; McGregor, Man. Phil. Bds., II, p. 665 ; Grant & La Touche, Ibis, 1907, p. 106 ; Uchida, Annot. Zool. Japon., 1912, p. 176 ; *Calobatus melanope* Swinhoe, P.Z.S., 1871, p. 364.

Suisha, Nantō Distr.: 1 ♂ œst., breed. pl., May 3. Rather less common than *M. flava taivana.*

62. ***Motacilla flava taivana*** (Swinhoe).
Tsumenaga-sekirei.

M. taivana (Sw.), Sharpe, Cat. B. Br. Mus., X, p. 514 ; Dresser, Man. Pal. Bds., I, p. 208 ; Tada, Taiwan Chōrui Ippan, pp. 43–45 ; Grant, P.Z.S., 1900, p. 467 ; Grant & La Touche, Ibis, 1907, p. 166 ; Grant, op. cit., 1908, p. 602; Uchida, Annot. Zool. Japon., 1912, p. 176 ; *Budytes taivanus* Swinhoe, P.Z.S., 1871, p. 364.

Horisha, Nantō Distr.: 1 ♀, May 1 ; 2 ♂s, May 2 ; Enteishō, Tainan Distr.: 1 ♀, May 9; Kansaishō, Tainan : 2 ♂s & 1 ♀, May 10. Very common on the fields.

63. ***Motacilla alba leucopsis*** Gould.
Hōjiro-sekirei.

Ogawa, Annot Zool. Japon., 1908, p. 385; *M. leucopsis* Gould, Sharpe, Cat. B. Br. Mus., X, p. 482 ; Oates, F. B. Ind., Bds., II, p. 288 ; Dresser, Man. Pal. Bds., I, p. 198 ; Tada, Taiwan Chōrui Ippan, pp. 42–43 ; Grant, P.Z.S., 1900, p. 467; Grant & La Touche, Ibis, 1907, p. 164 ; Grant, op. cit., 1908, p. 602 ; Uchida, Annot. Zool. Japon., 1912, p. 177.

Shinnenshō, Nantō Distr.: 1 ♂, May 4. Rather common along streams.

Family TIMELIIDÆ.

64. ***Trochalopterum taiwanum*** (Swinhoe).
Hoibii.

Sharpe, Cat. B. Br. Mus., VII, p. 377 ; Tada, Taiwan Chōrui Ippan, p.

15; Grant & La Touche, Ibis, 1907, p. 178; Uchida, Annot. Zool. Japon., 1912, p. 178; *Leucodioptrum taivanum* Swinhoe, P.Z.S., 1871, p. 371.

Musha or Pāransha, Nantō Distr.: 1 ♂, May 1. Rather common in bushes in the mountainous parts. Its notes are melodious.

65. ***Trochalopterum morrisonianum*** Grant.

Kinbane-hoibii.

Ogilvie-Grant, Bull. B. O. C., XVI, 1906, p. 120; Grant & La Touche, Ibis, 1907, p. 178; Grant, op. cit., 1908, p. 603; Uchida, Annot. Zool. Japon., 1912, p. 178; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 17, Pl. II, fig. 6.

Mt. Arisan at 8000 ft. elevation above sea level, Kagi Distr.: 1 ♀ ad., May 14; caught in a snare set by the native for capturing *Calophasis mikadoi*. The note of the bird is said to be musical.

66. ***Pomatorhinus musicus*** Swinhoe.

Himemaruhashi, Hoibiikū.

Swinhoe, P.Z.S., 1871, p. 370; Sharpe, Cat. B. Br. Mus., VII, p. 424; Tada, Taiwan Chōrui Ippan, p. 15; Grant & La Touche, Ibis, 1907, p. 179; Grant, op. cit., 1908, p. 603; Uchida, Annot. Zool. Japon., 1912, p. 179; Uchida, Nihon Chōrui Zusetsu III, 1915, pp. 18–19, Pl. II, fig. 3.

Suirikō, Nantō Distr.: 2 ♂s, Ap. 29. Common; notes musical.

67. ***Alcippe morrisonia*** Swinhoe.

Mejiro-chimedori, Shirekku.

Swinhoe, P.Z.S., 1871, p. 374; Tada, Taiwan Chōrui Ippan, p. 22; Grant & La Touche, Ibis, 1907, p. 181; Uchida, Annot. Zool. Japon., 1912, p. 180; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 22, Pl. I. fig. 7; *Alcippe morrisoniana* Sw., Sharpe, Cat. B. Br. Mus., VII, p. 621; Grant, P.Z.S., 1900, p. 477.

Suirikō, Nantō Distr.: 2 ♂s, Ap. 29; Musha or Pāransha, Nantō Distr.: 2 ♀s, Ap. 30; 1 ♂, May 1; Suisha; Nantō: 2 ♂s & 1 ♀, May 4; Arisan, Kagi Distr.: 1 ♀, May 13.

Very common in bushes and forests. This species is also found in the Island of Hainan (*Grant*).

68. ***Schœniparus brunneus*** (Gould).

Chimedori.

Grant & La Touche, Ibis, 1907, p. 181; Uchida, Annot. Zool. Japon., 1912, p. 181; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 23, Pl. I. fig. 8; *Alcippe brunnea* Gould, Swinhoe, P.Z.S. 1871, p. 374; Sharpe, Cat. B. Br. Mus., VII, p. 624; Tada, Taiwan Chōrui Ippan, p. 22; *Alcippe obscurior* Grant, Bul. B. O. C., XVI, 1906, p. 121.

Musha or Pāransha, Nantō Distr.: 1 ♂, Ap. 30. I have found the bird to be rather rare in the mountains.

69. ***Stachyrhidopsis præcognitus*** Swinh.

Zuaka-chimedori.

Grant & La Touche, Ibis, 1907, p. 183; Uchida, Annot. Zool. Japon., 1912, p. 181; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 24, Pl. II, fig. 9; *Stachyris præcognitus* Swinhoe, P.Z.S., 1871, p. 373; *Stachyridopsis ruficeps* (Blyth), Sharpe, Cat. B. Br. Mus., VII, p. 598; Tada, Taiwan Chōrui Ippan, p. 23; Oates, F. B. Ind. Bds., I, p. 165; Grant, P.Z.S., 1900, p. 476.

Musha or Pāransha, Nantō Distr.: 1 ♂, Ap. 30. This is also a rather rare species.

70. ***Myiophoneus insularis*** Gould.

Rurichō.

Swinhoe, P.Z.S., 1871, p. 368; Sharpe, Cat. B. Br. Mus., VII, p. 11; Tada, Taiwan Chōrui Ippan, p. 18; Grant & La Touche, Ibis, 1907, p. 184; Grant, op. cit., 1908, p. 603; Uchida, Annot. Zool. Japon., 1912, p. 181, Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 25, Pl. X, fig. 8.

Arisan, Kagi Distr.: 1 ♀, May 13. Common on Mt. Arisan at 6–7000 ft. elevation above sea-level. The example obtained was caught by the native by means of a snare at 8000 ft. elevation on Arisan.

71. ***Brachypteryx cruralis*** (Blyth).

Kikuchi-chimedori.

Sharpe, Cat. B. Br. Mus., VII, p. 26; *Drymochares cruralis* (Blyth), Oates, F. Brit. Ind. Bds., I, p. 188.

A female specimen was collected by Mr. Y. Kikuchi at Takkai, Karenkō District, Mar. 2, 1911, and is preserved in the Taihoku Museum. The species may be distinguished from *B. goodfellowi* Grant from Arisan by longer tarsus, which is 30 mm., instead of 19–21 mm., long.

72. ***Actinodura morrisoniana*** Grant.

Shimadori.

Grant, Bul. B. O. C., XVI, 1906, p. 119; Grant & La Touche, Ibis, 1907, p. 185; Grant, op. cit., 1908, p. 604; Grant, op. cit., 1912, p. 650; Uchida, Annot. Zool. Japon., 1912, p. 182; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 27, Pl. II, fig. 7.

Arisan: 1♂ & 1♀, May 13; 1♂ & 2♀s, May 14. Pretty common on Mt. Arisan at 7050 ft. elevation above sea-level.

73. ***Yuhina brunneiceps*** Grant

Kammuri-chimedori.

Grant, Bul. B. O. C., XVI, 1906, p. 121; Grant & La Touche, Ibis, 1907, p. 186; Grant, op. cit., 1908, p. 604; Uchida, Annot. Zool. Japon., 1912, p. 182; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 28, Pl. I, fig. 6.

Arisan: 2♂s & 2♀s, May 13; 2♂s, 1♀ & 1 fledgeling, May 14. Very common on Mt. Arisan at 7050 ft. elevation.

74. ***Liocichla steeri*** Swinhoe.

Yabu-dori.

Swinhoe, P.Z.S., 1877, p. 474, Pl. XIV; Tada, Taiwan Chōrui Ippan, p. 26; Grant & La Touche, Ibis, 1907, p. 188; Grant, op. cit., 1908, p. 604; Uchida, Annot. Zool. Japon., 1912, p. 182; Uchida, Nihon Chōrui Zusetsu, III, 1915, pp. 29–30, Pl. II, fig. 1.

Musha or Pāransha, Nantō Distr.: 1 ♀, May 1; Mt. Arisan: 1 ♂ & 2 ♀s, May 14. Pretty common on Mt. Arisan at 7050 ft. elevation above sea-level.

75. ***Suthora morrisoniana*** Grant.
Niitaka-hashibuto-chimedori.

Grant, Bul. B. O. C., XVI, 1906, p. 119; Grant & La Touche, Ibis, 1907, p. 188; Grant, op. cit., 1908, p. 604, Pl. XII, fig. 1; Grant, op. cit., 1912, p. 651; Uchida, Annot. Zool. Japon., 1912, p. 183; Uchida, Nihon Chōrui Zusetsu, III, p. 31.

Arisan at 7050 ft. elevation above sea-level: 2 ♂s, May 14. This interesting bird was met with but very rarely.

Family PYCNONOTIDÆ.

76. ***Pycnonotus taivanus*** Styan.
Kuro-gashira, Ōtāko.

Styan, Ibis, 1893, p. 470; Tada, Taiwan Chōrui Ippan, p. 17; Grant & La Touche, Ibis, 1907, p. 189; Uchida, Annot. Zool. Japon., 1912, p. 183; Uchida, Nihon Chōrui Zusetsu, III, p. 33, Pl. III, fig. 4.

Bōzan, Akō Distr.: 2 ♂s, May 17, Mr. Y. Kikuchi coll. The species was met with at Taitō, Karenkō and Akō Districts, but not in the northern and western parts of the island.

77. ***Pycnonotus sinensis formosæ*** Hartert.
Shirogashira, Pētāko.

Hartert, Nov. Zool., 1910, pp. 229–230; Uchida, Annot. Zool. Japon., 1912, p. 183; Uchida, Nihon Chōrui Zusetsu, III, p. 32, Pl. III, fig. 3; *Py. sinensis* (nec Gm.), Sharpe, Cat. B. Br. Mus., VI, p. 149; Tada, Taiwan, Chōrui Ippan, p. 16; Grant & La Touche, Ibis, 1907, p. 189; Grant, op. cit., 1908, p. 604; *Ixus sinensis* (nec Gm.), Swinhoe, P.Z.S., 1871, p. 369.

Hokuto, Taihoku Distr.: 3 ♂s, May 22; Shūshū, Nantō Distr.: 1 ♂, Ap.

28; Horisha, Nantō: 1 ♂, May 1; 1 ♂ & 1 ♀, May 2; Enteishō, Tainan Distr.: 1 ♂, May 9; Kansaishō, Tainan: 1 ♀, May 10. Quite common in the island, except in some eastern and southern parts.

78. ***Spizixus cinereicapillus*** Swinh.

Kayanobori.

Swinhoe, P. Z. S., 1871, p. 370; Tada, Taiwan Chōrui Ippan, p. 26; Grant, P.Z.S., 1900, p. 477; Grant & La Touche, Ibis, 1907, p. 190; Uchida, Annot. Zool. Japon., 1912, p. 184; Uchida, Nihon Chōrui Zusetsu, III, pp. 34–35, Pl. III, fig. 7.

Musha or Pāransha, Nantō Distr.: 1 ♀, May 1; Gyochi, Nantō: 1 ♀, May 2; Funpōshō, Nantō: 1 ♂, May 4. Less common than the preceding species. It is frequently observed on top of bushes or of tall grasses. This species also occurs in Hainan.

79. ***Hypsipetes nigerrimus*** Gould.

Kurohiyodori, Antsui-ōchū, Antsui.

Swinhoe, P.Z.S., 1871, p. 369; Sharpe, Cat. B. Br. Mus., VI, p. 41; Tada, Taiwan Chōrui Ippan, p. 13; Grant & La Touche, Ibis, 1907, p. 189; Uchida, Annot. Zool. Japon., 1912, p. 184; Uchida, Nihon Chōrui Zusetsu, III, pp. 33–34, Pl. III, fig. 8.

Suirikō, Nantō Distr.: 3 ♂s & 1 ♀, Ap. 29; Musha, Nantō: 1 ♀, May 1; Hokuto, Taihoku Distr.: 1 ♂ & 1 ♀, May 22; 2 ♂s & 2 ♀s, May 23. Common on the hills.

Family MUSCICAPIDÆ.

80. ***Hemichelidon ferruginea*** Hodgson.

Miyama-hitaki.

Oates, F. B. Ind. Bds., II, p. 6; Grant, Ibis, 1908, p. 604; McGregor, Man. Phil. Bds., II, p. 434; Uchida, Annot. Zool. Japon., 1912, p. 185; *Hemichelidon ferrugineus* Hodgs., Sharpe, Cat. B. Br. Mus., IV, p. 122

Grant, P.Z.S., 1900, p. 479; *Muscicapa ferruginea* (Hodgs.), Uchida, Nihon Chōrui Zusetsu, III, 1915, p 38; *Butalis ferruginea* (Hodgs.), Swinh, P.Z.S. 1871, p. 379.

Arisan: 4♂s, May 13; 4♂s, May 14. Rather common in the spring on Arisan at 7050 ft. altitude above sea-level. Mr. Kikuchi obtained also a male specimen at Tattaka, Nantō District, July 9, 1912; it is now preserved in the Taihoku museum. It is strange that the female of the species has never yet been collected.

81. ***Hemichelidon griseosticta*** Swinhoe.

Yezo-bitaki.

McGregor, Man. Phil. Bds., II, p. 433; *Hemichelidon griseisticta* Sw., Ogawa, Annot. Zool. Japon., 1908, p. 388; *Muscicapa griseisticta* (Sw.), Sharpe, Cat. B. Br. Mus., IV, p. 153; Grant & La Touche, Ibis, 1907, p. 191; Uchida, Annot. Zool. Japon., 1912, p. 185; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 39; *Butalis griseosticta* Swinhoe, P.Z.S., 1871, p. 379.

Near Nantō, Nantō Distr.: 1♂ ad., Ap. 30. Rather rare.

82. ***Hypothymis azurea*** (Bodd.)

Kuroeri-hitaki.

Sharpe, Cat. B. Br. Mus., IV, p. 274; Oates, F. B. Ind. Bds., II, p. 49, fig. 20; Grant, P.Z.S., 1900, p. 481; Grant & La Tonche, Ibis, 1907, p. 193; Uchida, Annot. Zool. Japon., 1912, p. 186; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 42, Pl. V, fig. 6; *Myiagra azurea* (Bodd.), Swinh., P.Z.S. 1871, p. 381; *Hypothymis occipitalis* (Vigors), Tada, Taiwan Chōrui Ippan, p. 9; McGregor, Man. Phil. Bds., II, p. 451.

Suirikō, Nantō Distr.: 1♂ & 1♀, Ap. 29; Tamsui, Taihoku Distr.: 1♀, May 22. Found in the mountainous parts, more rarely near river bank on the plain. The notes of this species are musical.

83. ***Cryptolopha fulvifacies*** (Swinh.).

Koshijiro-hitaki.

Sharpe, Cat. B. Br. Mus., IV, p. 405; Grant, P.Z.S., 1900, p. 481;

Grant & La Touche, Ibis, 1907, p. 193 ; Grant, Bul. B. O. C., XXXI, 1912, p. 14 ; Uchida, Annot. Zool. Japon., 1912, p. 187 ; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 43, Pl. III, fig. 1 ; *Abrornis albigularis formosana* Laubmann, Orn. Manatsb. XX, 1912, p. 174.

Musha or Pāransha, Nantō Distr.: 1 ♀, Ap. 30. Quite rare in the mountainous parts of Formosa.

Family TURDIDÆ.

84. ***Rhyacornis fuliginosus affinis*** (Grant).
Kawa-bitaki.

Xanthopygia affinis Grant, Bul. B. O. C., XVI, 1906, p. 118 ; Grant & La Touche, Ibis, 1907, p. 192 ; Uchida, Annot. Zool. Japon., 1912, p. 186 ; *Muscicapa affinis* (Grant), Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 40, Pl. III, fig. 6.

Punkiko, Arisan, Kagi Distr.: 1 ♀, May 20; Musha : 2 youngs, Ap. 30. Very scarce on Mt. Arisan at 6000–7000 ft. elevation above sea-level.

85. ***Ianthia johnstoniæ*** Grant.
Arisan-hitaki.

Grant, Bul. B. O. C., XVI, p. 118 ; Grant & La Touche, Ibis, 1907, p. 175, Pl. IV; Grant, op. cit., 1908, p. 603; Grant, op. cit., 1912, p. 648; Uchida, Annot. Zool. Japon., 1912, p. 19 ; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 49, Pl. IV, fig. 3.

Arisan : 1 ♂ & 3 ♀s, May 14. Found on Mt. Arisan up to 7050 ft. elevation, but not commonly. This species was also met with at the foot of Morrison mountain.

86. ***Notodela leucura montium*** (Swinhoe).
Kon-hitaki.

Notodela montium (Sw.), Swinhoe, P.Z.S., 1871, p. 359 ; Sharpe, Cat. B. Br. Mus., VII, p. 24 ; Tada, Taiwan Chōrui Ippan, p. 20 ; Grant & La

Touche, Ibis, 1907, p. 176; Grant, op. cit., 1908, p. 603; Uchida, Annot. Zool. Japon., 1912, p. 190; Uchida, Nihon Chōrui, Zusetsu, III, 1915, p. 51 Pl. IV, fig. 4.

Musha or Pāransha, Nantō Distr.: 2♀s, Ap. 30. Found at 6–7000 ft. elevation in the mountains of Formosa.

87. ***Accentor collaris nipalensis*** Hodgs.
Miyama-iwahibari.

Accentor nipalensis Hodgs., Sharpe, Cat. B. Br. Mus., VII, p. 664; Oates, F. Brit. Ind. Bds., II, p. 166, Fig. 43; Swinh., P.Z.S., 1871, p. 360.

A specimen obtained at Mt. Arisan, Nov. 2, 1909, is in the Zoological Institute, Science College, Tokio Imperial University. Two more specimens in the Taihoku museum, both collected on Mt. Morrison Oct. 24, 1912.

Family SYLVIIDÆ.

88. ***Acrocephalus orientalis*** (T. & S.)
Ō-yoshikiri.

Seebohm, Cat. B. Br. Mus., V, p. 97; Oates, F. Br. Ind. Bds., I, p. 357; Dresser, Man. Pal. Bds., I, p. 120; McGregor, Man. Phil. Bds., II, p. 571; Grant & La Touche, Ibis, 1907, p. 170; Uchida, Annot. Zool. Japon., 1912, p. 191; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 55; *Calamodyta orientalis* (T. & S.), Swinhoe, P.Z.S., 1871, p. 352.

Enteishō, Tainan Distr.: 1♂, May 9. Very rare in Formosa. A bird of the species was seen, May 22, on the bank of Tamsui River, Taihoku District.

89. ***Phylloscopus borealis*** (Blasius).
Komushikui.

Seebohm, Cat. B. Br. Mus., V, p. 40; Tada, Taiwan Chōrui Ippan, p. 7; Dresser, Man. Pal. Bds., I, p. 99; Grant & La Touche, Ibis, 1907, p. 171; Uchida, Annot. Zool. Japon., 1912, p. 192; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 57; *Phyllopneuste borealis* Blasius, Swinhoe, P.Z.S., 1871, p. 356; *Acanthopneuste borealis* (Blas.), Oates, F. Br. Ind. Bds., I, p. 412; McGregor, Man. Phil. Bds., II, p. 584.

Horisha, Nantō Distr.: 1 (sex?), May 1. Not common.

90. ***Phylloscopus borealis xanthodryas*** Swinh.
Meboso.

Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 57; *Phylloscopus xanthodryas* Sw., Seebohm, Cat. B. Br. Mus., V, p 42; Dresser, Man. Pal. Bds., I, p. 100; Uchida, Annot. Zool. Japon., 1912, p. 192; *Phyllopneuste xanthodryas* (Sw.), Swinh., P. Z. S., 1871, p. 356; *Acanthopneuste xanthodryas* (Sw.), McGregor, Man. Phil. Bds., II, p. 585.

Horisha, Nantō Distr.: 1 ♀, Ap. 30. Not common.

91. ***Suya crinigera*** Hodgson.
Hauchiwadori.

Sharpe, Cat. B. Br. Mus., VII, p. 177; Oates, F. Br. Ind., Bds., I, p. 444, fig. 137; Tada, Taiwan Chōrui Ippan, p. 23; Grant & La Touche, Ibis, 1907, p. 172; Uchida, Annot. Zool. Japon, 1912, p. 193; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 60; *Suya striata* Swinhoe, P.Z.S., 1871, p. 351.

Suirikō, Nantō Distr.: 1 ♂ æst., Ap. 29. Probably rare. A specimen observed at Suirikō.

92. ***Prinia inornata formosa*** Harington.
Mami-hauchiwadori.

Harington, Bul. B. O. C., XXXI, 1913, p. 111; *Prinia extensicauda* (nec Swinh.), Sharpe, Cat. B. Br. Mus., VII, p. 199; Grant & La Touche, Ibis, 1907, p. 173; Uchida, Annot. Zool. Japon., 1912, p. 193; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 59, fig. 2; *Drymæpus extensicauda* Swinhoe, P.Z.S., 1871, p. 351; *Prinia inornata* (nec Sykes), Tada, Taiwan Chōrui Ippan, p. 21.

Shūshū Nantō Distr.: 1♂, Ap. 29; Horisha, Nantō: 1♂, May 1; Kansaishō, Tainan Distr.: 1♂, May 10; Shintengai, Taihoku Distr.: 3♂s, May 19. Very common except in the mountainous region. The notes are musical.

93. ***Burnesia sonitans*** (Swinhoe).

Kibara-hauchiwadori, Awo-hauchiwadori.

Sharpe, Cat. B. Br. Mus., VII, p. 205; Grant, P. Z. S., 1900, p. 471; Grant & La Touche, Ibis, 1907, p. 173; Uchida, Annot. Zool. Japon., 1912, p. 193; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 61; *Prinia sonitans* Swinh., P.Z.S., 1871, p. 351; Tada, Taiwan Chōrui Ippan, p. 21.

Horisha, Nantō Distr.: 1♂, May 1; 1♀, May 2; Enteishō, Tainan Distr.: 2♂s, May 9. Rare in the northern parts of the island, but much commoner in the districts of Nantō and Tainan. At Horisha, May 1, a nest with four eggs of this species was obtained by me. The eggs are of a bright mahogany-red colour with an indistinct ring of dusky blotches near the larger end; they measure 16×12 mm.

Family HIRUNDINIDÆ.

94. ***Hirundo rustica gutturalis*** Scop.

Tsubame.

Tada, Taiwan Chōrui Ippan, p. 54; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 65; *Hirundo gutturalis* Scop., Sharpe, Cat. B. Br. Mus., X, p. 134; Oates, F. B. Ind. Bds., II, p. 277; David & Oust., Ois. Chine, p. 124; Dresser, Man. Pal. Bds., I, p. 265; McGregor, Man. Phil. Bds., II, p. 427; Grant & La Touche, Ibis, 1907, p. 194; Uchida, Annot. Zool. Japon., 1912, p. 194.

Near Nantō, Nantō Distr.: 1♀, Ap. 28; Enteishō, Tainan: 1♀, May 9. Scarce in the season of my visit to the island.

95. ***Hirundo daurica striolata*** T. & S.

Ō-koshiakatsubame.

Uchida, Nihon Chōrui Zusetsu, III, 1915; p. 65; *Hirundo striolata*

Oates, F. B. Ind., Bds., II, p. 281; Dresser, Man. Pal. Bds., I, p. 268; Sharpe, Cat. B. Br. Mus., X, p. 161, McGregor, Man. Phil. Bds., II, p. 429; Tada, Taiwan Chōrui Ippan, p. 54; Grant & La Touche, Ibis, 1907, p. 193; Ogawa, Annot. Zool. Japon., 1908, p. 398; Uchida, op. cit., 1912, p. 194; *Cecropis striolata* (T. & S.), Swinhoe, P.Z.S., 1871, p. 346; *Hirundo substriolata* (Hume), Sharpe, Cat. B. Br. Mus., X, p. 163; *Hirundo japonica* (T. & S.), Sharpe, Cat. B. Br. Mus., X, p. 162.

Keibigai, Taihoku Distr.: 1♂ & 1♀, May 19; Shintengai, Taihoku: 4♂s & 1♀, May 19. Very common. Some authors have erroneously given that this subspecies occurs in Japan also. In Japan it is replaced by *H. daurica nipalensis* Hodgs.

96. ***Chelidon urbica nigrimentalis*** (Hartert).

Hime-iwatsubame.

Hirundo urbica nigrimentalis Hartert, Vög. Pal. F., I, p. 810.

A specimen of the subspecies obtained at Arisan, Aug. 1912, and two more obtained at Kanetowansha, Nantō Distr., Nov. 11, 1912, are preserved in the Taihoku museum. The subspecies is closely allied to *Ch. urb. kashmiriensis* Gould, but is smaller, the wing measuring only 92–96 mm. long.

97. ***Cotile sinensis*** (J. E. Gray).

Chōsen-shōdōtsubame.

Sharpe, Cat. B. Br. Mus., X, p. 104; David & Oust., Ois. Chine, p. 128; Oates, F. B. Ind., Bds., II, p. 273; Dresser, Man. Pal. Bds., I, p. 272; Grant & La Touche, Ibis, 1907, p. 194. *Riparia chinensis* (Gray), McGregor, Man. Phil. Bds., II, p. 426; *Cotile riparia* (nec Linn.), Tada, Taiwan Chōrui Ippan, p. 54; Uchida, Annot. Zool. Japon., 1912, p. 194; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 66.

Enteishō, Tainan Distr.: 1♂, May 9. The bird was found to be common at Enteishō, Tainan Distr. Mr. Kikuchi tells me that he observed the species in abundance at Horisha. Mr. Tada reported the occurrence of *Cotile riparia* (L.) in Formosa, but I should doubt the correctness of his specific identification.

98. ***Pericrocotus griseigularis*** Gould.

Benisanshokui.

Swinhoe, P.Z.S., 1871, p. 379; Tada, Taiwan Chōrui Ippan, p. 39; Grant & La Touche, Ibis, 1907, p. 190; Uchida, Annot. Zool. Japon., p. 195; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 67, Pl. V, fig. 1 & 2.

Suisha, Nantō Distr.: 1♂ & 2♀s, May 3. Found in the mountains at an altitude of 4–6000 ft. or more above sea-level.

99. ***Graucalus rex-pineti*** Swinhoe.

Oni-sansho-kui.

Sharpe, Cat. B. Br. Mus., IV, p. 35; Swinhoe, P.Z.S., 1871, p. 378; Tada, Taiwan Chōrui Ippan, p. 39; Grant & La Touche, Ibis, 1907, p. 161; Grant, op. cit., 1908, p. 601; Uchida, Annot. Zool. Japon., 1912, p. 195; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 68, Pl. VI, fig. 4.

Suisha, Nantō Distr.: 1♀, May 3. Somewhat rarer than the foregoing species. The bird loves to be on branches of tall trees, so that it is very difficult to find it among the foliage.

Family DICRURIDÆ.

100. ***Buchanga atra*** (Hermann).

Ōchū, Taiwan-garasu.

Sharpe, Cat. B. Br. Mus., III, p. 246; Tada, Taiwan Chorui Ippan, p. 33; Grant & La Touche, Ibis, 1907, p. 161; Grant, op. cit., 1908, p. 601; Uchida, Annot. Zool. Japon., 1912, p. 196; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 69, Pl. VI, fig. 1; *Dicrurus cathœcus* Swinhoe, P.Z.S., 1871, p. 377; *Dicrurus ater* (Herm.), Oates, F. B. Ind., Bds., I, p. 312, fig. 95.

Shūshū, Nantō Distr.: 1♂, Ap. 28; Gyochi, Nantō: 1♀, May 2; Kansaishō, Tainan Distr.: 1♂, May 10; Shintengai, Taihoku Distr.: 3♀s, May 19; Hokuto, Taihoku: 1♂ & 1♀, May 22. Very common on the plains. Once I have counted 136 individuals of this species, seen on one side of the railway during a journey from Keelung to Akō. The bird is frequently seen perched on the back of domestic animals.

101. ***Chaptia brauniana*** Swinhoe.

Hime-ōchū.

Swinhoe., P.Z.S., 1871, p. 378; Tada, Taiwan Chōrui Ippan, p. 34; Grant & La Touche, Ibis, 1907, p. 161; Grant, op. cit., 1908, p. 601; Uchida, Annot. Zool. Japon., 1912, p. 195; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 70, Pl. V, fig. 3.

Baikei, Nantō Distr.: 2♂s, Ap. 30. Found only in the mountains at an altitude of 4–6000 ft. above sea-level.

Family LANIIDÆ.

102. ***Lanius cristatus lucionensis*** Linn.

Shima-mozu.

Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 72; *Lanius lucionensis* Linn., Swinhoe, P.Z.S., 1871, p. 376; Gadow, Cat. B. Br. Mus., VIII, p. 274; Oates, F. B. Ind., Bds., I, p. 469; Dresser, Man. Pal. Bds., I, p. 242; Tada, Taiwan Chōrui Ippan, p. 37; Grant & La Touche, Ibis, 1907, p. 170; Uchida, Annot. Zool. Japon., 1912, p. 197; *Otomela lucionensis* (L.), McGregor, Man. Phil. Bds., II, p. 597.

Kansaishō, Tainan Distr.: 1♂, May 10. This shrike is rather rare. I came across it only in the southern parts of the island.

103. ***Lanius schach*** Linn.

Takasago-mozu.

Swinhoe, P.Z.S., 1871, p. 375; Gadow, Cat. B. Br. Mus., VIII, p. 261; Tada, Taiwan Chōrui Ippan, p. 36; Grant, P.Z.S., 1900, p. 469; Grant & La Touche, Ibis, 1907, p. 170; Uchida, Annot. Zool. Japon., 1912, p. 196; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 71, Pl. VI, fig. 2.

Gyochi, Nantō Distr.: 2♂s, May 2; Horisha, Nantō: 1♀, May 2; Kansaishō, Tainan Distr.: 1♀, May 10. Common but not numerous.

Family PARIDÆ.

104. ***Ægithalus concinnus*** (Gould).

Zuaka-gara.

Grant & La Touche, Ibis, 1907, p. 169; Hellmayr, Tierreich, Paridæ, p. 122; Uchida, Annot. Zool. Japon., 1912, p. 198; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 75, Pl. VII, fig. 2.

Arisan: 1 ♀, May 13. Very rare on Mt. Arisan at 7050 ft. elevation.

Family PLOCEIDÆ.

105. ***Munia formosana*** Swinhoe.

Taiwan-kinpara.

Swinhoe, P.Z.S., 1871, p. 385; Sharpe, Cat. B. Br. Mus., XIII, p. 338; Tada, Taiwan Chōrui Ippan, p. 53; Grant & La Touche, Ibis, 1907, p. 162; McGregor, Man. Phil. Bds., II, p. 691; Uchida, Annot. Zool. Japon., 1912, p. 199; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 81, Pl. VII, fig. 4.

Horisha, Nantō Distr.: 1 ♂, Ap. 29. Not common near Horisha, but common in the eastern districts.

106. ***Munia topela*** Swinhoe.

Shima-kinpara, Seiban-suzume.

Swinhoe, P.Z.S., 1871, p. 385; Sharpe, Cat. B. Br. Mus., XIII, p. 351; Tada, Taiwan Chōrui Ippan, p. 52; Grant, P.Z.S., 1900, p. 465; Grant & La Touche, Ibis, 1907, p. 162; Uchida, Annot. Zool. Japon., 1912, p. 199; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 80, Pl. VII, fig. 1.

Horisha, Nantō Distr.: 3 ♂s & 2 ♀s, Ap. 29; 1 ♂, May 1; 1 ♀, May 2; Suisha, Nantō: 2 ♂s, May 3; Enteishō, Tainan Distr.: 1 ♀, May 9. Very common in all the localities mentioned above.

107. ***Uroloncha acuticauda squamicollis*** Sharpe.

Koshijiro-kinpara.

Uroloncha squamicollis Sharpe, Cat. B. Br. Mus., XIII, p. 359; Grant, P.Z.S., 1900, p. 466; *Uroloncha acuticauda* (nec Hodgs.), Grant & La Touche, Ibis, 1907, p. 162; Uchida, Annot. Zool. Japon., 1912, p. 199; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 79, Pl. VII, fig. 3; *Munia acuticauda* (nec Hodgs.), Swinhoe, P.Z.S., 1871, p. 385.

Horisha, Nantō Distr.: 2♂s & 2♀s, Ap. 29; Suisha, Nantō: 1♂ & 1♀, May 3; Hokuto, Taihoku Distr.: 1♀, May 23. Common at the above localities; rarer in the northern parts of the island.

Family CORVIDÆ.

108. *Corvus macrorhynchus levaillanti* Less.

Riukiu-hashibuto-garasu.

Tada, Taiwan Chōrui Ippan, p. 30; Uchida, Annot. Zool. Japon., 1912, p. 200; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 82; *Corvus macrorhynchus* (nec Wagl.), Grant & La Touche, Ibis, 1907, p. 158; *Corone levaillanti* (Less.), Sharpe, Cat. B. Br. Mus., III, p. 39; *Corvus sinensis* Sw., P.Z. S., 1871, p. 383.

Baikei, Nantō Distr.: 1♂, Ap. 30; 1♂, May 1. Rare in the western parts of the island, but common in the eastern parts.

109. *Corvus pastinator* Gould.

Miyama-garasu.

Dresser, Pal. Bds., I, p. 427; Ogawa, Hand. Bds. Jap., Annot. Zool. Japon., 1908, p. 403; Uchida, "Nihon Chōrui Zusetsu" (The Birds of Japan) II, p. 481, Pl. XXXI, fig. 17; *Trypanocorax pastinator* (Gould), Sharpe, Cat. B. Brit. Mus., III, p. 10.

A specimen of this species exists in the Taihoku museum.

110. *Pica pica sericea* Gould.

Kasasagi.

Ogawa, Annot. Zool. Japon., 1908, p. 403; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 83; *Pica pica* (nec L.), Grant & La Touche, Ibis, 1907, p. 159; Grant, op. cit., 1908, p. 601; Uchida, Annot. Zool. Japon., 1912, p.

200; *Pica media* (nec Blyth), Swinhoe, P.Z. S., 1871, p. 382; *Pica caudata* Ger., Tada, Taiwan Chōrui Ippan, p. 31.

Kansaishō, Tainan Distr.: 2♀s, May 10. Found in the south-western parts of the island, but not in abundance.

111. ***Urocissa cærulea*** Gould.

Yamamusume, Tonboiten.

Swinhoe, P.Z.S., 1871, p. 382; Sharpe, Cat. B. Br. Mus., III, p. 74; Tada, Taiwan Chōrui Ippan, p. 31.; Grant & La Touche, Ibis, 1907, p. 371; Grant, op. cit., 1908, p. 601; Uchida, Annot. Zool. Japon., 1912, p. 200; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 84, Pl. VI, fig. 3.

Funpōshō, Nantō Distr.: 1♀, Ap. 29. Found in the mountains at an altitude of about 4–5000 ft. I have seen groups of this bird in Funpōshō and Yakanronshō near Horisha, Nantō.

112. ***Dendrocitta formosæ*** Swinhoe.

Taiwan-onagadori, Seibantomoedori.

Swinhoe, P.Z.S., 1871, p. 382; Tada, Taiwan Chōrui Ippan, p. 32; Grant & La Touche, Ibis, 1907, p. 159; Uchida, Annot. Zool. Japon., 1912, p. 201; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 84, Pl. VI, fig. 7.

Suirikō, Nantō Distr.: 1♀, Ap. 29; Suisha, Nanto: 1♂, May 3; Funpōshō, Nantō: 1♀, May 4. Pretty common in the district of Nantō.

113. ***Garrulus taivanus*** Gould.

Takasago-kakesu.

Swinhoe, P.Z.S., 1871, p. 361; Tada, Taiwan Chōrui Ippan, p. 30; Grant & La Touche, Ibis, 1907, p. 160; Uchida, Annot. Zool. Japon., 1912, p. 201; Uchida, Nihon Chorui Zusetsu, III, 1915, p. 85, Pl. VI, fig. 5.

Arisan: 1♂ & 1♀, May 14. Found in a very few number on Mt. Arisan at an altitude of 7050 ft.

Family STURNIDÆ.

114. ***Æthiopsar cristatellus formosanus*** Hartert.

Kāren.

Hartert, Bul. B. O. C., XXXI, 1912, p. 14; *Ætheopsar cristatellus* (nec Linn.), Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 86, Pl. VI, fig. 6; *Acridotherus cristatellus* (nec L.), Sharpe, Cat. B. Br. Mus., XIII, p. 92; Tada, Taiwan Chōrui Ippan, p. 40; Grant & La Touche, Ibis, 1907, p. 160; Grant, op. cit, 1908, p. 161; Uchida, Annot. Zool. Japon, 1912, p. 201.

Tainan: 1 ♂, May 9. I have seen this species only in the southern parts of the island.

Family ZOSTEROPIDÆ.

115. ***Zosterops palpebrosa simplex*** Swinhoe.

Hime-mejiro.

Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 88; *Zo terops simplex* Swinh., P.Z.S., 1871, p. 349; Tada, Taiwan Chōrui Ippan, p. 28; Grant & La Touche, Ibis, 1907, p. 167; Grant, op. cit., 1908, p. 602; Uchida, Annot. Zool. Japon., 1912, p. 202.

Shūshū, Nantō Distr.: 1 ♂, Ap. 28; Kansaishō, Tainan Distr.: 1 ♂ & 2 ♀s, May 10; Shintengai, Taihoku Distr.: 1 ♂, May 19; Hokuto, Taihoku: 1 ♀, May 21; 2 ♂s, 1 ♀ & 3 youngs, May 22; 2 ♂s, 1 ♀ & 1 young, May 23. Very common on the plains.

116. ***Zosterops palpebrosa batanis*** McGregor.

Kikuchi-mejiro.

Zosterops batanis McGregor, Phil. Jour. Sci., 1907, 2, Sec. A, p. 343; Man. Phil. Bds., II, 1909, p. 616.

Five specimens of the subspecies were collected by Mr. Y. Kikuchi on the island of Botel Tobago or Kōtōshō, Jan. 10, 1909 and June 12, 1911. The form is much larger than the common Formosan *Zosterops palpebrosa* *simplex* Sw. Wing measures 55–58 mm. long; bill from gape 14.5–16 mm.; tail 40–43 mm.; tarsus 17.5–18 mm.

Family FRINGILLIDÆ.

117. ? ***Carpodacus formosanus*** Grant.

Takasago-mashiko.

Grant, Bull. B. O. C., XXVII, p. 51; Grant, Ibis, 1912, p. 644; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 92; *Carpodacus incertus* (nec Risso) Grant, Bull. B. O. C., XVI, p. 122; Grant & La Touche, Ibis, 1907, p. 164; Rothschild, Bull. B. O. C., XXI, p. 9; Grant, Ibis, 1908, p. 601; Uchida, Annot. Zool. Jap., 1912, p. 203.

A female specimen obtained by Mr. Kikuchi on Mt. Arisan, May 18. It is now in my collection. I attach some doubt if my identification of the specimen is correct, as the wing is very considerably shorter than is known from *C. formosanus* Grant, which should have wing length of 3.2 in. (=81 mm.). Possibly it may be *C. vinaceus* Verr., which is known from western China. But the fact that the lower surface of body is yellowish brown, and not ashy as in the species just mentioned, makes me inclined to take the specimen for a young female of *C. formosanus*. The measurements are: culmen 12 mm., wing 73 mm., tail 58.5 mm., tarsus 21 mm.

118. ***Pyrrhula uchidai***, sp. nov.

Uchida-uso.

♂ ad. (type of species). Similar to *P. nipalensis* Hodgs., but easily distinguishable from it by the presence of white area in many tail-feathers.

General colour of upper parts ashy-brown, with a band of dusky black across the lower back, followed by a broad white band on the rump; forehead, lores, base of cheeks, and chin dark brown; crown and nape ashy brown, the feathers with dusky centre and giving a scaly appearance; a white patch beneath and behind the eye; lower parts plain ashy brown, except the middle of abdomen and the under tail-coverts which are white;

lesser and median wing-coverts dark ashy brown ; greater coverts pale ashy brown with nearly white tip, the outer ones broadly margined with purplish black ; primaries and secondaries blackish, margined on the outer web with purplish velvety black increasingly towards the tertiaries, which are almost entirely of that colour ; the short innermost tertiary margined exteriorly with crimson; upper tail-coverts purplish black, and all the feathers tipped with velvety black giving a scaly appearance; tail-feathers blackish tinged with purple towards ends, the tip margined with velvety black as in upper tail-coverts; the central pair of rectrix in the middle of each with an elongate broad white patch (5 mm. wide), beginning at some distance (9 mm.) from tip of the feather, the shaft being white in the white area; the next lateral rectrix with distinct white shaft streak, beginning at some distance from the tip, without white margin to the inner web; the third lateral rectrix with the shaft less white than in the second, with no perceptible white margin to the inner web ; the fourth lateral rectrice with the shaft somewhat whiter than in the third, the inner web with very narrow white margin; the fifth or penultimate rectrix with an elongate irregular white area near the end of the inner web, the distance from tip of the feather to the white patch measuring about 6 mm., the shaft along the white area white, with white margin to the inner web ; the outermost rectrix with a large elongate white patch on the inner web begins a short distance (about 4 mm.) from tip, the shaft white along that white area; the central tail-feather 18 mm. shorter than the longest. Culmen 11 mm., wing 83 mm., tail 71 mm., tarsus 14 mm.

The type specimen is from Shishaban, Akō District : July 16, 1909, collected by Mr. Y. Kikuchi. It is preserved in the Zoological Institute, Science College, Tokyo.

♀ ad. Similar to the female of *P. nipalensis*, but each of the central pair of rectrices with an elongate broad white patch as in the male, all the remaining tail-feathers blackish tinged with purple towards their ends, the tips being margined with velvety black ; the shafts white only in the white area of the central pair of rectrices ; the innermost tertiary margined on the outer web with yellowish (instead of crimson as in the male). Culmen 12 mm., wing 80 mm., tail 68 mm., tarsus 14.5 mm.

The female specimen was captured together with the type at the same locality.

119. ***Passer montanus taivanensis*** Hart.

Taiwan-suzume.

Hartert, Vög. Pal. F., I, p. 161; *Passer montanus* (nec Linn.), Swinhoe, P.Z.S., 1871, p. 386; Tada, Taiwan Chōrui, Ippan, p. 49; Grant & La Touche, Ibis, 1907, p. 163; Uchida, Annot. Zool. Japon., 1912, p. 204; Uchida, Nihon Chōrui Zusetsu, III, 1915, p. 94.

Taihoku: 1♂ & 2♀s, Ap. 23; 1♀, Ap. 24; 6♂s & 4♀s, May 17; Horisha, Nantō Distr.: 1♂, May 1; Shūshū, Nantō: 1♀, May 4; Enteishō, Tainan Distr.: 2♀s, May 9; Hokuto, Taihoku Distr.: 2♂s, May 23. This bird may be said to be common in all parts of the island. I found it most abundant in the district of Taichū.

120. ***Emberiza elegans*** Temm.

Miyama-hōjiro.

Sharpe, Cat. B. Br. Mus., XII, p. 497; Dresser, Pal. Bds., I, p. 355; Ogawa, Hand. Bds. Jap., Annot. Zool. Jap., 1908, p. 411; Uchida, Nihon Chōrui Zusetsu, II, p. 525, Pl. XXXV, fig. 3.

A female specimen collected at Arisan, Feb. 1909, exists in the Taihoku museum. The species occurs only rarely in the mountainous parts of Formosa.

Notes on the Photophores of *Sergestes prehensilis* Bate.

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With 3 figures in text.

The photophores of decapod crustacea have received much illumination from the researches of Kemp[1] ('10 a and b). *Sergestes challengeri* Hansen, amongst some others, was studied by him with great care as regards that organ. Now, my own studies of a decapod crustacean of the same genus, which I identify with *S. prehensilis* of Bate, have shown that it is in possession of photophores apparently agreeing in essential structure with those known from certain other crustaceans, but especially closely with those of *S. challengeri* as described by Kemp, although I stand at variance from him in many points with respect to the interpretation of the parts.

Bate[2] ('88), the original describer of *S. prehensilis*, and Hansen[3] ('03), who re-examined the species, have both made no mention of the photophores. The organ loses its pigments in most preservative fluids and is thus rendered inconspicuous, so that it may easily remain unnoticed unless a special search be made for it. In the fresh specimens and in certain conditions of preservation, the photophores can without difficulty be observed with the naked eye as minute reddish spots located at definite

1) Kemp, S, 1910 a. The Decapoda Natantia of the Coasts of Ireland. Fish. Ireland &c. Invest. for 1908, no. 1. Ditto, 1910 b. Notes on the Photophores of Decapod Crustacea. P. Z. S., 1910, pt. III.

2) Bate, C. S., 1888. Report on the Crustacea Macrura dredged by H. M. S. Challenger during the years 1873–1876.

3) Hansen, H. J., 1903. On the Crustacean of the Genera *Petalidium* and *Sergestes* from the 'Challenger' with an Account of Luminous Organ in *Sergestes challengeri*, n. sp. P. Z. S.

positions. They number 157 in all, thus coming in this respect very near to *S. challengeri*, for which both Hansen and Kemp have given the number to be over 150. The topographical distribution of the organs is also closely alike in the two species. In the present species I have determined their distribution in the body to be as follows :

Inner surface of branchiostegites	Three pairs.
Eyestalks	Two pairs.
Third joint of antennular peduncles	One pair.
Between bases of first antennæ	Single (median).
Squamæ of second antennæ	Three pairs.
Fifth joint of antennal peduncles	One pair.
Bases of second antennæ	Two pairs.
Near anterior end of labrum	Single (median).
Lateral sides of labrum	One pair.
Penultimate joint of mandibular palpi	One pair.
Mandibles proper	One pair.
Bases of mandibles	Two pairs.
Bases of first maxillæ	One pair.
Sternite between bases of first maxillipeds	Two (median).
Second maxillipeds	Four pairs.
Bases of second maxillipeds	Two pairs.
Sternite between bases of second maxillipeds	Single (median).
Third maxillipeds	Four pairs.
Sternite between bases of third maxillipeds	Three (median).
First peraeopods	Two pairs.
Sternites between bases of first peraeopods	Three (median).
Second peraeopods	Two pairs.
Sternite between bases of second peraeopods	Five (median).
Third peraeopods	Three pairs.
Sternite between bases of third peraeopods	Five (median).
Fourth peraeopods	One pair.
Sternite between bases of fourth peraeopods	Five (median).

Fifth peraeopods	One pair.
Sternite between bases of fifth peraeopods	Six (median).
Lateral sides of first, second, third, fifth, and sixth abdominal tergites	Five pairs.
First to fifth abdominal pleura	Five pairs.
Bases of first to fifth pleopods	Five pairs.
First abdominal sternite	Single (median).
Second abdominal sternite	Two („).
Third abdominal sternite	One („).
Fourth abdominal sternite	One („).
Fifth abdominal sternite	One („).
Sixth abdominal sternite	Five („).
Uropods	Four pairs.

On two occasions I have had the opportunity of collecting the crustacean myself and of observing the photophores in functional activity, viz., on March 2 and May 31, 1914, at a spot in Suruga Bay about four kilometers off the town of Kambara. On both occasions the capture occurred at 9 p. m. Observation then made on the spot showed that, in all the freshly obtained specimens, the photophores emitted dim greenish yellow light in an intermittent way, each time starting suddenly and vanishing with as much promptitude after a longer or shorter period of illumination. Frequently, after dark intervals of varying length, the lighting up of different photophores in the same body occurred one after another in serial succession, beginning with those at the head end and thence progressing posteriorly, to finish up at the tail end. Each single photophore lighted up for nearly a moment only, and as soon as a light disappeared, another appeared a short distance behind in rapid succession, so that there were scarcely ever observed more than one light alive at a time. It took 1–2 seconds from start to finish of a single series of illumination of the above sort. At other times, only a limited number of photophores in a certain body region were observed to light up simultaneously, this time the lights remaining steadily alive for several seconds. Most frequently it was the photophores in the neighborhood of the eyes that showed this sort of activity; less frequently those of the third or of the sixth abdominal somite. A simultaneous luminescence of photophores in all parts of the body, f. i., such as Doflein[1] (Tafel XVII) has beautifully depicted for *Acanthephyra debilis*, was never observed in the present form. Giving a shake to the water in the vessel containing the crustaceans, all these began the first mentioned sort of illumination. A second shake given to the water immediately after the extinction of the last light at the posterior body end, produced no effect. Nor could the lights be called forth by rubbing or by lightly pressing the crustacean with the finger. However, by crushing it between the fingers a number of the photophores started light just for an instant, producing a sparkling-like effect, but the lights immediately vanished without leaving diffuse lingering luminescence, as the Euphausians do under the same circumstance. By the way, I may mention that the luminescent power of *S. prehensilis* was distinctly much weaker than that of the Euphausians which were obtained in the same haul of the collecting net.

On the morning following the collecting, the specimens of *S. prehensilis*, which were kept living, were found to be in apparently good health, being still quite active in their movements. However, when subjected to observation in the dark room, they have entirely failed to show lights. Attempts were made to rouse them into luminescence by external stimuli, but in vain. This may be explained in a general way by assuming that the photophores were in a state of fatigue, and in a concrete way for some, though not all, of them by the fact that the photogenous cells were breaking up, as I have later determined by microscopical examination of the sections.

Now, as to the structure of the photophores. At the outset I should mention that my material for the morphological study were all fixed early in

1) Doflein, F., 1914. Tierbau und Tierleben, Bd. II. Das Tier als Glied des Naturganzen. Leipzig und Berlin.

the morning following the night when the specimens were collected, that is to say, after they had been kept alive in captivity for about ten hours. I greatly regret that circumstances prevented me from doing the fixing work on the sea, right at once after the capture. The fact already alluded to, that in some photopores the photogenous cells are found in the process of breaking up, may be due to the belated fixing of the material. Nevertheless, there are to be found in the fixed material a goodly number of other photophores, which seem from their histological appearance to have remained in a state fairly well representing their normal structure.

A completely developed photophore of *S. prehensilis* may be said to be composed of the following eight parts: 1) the lens, 2) the lens epithelium, 3) the photogenous layer, 4) the basement membrane, 5) the reflector, 6) the pigment mantle, 7) the connective tissue theca, and 8) the nerves.

1) ***The lens.***—This is nothing more than a strongly thickened areolet of the general cuticula. The latter, perfectly colorless and transparent in all parts of the body, is made up of three layers, of which the middle and the inner are about equally thick, while the outer is by far much thinner than either and represents a fine membrane of only about $1\frac{1}{2}\,\mu$ thickness. Now, the photophore lens consists of three parts corresponding to, and directly

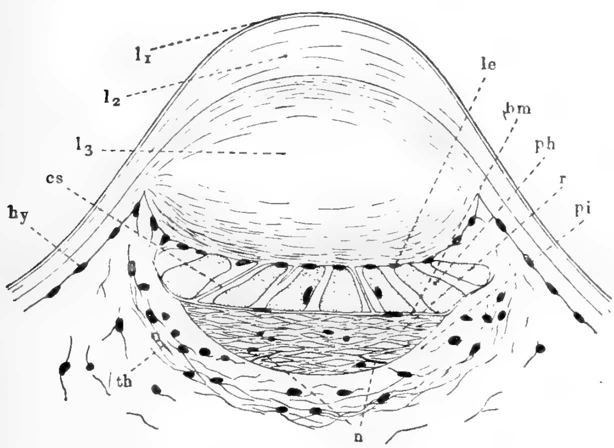

Fig. 1. Semi-diagrammatic representation of a section through the median photophore of a thoracic sternite. Pigments omitted. ×400. From a transverse section of *S. prehensilis*. *bm*, basement membrane; *cs*, connective strands of photogenous layer; *hy*, hypodermis; l_1, covering layer of lens; l_2, outer lens body; l_3, inner lens body; *le*, lens epithelium; *n*, nerve; *ph*, photogenous cells; *pi*, pigment layer; *r*, reflector; *th*, theca.

continuous with, the above three layers of the general cuticula. They are: the covering layer (l_1), the outer lens body (l_2) and the inner lens body (l_3).

The covering layer of the lens differs in no way from the externalmost layer of the general cuticula, like which layer it is uniformly very thin in all its parts. In sectioning, the layer is easily torn away, especially if the object is imbedded in paraffin. Both Heidenhain's iron-haematoxylin and borax-carmine stain the layer very deeply, much more so than they do the remaining inner parts of the lens. Freeborn's picro-nigrosin stains it faintly yellow, the Congo red yellowish-orange. The corresponding layer of the general cuticula, outside the lens area, is affected by the stains in exactly the same way, so that it may be said that the general cuticula, so far as concerns its outermost layer, shows no differentiation whatever in the parts overlying the photophores. Kemp ('10 b), in his semi-diagrammatic figure (Pl. LIV, fig. 3) of the photophores of *S. challengeri*, has given a special covering membrane to the lens but seems to have entertained some doubt as to its real presence, for, in the text he has referred to it as a structure which "possibly" exists. I almost do not doubt that the same covering layer as that I have described above does exist in *S. challengeri* also; since, the black bordering line, visible in the microphotograph given by Kemp (Pl. LIII) and running continuously over the lens as well as over other parts of the body surface, can well be interpreted as representing the layer in question.

The outer lens boby (l_2) is a distinct and simple concavo-convex thickening of the middle layer of the general cuticula, standing with its outer convex and inner concave surfaces in direct apposition respectively to the external covering layer and the inner lens body. Peripherally the outer lens body becomes gradually thinner, passing over imperceptively into its mother layer in the general cuticula. In unison with that mother layer, the outer lens body stains uniformly red with Congo red, but somewhat more faintly than does the inner layer of the general cuticula or the directly adjoining stratum of the inner lens body. It takes up Heidenhain's iron-haematoxylin moderately well; and then, unless the sections are excessively thin, it presents a distinctly darker appearance than the underlying cuticular parts. Freeborn's picro-nigrosin gives it a yellowish-green color, while the underlying parts assume a bluish color.

The inner lens body (l_3) forms the most bulky part of the entire lens, measuring more than three times as thick as the outer lens body. It is of a biconvex shape, being uniformly arched on the outer surface and somewhat flattened in the central major parts of the inner. It joins the inner layer of the general cuticula at the equator, very gradually on the outer side but with a sharply angular demarcation on the inner. Unlike the two other parts of the lens, the inner lens body shows the peculiarity of differentiating itself into three strata, when stained with Congo red or with Freeborn's picro-nigrosin. The strata are about equally thick. The outer stratum takes up the stains to a moderate degree, the middle stratum very weakly, and the inner stratum most strongly. However, when the sections are too thin, or when staining reagents other than the two mentioned are used, it frequently happens that the outer and the middle strata are both about equally weakly stained and are thus scarcely distinguishable not only from each other but also from the outer lens body, while the inner stratum presents itself strongly stained and well set off from the middle stratum. Under such circumstances one might easily mistake the inner stratum for a part distinct in itself, and the middle and outer strata together with the outer lens body for another single part of the lens. I should think that this fact may have had to do in leading both Hansen ('03, p. 74) and Kemp ('10 b, p. 641) to regard the lens in *S. challengeri* to be composed of an outer *biconvex* and an inner *concavo-convex* parts, which, at any rate, does not fit with the state of the thing in *S. prehensilis*. Likewise, the "middle layer" described by Kemp from the lens of *Acanthephyra debilis* and held by him to be distinct from the inner lens layer, is not improbably nothing else than the strongly differentiated outer strata of the inner lens body. In passing it may be noted that the entire lens in *S. prehensilis* is perfectly colorless, differing in this respect remarkably from the same of

Acanthephyra debilis, in which, according to Kemp, it should be permeated by a deep violet-blue coloring matter.

The lens, when viewed surface on, is either circular or oval in outline, the diameter varying from 45 μ to 143 μ in the former case and from 41 × 32 μ to 169 × 150 μ in the latter. Roughly speaking, the size increases as the individuals grow older and larger, as will be seen from the following table:

Sex	♀	♂	♀	♂
Total length of body	29 mm	34 mm	39 mm	43 mm
Carapace length	7.5 mm	8.5 mm	10.5 mm	12 mm
Median photophore of 1st abdominal sternite	131×92 μ	135×98 μ	169×150 μ	154×128 μ
Median photophore of 4th abdominal sternite	105×101 μ	113×109 μ	143×143 μ	154×135 μ
3rd photophore of 6th abdominal sternite	83×71 μ	98×79 μ	107×87 μ	98×92 μ
Proximal photophore of left exite of uropod	81×71 μ	113×94 μ	116×98 μ	120×99 μ
Distal photophore of same	45×45 μ	71×68 μ	90×83 μ	83×75 μ

2) ***The lens epithelium.***—Since the lens is but a local thickening of the cuticula, it is quite natural that there exists directly beneath it a cellular layer continuous with, and similarly charaterized as, the hypodermis of the general body surface. The latter (fig. 1, *hy*) is an exceedingly thin epithelium, in which the cells are indicated mainly by their flattened nuclei arranged in a single layer and all pressed flatly against the cuticula. Now, that part of the hypodermis which lines the inner convex surface of the lens may be distinguished by the designation of lens epithelium (*le*). Hansen seems to have observed this in *S. challengeri*, without however coming into definite knowledge of its nature nor even of its real existence. Kemp has entirely overlooked the epithelium in the same species, though the nuclei

belonging to it did not remain unobserved by him ; but these were regarded by him to be those of the underlying photogenous cells, the true nuclei of which apparently remained unrecognized by him. In passing it may be remarked that the epithelially arranged cells, described by Kemp and situated under the lens in the photophores of *Acanthephyra debilis*, probably represent the lens epithelium under consideration.

The lens epithelium in *S. prehensilis* is of much the same appearance as the general hypodermis. But there are in it some special features which deserve specially noting, as being of some significance as regards the genetic relation of the photogenous layer to the epithelium. While the majority of the nuclei in the epithelium lie flattened against the lens surface, exactly as do those of the hypodermis against the cuticula, a good many others are seen to more or less stand out inwards at certain angles from the level of the epithelium. The projecting nuclei, which appear to be mostly of an elongate ovoid shape, are generally so disposed with their long axes that imaginary outward prolongations of these converge towards the axis of the internal lens body. Cell-bodies to the projecting nuclei could scarcely ever be made out with definiteness. Instead of resting nuclei, karyokinetic figures occur not unfrequently in the lens epithelium ; they are mostly found in positions which indicate their origin from the projecting nuclei, the spindle axis being directed in the same way as the long axis of the latter. It may be that the multiplication of the epithelial cells, especially of those projecting inwards, stands in relation to the regeneration of photogenous cells, which not unlikely takes place at certain period or under certain circumstances.

3) ***The photogenous layer.***—Directly inside of the lens epithelium is a relatively thick layer, the photogenous layer, the main constituents of which are the photogenous cells (*ph.*). The layer is seen to cover the somewhat flattened central parts of the internal lens surface, without extending into the periphery of the latter. The photogenous cells are of a bulky size and of an approximately pyramidal shape, being broadest

at the inner end and more or less narrowed towards the outer end, with which they stand in contact with the lens epithelium. Some seven or so of them in a row may be seen in a section passing through the axis of the photophore. While the central photogenous cell or cells stand with their long axes vertically disposed to the internal lens surface, the more peripherally situated ones are all obliquely set, with their outer ends so inclined that outward prolongations of their long axes converge toward a point well within, and approximately in the axis of, the photophore. It will be noticed that this arrangement of the photogenous cells agrees with that of the projecting nuclei of the lens epithelium,—a fact, which may be taken as suggestive of the derivation of the former from the cell-bodies of the latter.

The photogenous cells do not form a compact layer. There exist between them interstices of a considerable width. These intercellular spaces are clearly not artefacts, but are evidently haemal spaces, as was stated by Chun[1] for the photophores of *Euphausia*. They are occupied by a clear substance which is stained bluish by Freeborn's picro-nigrosin, exactly like the blood. Further, the spaces, as seen in sections, are frequently, but not always, traversed by fine strands (*cs*), the connective strands (" Bindesubstanz " of Grobben[2]), which extend between the lens epithelium and the basement membrane of the photogenous layer. The strands are evidently protoplasmic and are directly continuous with the substance of the basement membrane. A nucleus was never observed to be present in the strands.

The nucleus of the photogenous cell is found about midway between the ends of the cell-body, always more or less closely pressed against the lateral cell-wall. It is relatively very small, elongate in shape (about 8 μ long) and of a rather compact appearance. On account of its insignificant size, disproportionate to the bulky development of the cell-body, it may

1) Chun, C., 1893. Sehorgane und Facettenauge. Ein Beitrag zur Theorie des Sehens in grossen Meerestiefen. Biol. Centralb., Bd. 13, p. 550.

2) Grobben, K., 1911. Die Bindesubstanzen von *Argulus*. Ein Beitrag zur Kenntnis der Bindesubstanz der Arthropoden. Arb. Zool. Inst. Wien, Bd. 19.

easily be overlooked, as indeed Kemp seems to have done in the photogenous cells of *S. challengeri.*

The body of the photogenous cells, fixed with Flemming's fluid or with picric acid mixtures, is densely and uniformly fine-granular. This condition I regard to fairly represent the normal. The granules are moderately refractive. In the material treated with Flemming's fluid and stained with safranin, the cell-body appears rosy red. Using picric acid fixatives, fuchsin stains it red, Freeborn's picro-nigrosin yellow, Heidenhain's iron-haematoxylin blackish, and Congo red yellowish. It shows strong affinity towards eosin but very slightly towards Delafield's haematoxylin.

According to Kemp, there exist deep blue pigments in the photogenous cells of *S. challengeri.* It is noteworthy that I have found nothing like them in the same cells of *S. prehensilis,* in both the fresh and the fixed state.

As before indicated, there exists, marginally to the photogenous layer and directly beneath the lens epithelium in the periphery of the inner lens surface, a zone which is entirely devoid of the photogenous cells and consists of a haemal space traversed by some thin fibres, in much the same manner as the haemal spaces between photogenous cells are by the connective strands. I believe that the said fibres and the connective strands are in fact identical structures derived from the cells of the lens epithelium, and that the marginal zone in question is genetically the same as the more centrally situated photogenous layer, but has not given rise to photogenous cells, which probably also originate from certain cells of the lens epithelium by special development. Kemp has entered, in his semi-diagrammatic figures (op. cit., pl. LIV, figs. 2, 3, 5), some small cells in the marginal parts of the photogenous layer, although none of the photographs given by him (pl. LIII, figs. 2–4) clearly shows the same cells. If the cells in question do really exist*, they may perhaps be interpreted as representing the

* Possibly the bodies here referred to as cells are not cells at all, but disintegration products of photogenous cells.

transitional stages of lens epithelium cells to photogenous cells. Against the underlying connective tissue, the marginal zone is quite ill-defined, in correlation with the fact that the basement membrane is so thinned out that it is scarcely distinguishable as such in the parts concerned.

In the photophores preserved by me, I find that not a few of them have the photogenous cells in the process of breaking up. This may be due to the faulty action of the fixing or preserving reagents, or more probably to the fact that the specimens were kept in captivity—therefore, under conditions which may be assumed to have been different from those of their natural habitat—for about ten hours before the fixing took place. The breaking up first commences in some of the cells in the peripheral parts of the photogenous layer; thence it extends into those more centrally situated, eventually affecting all the photogenous cells in the layer. The first indication of the process consists in the appearance, in the cell body, of a few unusually large granules among the uniformly fine ones before described. Soon the large granules coalesce into a single homogenous and refractive mass. This increases in volume at expense of the original finely granular cell-body and finally completely replaces the latter. After this change, the cell-body exhibits much the same reactions towards staining reagents as before, except that it now becomes stained deep black by Heidenhain's iron-haematoxylin. This indicates that, hand in hand with the physical change, some chemical change has also taken place in the substance of the cell-body. Now, the transformed cell-body begins to undergo disintegration into fragments of various sizes. A number of these fragments are shown in fig. 2. While some are very small and simply granule-like, others are very much larger and present a spherical, ovoid or almost indefinite shape. Frequently they show a constriction or constrictions on the body and thus have a biscuit-like or a lobate or tuberculate-like form. The substance of the fragments is either of a homogeneous appearance or exhibits a varying number of large and small drop-like inclusions. Microchemically it behaves just as before the disintegration.

Sooner or later, the detrital fragments move off from the site of their origin, without doubt carried on by the blood. So that, after the disintegration of the cells has advanced to a certain extent, the identical fragments as those found in the photogenous layer begin to be met with also in the connective tissue adjacent to the photophore. When all the photogenous cells in a photophore have broken up and the detrital fragments have been deported, the site of the photogenous layer may appear like an empty space, traversed by the connective strands only. I have dwelt at length on the disintegration of photogenous cells and its products, because the matter may have important bearing on the correct interpretation of structural parts observed in preparation of preserved photophores. Thus, it seems to me not unlikely that what Kemp has given as photogenous cells in his representation of the photophore of *Acanthephyra debilis* (op. cit., pl. LII., fig. 1, and pl. LIV., fig. 1), are not cells at all, but empty spaces left behind by photogenous cells which had disappeared. The lines taken by him for the wall of photogenous cells were probably nothing else than connective strands, while the mass of minute and highly refractive granules at the end of the nerve-bundle reaching the photogenous layer, may simply be the remnants of the disintegration products of the photogenous cells.

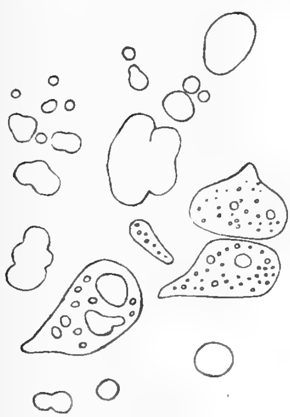

Fig. 2.
Disintegration-products of photogenous cells.
×765.

A few more words concerning the detrital fragments of photogenous cells in *S. prehensilis.* I have already stated that they are deported, eventually by the blood current, into the connective tissue in the immediate neighborhood of the photophore. After that, there are signs of their transportation farther away, into the gills, the liver, &c. In the gills of those individuals in which the photogenous cells have already disappeared from a number of the photophores or are in an advanced stage of degeneration, it is not at all uncommon to meet with granules which are of exactly the same microchemical properties as the detrital fragments found in or about the photophores. They float in the blood. Examination of the branchial glands showed no indication of their activity in excreting the granules.[1] Remarkable is the fact that, whenever there was the presence of the granules in the gill-blood, this stained more or less yellowish by Freeborn's picro-nigrosin, instead of bluish as it usually does. Greater the quantity of the granules present, the stronger is the yellowish tinge acquired by the gill-blood. In some of the liver cells I have also not unfrequently found similar or identical granules, each inclosed in a relatively large vacuole in the cell-body. They were probably destined to be thrown out into the digestive canal. Further, masses of apparently the same nature as the granules in question were discovered in the cavities of the antennal glands.

4) ***The basement membrane.***—This is a thin but distinct membrane at the base of the photogenous layer (fig. 1, *bm*). A limited number of flattened nuclei is distinctly present in it. As before mentioned, the substance of the membrane is directly continuous with that of the connective strands. Peripherally and beyond the margin of the photogenous layer the membrane thins out and becomes ill distinguishable as such. I should think that the membrane and the connective strands are, alike the photogenous cells, derivatives of the lens epithelium or the hypodermis, and that the two together may be regarded to form a single structure which gives support to the photogenous cells, somewhat as the neuroglia does to ganglion cells.

The layer which Kemp has called the second cellular layer in the photophore of *S. challengeri* (l. c., p. 642), is undoubtedly identical with the membrane under consideration. A similar or the same membrane seems to exist also in the photophore of *Acanthephyra debilis*, judging from the microphotograph given by the same author (pl. LIII, fig. 2),

1) Cuénot, L., 1895. Études physiologiques sur les Crustacés décapodes. Arch. Biol., tome XIII.

although the presence of the membrane was given by him neither in the text nor in the diagrammatic figure (pl. LIV, fig. 1).

5) ***The reflector.***—A body, which is regarded as the reflector, is usually, though not always, present in the photophores of *S. prehensilis* (fig. 1, *r*). It represents a plano-convex or a somewhat hemispherical body, standing with its plane surface in direct contact with the basement membrane and with its sharply defined arched surface in apposition to the pigment mantle. Its diameter is somewhat shorter than that of the photogenous layer. Observed in sections of well preserved material, the reflector consists of a small-meshed and dense network of protoplasm, which contains some small nuclei in irregularly scattered distribution. The mesh spaces are of a flattened shape, compressed in the direction vertical to the plane surface of the body. In fact, the reflector may be regarded as being made up of branching and anastomosing cells, with horizontally extended slit-like interspaces. The protoplasmic reticulum is homogenous and agrees in its reactions towards staining reagents perfectly with the homogeneous contents of the photogenous cells at a stage just before they begin to disintegrate.

Kemp (*l. c.*, p. 642) has attributed to the reflector of *S. challengeri* a faintly striated appearance. I have found that to be also the case in *S. prehensilis*, but only in those specimens which were preserved in formalin, as were also Kemp's specimens. Moreover, it was given by the same author that the reflector, in the species studied by him, contains numerous pear-shaped nuclei which are very regularly arranged with their apices directed towards the lens (p. 642). Such a condition of the nuclei in the reflector, I have entirely failed to observe in *S. prehensilis*.

As to the origin of the reflector, I have arrived at no definite view. Its histological character is so very different from those of the connective tissue that it seems scarcely justifiable, in the absence of convincing proofs, to assume its derivation from the latter. Possibly it is of hypodermal origin. In its reactions towards stains, the reflector reticulum exhibits certain affinity to the photogenous cells and, at the same time, a marked difference from the connective tissue. Thus, Freeborn's picro-nigrosin stains it yellow, as it does the photogenous cells; while the same reagent stains the connective tissue blue.

In some photophores of the species the reflector may be entirely wanting. I have found it often absent in those situated in the median line of the sternite of cephalothoracic segments. In these cases there exists in place of the missing reflector, i. e., between the basement membrane and the pigment mantle, a narrow space occupied by the ordinary loose connective tissue which is continuous with that of a more internal situation.

6) ***The pigment mantle.***—A cup-like pigment mantle of a reddish color exists, holding in its hollow the marginal cells of the photogenous layer and the entire proximal convex surface of the reflector (*pi*, figs. 1 and 3). Proximally the mantle sends out a number of long chromorhyzae. Examined in the material preserved in glycerin, it is seen to consist of a dense accumulation of three kinds of pigment granules, viz., the red, orange and black, as is also the case with the pigment flecks under the hypodermis of the general body surface.

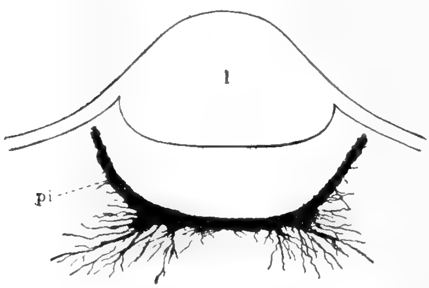

Fig. 3.
Optical section through second photophore of sixth abdomianl sternite. Glycerin material. ×200. *l*, lens; *pi*, pigment-mantle.

In weak formalin the pigment remains for some time but is ultimately dissolved away. In most other fixatives, f. i., in alcohol,* it quickly dis-

* A short time after the animal is thrown into alcohol, there come distinctly into view a pair of reddish-colored transverse bands behind the base of the fifth peraeopods, standing out pronouncedly on the now depigmented body surface. They seem to agree completely with the bands which Coutière (Note préliminaire sur les *Eucyphotes* recueillis par S. A. S. le Prince de Monaco à l'aide du filet à grand ouverture. Bull. Mus. Océan. Monaco, No. 48, 1905, p. 4. fig. 7) has described from *Hoplophorus grimaldi*, calling them "un organe lumineux en forme de longue bande." Their structure has remained unknown to me. Anyway, they are certainly not luminous organs in *S. prehensilis*.

appears, making difficult the detection of the photophores with the naked eye or under the lens. On the other hand, glycerin preserves the pigment practically without change for an indefinite length of time, even when heated over 40°C in that medium, so that Laubmann's[1] method of intra-vitam staining can not be brought into practice. In well dried specimens, in which the general color is changed into a reddish orange, the pigment is preserved to some extent. After the dissolving away of the pigment granules forming the mantle, there is left behind a loose connective tissue of the ordinary appearance.

7) ***The theca.***—Surrounding the pigment mantle on the proximal side is the theca, which is simply a condensed layer of the general connective tissue. In it the fibres run nearly parallel and concentrically, showing a sprinkling of elongate nuclei. It passes, both inside and outside, without delimitation into the same tissue of a much looser appearance. Internally to the theca there is a noticeably more numerous occurrence of the somewhat large granules which become blackened by Flemming's fluid, than in the theca itself or in the general connective tissue.

8) ***The nerve.***—The exact mode of innervation of the photophores I have not been able to determine. Certain it is that the nerve reaching the organ does not perforate the pigment mantle as a single trunk. On the other hand, it is very probable that the nerve, somewhat as in certain (thoracic and abdominal) photophores of Euphausians, breaks up into branches before it reaches the pigment mantle, and that these branches severally pass into the mantle. Some slender fibres were observed penetrating into the reflector from the internal convex side (fig. 1, *n*); they were probably of nervous nature.

In conclusion, I should discharge the pleasant duty of expressing my deep obligations to Professors Ijima, Watasé and Gotô as well as to Dr.

1) Laubmann, A. L., 1912. Untersuchungen über die Hautsinnesorgane bei decapoden Krebsen aus der Gruppe der Carididen. Zool. Jahrb., Anat. Ont., Bd. 35, H. 1.

Yatsu, who all helped me in various ways during the course of my studies. I am also greatly indebted to Mr. K. Nakazawa of the Fisheries Institute, who also took much interest in the study of *S. prehensilis*, for kindly placing some of his material at my disposal. Further, my thanks are due to Dr. T. Ogata of the Pathological Institute, Tokyo Imperial University, for giving me fascilities in the use of a freezing microtome in his laboratory.

A New Astomatous Ciliate, *Metaphrya sagittae*, gen. et sp. nov., found in the Coelom of Sagitta.

By

Iwaji Ikeda, *Rigakuhakushi.*

During a short stay, in December of 1913, at the Misaki Marine Biological Station, Dr. YATSU kindly called my attention to a living specimen of *Sagitta*, which contained some large ciliates in the body-cavity. Upon close examination under the microscope, these were ascertained to represent a new mouthless holotrichous form of a remarkable characterization. I propose to call it *Metaphrya sagittae*, gen. & sp. nov.

Owing to the transparency of the host, much of the external characters of the parasites could be observed in their natural habitat. Fig. 1 represents the surface view of one of the four largest specimens in life. The body is pear-shaped, measuring about 0.25 *mm* by 0.13 *mm*. It is nearly transparent and quite colourless. The anterior end is distinctly narrower than the posterior, which is rather rounded. The body appears to be radially symmetrical in its structural plan excepting the fact that the anterior end is somewhat deflected towards one side. Fine but long cilia are present, not uniformly all over the body, but growing in 12 longitudinal shallow grooves of the body, so as to form as many equidistant ciliary bands. The organism is devoid of a mouth or any other external aperture ; therefore, it should belong to the suborder Astomata of the order Holotricha. The cytoplasm investing the body is finely granular ; its differentiation into the ectoplasm and the entoplasm is in the fresh state indistinct. Beneath this cytoplasmic layer there can be recog-

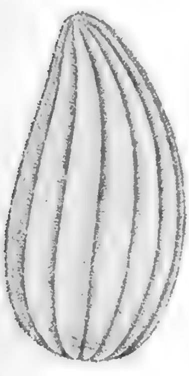

Fig. 1.
Fully grown
Metaphrya sagittae
in the living state.
×180.

nized a very thin but distinct layer, which is characterized by being strongly refractive and by extending in an irregularly wavy way when viewed in optical section. The wide space internal to this refringent layer is occupied by a clear fluid-like substance.

The parasites were fixed, together with the host, with picro-acetic acid and were in part sectioned and in part mounted in *toto*. The sections, 5μ thick, were stained with either iron-haematoxylin or DELAFIELD's haematoxylin, with or without the use of eosin as a counter stain. Unfortunately it was found that the effects of fixing were not in all respects satisfactory. In the larger specimens the superficial cytoplasmic layer and the underlying refringent layer have become in many places widely separated from each other. It is not quite clear how such a disturbance as this was brought about only in the larger specimens. Possibly it may be due to the fixing reagent having caused contraction of the extensive refringent layer. Fig. 2 represents a median longitudinal section of a large specimen stained with DELAFIELD's haematoxylin and eosin. The large clear spaces (marked with ✶) visible between the plasmic cortex and the layer of darkly stained threads representing the refringent layer that we have seen in the fresh state, are the artefacts just referred to. The same is evidently also true of the similar spaces in the central parts. One of the remarkable structural peculiarities shown by the larger, and therefore probaby full-grown, individuals consists in the fact that the cytoplasm is extraordinarily sparse in quantity as compared with the large size of the entire body. It merely forms a thin layer covering the body, the greater part of the latter being taken up by

Fig. 2.
A longitudinal section of a fully grown *M. sagittae*. ×370.

the central non-plasmic substance. The cytoplasm is differentiated, though by no means sharply into the ectoplasm and the entoplasm. The former forms a very thin, uniformly finely granular superficial layer, while the latter is a little thicker and presents a reticulate granular appearance (fig. 3). The two layers show neither a structural delimitation between them nor differential staining properties.

The curious refringent layer we have seen in the fresh state, when examined in sections, presents itself as being made up of a series of deeply stained pieces arranged in a layer in the deepest parts of the entoplasm. A cursory examination of stained total preparations or of serial sections makes it at once clear that the layer in question consists in fact of comparatively thick threads which divide and anastomose, so as to bring about a network with close and irregular-shaped meshes. The substance of the threads is evidently the chromatin, and I take no heed in regarding the entire structure as the meganucleus of the organism. The entire meganucleus may thus be said to have the structure of a basketwork with a spacious hollow inside. Strikingly remarkable as is this feature of the meganucleus, it may probably be regarded to be a condition which is foreshadowed more or lass in some other astomatous ciliates, *e.g.*, *Rhizocarium concavus* CAULLERY & MESNIL *Anoplophrya alluri* CÉPÈDE, *Opalinopsis sepiolae* FOETTINGER, *etc.*

The meganuclear threads are seen in most parts to be surrounded by narrow empty spaces, which are always found to be bordered each by a distinct and dense sheet of the entoplasm. I therefore regard the spaces to be equivalent to the excretory vacuoles described by METCALF[1)] from a number of *Opalina* species.

The part of the entoplasm lying internal to the meganuclear threads appears in sections as an extremely thin, very finely granular and deeply staining layer which directly invests the large central non-plasmic body. Fig. 3, which represents under a high magnification a small portion of a section belonging to the same series as that of fig. 2, illustrates all the

1) METCAL , M.M.—The excretory organs of *Opalina*, Parts I and II. Arch. f. Protist., Band X, 1907.

structures aboved described. It should further serve to illustrate an important structure not yet mentioned, *viz.*, the micronucleus. This is a small, deeply staining body which, in all the specimens examined, occurred in a single number, independently of and situated closely external to, the meganuclear basketwork. It always lies in the transverse plane passing through the middle of the body. It is of an ellipsoidal or spindle-like shape, measuring about 5μ in the major diametre. There can be distinguished in it a deeply stained peripheral and a less deeply stained central part. Around the body there always exists a narrow clear space, which does not seem to be an artificial production, since it shows itself to be stained though very lightly. There can scarcely be a doubt that the above body represents the micronucleus of the organism.

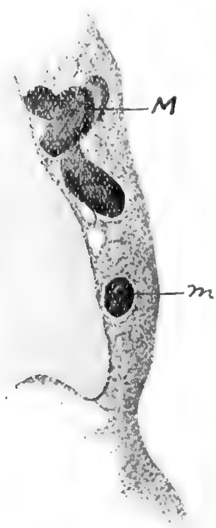

Fig. 3.
A small portion of a section through *M. sagittae*. Cytoplasmic layer to the right; central nonplasmic body to the left. M, a part of meganucleus; m, micronucleus. ×960.

The large central body differs from all the cytoplasmic structures in being perfectly homogeneous and also in being but little stainable with haematoxylin though very intensely with eosin. This peculiarity indicates that it is not protoplasmic but is probably a colloid substance of a proteidinous nature. It may be suggested that the body in question is in all probability to be looked upon as a sort of nutritive material in reserve, which is contained in, and fills up, an excessively enlarged and centrally situated vacuole.

Together with the above apparently full-grown individuals were found a number of much smaller—therefore assumably younger—specimens, which showed some important structural peculiarities. To begin with the youngest stage found, this was of an exceedingly small size in comparison mith the full-grown individuals, measuring only about 20μ by 10μ (figs. 4 and 5).

The body is covered with short cilia, which, instead of being arranged in longitudinal bands, are uniformly distributed all over. The cytoplasm presents much the same appearance as in the full-grown state. Situated in one part of the entoplasm is distinctly recognizable the micronucleus, which is of nearly the same shape and size as before described. What now form the striking features of the stage under consideration are the state of the meganucleus and the entire absence of a large central non-plasmic body. The meganucleus is not only very much smaller, but is also of a much simpler configuration, than in the fully developed state. In fact, it now consists of a relatively thick and sinuously winding thread, which may bear some short branches ending free. Some small empty-looking spaces, which I take for the excretory vacuoles, occur either close to or in direct apposition to the meganucleus. Further there occur in the entoplosm and in the vicinity of the nuclei, some small spherical, but sometimes somewhat irregular-shaped, bodies which agree in appearance and staining reactions perfectly with the substance forming the single central non-plasmic body of full-grown individuals. They may be designated the non-plasmic spherules for the sake of reference. I shall return to them presently again.

Fig. 4.
×960.

A very young individual in longitudinal seetion. ×96c.

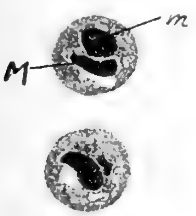

Fig. 5.

Two couse cutive cuoss-seetions through a very young indinidung. ×96o.

In still larger young individuals than those described above, all the structures referred to can be more distinctly made out. The individual shown in two longitudinal sections in fig. 6 measures about 40μ by 20μ. In it, as observed on the sections, the densely granular ectopiasm can be well distinguished from the reticular entoplasm, though the two gradually merge into each other. The micronucleus is found in the usual state and can be readily recognized. The meganucleus has approached a step towards the basketwork-like structure of that of full-grown individuals, that is, it now represents an irregular three-dimensional reticulum of the chromatin substance. Small as it still is, the meganucleus occupies a large part of the body. Its general appearance reminds one of the same organella in *Opalinopsis sepiolae* studied by Dobell.[1] The excretory vacules are now extensively and very distinctly developed, a number of relatively large ones existing in close connection with, or directly apposed to, the meganuclear threads. In this respect, one is reminded of Metcalf's illustration, especially his fig. N, of the excretory vacuoles of *Opalina*. As was stated by that author for *Opalina*, the vacuoles lack, in contrast to those described before of full-grown individuals, a definite limiting wall and seem in their nature to be nothing more than enlarged areolar spaces of the entoplasmic foam. In my opinion, the same may be said of the spaces which are occupied by the non-plasmic spherules before alluded to. In the developmental stage under consideration the same spherules are found more numerously and in a considerably larger size than in the earlier stage before descreibed, plainly indicating that they are something that grows, not only in number, but also in bulk as the organism advances in development. They lie rather closely crowded in the central parts of the body, partly inclosed in the mesh-like spaces or hollows of the yet spongy-like meganucleus (fig. 6.). I have not been able to trace subsequent changes of the non-plasmic spherules, but am of the opinion that they, at a certain stage of the development of the organism, begin to fuse together, finally to form a single mass, and that this, as the substance increases in volume, distend from within the growing meganucleus; so that, while it occupies that

Fig. 6.

Two longitudinal sections of a young individual. ×980.

1) Dobell, C.C.—Some observations on the Infusoria parasitic in Cephalopoda. Quart. Journ. Microscop. Sci., Vol. 53, 1909.

central position in the body, the latter assumes the form of an enveloping basketwork that we have seen in the full-grown individuals. Bodies similar to the non-plasmic spherules have been known from some astomatous infusorians. As such may be mentioned the granules observed by KOFOID[1] in *Protophrya ovicola* KOF. and interpreted by him as a highly differentiated metaplasmic substance. So likewise the peculiar spherules mentioned by METCALF[2] from both the ectoplasm and entoplasm of *Opalina*. I should think it highly probable that all the various cytoplasmic inclusions here referred to are in fact chemically nearly related substances and represent a nutritive substance stored up in the body.

Now as to the systematic position of the new genus and species. An attempt was made by CÉPÈDE[3] to exclude *Opalina*, alleged to be without micronucleus and the contractile vacuole, froms the Astomata, which group was thus made to include only the heterokaryote forms in possession of the contractile vacuole. This procedure CÉPÈDE's seems to me scarcely tenable in view of our present extended knowledge of the nature of micronucleus and of vacuoles, both contractile and non-contractile. Of the occurrence of these organellae in *Opalina*, *Opalinopsis*, and *Chromidina*, the reader is referred to the recent works of METCALF on *Opalina* and of DOBELL on *Opalinopsis sepiolae* and *Chromidina elegans*, and to the view expressed by HICKSON in LANKESTER's Treatise on Zoology (Protozoa, Part I) with regard to the presence of micronuclei in *Opalina*. The Astomata in the restricted sense was divided by CÉPÈDE into eleven families, making use of distinctive characters which, to my mind, appear to be scarcely of more than generic value. For the present at least, I should rather abide by the older scheme of LÉGER and DUBOSCQ[4] who divided the Astomata SCHEVIAKOFF simply into two

1) KOFOID, C.A.—On the structure of *Protophrya ovicola*, a ciliate infusorian from the brood-sac of *Littorina rudis* DON. The Mark Anniversary Volume, art. V, 1903.

2) METCALF M.M.—Studies on *Opalina* (preliminary notice). Zool. Anz., Bd. XXXII, 1907.

3) CÉPÈDE, C.—Recherches sur les infusoires astomes. Arch. d. Zool. Exp., tome III, 5e ser., 1910.

4) LÉGER, L., and DUBOSCQ. O.—Les Astomata representent-ils un groupe naturel? Notes sur les infusoires endoparasites. Arch. Zool. Exp., 4e ser., 1904.

families, the Opalinidae and the Anoplophryiidae. The former may be defined as the Astomata which show no morphological differentiation of the chromatin into generative and vegetative nuclei (heterokaryote) and which reproduce by muttiple division or repeated transverse segmentation ; latter as those which are heterokaryote and multiply by ordinary fission.

Now then, *Metaphrya sagittae* appears to be referable to the Anoplophryiidae Lég. & Dub. True, it somewhat approaches certain forms (*Opalinopsis*, *Chromidina*) of the Opalinidae in the peculiar form of meganucleus, and that familly generally in possessing non-contractile vacuoles instead of a single contractile vacuole ;[1] but these points I am inclind to view in the light of homoplastic convergence. The relatively complex organization of the new genus and species points to its being a highly advanced representative of the Anoplophryiidae, on which account I have chosen the generic name *Metaphrya*.

Cépède has described a goodly number of entozoic ciliates as inhabiting the body-cavities of many invertebrates. But none of them can be said to be as genuine a coelom-parasite as the present species is. *Heterophrya astomata* Siedlecki has often been referred to as a coelom-parasite, but the case is still open to doubt.

In conclusion, I beg to express my warmest thanks for Professor Ijima's kind advice and critics rendered me during my writing the present paper. I also owe very much to Dr. Yatsu's kind help in obtaining the literature.

Zoological Laboratory,
High Normal School, Hiroshima,

January 1916.

1) According to Fobel (*l. c.*), the single vacuole of *Opalinopsis* is contractile, and the single nucleus of this form is complicately branched into a network and is never in a dispersed state as was thought formerly to be the case.

Notizen über japanische Tricladen.

Von

Tokiö Kaburaki, *Rigakushi.*

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1. *Ectoplana*, eine neue Gattung der auf *Limulus* lebenden Tricladen.

Unter dem Namen *Procerodes limuli* habe ich, bei einer früheren Gelegenheit im Verein mit Herrn Professor Ijima,[1] eine auf dem Brustbeine von *Limulus longispina* lebende Tricladen-Art beschrieben, jedoch mit der Anmerkung: "Possibly the species deserves to be made into a new genus." Seitdem bin ich im Stande gewesen, frisches Material jener Art in Yobimatsu, Provinz Bizen, zu sammeln, und nach erneuerter Untersuchung bin ich zur Überzeugung gekommen, dass für sie eine besondere Gattung aufgestellt werden muss. Für diese bringe ich hiermit die Benennung *Ectoplana* in Vorschlag.

Die wichtigsten Charaktere der neuen Gattung, resp. der Art, sind wie folgt:

Körper an beiden Enden verschmälert und stumpf-spitzig, gewöhnlich milchweiss in Farbe. Ohne Tentakeln, mit zwei vom Kopfende ziemlich weit entfernt liegenden Augen. Beide hintere Darmschenkel an den hinteren Enden mit einander verbunden. Penis unbewaffnet. Samenleiter vereinigen sich innerhalb des Penisbulbus zu einem gemeinsamen Gang (Ductus deferens), bevor sie in die Vesicula seminalis übergehen. Eileiter münden getrennt in die obere Partie des dorsalwärts verlängerten, geräumigen Vestibules. Uterus hinter dem Vestibule gelegen, und durch eine ganz kurze Vagina von hinten her in dasselbe, hinter der Mündungsstelle der Eileiter, sich öffnend.

1) Diese Zeitschrift, dieser Band, S. 156, 157.

Offenbar steht *Ectoplana* der *Procerodes* am nächsten. Es geht dies hervor aus der Übereinstimmung der beiden in der hinteren Lage des sackförmigen Uterus, besonders aber aus der Vereinigung der Samenleiter, nach ihrem Eintritt in den Penisbulbus, zu einem gemeinsamen Ductus deferens, welche Verhältnisse sich bei keinen anderen Maricolen vorfinden. Anderseits besteht ein auffallender Unterschied zwischen den beiden Formen darin, dass, während bei *Procerodes* das Vestibule einen ganz unbedeutenden Raum darstellt, der Uterusgang aber von ansehnlicher Länge ist und in seinem Verlauf die Eileiter aufnimmt, bei *Ectoplana* die betreffenden Genitalteile ein merklich abweichendes Verhältnis aufweisen. Bei ihr ist das Vestibule geräumig entwickelt, mit gefalteter Wand versehen, und empfängt direkt die Ausmündungen beider Eileiter. Dieser Unterschied ist meines Erachtens hinreichend um die beiden Formen generisch gesondert zu halten.

Die oben angezeigte Sachlage der Genitalteile bei *Ectoplana* könnte man auch betrachten als hervorgerufen aus derjenigen bei *Procerodes*, einfach dadurch, dass der Uterusgang dieser, bis auf den dem Uterus unmittelbar angrenzenden, ganz kurzen Teil derselben, eine ungewöhnliche Erweiterung erfahren und so sich dem Vestibule angeschlossen hat. Es deutet dies darauf hin, dass die beiden Gattungen, obschon getrennt haltbar, doch zu einander in sehr naher Verwandtschaftsbeziehung stehen. Wäre es angemessen, die Procerodidae in Unterfamilien abzuteilen, wie Böhmig dies tat,[1] so würden *Procerodes* und *Ectoplana* in eine und dieselbe Unterfamilie (Euprocerodinæ Böhm.) zusammen gestellt werden müssen. Indessen scheint es mir kaum statthaft, die Böhmig'schen Unterfamilien beizubehalten, noch weniger die Cercyriden und die Micropharyngiden, nach Vorgang Wilhelmi's,[2] als verschiedene Familien von den Procerodiden abzutrennen.

1) Böhmig, L., 1906. Tricladenstudien. I. Tricladida maricola. Zeitschr. f. wiss. Zool. Bd. LXXXI.—1908. Turbellarien der: Résultats du Voyage de S. Y. Belgica en 1897–1898. Rapports scientifiques. Zool.

2) Wilhelmi, J., 1909. Tricladen. Fauna und Flora des Golfes von Neapel u. d. angr. Meeresabschnitte. XXXII. Monographie.

Da alle bisher bekannten, auf *Limulus* lebenden Tricladen-Arten[1] der Familie Bdellouridæ angehören, so ist es von Interesse, auch ein Mitglied einer anderen Familie, der Procerodidæ, als Bewohner desselben Wirttieres zu finden.

2. ***Polycelis ijimai***, eine neue Planarienart aus Hokkaido.

Im Herbst vorigen Jahres sammelte Herr Professor Ijima eine *Polycelis*-Art in einem Bächlein, welches in den Shikotsuko See, Hokkaido, einfliesst. Das Tier wurde lebendig nach Tokyo mitgebracht und war mir freundlichst zum Studium überlassen. Nach Untersuchung stellte es sich heraus, dass dasselbe als eine neue Art betrachtet werden muss. Für diese erlaube ich mir, zur Ehre des Entdeckers, den Namen *Polycelis ijimai* vorzuschlagen.

Das Tier stimmt äusserlich fast genau mit *Polyc. auriculata* und *karafto*[2] überein. Ähnlich wie diese beiden zeigt die Art in der Mitte des Stirnrandes eine schwache konvexität, welche jederseits allmählich in eine schwache Konkavität und alsdann in den schräg nach vorn gerichteten Tentakel übergeht. Der letztere ist im ganzen weniger spitzig als bei *Polyc. auriculata* und etwas kürzer als bei *Polyc. karafto*. Der Kopflappen ist durch eine seichte halsartige Einschnürung undeutlich von dem Rumpf abgezeichnet, dessen Seitenränder grösstenteils fast parallel laufen. Die grösste Körperbreite liegt hinter der Mitte des Körpers, in der Pharyngealgegend. Nach hinten zu verjüngt sich der Körper allmählich, um endlich stumpf gespitzt zu endigen. Die geschlechtsreifen Exemplare erreichen, im völlig ausgestreckten kriechenden Zustand, gewöhnlich eine Länge von 18–20 mm. bei einer Breite von 2–2,5 mm. in der Pharyngealgegend, also eine ungefähr gleiche Grösse wie die beiden oben genannten *Polycelis*-Arten.

Die zahlreichen kleinen Augen sind im allgemeinen in einer einfachen,

1) *Bdelloura candida* (Gér.), *B. wheeleri* Wilh., *B. propinqua* Wheel. und *Syncoelidium pellucidum* Wheel.

2) Diese Zeitschrift, dieser Band, S. 167–171.

wenn auch nicht ganz regelmässigen, hufeisenförmigen Reihe an dem Stirnrande und den Seitenrändern des Kopfendes angeordnet, genau wie bei *Polyc. karafto*, aber nicht genau so wie bei *Polyc. auriculata*, bei

1

2

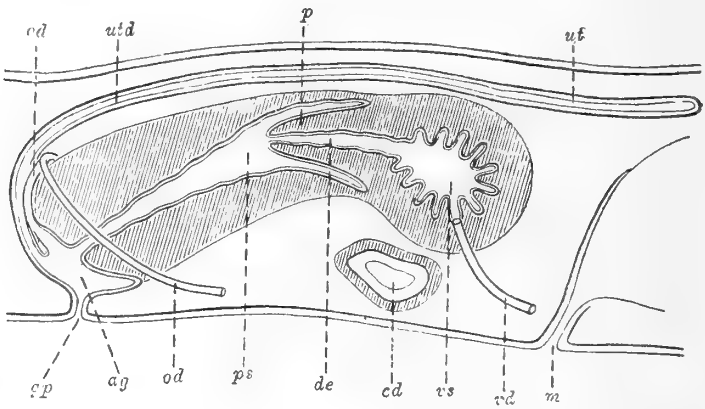

Fig. 1. *Polycelis ijimai*, n. sp. Körpergestalt im kriechenden Zustand. Vergr. 4,5×.

Fig. 2. Dieselbe. Schematischer Kopulationsapparat im Längsschnitt. Vergr. 60×.

ag	Vestibule,	*cd*	Querkommissur der hinteren
	Darmschenkel,	*de*	Ductus ejaculatorius,
gp	Genitalporus,	*m*	Mundöffnung,
od	Oviductus,	*od'*	Oviductus impar,
p	Penis,	*ps*	Penisscheide,
ut	Uterus,	*utd*	Uterusgang,
vd	Vas deferens,	*vs*	Vesicula seminalis.

welcher sie sich vielfach in doppelreihiger Anordnung befinden. Übrigens reicht die Augenreihe bei unserer Art nicht so weit nach hinten, wie bei den beiden anderen Arten. Die Augen nehmen mit dem Alter an Zahl zu. Bei einigen grossen Exemplaren betrugen sie rechts 28–38, links 28–39.

Die Oberseite des Körpers zeigt im allgemeinen eine schwärzlich olivenbraune Färbung, welche am Vorderende, an den seitlichen Körperrändern sowie in der Medianlinie etwas lichter auftritt als anderswo. Die Färbung ist viel schwärzlicher als bei *Polyc. auriculata*, und es mangelt ihr an den bei *Polyc. karafto* deutlich sichtbaren dunkleren Laterallängsstreifen. Auf der dorsalen Seite erkennt man wie gewöhnlich den quergerunzelten Pharynx und den Penisbeutel als hellere Partien. Die Ventralseite ist stets viel blasser, und die Pharyngeal- und Penisgegenden sind deutlicher wahrnehmbar als auf der Dorsalseite ; auch die Keimstöcke, die Hoden, sowie die ventralen Längsnerven sind daselbst stets leicht erkennbar als dunkle Flecke oder Streifen.

Die Mundöffnung liegt beim geschlechtsreifen Tiere etwas hinter dem Ende des zweiten Körperdrittels. Die Pharyngealtasche verhält sich in ihrer Länge zur Körperlänge wie 1 : 3,5 im Mittel. Der Pharynx ist von zylindrischer Gestalt. Der vordere unpaare Darmschenkel trägt im allgemeinen 5 wenig verzweigte sekundäre Divertikelpaare, die hinteren Darmschenkel je 15–17 nach den Seiten gerichtete Divertikeln. Sehr merkwürdig ist die Beschaffenheit eines quer verlaufenden Verbindungskanals zwischen den beiden hinteren Darmschenkeln. Er befindet sich dicht unter dem Penis und tritt beim geschlechtsreifen Tier besonders deutlich hervor. Er ist im Innern von einem aus kleinen dichtgedrängten zylindrischen Zellen bestehenden Epithel ausgekleidet, welches von dem übrigen Darmepithel merklich verschiedenen Charakter aufweist. Aussen wird er von einem starken Muskellager umhüllt, dessen Fasern hauptsächlich im Zirkel verlaufen. Dieses Muskellager ist bei den nicht geschlechtsreifen Individuen schwächer entwickelt als bei den geschlechtsreifen. Es scheint mir höchst wahrscheinlich, dass der Verbindungskanal eigentlich als ein Drüsenorgan funktioniert.

Geschlechtsreife Individuen habe ich unter den mir zur Verfügung stehenden Exemplaren nur wenige gefunden. Der ganze Geschlechtsapparat zeigt im Wesentlichen ähnliche Beschaffenheit wie bei *Polyc. auriculata*. Der Genitalporus ist ungefähr so weit nach hinten von der Mundöffnung entfernt gelegen wie von dem hinteren Körperende. Er führt ein in das enge Vestibule, in welches von oben her der Uterusgang sowie der unpaare Eiergang, und von vorn die Penisscheide einmünden.

Die Penisscheide ist versehen mit einer mächtig entwickelten Ringmuskelschicht, weswegen dieselbe im frischen Zustand des Tieres sich als ein lichter Fleck sichtbar macht. Die Muskelschicht nimmt von vorn nach hinten an Dicke zu und ist am dicksten an dem hintersten Ende der Penisscheide. Auf Querschnitten der Penisscheide weist sie überall gleiche Dicke auf, also nicht besonders verdünnt an der ventralen Seite, wie es bei *Polyc. auriculata* der Fall ist. Auch das bei dieser Art vorhandene muskulöse und frei in die Penisscheide zurückgeschlagene Scheidenlippenrohr kommt bei unserer Art nicht vor.

An dem Penis unterscheidet man wie gewöhnlich einen konischen freien Teil, welcher in seiner ganzen Länge vom Ductus ejaculatorius durchbohrt ist, und einen knolligen basalen Teil, welcher im Innern eine Samenblase mit unregelmässig gefalteter Wand einschliesst.

Die Hoden liegen ventral im Körper und in grosser Anzahl dicht gedrängt zu beiden Seiten der Medianlinie, in der Gegend zwischen den Ovarien und der Pharyngealbasis. Die beiden, etwas median von den ventralen Längsnerven gelegenen Vasa deferentia erstrecken sich nach hinten bis zum basalen Teil des Penis und münden getrennt in die Samenblase an beiden Seiten.

Die unregelmässig gestalteten, verhältnismässig grossen Ovarien liegen beiderseits ventral, ein wenig nach innen von den Längsnerven und zwischen dem ersten und zweiten Paare der Darmäste. Von den beiden Ovarien ziehen die Ovidukte, mit einer deutlichen trichterförmigen Erweiterung beginnend und der Aussenseite der Längsnervenstämme entlang, nach hinten bis an die Gegend der Penisscheide. Hier steigen sie schräg dorsalwärts, um sich oberhalb des Vestibules zu einem kurzen gemeinsamen Gang (Oviductus impar) zu vereinigen, welcher dann dicht in das Vestibule ausmündet. An unregelmässigen Stellen in ihrem fast ganzen Verlauf nehmen die Ovidukte strangartige Dotterstöcke auf.

Der Uterus hat, wie bei *Polyc. karafto*, die Gestalt einer einfachen schlanken Röhre; er reicht nach vorn bis zur dorsalen Seite des hinteren Endes der Pharyngealtasche, ohne an seinem Blindende eine Erweiterung zu bilden. Die ganze Innenfläche der Röhre ist von einem einfachen kubischen Epithel ausgekleidet. Die Ausmündung in das Vestibule geschieht an der linken Seite desselben.

3. Bestimmungsschlüssel für die einheimischen See- und Süsswassertricladen.

Von der einheimischen Tricladen-fauna sind mir bis heute 3 See- und 10 Süsswasserarten sicher bekannt. Im folgenden gebe ich einen Schlüssel zur Bestimmung dieser Arten. Die von Stimpson[1] beschriebene *Planaria badia* aus Loo-choo und *Pl. cinerea* aus Oushima—beide wahrscheinlich zum Kreise der *Pl. gonocephala* gehörig—müssen als unvollständig bekannte Formen einstweilen dahingestellt bleiben.

I. Maricola.

A. Mit Tentakeln.

Kopfende abgestutzt; 2 Augen; Körper milchweiss.

1. *Procerodes lactea* Ij. et Kab.
(Küste der Saghalin).

B. Ohne Tentakeln.

a.′ Kopfende ungefähr dreieckig; 2 Augen; Körper farblos oder verschieden gefärbt.

2. *Procerodes trigonocephala* Ij. et Kab.
(Oginohama, Prov. Rikuzen; Itsukushima, Prov. Aki).

b.′ Kopfende verschmälert; 2 Augen; Körper milchweiss, bisweilen hellbraun. Ectoparasitisch auf *Limulus longispina*.

1) Stimpson, W., 1857. Prodromus Descriptioni Animalium Evertebratum quæ in Expeditione ad Oceanum Pacificum Septentrionalem a Republica Federata missa, Johanne Rodgers Duce, observavit et descripsit. Pars I. Turbellaria Dendrocoela. Proc. Acad. Nat. Sci. Philadelphia. Vol. IX.—Diesing, K. M., 1862. Revision der Turbellarien. Abteil: Dendrocoelen. Sitzungsb. d. K. Akad. Wien, Math. naturw. Cl., Bd. XLIV. Abteil. I.

3. *Ectoplana limuli* (Ij. et Kab).
(Yobimatsu, Prov. Bizen).

II. Paludicola.

A. 2 Augen (selten 3 oder 4).

a.′ Mit Haftwürste an der Ventralfläche des Kopfrandes.

a.″ Körper gross ; Stirnrand in der Mitte leicht gerundet ; Tentakeln kurz, lappenförmig ; Farbe rotbraun.

4. *Bdellocephala annandalei* Ij. et Kab.
(Biwako See, Prov. Ōmi).

b.″ Körper mittelgross ; Vorderende abgestutzt ; Tentakeln wie bei der vorigen Art ; Farbe olivenbraun, bisweilen schwärzlich.

5. *Bdellocephala brunnea* Ij. et. Kab.
(Yamada und Kanazuchi, Prov. Rikuzen ; Koiwai, Prov. Rikuchu ; Inawashiro, Prov. Iwashiro ; Kyoto).

b.′ Ohne Haftwürste.

a.″ Mit Tentakeln.

a.‴ Tentakeln lang, zugespitzt ; Körper schwarz oder olivenbraun.

6. *Planaria vivida* Ij. et Kab.
(Gebirgige Gegend von Hondō).

b.‴ Tentakeln kurz, abgerundet ; Körper farblos, durchsichtig.

7. *Planaria pellucida* Ij. et. Kab.
(*Saghalin*).

b.″ Ohne Tentakeln.

a.‴ Kopfende dreieckig, mit Ohrlappen und Aurikularsinnesgruben ; Körper gewöhnlich olivenbraun, sonst verschieden gefärbt.

8. *Planaria gonocephala* Dugès.
(Hondō ; Shikoku ; Kiushu).

b.‴ Vorderende abgestutzt ; Farbe graulich, mit einer Reihe von Papillen an der Dorsalmedianlinie.

9. *Planaria papillifera* Ij. et Kab.
(Tokyo.)

B. Zahlreiche Augen.

a.′ Augen nicht randständig.

Augen in zwei Haufen; Tentakeln ziemlich lang, abgerundet; Körper farblos oder verschieden gefärbt.

10. *Sorocelis sapporo* Ij. et Kab.
(Sapporo, Hokkaido).

b.′ Augen randständig.

a.″ Augen in unregelmässiger Bogenreihe.

Tentakeln lang, wenig abgerundet; Körper gewöhnlich sepiabraun.

11. *Polycelis auriculata* Ij. et Kab.
(Gebirgige Gegend von Hondō).

b.″ Augen in einfacher Bogenreihe.

a.‴ Tentakeln mässig kurz, zugespitzt; Körper dunkelolivenbraun.

12. *Polycelis ijimai* Kab.
(Shikotsuko See, Hokkaido).

b.‴ Tentakeln lang, zugespitzt, pfriemenförmig; Körper dunkelbraun; mit ziemlich deutlichen dunkleren Laterallängsstreifen.

13. *Polycelis karafto* Ij. et Kab.
(Saghalin).

A Report on the Cyclostomatous Bryozoa of Japan.

By

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Zoological Institute, Sci. Coll.

The collection of Japanese cyclostomatous Bryozoa in the Zoological Institute, Sci. Coll., Tokyo, was assigned to me for examination by Professor Ijima. The outcome of my studies is this report, dealing with seven genera and thirty-two species. Of the latter I consider six to be new to science.

I beg here to express my hearty thanks to the above named gentleman for supervision of the work, and also to Professor Gotô, Dr. Kinoshita, Mr. Yanagi and Mr. Ogura for assistance rendered me in one way or other.

Crisiidæ Johnston 1838.

Crisia Lamouroux 1812.

1. ***Crisia aculeata*** Hassall 1841.

Crisia aculeata, Hassall 1841 (1), 170, pl. vii, figs. 3, 4.—Johnston 1847 (2), 285.—Smitt 1863 (1), 3.—Harmer 1891 (1), 132, pl. xii, fig. 4.

Crisia eburnea, var. *aculeata*, Busk 1875 (4), 4, pl. v, figs. 5–10.—Hincks 1880 (3), 421, pl. lvi, figs. 5, 6.

A few small fragments, which may be identified with the above species, are found in the collection. They were obtained at Okinosé Bank, Sagami Sea, from a depth of 400 fms. The fragments exhibit the peculiar ovicell described by Harmer from British specimens of the species, but are entirely devoid of the spines. The zooecia occur on complete internodes usually in an odd number, and rarely in an even number. Formula of a fragment :

$$
\begin{array}{l}
(12+\text{ov.}+7+1^r+r^4) \\
\qquad\qquad | \qquad\quad | \\
\qquad\qquad | \qquad (10+\text{ov.}+7+2^r+x) \\
\qquad\qquad | \\
\qquad\quad (6+1^r+x) \\
\qquad\qquad\quad | \\
\qquad\qquad (4+x)
\end{array}
$$

Formula of another fragment :

$$
\begin{array}{l}
(7+r^1+1^r)+(9+1^r+x) \\
\quad | \qquad\qquad\qquad | \\
\quad | \qquad\qquad (8+\text{ov.}+5+2^r+x) \\
\quad | \qquad\qquad\qquad\qquad\quad | \\
\quad | \qquad\qquad\qquad\qquad (4+x) \\
\quad | \\
(13+\text{ov.}+6+r^3+x) \\
\qquad\qquad | \\
\qquad\quad (8+x)
\end{array}
$$

The ovicell is found always at a position above the middle of internodes, not below it as in the specimens previously described by authors.

Measurements :

	mm.
Diameter of zooeciopore	0.06
Breadth of zooecia	0.08
Distance from aperture to aperture	0.36–0.44
Breadth of branches	0.22
Diameter of ooeciopore	0.04
Length of ovicell	0.46
Breadth of ovicell	0.32

2. ***Crisia cuneata*** Maplestone 1904.

Crisia cuneata, Mapleston 1904 (1), 390, pl. xxix, fig. 12.—Harmer 1915 (2), 103, pl. viii, figs. 13–17.

Crisia cylindrica, Ortmann 1890 (1), 58, pl. iv, fig. 17.

Crisia circinata, Waters 1914 (10), 840, pl. i, figs. 7–9.

This species is represented in the collection by a number of fragments, which probably belong to one and the same zoarium. They were obtained at Okinosé Bank, from a depth of 400 fms.

Measurements :

	mm.
Diameter of zooeciopore	0.08
Distance from aperture to aperture	0.30–0.42
Width of branch	0.12–0.16
Length of ovicell	0.44
Breadth of ovicell	0.26
Diameter of ooeciopore	0.05

Compared with the description given by Harmer of the Japanese specimens preserved in the Cambridge Museum, the specimens before me are smaller in the dimensions of parts, though agreeing in all essential characters, especially in the features presented by the ovicells. Waters has described *Crisia circinata* as distinct from *Crisia cuneata* on the basis of a difference in the shape of the ovicells. In the Okinosé specimens, I find the ovicell shaped somewhat as was given by him for *Crisia circinata*, but in all other respects they agree perfectly with Maplestone's *Crisia cuneata*, so that there can scarcely be a doubt as to their specific identity with the latter. I should think the Waters' species can not be held up as distinct from *Crisia cuneata*.

3. ***Crisia eburneo-denticulata*** Smitt 1865.

Crisia eburneo-denticulata, Smitt 1865 (2), 142, pl. xvi, fig. 9.—Busk 1875 (4), 5, pl. vi.—Ortmann 1890 (1), 58, pl. iv, fig. 18.—Waters 1904 (6), 165.—Waters 1916 (11), 474.
Crisia denticulata, Osburn 1912 (1), 216, pl. xviii, fig. 8.

This species is found in abundance between tidemarks along the coast near Misaki, attached on stones and shells. It was dredged from a considerable depth off Jôgashima, and also in Chichijima, Bonin Islands (45 fms.). In the specimens before me, the mode of branching differs somewhat from the Japanese specimens described by Ortmann. Formula of a fragment :

$$(13+r^8)+(13+4^r) \ + \ (13+r^5)+(5+x)$$

$$(17+7^r+x) \quad (9+r^4+x)$$

$$(17+r^5)+(11+x)$$

Same of another fragment :

$$(23+2^r+r^6+x)$$

$$(17+3^r)+(x)$$

$$(3+x)$$

$$(17+r^2)+(4+x)$$

$$(14+r^4+x)$$

This species is closely allied to *Crisia denticulata* (L.) in the zooecial arrangement, but is distinguished from it by being prolonged and somewhat narrowed at zooecial apertures and by the shape of ovicells. Osburn has described a form found in Woods Hole under the name of *Crisia denticulata*, but judging from the description and figure given by him, I should think that form to be scarcely separable from *Crisia eburneo-denticulata* Smitt.

Measurements :

	mm.
Diameter of zooeciopore	0.06
Breadth of zooecium	0.08
Distance from aperture to aperture	0.28
Breadth of ovicell	0.44
Length of ovicell	1.34

4. ***Crisia franciscana*** Robertson 1910.

Crisia franciscana, Robertson 1910 (2), 233, pl. xviii, figs. 1–4.
Crisia occidentalis, Robertson 1903 (1), 116.

A number of large colonies, which may be identified with the above species, exist in the collection. They were all obtained in Hakodate at shallow water, attached on rocks and seaweeds. The arrangement of zooecia in ooecial internodes differs somewhat from that in the Californian specimens described by Robertson. The ooecial internode in the Japanese specimens is composed of five non-flexibly adnate members. The first or basal member is an ordinary zooecium to which is attached the second member, i. e., the ovicell. The third member is adnate to the ooecium with nearly its entire length. The fourth member is adnate to the third; and the fifth, in its turn, to the fourth. Whereas, in the Californian form, the fourth and the fifth members do not exist, there being in all only three members to an ooecial internode. Whether the difference indicated suffices to base specific distinction upon, may be left a question.

In the mode of branching and in the zooecial arrangement of ordinary internodes, the species seems to agree closely with *Crisia geniculata* Milne-Edwards, but differs somewhat from it in the features of ovicells as well as in the zooecial arrangement of ooecial internodes. Formula of a fragment:

$$
\begin{array}{cccc}
(1^r+1+r^1) & & & \\
| & (1+1^r) & & \\
| & | & (1^r+1+r^1) & \\
| & | & | & \\
(1'+1+r^1) & & & (1^r+1+r^1) \\
 & & (1^r+1+r^1) &
\end{array}
$$

Measurements:

	mm.
Diameter of zooeciopore	0.10
Length of zooecia	0.74–0.86
Length of ovicell	0.73–0.8
Breadth of ovicell	0.303
Ooesiopore	0.04 × 0.06

5. ***Crisia ramosa*** Harmer 1891.

Crisia ramosa, Harmer 1891 (1), 134, 163, pl. xii, figs. 10, 11.
Crisia fistulosa, Busk 1875 (4), 5, pl. vi, A, figs. 1–2.
Crisia denticulata, (pars) Hincks 1880 (3), 423, pl. lvi, fig. 9.

A few number of small fragments of this species were found, attached on an example of *Steganoporella magnilabris* Busk, which came from a spot off Jôgashima in the Sagami Sea. Most of ooecial internodes give off only three branches each, instead of four as in the British specimens which were described by Harmer.

Measurements:

	mm.
Diameter of zooeciopore	0.06
Distance from aperture to aperture	0.3
Breadth of zooecia	0.08
Diameter of ooeciopore	0.04
Greatest breadth of ovicell	0.36
Length of ovicell	0.48

6. ***Crisia simplex*** n. sp.

Zoarium small, erect, dichotomously branching, attached to substratum by basal joint, instead of rootlets. Internodes sub-cylindrical, broad at the distal end and narrowing towards the proximal. Zooecia present in an internode usually in an odd and occasionally in an even number. Formula of a fragment:

$$(5+\text{ov.}+8+r^1+r^3+x)$$
$$(5+x)$$
$$(7+x)$$

Same of another fragment:

$$(7+\text{ov.}+10+r^1+2^r+r^3+r^6+x)$$
$$(3+x)$$
$$(10+x)$$
$$(11+x)$$
$$(5+\text{ov.}+8+r^1+3^r+x)$$
$$(5+x)$$
$$(9+x)$$

From these formulæ it will be seen that the number of zooecia in an internode does not exceed seventeen in number and that most of the branches stand out from the first zooecium on one side. Ooecial internode gives off two, sometimes four branches, in the part proximal from the ovicell. Zooecia alternately arranged on sides, connate and immersed in the greater part of their length; their end prolonged into a short and somewhat narrowing tube, terminating with a circular aperture of 0.06 mm. in diameter and opening forwards. End of branches not truncate, but pointed. Joints usually colourless, sometimes faintly yellowish. Ovicell globular, with minutely punctured surface, placed below the middle of terminal internodes. Ooeciostome simple, short, slender, situated more or less laterally from ooecial summit and adherent to zoarial surface by the dorsal side. Ooeciopore elliptical, 0.04×0.03 mm. large, with thin margin. Basis rami not wedged in between the adjoining two zooecia, short and not quite reaching up to the zooeciopore of the zooecium with which it is adnate. Dorsal surface of entire zoarium convex, minutely punctured as on the ventral surface.

Measurements:

	mm.
Average length of zooecia	0.318
Diameter of zooeciopore	0.06
Distance from aperture to aperture	0.3
Breadth of zooecium	0.08
Ooeciopore	0.03×0.04
Greatest breadth of ovicell	0.36
Length of ovicell	0.48

This new species is represented in the collection by a few number of small colonies attached to an example of *Stegonoporella magnilabris* Busk, which came from a spot off Jôgashima in the Sagami Sea. The species seems to agree somewhat with *Crisia sertularoides* (Aud. & Savig.) in most characters of zooecia, but differs from it in the internodal zooecial number and in the shape of ooeciopore.

7. ***Crisia sinclarensis*** Busk 1875.

Crisia sinclarensis, Busk 1875 (4), 6, pl. iv, figs. 7–11.

There exist in the collection a number of large colonies, which may be identified with the above species. They were all obtained from shallow water, attached on stones and kelps at Hakodate. Every colony is provided with numerous segmented rootlets which are given off from either the lateral or the dorsal side of the lowest zooecium, a fact of which no mention was made by Busk for the British specimen. The minute perforations on zoarial surface are distinctly densely present, not scantily as was given by Busk. Formula of a fragment :

$$\begin{array}{l}
(9+r^1)+(9+1^r)+(7+r^1) \\
\quad | \qquad\qquad\quad | \\
\quad | \qquad\qquad (9+1^r)+(5)+(x) \\
\quad | \\
(11+r^1)+(7+1^r)+(5+r^1)+(x) \\
\qquad\qquad\qquad | \\
\qquad\qquad (7+1^r)+(x)
\end{array}$$

Measurements :

	mm.
Diameter of zooeciopore	0.04–0.06
Distance from aperture to aperture	0.18–0.2

Tubuliporidæ Johnston 1838.

Crisulipora Robertson 1910.

8. ***Crisulipora occidentalis*** Robertson 1910.

Crisulipora occidentalis, Robertson 1910 (2), 254, pl. xxi, figs. 22–24.

Numerous large colonies in the collection are referable to the above species. They were all obtained from shallow bottom along the Misaki coast. They grow on stones and shells, forming dense tufts of a considerable size. As was already pointed out by Robertson, the present species exhibits many characters which may be said to be intermediate between those of the *Tubuliporidæ* and the *Crisiidæ*. It may even be said that in many respects the species stands nearer to the latter than to the former.

9. *Crisulipora Ijimai* n. sp.

Zoarium bushy, attached to substratum by inferior end of basal internode, without rootlets; internodes and branches decumbent, being bent dorsally in a bow-like manner; both these milky white, articulating with one another by corneous joints of an yellowish or a bluish yellow colour, opaque at truncate free end of branches, gradually narrowing towards base, minutely punctate all over; dorsal surface somewhat flattened, transversely wrinkled; ventral surface rounded, with zooecia standing out in two lateral, longitudinally running zooecial zones separated by a narrow median space. Internodes 9–17 mm. long, the longer ones bearing branches which spring out usually solitarily, rarely two or three together at a time and that at an indefinite height of the internode. Zooecia arranged in numerous successive series in each zooecial zone, those of the two lateral zones alternating with one another. In the distal parts of an internode, each zooecial series consists usually of four, and sometimes of three, zooecia. Proximally the number decreases, so that in the lowest parts each series is made up of three or two zooecia. Zooecial aperture circular or sub-elliptical, $0.12 \times 0.14 - 0.2 \times 0.16$ mm. large, always less wide than greatest width of zooecium, slightly thickened at margin; most apertures provided with the so-called "closure" occurring a short distance within them, its surface sparsely pored. Branches without basis rami; each branch arising from an enlarged special zooecium. This is, in the case of solitary branches, invariably the innermost zooecium of a series. When a second branch occurs on the same internode, it is borne likewise by the innermost zooecium belonging to another series of either the same or the opposite zone and either directly adjacent to the series bearing the first branch or separated from this by a few intervening series. The third branch is borne on the zooecium next outer to that which bears the first or the second branch. The third and fourth zooecia of a series, counting from the inner end never carry a branch. A single ovicell was met with in the specimen. It is an inflation of the midventral parts between the zooecial zones, extending from the extreme tip of a branch down to the level of the ninth zooecial series. It shows, on both its sides, lateral outbulgings which just out between the inner ends of every two successive zooecial series of the region. Ooeciostome not yet developed.

The above type specimen was obtained by Professor Ijima at a spot off to the west of Niijima, one of the Seven Islands of Izu. Depth unknown. Somewhat smaller specimens, which may be regarded to be specifically the same as the above, are to hand from two more localities in the Sagami Sea, viz., from Kôzushima, another of the Seven Islands (Dr. Kinoshita coll., depth not stated), and from a spot off Jôgashima (70–80 fms.).

The Kôzushima specimens have internodes and branches which are much more slender than in the type. Moreover, the number of zooecia in a series never exceeds two; and in the proximal parts of internodes and branches, there stands a single zooecium in place of a series. Ovicell not found.

The Jôgashima specimens include some very small and yet unbranched colonies consisting of a single internode which stands erect but is slightly bent in the upper parts. The specimens with branches are in part essentially like the type, while some others show points of considerable variation from it, especially with respect to the zooecial number in a series and the number of branches springing out from an internode. Usually three, not unfrequently two, zooecia constitute a series. The branches from an internode number two or three and seldom only one or as many as four. Here again the branch bearing zooecia are, in the first instance, the innermost of a series; and the second zooecium, lying next outer to a branch-bearing first zooecium, may also carry a branch in certain cases; while the third zooecium, which is usually the last or the outermost in series, never carries a branch. Ovicell was found in none of the specimens.

The new species described above is generically associated with Robertson's *Crisulipora occidentalis*, the only species hitherto known of the genus, with much reserve. Not improbably the new species represents a distinct genus. It may be pointed out that, while *Crisulipora occidentalis* is a form approaching the *Crisiidæ* rather than the *Tubuliporidæ*, ***Crisulipora Ijimai*** may be said to agree well with the *Tubuliporidæ*, save in having corneous joints in common with the *Crisiidæ*. In fact, the form and arrangement of zooecia and especially the character of ooecium as well as the absence of flexible rootlets and basis rami make the new species more readily associable with the *Tubuliporidæ* than *Crisulipora occidentalis*.

Tubulipora Lamarck 1816.

10. ***Tubulipora atlantica*** (Johnston) 1847.

Tubulipora atlantica, Osburn 1912 (1), 217, pl. xx, figs. 9, 9a.—Osburn 1912 (2), 276.—Harmer 1915 (2), 124, pl. x, figs. 4, 5.
Idmonea atlantica, Johnston 1847 (2), 278, pl. xlviii, fig. 3.—Busk 1856 (1), 34, pl. I, fig. 6.—Busk 1858 (2), 128, pl. xviii, fig. 5.—Busk 1875 (4), 11, pl. ix.—Smitt 1872 (4), 6, pl. ii, figs. 7, 8.—Hincks 1877 (2), 108.—Waters 1879 (1), 269.—Hincks 1880 (3), 451, pl. lxv, fig. 1–4.—Waters 1884 (2), 683,—Busk (pars) 1886 (5), 10.—Ortmann 1890 (1), 58, pl. iv, figs. 20, a–b.—Calvet 1896 (1), 265—Bidenkap, 1900 (1), 527.—Norman 1903 (1), 575—Waters 1904 (7), 90.—Nordgard 1907 (1), 16.—Waters 1914 (10), 166.
Tubulipora atlantica, form. *erecta*, Smitt 1866 (3), 399, pl. iii, figs. 6–7; pl. iv, figs. 4–13.

Of this species there exist in the collection: some fragments from off Inatori, and a complete zoarium from a depth of 80 fms. off Jôgashima.

11. ***Tubulipora atlantica***, var. ***disticha*** (Ortmann) 1890.

Idmonea atlantica, var. *disticha*, Ortmann 1890, (1), 58, pl. iv, fig. 20.

Some small colonies which may be identified with the above form exist in the collection. The localities are: Ôshima (depth unknown), Onigasé (150–300 fms.) and off Jôgashima (70 fms.). The specimens in spirit are milky white, frequently with a faint pinkish tint. A structural feature, which was not mentioned by Ortmann, the original describer of the form, consists in the presence of a peculiarly characterized area at the base of main stem on the dorsal side. The area which may be called the dorso-basal plate extends from the very base a short distance up the stem and is sharply marked off from the minutely punctured general surface of the stem by a slight border ridge. The surface of the plate is unpunctate and even, except for being pitted by a number of short groove-like depressions, which at their one end or both ends, show deep-going perforations of a considerable size. On account of the said depressions the plate presents an irregularly cancellate-like appearance. A structure comparable to the above dorso-basal plate but totally different in structural details, is found in *Tubulipora tumida* Smitt.

12. ***Tubulipora eboracensis*** (Busk) 1886.

Idmonea eboracensis, Busk 1886 (5), 12, pl. iii, fig. 4.
Alecto polysticha, Ortmann 1890 (1), 62, pl. iv, fig. 35.
Idmonea concinna, Mapleston 1908 (2), 234, pl. vii, fig. 5.

Specimens from: Yodomi Bank, 80–100 fms.; Okinosé 312 fms., small colonies attached on a *Hexactinellid*; Off Jôgashima, 50–100 fms., small colony attached on *Crisulipora Ijimai*. The specimens vary considerably in the size and arrangement of zooecia and in some other characters, but all agree in the characters of ooecium.

13. ***Tubulipora misakiensis*** n. sp.

Zoarium adherent by thin lamina which does not extend beyond its margin; small specimens nearly flabelliform; larger specimens irregularly circular with two or three indentations at margin. Zooecia long, slender, erect or sub-erect, radiating from the centre; partly arranged in radial rows of 3–7 zooecia each and partly joined together into bundles of 2 or 3 zooecia; the basal third of their length immersed, the remaining two-thirds being free and either simply bent upwards or recurved. Zooecial aperture circular, 0.10 mm. in diameter, frequently elliptical. Dorsal surface smooth; margin of primitive disc without teeth. Ovicell an extensive inflation of zoarial surface underlying several zooecial tubes, with minutely punctured surface and irregularly lobate outline. Ooeciostome simple, at first vertically standing but soon bending in transverse direction, frequently entirely straight, arising close to zooecial bundles on the proximal side or between rows of zooecia. Ooeciopore nearly circular, 0.04 mm. in diameter, rarely elliptical.

This new species occurs in abundance in shallow water along the Misaki coast, attached on seaweeds and stones. Specimens also exist from Mera, Awa province. The species is evidently a near relative of *Tubulipora flabellaris* Fabricius, but differs from it in the shape of ooeciopore. It also agrees closely with *Tubulipora occidentalis* Robertson in the appearance of zoarium, but is different in the characters of ovicells.

14. ***Tubulipora pacifica*** Robertson 1910.

Tubulipora pacifica, Robertson 1910 (2), 248, pl. xxii, figs. 27–28.

The species is represented by numerous colonies in the collection. It is quite common along the near Misaki attached on kelps and stones, together with other *Tubulipora* species. In all the specimens on hand, there exist on the dorsal surface a limited number of conical processess which insert their pointed ends into the substratum and thus serve as the organ of attachment.

15. ***Tubulipora pulchra*** MacGillivray 1885.

Tubulipora pulchra, MacGillivray 1885 (1), 92, pl. xii–xiv,—Robertson 1910 (2), 250, pl. xxiii, figs. 32–35.
Tubulipora fimbria, form. *pulchra,* Waters 1887 (4), 258, pl. vii, figs. 1–3.
Tubulipora continua, Ortmann 1890 (1), 63, pl. iv, fig. 36.

A large number of colonies, which may be identified with this species were collected at shallow water along the coast of the Sagami Sea, attached on stones and seaweeds. Most colonies present a fan-shaped or nearly circular form 2–6 mm. across. Others are 2–6 lobed, the broad and narrow lobes being radially arranged in relation to the marginally situated center of the colony. The dorsal calcareous projections in the Sagami specimens differ from the same in Californian specimens as described by Robertson, in being elongated in radial direction and in being devoid of lateral blunt processes. In the specimens from Hayama, I find the dorsal projections united into a continuous transverse band, instead of being separated by narrow interspaces as in the type. Ortmann has described a species from

Japan under the name of *Tubulipora continua ;* but, judging from the brief description and the figure given of it by him, I should think that form can scarcely be separable from the present species.

16. ***Tubulipora pulcherrima*** (Kirkpatrick) 1890.

Tubulipora pulcherrima, Harmer 1915 (2), 129, pl. ix, figs. 1–5.
Idmonea pulcherrima, Kirkpatrick 1890 (2), 22, pl. iv, figs. 6–6b.
Idmonea radicata, Kirkpatrick 1888 (1), 83, pl. ix, figs. 2, 2a.
Idmonea interjuncta, Waters 1887 (4), 84, 256, pl. vi, fig. 29.—Philipps 1899 (1), 441, 449.—Waters 1914 (10), 846, pl. ii, fig. 5.
Idmonea milneana, Haswell 1880 (2), 35.—Thornely 1905 (1), 127.
Idmonea rustica, var. *triplex*, Ortmann 1890 (1), 61, pl. iv, figs. 22c.

There exist in the collection numerous large colonies which are referable to this species. The localities are : Yodomi (62–78 fms.) ; off to west of Niijima ; off Kôzushima (depths unknown) ; shallow water near Misaki. The specimens vary considerably in zoarial shape. While some are without the cross-connections between branches as was noted by Harmer on Japanese specimen of the species preserved in the Cambridge Museum, the majority show the said connections. In all cases the ovicells agree well in their character with the same in the 'Sieboga' specimens, described by the above author under the same species.

17. ***Tubulipora radiata*** n. sp.

Zoarium shaped like an outflaring funnel about 25 mm. or less in diameter, consisting of short dichotomous branches, pointed at end and all arising from the upper end of a short stem. Zooecia arranged in alternating lateral series ; each series consisting usually of three, sometimes of two or four zooecia. The first or the innermost zooecium in a series prominently projecting, distinctly laterally bent, and nearly concealing all other zooecia of the same series ; with orifice mostly provided on the inner side with a lip-like process broad at base and narrowed towards apex. All other zooecia in the same series without the lip-like process at orifice, growing shorter by degrees towards the outer end of series. Ovicell occurs either near free end of branches or at their bifurcation point ; it is a weak inflation of the ventral surface of zoarium, which inflation extends to both the sides, or in case it is situated at the bifurcation point, to the surface of the bifurcation angle. Ooeciostome occurring on lateral ooecial surface, occasionally also on the surface of bifurcation angle, short, directed outwards. Ooeciopore circular, 0.04 mm. in diameter, overhung by a hood-like expansion from the margin. Dorsal surface minutely punctate, transversely wrinkled. That at base of stem forms a peculiary characterized and sharply marked off area, which may be called the dorso-basal plate. The surface of the plate is unpunctate, but is pitted by a number of small groove-like depressions.

This new species is represented in the collection by a few colonies of different sizes, attached on stones. They were all obtained from shallow water in Aburatsubo, close to the Misaki Marine Biological Station. Characteristic to the species are the fork-like habitus of bifurcating branches and the presence of the hood-like covering to ooeciopore. In external appearance of zoarium, it closely resembles *Crisina radians* (Lamk.), though entirely different in the characters of dorso-basal plate and of ovicells as well as in the absence of the so-called "porous lateral windows" characteristic of the form just mentioned.

18. ***Tubulipora tumida*** Smitt 1872.

Tubulipora tumida, Smitt 1872 (4), 119, pl. xx, fig. 7.
Idmonea atlantica, var. *tenuis*, Busk 1859 (3), 146.
Idmonea tumida, Waters 1904 (6), 168, pl. xxi, figs. 4. 5.

Numerous colonies of this species are contained in the collection. The localities are: off Jôgashima (80 fms.), off Odawara (93 fms.), and Yodomi (78 fms.) in the Sagami Sea; Kagoshima Gulf (54 fms.). In spirit they are milky white, frequently with a faint pinkish tint. The ovicell and the dorso-basal plate of the species appears to have hitherto remained unknown, but I was fortunate enough to meet with them both. The ovicell, situated close to certain bifurcation point of branches on the ventral side, is an inflation with minutely punctate surface and taking up usually three successive pairs of zooecial series. Ooeciostome short, projecting at a point close to the base of innermost zooecium of certain series ; its aperture slit-like, 0.10×0.018 mm. large, directed upwards. The dorso-basal plate is slightly marked off from the minutely punctured general surface of the stem by a weak wrinkle. Its surface is unpunctate but pitted by a number of groove-like depressions, each of which contains an oval projection of a considerable size.

Stomatopora Bronn 1825.

19. ***Stomatopora granulata*** (Milne-Edwards) 1838.

Stomatopora granulata, d'Orbigny 1850 (2), 836, pl. dcxxviii, figs. 5-8.—Hincks 1880 (3), 425, pl. lvii, figs. 1, 2.—Busk 1886 (5), 22.—Waters 1887 (5), 338.—Kirkpatrick 1890 (3), 17.—Calvet 1896 (1), 219.—Calvet 1906 (3), 461.
Alecto granulata, Milne-Edwards 1838 (1), 205, figs. 3, 3a.—Johnston (pars), 1847 (2), 280, pl. xlix, figs. 1, 2.—Busk 1875 (4), 24, pl. xxxii, fig. 1.—Carus 1889 (1), 44.
Alecto granulata, var. *japonica*, Ortmann 1890 (1), 62, pl. iv, fig. 33.
Alecto ramea, Blainville 1834 (1), 464, pl. lxxviii, figs. 6, 6a, 6b.

Two small colonies in the collection, both from a spot off Misaki, 54–62 fms., attached on a *Brachiopod* and on a *Gorgonian*.

Entalophoridæ Reuss (pars) 1869.

Entalophora Lamouroux 1821.

20. ***Entalophora proboscidioides*** Smitt 1872.

Entalophora proboscidioides, Smitt 1872 (4), 11, pl. iv, figs. 26, 27.—Busk 1886 (5), 19, pl. iv, fig. 4.—Ortmann 1890 (1), 61, pl. iv, fig. 29.—Jullien 1903 (1), 159.—Calvet 1906 (3), 474.

A few small fragments were obtained near Ôshima.

21. ***Entalophora raripora*** d'Orbigny 1872.

Entalophora raripora, d'Orbigny 1847 (1), 267.—d'Orbigny 1850 (2), 787.—Waters 1884 (2), 686.—Calvet 1906 (3), 473.—Robertson 1910 (1), 256, pl. xxiv, figs. 42, 43.
Pustulopora proboscidea, Milne-Edwards 1838 (1), 219, pl. xii, fig. 2.—Johnston 1847 (2), 278, pl. xlviii, fig. 4.—Busk 1875 (4), 21, pl. xvii, A.—Busk 1886 (5), 19, pl. iv, fig. 1.
Entalophora proboscidea, Calvet 1896 (1), 267.—Jullien 1903 (1), 159.—Waters 1904 (8), 247.

A few small fragments obtained together with the foregoing species.

22. ***Entalophora conferta*** Ortmann 1890.

Entalophora conferta, Ortmann 1890 (1), 61, pl. iv, fig. 3c.

A small colony referable to this species was obtained from a depth of 54–62 fms., off Misaki. This seems to closely agree with *Entalophora regularis* Busk in all essencial characters, differing from it only in the more robust development of colony and in the more densely perforated zoarial surface. Should the two species be found to agree also in the characters of their ovicell, which is yet unknown from either, I think they can scarcely be held up as distinct from each other.

Measurements :

	mm.
Width of branch	0.5–0.6
Diameter of zooeciopore	0.10

Diastoporidæ Busk 1859.

Berenicea Lamouroux 1821.

23. ***Berenicea ampulliformis*** n. sp.

Zoarium flat, sub-elliptical, 5.6 mm. across, bordered with a thin plate. Zooecia arranged in radial rows from the zoarial center, the number of the rows doubled in the periphery by addition of intermediate rows between every two rows proceeding from the centre. In the central parts of zoarium, zooecia immersed for the greater part of their length, while in the peripheral parts they freely project with more than half their length. Zooecial aperture elliptical, with slightly thickened margin, mostly provided with a porous closure, that in the marginal parts always without it. From the closure there arise, either centrally or eccentrically at an outer position than the centre, a short and slender tube open at the end. Ovicell ampulliform, prominently inflated, with densely punctate and transversely wrinkled surface. Ooeciostome very short, projecting from the summit of ovicell, close to zoarial surface, outflared at the margin. Ooeciopore circular, 0.04 mm. in diameter, directed obliquely upwards and towards the zoarial periphery. Ventral surface of zoarium and marginal plate scantily punctate. The spaces between zooecial rows transversely wrinkled.

This new species is represented in the collection by a single specimen which was found attached on a *Hexactinellid* obtained from a depth of 62–78 fms. at Yodomi. Characteristic of the species is the ampulliform ovicell, on which account I have given it the specific name *ampulliformis*.

24. ***Berenicea lineata*** (MacGillivray) 1885.

Berenicea lineata, Harmer 1915 (2), 116, pl. xi, figs. 6, 7.
Diastopora lineata, MacGillivray 1885 (1), 96, pl. iii, fig. 1.
Discotubigera lineata, Waters 1887 (4), 260, pl. vi, fig. 24.—Waters 1890 (5), 28, pl. xv, fig. 5.
Diastopora prominens, Ortmann 1890 (1), 64, pl. iv, fig. 38.

A few small and large colonies, referable to the above species, exist in the collection. They were all obtained from shallow water in Aburatsubo, close to the Misaki Marine Biological Station.

25. ***Berenicea obelia*** (Johnston) 1847.

Diastopora obelia, Johnston 1847 (2), 277, pl. xlvii, figs. 7, 8.—Hincks 1862 (1), 467.—Smitt 1866 (3), 10.—Heller 1867 (1), 123.—Busk 1875 (4), 28, pl. xxvi, figs. 1, 2.—Waters 1879 (1), 273.—Hincks 1880 (3), 462, pl. lxvi, figs. 10, 10a.—Bidenkap 1900 (1), 528.—Norman, 1903 (1), 575.—Calvet 1906 (2), 464.—Nordgard 1907, (1), 17.—Arndt 1912 (1), 129.
Tubulipora obelia, Johnston 1838 (1), 269.
Berenicea hyalina, Fleming 1828 (1), 533.
Diastopora hyalina, var. *obelia*, Smitt 1866 (3), 396, pl. viii, figs. 9–12.

A single specimen of this species, from Yodomi 62–78 fms., exists in the collection. It is attached on *Xenophora* shell. The adventitious tubules have their opening partly above and partly below the level of zooecial apertures. I mention this fact, because Waters has distinguished the form from Franz-Josef Land under the name of *Diastopora obelia*, var. *arctica*, on the ground that the adventitious tubules open all at a higher level than the zooecial apertures.

26. ***Berenicea rotunda*** n. sp.

Zoarium circular, 1–5 mm. in diameter, bordered with thin wide lamina ; the ventral surface slightly concave, the zoarium being thinnest in the centre and thickest at margin owing to superposition of two or three zooecia in that part. Zooecia arranged in radial series, in the each series consisting of a row of them; in the peripheral parts, rows of later origin add themselves to between those which start from the center. Zooecial aperture circular, 0.12–0.16 mm. in diameter; provided with porous closure, except those near the margin. Ovicell prominently inflated; tubercular when small, transversely elongate when larger. Ooeciostome very short, situated near distal border of ovicell at nearly the center of ooecial summit or somewhat laterally to it. Ooeciopore sub-elliptical, 0.1 × 0.04 mm. large. Dorsal surface of zoarium with fine and dense wrinkles, nearly smooth.

Measurements :

	mm.
Breadth of ovicell	0.78–1.03
Diameter of zooeciopore	0.12–0.16
Ooeciopore	0.10 × 0.04

This new species is represented in the collection by a few number of colonies, which were all taken from a *Hexactinellid* obtained at Okinosé, from a depth of 312 fms. The species closely resembles *Berenicea lineata* (MacGill.), but differs from it in the arrangement of zooecia and in the shape of ooeciopore.

Lichenoporidæ Smitt 1866.

Lichenopora Defrance 1823.

27. ***Lichenopora algoensis*** Busk 1875.

Lichenopora algoensis, Busk 1875 (4), 31, pl. xxviii, figs. 1–4.

A single specimen in the collection, attached on a *Hexactinellid* from Okinosé, 312 fms. As Busk's original description of the species is brief, it is with some doubt that this specimen is identified with the above species. However, so far as his description and figures go, there is a complete agreement between the two. The ovicell of the species appears to have hitherto remained unknown. The same occurs in the specimen before me in the form of a weak inflation of the central surface, situated near the center of the zoarium. Ooeciostome short, projecting from the periphery of ooecium; its aperture circular, 0.08 mm. in diameter and directed outwards.

28. ***Lichenopora buski*** Harmer 1915.

Lichenopora buski, Harmer 1915 (2), 161, pl. xii, figs. 4, 5.
Discoporella ciliata, Busk 1875 (4), 31, pl. xxx, fig. 6; pl. xxxiii, fig. 4.—Haswell 1879 (1), 354.
Lichenopora ciliata, Waters 1887 (4), 263, pl. vii, fig. 5.—Philipps 1899 (1), 441.

A number of colonies are on hand. The localities are: Yodomi 62–72 fms. and Aburatsubo.

29. ***Lichenopora imperialis*** Ortmann 1890.

Lichenopora imperialis, Ortmann 1890 (1), 64, pl. iv, fig. 25.

There are in the collection numerous colonies which may be identified with the above species. They were all obtained from shallow water in Aburatsubo, close to the Marine Biological Station, where they are commonly found, attached on stones and seaweeds. Specimens in spirit white; in the fresh state, milky white, but frequently with a light yellowish tint. The ovicell exists in most of the specimens. It is a weak inflation with punctate surface and situated below the level of the ribs of cancelli. It is either confined to the central area or extends farther outwards in the form of lobes between every two raised rays of zooecia, frequently reaching nearly to the zoarial margin. Ooeciostomes very short, generally situated in the periphery of ovicell; their aperture oblong, 0.04 × 0.08 mm. large, situated in specially enlarged and elliptical cancelli surrounded by a very much thickened rib.

30. ***Lichenopora mediterranea*** Blainville 1834.

Lichenopora mediterranea, Blainville 1834 (1), 407.—Michelin 1841–42 (1), 68, pl. xiv, figs. 5a, 5b.—Pergens 1889 (1), 7.—Carus 1889 (1), 46.—Neviani 1904 (1), 2.—Harmer 1915, (2), 164, pl. xii, figs. 2, 3.
Discoporella mediterranea, Busk 1875 (4), 33, pl. xxxiv, fig. 4.

A few colonies which seem to be referable to the above species, exist in the collection. They were all obtained at a spot off Jôgashima, attached on an example of *Steganoporella magnilabris* Busk. In most of the specimens, there exist the specially prominent zooecia which were described by Harmer from the 'Sieboga' specimens. The secondary abnormal zooecia have distinctly mucronated aperture and are easily recognizable.

31. ***Lichenopora novæ-zelandiæ*** (Busk) 1875.

Lichenopora novæ-zelandiæ, Hincks 1884 (4), 362.—Hincks 1887 (5), 132.—Ortmann 1890 (1), 65, pl. ii, fig. 10.—Thornely 1915 (1), 127.—Harmer 1915 (2), 155, pl. xii, figs. 6–11.
Discoporella novæ-zelandiæ, Busk 1875 (4), 32, pl. xxx, fig. 3.—Haswell 1879 (1), 353.
Lichenopora victoriensis, Waters 1890 (5), 284, pl. xv, fig. 4.
Discoporella holdsworthii, Busk 1875 (4), 33, pl. xxx, fig. 4.
Lichenopora holdsworthii, Thornely 1912 (2), 157.

This is quite a common species along the coast near Misaki, attached on stones and seaweeds. It is interesting to note that whereas specimens of the species from certain localities are of a light greyish color in the fresh state, those living in Aburatsubo show a bright red or a deep purplish color. This is due to the presence, in the cancelli and sometimes also in the ooeciostomes, of numerous microscopical algæ of the color referred to. The pigment dissolves away in alcohol, imparting its color to this and thus rendering colorless the immersed Bryozoa.

32. ***Lichenopora radiata*** (Audouin) 1826.

Lichenopora radiata, Hincks 1880 (3), 32, pl. lxviii, figs. 9, 10.—Waters 1884 (2), 694.—Waters 1887 (3), 345.—Kirkpatrick 1890 (2), 612.—Ortmann 1890 (1), 64, pl. iv, fig. 23.—Neviani 1900 (1), 246.—Calvet 1906 (2), 467.—Calvet 1906 (3), 215.—Norman 1909 (2), 281.—Waters 1909 (9), 237.
Melobesia radiata, Audouin 1826 (1), 235, pl. vi, fig. 3.
Unicavea radiata, d'Orbigny 1850 (2), 971.
Discoporella radiata, Busk 1875 (4), 32, pl. xxxiv, fig. 3.—Waters 1879 (1), 276, pl. xxiv, fig. 11.
Discoporella patina, Heller 1867 (1), 122.
Diastopora catillus, Johnson 1897 (1), 61.

Of this species there are numerous colonies in the collection. The localities are: Yodomi (62–78 fms.); shallow water along the coast near Misaki; Tokyo Bay (17–32 fms.); Kagoshima Gulf (70 fms.).

33. ***Lichenopora sagamiensis*** n. sp.

Zoarium circular, 6.5 mm. in diameter, shaped like a thick disc, bordered with a moderately thick lamina. Zooecia form raised rays radiating from the central area ; there are long and short rays which occur in nearly regularly alternate arrangement. The short rays are composed of zooecia in a single row ; the same holds good for the outer parts only of the long rays, which in the inner parts are biforked and show in each of the branches one or two rows of zooecia. The space between the branches is occupied by cancelli forming a nearly continuous row with certain others of the central area. Zooecial aperture elliptical, 0.10 × 0.14 mm. large, the margin indented so as to produce seven spiny processes, of which the outermost is the longest of all. Cancelli very small in the central area, but growing gradually larger towards the periphery, 0.02–0.14 mm. in diameter. Ovicell unknown.

The above type specimen was obtained from Yodomi, 62–78 fms. A second small specimen comes from Okinosé 336 fms. ; it was found attached on a *Hexactinellid.*

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Notes on the Cephalopoda.

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I. On the male of *Amphitretus pelagicus* Hoyle.

Prof. A. OKA obtained in Tateyama Bay, Sagami Sea, April 7th, 1910, a jellyfish-like octopod which I identify as *Amphitretus pelagicus* Hoyle[1]. So far as I know, it is the second specimen of the species captured in the region, the first being the one which was described by IJIMA and IKEDA[2]. Moreover, it is of special interest as being the first specimen ever obtained, which can be determined as the male of that rare species. According to the statement of the collector, the specimen in question was discovered among the rocks near the shore after a storm. It is preserved in an excellent state. For placing this valuable specimen at my disposal, I wish here to express my grateful thanks to Professor OKA.

Aside of the characters in relation to the difference in sex, the specimen is not without some noteworthy differences from the female described by IJIMA and IKEDA. But this may be due in part simply to the difference in the state of preservation and in part to variations of secondary importance. (In making comparisons, the female described by IJIMA and IKEDA shall be referred to as the Misaki specimen).

In the first place, the body is somewhat laterally compressed, not nearly dorso-ventrally as in the Misaki specimen. The gelatinous coating is much thinner than in that specimen, measuring at most 6 mm., instead of 20 mm., in thickness at the posterior body-end. The umbrella is equally developed all around : unlike the Misaki specimen, the part of it between the ventral arms is as broadly developed as at any other interbrachial space.

In spite of the fact that the arms, except the left second and the hecto-

1) Chall. Rep. XVI, pp. 67–68; pl. ix, figs. 7–9.

2) Annot. Zool. Jap., IV, 1902, pp. 87–101; pl. ii; 3 text-figs.

cotylized right third, are more or less damaged at the tip, it may safely be said that all are subequal or nearly equal. The arm length, as measured on the completely preserved left second arm, is 85 mm., which is about twice the length of the head and body taken together. The suckers on the same arm number thirty-two in all. Their disposition and relative size will best be seen from the annexed figure. In these respects there exists some slight deviation from the Misaki specimen.

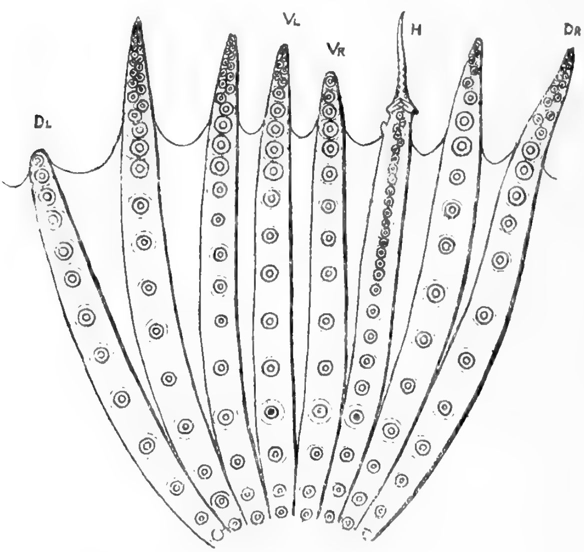

Fig. 1. Inner aspect of the arms, about natural size. *DL*, left dorsal ; *DR*, right dorsal ; *VL*, left ventral; *VR*, right ventral; *H*, hectocotylized arm.

The hectocotylized right third arm presents strikingly peculiar features. It is a little shorter than the left second arm, measuring 75 mm. long. Its tip, for a length of 14 mm., is remarkably slender, gradually tapering, finely pointed at the extreme end and of a somewhat firm consistency. The flattened inner surface of the tip shows a series of minute rounded protuberances along each of its lateral margins. The tip is rather abruptly set off from the remaining parts of the arm by the presence, at the junction on the inner surface, of an angular shaped swelling, of which the angle is pointed distad and the two ends project on the sides of the arm. The swelling is traversed by a well defined narrow and deep groove of a similar shape and disposition, so that it may be said to consist of a distal and a proximal lip-like ridge, passing into each other at the sides. The proximal ridge exhibits in the middle a small rounded protuberance. Directly proximal to the above swelling and


Fig. 2.
Terminal part of the hectocotylized arm, $\times 3/8$.

unilaterally on the ventral side of the arm, there exists an indentation, which is proximally bounded by a firm prominence of the arm on the side referred to. Suckers occur on the arm in a series from the base to the angular shaped swelling. They are smaller, more numerous and more closely set than in other arms. Numbering twenty-seven in all, the fourth and the fifth suckers are the largest. For other points in the manner of their arrangement, the reader is referred to the figures.

Of the internal anatomy I can give only such scanty notes as could be taken by making incisions without much impairing the specimen. The liver presents the notable feature that its posterior parts project caudad and ventrad into the median mantle connective, which serves as a delicate sheath to those parts of the organ. The posterior end of liver is of the form of a rounded cone. From the apex of this emerges the ink-duct, which then proceeds straight to the anus. The penis has a striking resemblance to that of *Polypus*. It is of a retort-like shape, about 9 mm. long and situated on the left side of the visceral sac, the elongate part being directed cephalad. Needham's sac joins the penis at the neck-like part of the diverticle by means of a narrow passage.

The measurements of the specimen are as follows :

Total length	135	mm.
Breadth of body	40	,,
Depth of body	45	,,
End of body to mantle margin	45	,,
End of body to the middle point between eyes	50	,,
End of body to mouth	60	,,
End of body to funnel extremity	72	,,
End of body to umbrella edge between ventral arms	95	,,
End of body to umbrella edge between dorsal arms	95	,,

Length of right second arm measured up from mouth......85 mm.
Greatest thickness of arms ....10 „
Diameter of largest sucker .... 2.3 „

As regards the affinity of the genus, Hoyle has assumed that it stands closest to *Cirroteuthis*, as agreeing with that genus in having the suckers arranged in single series and the arms united by a broad umbrella. It seems to me exceedingly doubtful if this view can be held up when the following facts are taken into consideration: Firstly, *Amphitretus* is entirely devoid of the dorsal cartilage, fins and brachial cirri, all which *Cirroteuthis* is in possession of. Secondly, *Amphitretus* has a pair of oviducts, while in *Cirroteuthis* and its allies that duct is always unpaired, — a difference which, in my view, goes far in indicating a rather remote relationship between the two genera. (IJIMA and IKEDA's statement that in *A. pelagicus* the oviduct occurs in a pair, I have confirmed by personally examining the original specimen described by them. I have found that the oviducts are in character essentially of the same type as those of *Polypus*. The oviduct proper and the vaginal part are both of a moderate length, connected together by a roundish oviducal ball. The vaginal part is thicker than the oviduct proper, and terminates at a point far posterior to the anus).

Rather it seems to me that *Amphitretus* is more nearly related to the Polypidæ than to *Cirroteuthis*. This is indicated especially by the general agreement in the arrangement of internal genital organs.

It was pointed out by IJIMA and IKEDA that *Amphitretus* approaches *Alloposus* in several respects. This is indeed true to a degree, but the structure of the hectocotylus seems to point to the former being nearer to the Polypidae than the latter.

II. Diagnoses of Four New Species of Polypus.

Polypus ovulum sp. nov.

? *Octopus areolatus*, Hoyle 1886, Chall. Rep. p. 86, pl. pl. iii, figs. 6, 7.
? *Octopus ocellatus*, Appllöf 1886, Jap. Cephal. p. 8. pl. i, figs. 1–3.

Adult small, nearly 150 mm. in total length and 40 mm. in mantle-length ; skin firm, shagreen-like, being thickly covered with uniform warts. Body oblong ; sides with neither tubercles nor ridges. Umbrella of a moderate breadth, distinctly narrower between dorsal than between ventral arms. Funnel organ deeply W-shaped.

Arms slender, subequal ; dorsal pair the shortest. Right third arm weakly hectocotylized, only a little shorter than the corresponding arm of the opposite side ; apical organ $^1/_{15}$ the entire length ; suckers in the normal part in 59–70 transverse series.

Frequently a few broad and dark longitudinal stripes on the back of head and body, but no brick-colored patch either on head or on mantle. In front of and below each eye, there is found a conspicuous black round patch containing a small shining cobaltic or violet ring which never exceeds 4 mm. in diameter. The patch lies nearer to umbrella margin than to eye.

Branchial leaflets number 15–17 in each gill.

General shape of vas deferens in situ hemispherical and cup-like, covering over antero-lateral parts of testis; Needham's sac long, encircling the vas deferens and testis meridionally ; spermiduct moderately long. Penis slender, conspicuous, bent into V-shape, forming a swollen, elliptical and well marked diverticle at the anterior extremity of the inner lobe ; Needham's sac connected to the diverticle. Spermatophore 49–61 mm. long ; its spermatic part 23–27 mm. long, containing 230–270 coils of sperm cord.

Vagina thin, with a marked S-like curve in the middle of its course, terminating a short distance posterior to anus ; oviducal ball situated on the dorsal side of ovary. Ovarial ova very small, attaining only 2–3 mm. in length, even when ripe. The specific name *ovulum* refers to the small size of ova.

Numerous specimens of the species purchased in the Tokyo market are preserved in the Sci. Coll. Tokyo.

Polypus parvus sp. nov.

Adult very small, only a little over 100 mm. in total length ; skin firm, finely wrinkled, evenly and uniformly warty. Umbrella poorly developed, extending for about $^1/_5$ the length of arms. Funnel organ composed of a thin, W-shaped cushion.

Arms subequal; second pair the longest by a little. Suckers thickly set in double series, except the three at base which are uniserial.

Branchial leaflets number 9 or 10 in each gill. Vagina thick, short, nearly straight, terminating far posterior to anus. Ink-duct runs straight to anus; visible in its entire extent from outside the visceral sac. Spermatophore very small, about 12 mm. long; its spermatic part 5 mm. long, containing about 65 coils of sperm cord.

One male and female obtained from Prov. Satsuma. They are preserved in the Agric. Coll. of Sapporo.

Polypus longispadiceus sp. nov.

Adult male attains about 300 mm. in total length. Dorsal surface of body, head, and bases of arms covered with single-headed roundish warts of somewhat various sizes, found in thickest distribution and best development above eyes; one of the supraorbital warts on each side is a little larger than the others. Umbrella broad, generally extending about $^1/_5$ up the length of arms and thereafter continued as narrow contractile membrane along the ventral outer edge of each arm to the subterminal parts.

Arms slender, formula: $1>2 \doteqdot 3 \doteqdot 4$; the longest 5–6 times the mantle-length. Suckers biserial, except the three at base which are uniserial; those of 2 or 3 transverse series near umbrella margin conspicuously enlarged. Right third arm, though prominently hectocotylized, about equally long as the left third; suckers on the normal part in 49–60 transverse rows; the hectocotylized part slender, $^1/_{10}$ the entire length of the arm, of the same structural type as that of *Polypus hongkongensis* (Hoyle).

Funnel organ thickly W-shaped. Branchial leaflets count 20–23 in each gill. Coecal appendage of stomach reniform. First part of ink-duct hidden in liver.

Penis slender, slightly tapering caudad, mostly curved in a C-like and rarely in a 6-like manner; Needham's sac joins it near the anterior end. General shape of vas deferens in situ oblong, flattened a little, with the long axis transversely directed; Needham's sac running over and obliquely across spermatophoric and accessory glands; when full of spermatophores the sac is greatly enlarged, acquiring an S-like shape; spermiduct comparatively short and thick. Spermatophore slender, 90–105 mm. long; its spermatic part 35–40 mm. long, containing 110–120 coils of sperm cord.

Four males obtained from Prov. Rikuzen in the Sci. Coll., Tokyo.

Polypus conispadiceus sp. nov.

Adult large, attaining about 1 m. in total length; skin nearly smooth, possessing only a few warts around the head, and a single cirrus above each eye. Head about half as wide as body. Funnel organ composed of two V-shaped pads.

Arms thick, about thrice as long as head and body taken together, uniform but the ventral pair a little shorter than the rest. Suckers comparatively small, somewhat sparsely set in double alternate series, except the three at base which are almost uniserial.

Right third arm prominently hectocotylized, about $^1/_3$ shorter than the left third; suckers in the normal part in 26–29 transverse series; the hectocotylized part conspicuous, $^1/_5 - ^1/_6$ as long as the entire arm, typically conical, thick at base, with a deep but narrow longitudinal groove.

Branchial leaflets number 20–24 in each gill.

Penis straight, subfusiform, about 30 mm. long in the adult; Needham's sac joins it in front of the middle. Spermatophore 110–140 mm. long; its spermatic part 40–60 mm. long, containing 46–63 coils of sperm cord. Oviduct terminates at a point far posterior to anus; ripe ovarial ova 30 mm. long.

Numerous specimens purchased in the Sapporo market and preserved in the Agric. Coll., Sapporo.

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CONTENTS.

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Supplementary Notes on Flounders from Japan with Remarks on the Species of Hippoglossoides.

By

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I.—Introduction.

Since the publication of the report on the "Flounders and Soles from Japan, collected by the United States Bureau of Fisheries steamer 'Albatross' in 1906,"[1] some additional facts[2] have come to light, and are added to the literature of ichthyology in the following notes. A discussion of the species *Hippoglossoides* is also presented.

II.—Japanese Flounders (other than Hippoglossoides).

Pseudorhombus misakius Jordan and Starks.

The characters separating this species from *P. arsius* are: the presence of a white bordered ocellus on the lateral line, more rays in the dorsal, and a deeper body; these statements through a clerical error were reversed by Hubbs (l.c., p. 463) in quoting Snyder.

Genus **Acanthopsetta** Schmidt.

Acanthopsetta in its technical characters is close to *Hippoglossina*, a genus from the eastern Pacific. The two genera, however, are of dissimilar habitus, and probably of independent origin.

---

1) Hubbs, Proc. U.S. Nat. Mus., 48, 1915, pp. 449-496.

2) The additional records of flounders dredged by the Albatross are added with the permission of Dr. Hugh M. Smith, Commissioner of Fisheries, U.S.A.

Genus **Cleisthenes** Jordan and Starks.

The scales of *C. pinetorum* are less strongly ctenoid than in *C. hertzensteini*, despite the reverse statement,[1] due to a clerical error.

C. hertzensteini should further be recorded from *Albatross* station 4988, in the Gulf of Tartary.

Pleuronichthys cornutus (Temminck and Schlegel).

This species was also obtained at *Albatross* station 4888, in Eastern Sea.

Lepidopsetta mochigarei Snyder.

The recording[2] of this flounder from *Albatross* station 5067 in Suruga Gulf was an error, arising from incorrect tin tag labeling, discovered subsequently to the publication of the record. In addition to other localities, the species was obtained at *Albatross* station 5000 in the Gulf of Tartary.

Liopsetta glacialis Pallas.

On the basis of European material, this species has been divided into a robust and a slender form.[3] The Kamchatkan specimens previously recorded[4] belong to the robust type, whatever its systematic position may be.

Genus **Dexistes** Jordan and Starks.

Subgenus **Tanakius,** nov.

Subgenotype.—*Microstomus kitaharæ* Jordan and Starks.

Extremely similar to *Dexistes*, differing in the still more fragile body and in the increased number of vertebræ, fin-rays, and scales.

In the usual division of the genera of the Pleuronectinæ, ***Dexistius***

1) Hubbs, *l.c.*, p. 472.
2) Hubbs, *l.c.*, p. 477.
3) Smitt, Hist. Scandin. Fishes, 1, 1893.
4) Hubbs, *l.c.*; p. 487.

and *Tanakius* would be separated in the two primary subdivisions. The close relationship of the two groups, however, is quite evident, and is very well expressed by subgeneric distinction.

Each of the two subgenera contains a single Japanese species, and *Dexistes*, in correlation with its fewer vertebræ and associated characters, is the southern representative of *Tanakius*.

Tanakius: named in honor of Dr. Shigeho Tanaka, a distinguished Japanese zoologist.

Dexistes* (*Tanakius*) *kitaharae Jordan and Starks.

Microstomus kitaharæ Jordan and Starks, Bull. U. S. Fish. Comm., 22, 1902 (1904), p. 622, with plate; Proc. U. S. Nat. Mus., 31, 1906 (1907), p. 223; Hubbs, *ibid.*, 48, 1915, p. 490.

Microstomus hireguro Tanaka, Zool. Mag., 28, 1916, p. 67 (not seen); Fig. Desc. Fishes Jap., 25, 1917, p. 447, pl. 122, fig. 351.

Microstomus hireguro seems to be based upon a large individual of *Dexistes kitaharæ*, specimens of which were dredged by the *Albatross* near the type locality of the nominal species.

The marked differences between this species and *Microstomus stelleri*[1] are really of generic value, and their relationship is quite distant. In addition to these differences, the teeth in *Dexistes* are more numerous, and occur on both sides of the jaws, whereas in *Microstomus* they are fewer in number, and are nearly confined to the blind side.

Genus **Microstomus** Gottsche.

Veraequa Jordan and Starks, Bull. U. S. Fish. Comm., 22, 1902 (1904), p. 628; Proc. U. S. Nat. Mus., 31, 1906 (1907), p. 210.

Veraequa achne Jordan and Starks is so closely related to *Microstomus stelleri* that the two species are now regarded as congeneric. *Microstomus achne* differs from *Microstomus stelleri* in the narrower

1) Hubbs, *l.c.*, p. 490.

interorbital, and perhaps in the more slender form, and in the slightly smaller scales, and in the somewhat fewer fin-rays.

III. The Species of Hippoglssoides.

A.—Introduction.

In a recent report on flounders and soles from Japan, the writer[1] described a new species of *Hippoglossoides* (*H. propinquus*), and described or discussed the species of the genus previously recognized. Schmidt[2] has since published an account of the Pacific species of *Hippoglossoides*, reducing them to the rank of subspecies. In a number of cases our conclusions were at variance. A subsequent review of the species has resulted in the following account of the classification, status, and nomenclature of these flounders.

B.—The Subgeneric Distinction of the Atlantic and Pacific Species.

The most important result of Schmidt's work probably lies in his discovery of certain differences which separate the Atlantic species consistently from those found in the Pacific. He separates the two groups as follows:

"I. Brancheostegal rays 8. Lateral line single, nearly straight. The contours of the dorsal and anal fins in the posterior half convex (Atlantic Ocean)....*H. platessoides* Fabr.

"II. Brancheostegal rays 7. Lateral line single, slightly rising anteriorly, or forming a very low arch. The contours of the dorsal and anal fins in the posterior half concave (Pacific Ocean)....*H. ellassodon*, Jord. and Gilb."

These statements have been verified in *H. platessoides* and in four of the Pacific species: *H. elassodon*, *dubius*, *hamiltoni*, and *propinquus*.

1) Hubbs, Proc. U. S. Nat. Mus., 48, Mar. 20, 1915, pp. 466–471, pl. 26, fig. 5.

2) Schmidt, Ann. Mag. Nat. Hist., 16, Oct. 1915, pp. 299–308 (with complete synonomies, apparently published before the receipt of the paper by Hubbs).

In two instances however, a certain qualification must be made. In a small specimen of *platessoides*, 63 mm. long from tip of snout to base of caudal,[1] the margin of the dorsal fin is slightly concave posteriorly, but it is convex in the adult. The lateral line in the Pacific species usually forms a well-marked curve anteriorly,[2] but in *H. elassodon* is only a little more curved than in *platessoides*. Other differences further serve to distinguish the two groups: the Pacific species have stronger premaxillary teeth than those from the Atlantic, and they lack the dark spots, so characteristic of their Atlantic representatives.

The species of the two oceans should apparently be separated as distinct groups, which are provisionally regarded as subgenera. The Atlantic forms retain the name *Hippoglossoides* Gottsche, 1835, while *Cynopsetta* is available for the Pacific species. This name was proposed by Schmidt (in 1904) as a genus for *C. dubia* to distinguish that species from *elassodon*, primarily on account of the stronger dentition. This character, however, is only of specific value, as Schmidt has since recognized.

C.—List of the Subgenera and Species of Hippoglossoides.

Subgenus *Hippoglossoides*.

H. platessoides (Fabricius).[3]

H. limandoides (Bloch).

Subgenus *Cynopsetta*.

H. elassodon Jordan and Gilbert.[4]

---

1) From long. 10° E., lat. 72° 20′ N.

2) This character is quite variable in *H. dubius*.

3) The form from Greenland and the east coast of North America is probably distinct from the European species *H. limandoides* (see Smitt, Hist. Scandin. Fishes, 1, 1893, p. 421, pl. 17, fig. 3).

Both of the specimens in the collections of Stanford University have 11 pectoral rays, corresponding with Smitt's figures for *platessoides*. One of these is from Massachusetts; the other, from long. 10° E., lat. 79° 20′ N.

4) Dorsal, 75 and 80; anal, 59 and 60; in two specimens from *Albatross* station 3642, Avatcha Bay, Kamchatka.

H. dubius Schmidt.
H. robustus Gill and Townsend.
H. hamiltoni Jordan and Gilbert.
H. propinquus Hubbs.

D.—Status of the Species of the Subgenus Cynopsetta.

Four of the species of *Cynopsetta : elassodon, dubius, hamiltoni,* and *propinquus* have already been examined and compared by the writer (*l. c.*). These species were found to be quite distinct from one another. Comparisons of descriptions of the fifth known species, *H. robustus,* with specimens of both *hamiltoni* and *propinquus,* seemed to indicate that *robustus,* with its deeper body, etc., was distinct. The measurements presented by Schmidt indicate clearly that the specimens which he identified as *Hippoglossoides elassodon robustus* have more slender bodies than the types of *robustus,* and that they have shorter fin-rays especially in the pectorial fin, than in *hamiltoni.* It is probable that Schmidt's form is identical with neither *robustus* nor *hamiltoni,* as he urged. In both of the characters just mentioned it agrees with *H. propinquus.*

Schmidt refers *Hippoglossoides katakuræ* Snyder to *H. elassodon.* As the writer has previously indicated (*l. c.*, p. 466), *H. katakuræ* is a synonym of *H. dubius ;* the type has 12 gill-rakers on the lower limb of the outer arch ; *dubius* has 13—15 (rarely 12, or even 11 or 17) ; *elassodon* has 15 – 19.

Hippoglossoides dubius cannot be an age-variant of *elassodon,* as Schmidt suggested, because of the numerous differences evident in both young and adult, as previously described by the writer.

E.—The Relationship of the Species of the Subgenus Cynopsetta.

Schmidt has referred all the Pacific species of *Hippoglossoides* to *H. elassodon,* recognizing three subspecies : *H. e. dubius, H. e. elassodon,* and *H. e. robustus*. The application of trinominal nomenclature to these fishes seems wholly unwarranted, at least at present. Such a usage would indicate that there is but one species of *Hippoglossoides* in the Pacific, with characters not constantly different in the three forms. According to the current conception of subspecies, it would be further necessary to assume that these three forms have different distribution, and that they intergrade in the area where their ranges interlap. No such intergradation has been demonstrated. In two provinces three species live together, as indicated in the following table.

Table to Show the Distribution of the Species of the Subgenus Cynopsetta.

	West cost of U. S. A.	Bering Sea.	Kamchatka	Northern Japan
H. elassodon	×	×	×	—
H. dubius	—	—	—	×
H. robustus	—	×	—	—
H. propinquus	—	—	×	×
H. hamiltoni	—	—	×	×

The Kamchatkan record of *propinquus* is added on the assumption that *H. e. robustus* Schmidt is the same.

The suggestion of Schmidt that the form which he names *H. elassodon robustus* is the northern representative of *H. e. elassodon* and of *H. e. dubius* can not be confirmed: on one hand, because *elassodon* also occurs in Kamchatka and Bering Sea; on the other hand, because *propinquus*, to which *H. e. robustus* Schmidt should probably be referred, was dredged by the *Albatross* in Aniwa Bay, together with *H. dubius*.

So far as known, *H. dubius* is confined to the fauna of northern Japan,[1] and appears there to represent[2] *H. elassodon* of the Kamchatkan

1) Additional records to those already given are *Albatross* stations 5003 and 5011.

2) Schmidt has recorded both species from the Gulf of Tartary.

and Bering Sea faunas, just as *Hippoglossus stenolepis*, *Liopsetta pinnifasciata*, and *Lepidopsetta mochigarei* represent their more northern representative species *H. hippoglossus*, *L. glacialis*, and *L. bilineata*.[1]

1) The northern subspecies or species should probably be called either *umbrosa* or *perarcuratus*.

Notes on the Development of *Cucumaria echinata.*

By

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With Plate V.

From the fact that the embryo is quite opaque and that the transformation proceeds very rapidly, the study of the development of *Cucumaria* is not an easy task. Though SELENKA, LUDWIG and some others have elucidated many important features upon the subject, our knowledge is still very far from being satisfactory, especially about the early development of the ambulacral system and the formation of the body-cavities. I have endeavored to make clear these points in *Cucumaria echinata,* which abounds in Misaki.

In this paper I give a preliminary account of some of the results of my observations. This holothurian develops in a way not very different from the allied forms of Europe, such as *C. planci, C. normani,* etc. Detailed comparison with those forms and discussion on the literature will be made in the definitive paper to be published later.

Spawning.

The breeding season of *Cucumaria echinata* begins, in the vicinity of Misaki, in the middle of June and lasts till the early part of August. Freshly obtained mature animals kept in a glass jar will begin to pour out reproductive elements in the evening of the same day. The poured out spermatic fluid forms white cloudy strings, five or six in number[1] and sinks down to the bottom at first, and then spreads out in the water. Ova are then laid by female individuals, and, being much heavier than sea-water, very soon sink to the bottom.

The ovum is slightly flattened at the animal pole, as is known in *Cucumaria normani*.[2] It measures up to 440 μ across the axis, and about 310 μ along it. A radially striated, gelatinous coating of the thickness of about 70 μ, is distinctly seen, and the jelly-canal running through it opens at the centre of the flattened surface indicating the animal pole.

In the ovarial tube, the ova are attached to the wall in such a way that the animal pole ("umbilicus") is directed towards the internal cavity of the tube. The germinal vesicle is situated eccentrically, nearer the animal pole.

Immediately after being laid, the ovum shows the second maturation spindle, the first polar body being found attached at the umbilicus.

Cleavage.

The ovum divides quite regularly until about the 32-cell stage. The blastula is not wrinkled on the surface as is stated to be the case in *C. frondosa*,[3] *C. saxicola* and *C. normani*,[4] but smooth and round, with a slightly thicker wall in the vegetative half. The diameter of the blastula is about 335 μ.

Gastrula.

On the next morning, invagination begins at the now slightly flattened vegetative pole, from which numerous mesenchyme cells have been immigrating into the blastocœle.

---

1) The openings on the genital papilla are much more numerous and may even reach up to several tens.

2) H. G. NEWTH, P. Z. S., 1916.

3) L. DES ARTS, Bergens Mus. Aarb., 1910.

4) H. G. NEWTH, P. Z. S., 1916.

The gastrula, uniformly covered with cilia, gradually elongates along the future body-axis, and rotates actively around that axis, with its apical pole directed forwards. The archenteron lengthens into a long flattened vesicle more than half as long as the whole body, and finally its posterior half bends and coils so that the whole archenteron assumes the form of a sinistral spiral (Pl. V, figs. 1 and 2). At this stage the following three parts are distinguishable in the archenteron :—

1. The anteriormost part, which is large, round and flattened from right to left, making a right angle with the frontal plane, with its hind end approaching the left side of the body (*hy'*)[1].

2. The middle part which goes round transversely from left to irght across the dorsal side and slightly bending anteriorly near its middle (*en'*).

3. The last part, which is in direct connection with the blastopore, runs almost parallel to the body-axis, and has a very narrow lumen (*g'*).

The first part is the future hydrocœle, the second part the enterocœle, and the third part gives rise to the gut. This fully developed gastrula stage is reached during the second day of development.

The next change which occurs in an old gastrula is the formation of the stomodæum. At about the middle of the ventral side, the ectoderm begins to thicken inwards, and at last its inner surface comes to touch the ventral edge of the anterior flattened part of the archenteron (Pl. V, fig. 1, *stm'*). On the outer surface of this thickened ectoderm, a little to the left of the sagittal plane, the stomodæum appears as a longitudinal slit-like depression.

1) The orientation as to right and left of the embryo can not be ascertained with any degree of certainty from an examination of this stage alone. But in later stages, where the midventral radial canal marks the midventrum of the body, the position of the stomodæum is found to be on the left side, and, as seen in cross section of the body, at an angle of about 30° from the midventral line (Pl. V, figs. 5 and 6, *stm*). The stomodæum makes its fisrt appearance in the very old gastrula, a little to the left side of the plane containing the flattened part of the archenteron.

Dipleurula.

During the next stage of development the archenteron divides into the hydro-enterocœle and the gut, and the former again into the hydrocœle and the enterocœle. The enterocœle again divides into the right and left halves. This stage corresponds with the auricularia of other holothurians so far as the arrangement of these vesicles is concerned, and I may call the embryo "dipleurula" for the sake of convenience, though the internal structure is never bilaterally symmetrical. The stage is passed over at about the end of the second day of development.

The third and posteriormost part of the archenteron, the future gut (Textfig. A, *g'*), is first pinched off from the rest, the hydro-enterocœle. Part 1 above mentioned of the archenteron (*hy'*) then goes over from its original position on the left to the right, across the dorsal side; while part 2 (*en'*) moves anteroventral towards the left side, from its original position on the dorsal side (Textfig. B). These two parts are later constricted off from each other, resulting in the separation of the hydrocœle from the enterocœle (Textfig. C).

From the posterodorsal corner of the hydrocœle is given out a conical process, the rudiment of the primary stone-canal (*stc'*). This is formed before the separation of the hydro-enterocœle, but its external opening, the dorsal pore (Textfig. D, *dp*), appears some time after the separation. The broad anterior margin of the hydrocœle is then divided into several lobes. From the hydrocœle on its right ventral edge is given out another lobe, which gradually grows on to the ventral side, and brings about the horse-shoe shape of the future ring-canal.

The enterocœle which has been extending all along the left side of the gut is then divided into two halves, one anteroventral the other posterodorsal. The one situated on the anteroventral side corresponds with the left enterocœle of other echinoderms (Textfig. D, *len*), while the other, although situated on the *left* dorsal side, is the right enterocœle (*ren*) and extends posteriorly, and is much smaller than the former.

Doliolaria.

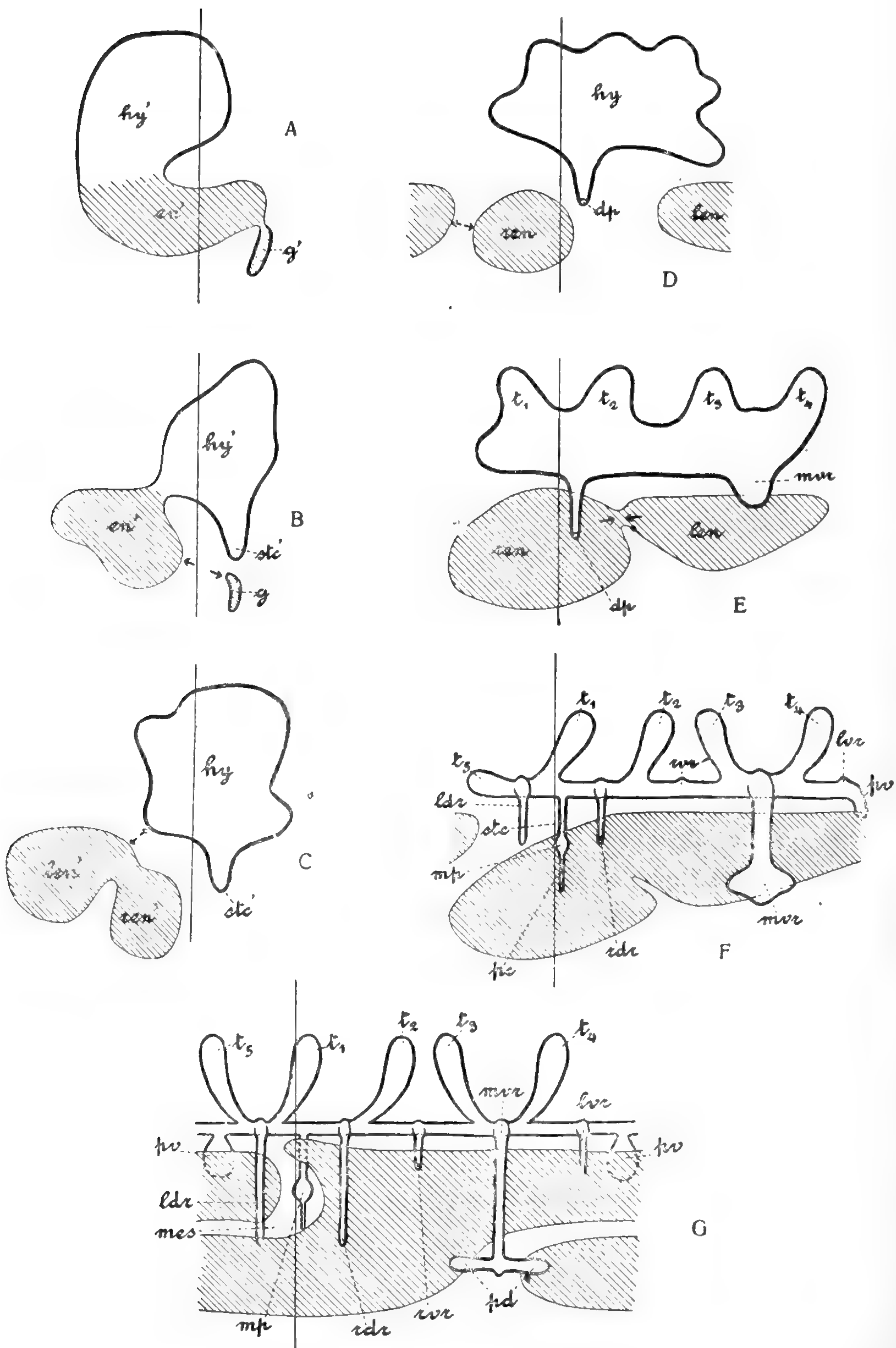
The right free end of the rudimentary ring-canal, on reaching the midventral line, bends posteriorly (Textfig. E, *mvr*). In this stage four of the primary tentacles are well distinguishable, lying in the middorsal (t_1), right dorsal (t_2), right ventral (t_3) and left ventral interradius (t_4) respectively. The fifth tentacle, corresponding to the left dorsal interradius, appears later (Textfig. F, t_5), so that a four-tentacled stage is distinctly present.

The right enterocœle, rapidly growing in size, now extends on to the right side across the middorsal line, and at last its right margin comes in contact on the *right* side of the gut with the right margin of the left enterocœle, which has been growing in the meanwhile into the right half of the body across the midventral line (Textfig. E, *ren*, *len*). The line of contact runs obliquely from anterodorsal to posteroventral. The intervening septum then disappears but leaves for a time an oblique incision at either end of the line.

The other ends of the two enterocœles stand opposed to each other on the left dorsal side, separated by an oblique partition, which begins near the middorsal line anteriorly, and runs obliquely backwards and to the left. This partition indicates the position of the future mesentery, its course roughly coinciding with that seen in adult *Cucumaria* (Textfig. G, and Pl. V, fig. 4, *mes*).

At about this stage appear three, very rarely four, ciliary bands encircling the posterior half of the body at nearly equal intervals (Pl. V, figs. 3 and 4, cb_{1-3}). The preoral lobe and the posterior end of the body are uniformly covered with weaker cilia. The embryo swims about immediately below the surface of the water, usually with its long axis in a vertical position, and rotating around it.

Textfigures.



Explanation on next page.

Explanation of textfigures.

Diagrams showing the transformations of the internal cavities of *Cucumaria echinata*. The cavities encircling the body-axis are shown as flattened out in a plane and as seen from the exterior. The mid-dorsal line is represented by a vertical line, hydrocœle drawn with heavy lines, enterocœle hatched, and gut (shown in figs. A and B) stippled. Arrows indicate either separated parts or the ends just united.

Fig. A.—The coiled archenteron not yet divided. Fig. B.—Gut separated from the hydro-enterocœle, the latter is constricted into two parts. Fig. C.—Hydrocœle separated from enterocœle, the latter again constricted into two parts. Fig. D.—Hydrocœle giving out several lobes, and dorsal pore formed; right and left enterocœle divided. Fig. E.—Four of the primary tentacles and rudiment of midventral radial canal formed, the two enterocœles united on the right side. Fig. F.—All the five tentacles and radial canals and Polian vesicle can be seen; posterior end of midventral radial canal dilated, madreporic vesicle formed in the course of primary stone-canal. Fig. G.—Hydrocœle-ring closed at the left dorsal interradius, enterocœle much extended, leaving an S-shaped partition which gives rise to the mesentery.

dp—dorsal pore, *en'*—enterocœle before separation from hydrocœle, *g*—gut, *g'*—do. before separation from hydro-enterocœle, *hy*—hydrocoele, *hy'*—do. before separation from enterocoele, *ldr*—left dorsal radial canal, *len*—left enterocœle, *len'*—do. before separation from the right one, *lvr*—left ventral radial canal, *mes*—rudimentary mesentery, *mp*—madreporic vesicle, *mvr*—midventral radial canal, *pc*—pore-canal, *pd*—pedicel canal, *pv*—Polian vesicle, *rdr*—right dorsal radial canal, *ren*—right enterocœle, *ren'*—do. before separation from the left one, *rvr*—right ventral radial canal, *stc*—stone-canal, *stc'*—primary stone-canal, t_{1-5}—primary tentacles situated on middorsal, right dorsal, right ventral, left vental and left dorsal interradius respectively.

The posterior end of the midventral raidial canal next dilates transversely (Textfig. F, *mvr*). Corresponding to each lateral end of this cavity the ectoderm forms a pit, the rudiment of the primary pair of pedicels (Pl. V, figs. 3–6, *lp* and *rp*). Either of them may be anterior to the other in position, differing in this respect from the cases observed by LUDWIG[1] and NEWTH.[2] In cross section each pedicel lies at an angle of ca. 40° with respect to the midventral line. The dorsal pore is in many cases slightly shifted to the right side. The two pedicels as well as the dorsal pore are all situated between the second and third ciliary bands. The stomodæum lies in front of the first ciliary band, and in cross section about 30° to the left of the mid-ventral line, and leads into a spacious atrial cavity into which the primary tentacles project. At about this time the four remaining radial canals arise from the hydrocœle-ring as at first anteriorly directed buds, but soon grows outwards and turns posteriorly. Of these, the right dorsal one (Textfig. F, Pl. V, fig. 6, *rdr*) appears first, and the left dorsal one (*ldr*) next. The fifth tentacle (Textfigs. F and G, Pl. V, figs. 4 and 6, t_5) now makes its appearance in the left dorsal inter-radius, and the right ventral radial canal (*rvr*) soon afterwards.

The peculiar relation of the five primary tentacles to the radial canals pointed out by LUDWIG[3] holds true in this case as well (Text-fig. G, Pl. V, fig. 6). But it is not quite clear in the early stages, where the rudiments of the tentacles and the radial canals appear to arise directly from the ring-canal independently of each other (Textfig. E, Pl. V, fig. 5).

The time of closure of the horse-shoe shaped hydrocœle into a ring varies somewhat. It may occur before the appearance of the two lateral ventral radial canals, but more often after the formation of the five radial canals and the Polian vesicle. In the latter case the left

1) H. LUDWIG, Sb. k. pr. Ak. Wiss., 1891.
2) H. G. NEWTH, P. Z. S., 1916.
3) H. LUDWIG, Sb. k. pr. Ak. Wiss., 1891.

ventral radial canal and the Polian vesicle are given out from the end of the *ventral* limb of the still open hydrocœle (Textfig. F, Pl. V, figs. 4 and 6, *lvr* and *pv*). Thus it is clear that the ring closes at the *left dorsal* interradius. The appearance of the Polian vesicle may be still later. It lies at first very near to the ventral radius, but afterwards assumes its final position in the left dorsal interradius.

The gut, whose internal lumen was almost obliterated in the dipleurula stage, has been rapidly growing during the transformation of the larva into the doliolaria. It now extends as far forwards as the hydrocœle-ring, has a distinct lumen, is flattened in the frontal plane, and has a thick entodermal wall. The posterior end of the gut is still solid, and the anal depression is present at the posterior end of the body.

The above changes are gone through very rapidly, and now the doliolaria is completed. The stage lasts till the end of the fourth day of development, or it may be prolonged still further, to the eighth day. While no marked change is visible from the exterior, the internal organs are gradually growing further during the rest of this stage.

At about the middle of the primary stone-canal there is formed a dilated part, the madreporic vesicle (Textfigs. F and G, Pl. V, figs. 4 and 6, *mp*), with its wall thickened on the side of the body-axis. The distal portion of the canal, which is now to be called the pore-canal (*pc*), is very fine, and opens externally by a minute dorsal pore (*dp*). The midventral radial canal becomes finer, and the first pair of pedicels are seen as cylindrical projections above the niveau of the body-surface. The tentacles have extruded through the widened stomodeal orifice, with minute papillæ on the tip, and subsequently giving out some knob-like branches. Of the paired radial canals the dorsal pair elongate faster than the ventral, and reach a little beyond the dorsal pore (Textfig. G, *ldr* and *rdr*). All the radial canals are now accompanied by the radial nerves and epineural canals. The enterocœle now widens and the mesenchyme filling the blastocœle has given rise to the connective tissue and the musculature of the body-wall.

The old doliolaria begins to sink to the bottom hand in hand with the degeneration of the ciliary bands and the formation of the calcareous deposits. The deposits make their first appearance at three places, *i.e.* at the base of each tentacular canal, in the wall of the madreporic vesicle, and in the integument of the posterior part of the body.

Pentactula.

This stage may be reached as early as on the fourth day, and is characterized by the presence of five branched tentacles, which now come to lie at the anterior end of the body owing to the gradual diminution of the preoral lobe. The ciliary bands have totally disappeared. The stomodæum breaks through and communicates with the anterior end of the gut, the latter showing the characteristic coil and the enlargement at the midgut. The anus is now open and is subdorsal in position.

The pore-canal which connects the madreporic body with the exterior is still visible during the early part of this stage, but is totally obliterated in an old pentactula. The tentacles give out one or two blunt branches, and the paired primary pedicels stand very near to the hind end of the body. The calcareous deposits of the integument are represented by delicate perforated plates devoid of the spine and knobs characteristic of the plates of the adult of this species.

The larva creeps on the bottom and grows.

Young.

The stage which follows the pentactula may be called young. Hand in hand with a remarkable increase in body size there appear new tentacles and pedicels, and the rudiments of the respiratory trees, etc. It will be superfluous to give further accounts in the presence of LUDWIG's observations on *Cucumaria planci*. But one point may here be noted about the shape of the tentacles. Of the ten tentacles, the ventral pair belonging to the midventral radial canal assume a quite different shape from the other eight. While the latter branch regularly in the same manner as in the adult,[1] the ventral pair remain for a considerable time destitute of side branches and only with bifurcate tips. In the adult they differ from the remaining eight in the remarkably large size of the first branch as compared with the quite small main stem, giving the appearance of the tentacles being divided at this point into two branches of equal length.

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May 5, 1917.

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1) H. OHSHIMA, Zool. Mag. (Japanese), 1914.

Explanation of Plate V.

(All the figures are semi-diagramma ic representations of reconstructions from sections, magnified about 120).

Fig. 1.—Old gastrula with coiled archenteron. Ectoderm shown in section, archenteron in external view with its lumen indicated by a broken line; mesenchymatous cells in blastocœle not represented. Viewed from right.

Fig. 2.—Do., ventral view.

Fig. 3.—Early doliolaria of the same stage as that shown in Textfig. E. Viewed from left side.

Fig. 4.—Completed doliolaria of the same stage as that shown in Textfig. F. Viewed from left side.

Fig. 5.—Early doliolaria, same as fig. 3. Only the hydrocœle is shown. Posterior view.

Fig. 6.—Completed doliolaria, same as fig. 4. Only the hydrocœle is shown. Posterior view.

blc—blastocœle, *blp*—blastopore, cb_{1-3}—ciliary bands, *dp*—dorsal pore, *en′*, *g′*, *hy′*—enterocœle, gut and hydrocœle not yet separated from each other, *ldr*—left dorsal radial canal, *len*—left enterocœle, *len′*—do. before separation from the right one, *lp*—left primary pedicel, *lpc*—left pedicel canal, *lvr*—left ventral radial canal, *mes*—rudimentary mesentery, *mp*—madreporic vesicle, *mvr*—midventral radial canal, *pr*—pore-canal, *prl*—preoral lobe, *pv*—Polian vesicle, *rc*—open ring-canal, *rdr*—right dorsal radial canal, *ren*—right enterocœle, *ren′*—do. before separation from the left one, *rp*—right primary pedicel, *rpc*—right pedicel canal, *rvr*—right ventral radial canal, *stc*—stone-canal, *stc′*—primary stone-canal, *stm*—stomodæum, *stm′*—ectodermal thickening for the stomodæum, t_{1-5}—primary tentacles situated in middorsal, right dorsal, right ventral, left ventral and left dorsal interradius respectively.

A Centipede with an Abnormal Antenna.

By

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Among the collection of myriapods in my possession, there exists an interesting specimen of the centipede, *Otocryptops rubiginosus* Koch, in which the left antenna is in anomalous development as shown in the camera drawing reproduced in this paper. No abnormality exists in other parts of the body. The specimen was collected on April 24, 1916, in my garden in Tokyo. It is dark yellowish brown in general color and of a medium size, measuring 35 mm. in length of body.

Normally developed antenna of this species is setaceus and pubescent; it is of a similar color as, though somewhat lighter than, the body. It consists of seventeen segments or annulets, of which the one at base is the broadest, while the rest grow successively narrower towards the distal end. The intersegmental ring-grooves in relation to the eight proximal annulets are not so markedly pronounced as they are in the more distal parts of antenna. The last four or five annulets are catogenous in their way of being joined together.

Now in the specimen under consideration, the right antenna exhibits quite normal development, while the left is composed of only four segments. This is similarly colored as the other normal antenna, and both are equally pubescent. The first annulet in the abnormal antenna takes a nearly normal shape, but is decidedly larger than the corresponding annulet of the right antenna. Of the remaining three annulets, which are all quite abnormal, the second is a little narrower but much longer than the first. It is almost as long as the second and third annulets of the right antenna taken together. Unlike a normal annulet, it is somewhat narrowed in the middle and swollen at both ends, and is slightly bent mesially in the distal parts. The third annulet is somewhat flattened and is about as long as the fourth, fifth and sixth annulets of the right antenna taken together. Its proximal, somewhat enlarged end is bent mesially; the distal parts are clavate. Due to the curvature of this and the preceeding annulet, the entire antenna takes a direction bent to the right. The last annulet is the largest, being as long as the five successive annulets from the seventh of the right antenna taken together. It is somewhat flattened like the preceeding one, but shows no enlargement at the proximal end. There can be no doubt of that being the last segment, since there exists no trace of injury at the extreme tip.

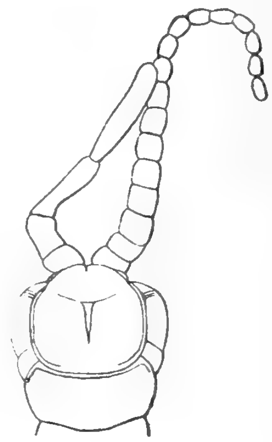


Fig 1.

Among the papers regarding structural anomalies of myriapods, we find a number of cases of polymery of the legs, such as those described by SILVESTRI (1897), BRÖLMANN (1884), and LÉGER and DUBOSQ (1903). A case of abnormality of the gonopod was described by BRÖLMANN (1916). As to abnormality of antenna in the group, the specimen here noted seems to be the first case put on record.

It is difficult to decide in the specimen whether the abnormality is due to regeneration or is congenital. It is true that in the myriapods homomorphosis is commonly met with, not only in the legs, but also in the anal appendages. NEWPORTS observed the *same* phenomenon in his experiments with the antennæ of *Julus*. However, I am inclined to think that the case described above is not one of regeneration, and that on the ground that the first annulet or the basal joint of the abnormal antenna is larger than the corresponding annulet of the other normal one. I should think that, were the antenna in question a regenerated one, the basal annulet should be smaller than, or at most about as large as, the same annulet in the normally developed state. The question can probably be definitely settled after more experimental data than we have at present regarding the regeneration of the antenna shall have become available.

Jan. 16, 1918.

Ein neuer Fall von der Ausstossung der Eingeweide bei den Ascidien.

Von

Dr. Asajiro Oka, *Tokio.*

Mit 1 Figur.

In 1885 beschrieb C. Ph. Sluiter in seinem Bericht "Ueber die einfachen Ascidien von der Insel Billiton" (Natuurk. Tijdschr. Nederl. Ind. D. XLV) eine neue Styelide, bei welcher der Kiemensack wie auch der Darm vollständig verschwunden war. Da er diese Besonderheit als einen normalen, der Form stets zukommenden Charakter auffasste, begründete er darauf eine neue Gattung und benannte die Art *Styeloides abranchiata* n. g. n. sp. Später, in 1897, entdeckte A. Willey an der Küste von Neu-Guinea eine zweite Art—ebenfalls eine Styelide—welche in ähnlicher Weise des ganzen Darmes und des Kiemensackes entbehrte; er gab ihr den Namen *Styeloides eviscerans* n. sp. und beschrieb sie in seinen "Letters from New Guinea on Nautilus and some other organisms" (Quart. Journ. Micr. Sci., n. ser. Vol. XXXIX). Seine Beobachtung ist insofern von besonderm Interesse, als er den ganzen Vorgang der Ausstossung der Eingeweide bei lebenden Tieren verfolgen konnte. Er stellte nämlich fest, dass diese, auch wenn sie in frischem, reinem Seewasser gehalten sind, unter lebhaften Kontraktionen der Leibesmuskulatur, zuerst den Darm und dann die Kieme durch die Egestionsöffnung hervorstülpen und abstossen, ohne daraufhin sofort zu sterben. Soviel ich übersehen kann, liegt seitdem keine weitere Mitteilung über Ascidien vor, die ohne Kieme und Darm angetroffen worden sind.

Unter dem Tunikatenmaterial, welches in 1906 durch den amerikanischen Fischerei-Dampfer "Albatross" im Nordwestpazifik gesammelt wurde, findet sich nun, neben einer Anzahl ganz normaler Individuen, ein Exemplar von *Styela clavata* Pallas, welches den ganzen Darmkanal und den grössten Teil des Kiemensacks verloren hat. Der Befund scheint mir interessant genug, um aufgezeichnet zu werden, zumal es sich hier um eine echt arktische Form handelt, im Gegensatz zu den beiden bereits bekannten Fällen, wo die Tiere unweit vom Aequator erbeutet wurden. Im folgenden erlaube ich mir eine kurze Beschreibung dieses merkwürdigen Exemplares zu geben.

Aeusseres. Das Stück stimmt in Grösse und Gestalt so vollkommen mit den normalen Exemplaren derselben Species überein, dass es ganz unmöglich ist, dasselbe nach äusseren Merkmalen herauszufinden. Die länglich ovoide Körperform, die quer und längs gerunzelte Oberfläche, die rötlich gelbliche Farbe, die an den Siphonen etwas dunkler ist, auch die kontrahierten, flach kegelförmigen Siphonen mit festgeschlossenen Öffnungen—alles das findet man bei diesem genau so wie bei jedem andern. Die Länge des Körpers beträgt 30 mm, der Querdurchmesser an der dicksten Stelle 16 mm, die Länge des Stiels 58 mm. Das Tier ist zusammen mit einem andern Exemplar von gleicher Grösse auf einer Hydrozoenkolonie angewachsen.

Tier ohne Testa. Wenn man den Innenkörper aus der Testahülle herauspräpariert, was sich bei in Formalin konservierten Tieren ganz leicht ausführen lässt, so springt die Eigentümlichkeit dieses Stückes sofort ins Auge. Das Tier erscheint jetzt wie eine mit Wasser gefüllte, dünnhäutige Blase, die nichts zu enthalten scheint als die charakteristisch gestalteten Gonade. Da diese Art sonst einen verhältnismässig sehr grossen Verdauungskanal besitzt, der einen beträchtlichen Teil des Innenraums einnimmt und den ganzen Körper undurchsichtig erscheinen lässt, so ist der Unterschied recht erheblich zu nennen. Der Innenraum ist tatsächlich nur mit der Konservierungsflüssichkeit erfüllt, so dass die Blase sofort zusammenfällt, wenn man sie aus dem flüssigen

Medium herausnimmt und irgend einen Teil der Wand aufschneidet. Die Tunica ist wie gewöhnlich sehr dünn, durchscheinend, und weist nur schwach entwickelte Muskulatur auf; an ihrer Innenfläche befindet sich eine Anzahl winziger, gleichmässig zerstreuter Endokarpen.

Die *Tentakel* sind wie gewöhnlich in zwei Kreisen angeordnet; im Ganzen zählt man ca. 45. Sie scheinen alle in vollkommen gesundem Zustande gewesen zu sein, da keine Andeutung auf etwa eintretende Degeneration wahrzunehmen ist.

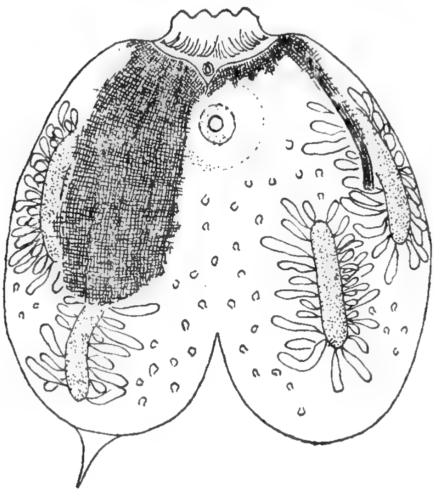
Das *Flimmerorgan* hat die Gestalt eines einfachen Hufeisens, dessen beide Enden sich nur berühren, aber nicht einrollen. Die Öffnung ist vorwärts und wenig nach rechts gewandt. In dieser Beziehung scheint die Art einigermassen variabel zu sein, indem die Öffnung auch unter normalen Individuen verschieden gerichtet ist.

Die *Dorsalfalte* ist gänzlich verschwunden. Dagegen ist der peripharyngeale Flimmerbogen wohl erhalten bis zu dem Punkte, wo die beiderseitigen Schenkel sich vereinigen, um in die Dorsalfalte überzugehen.

Der *Kiemensack* ist zum grössten Teil verloren gegangen. An der linken Seit, wo gewöhnlich der Darmkanal mit ihm zusammenhängt, ist er beinahe vollständig abgerissen, indem nur ein schmaler Saum an dem Flimmerbogen erhalten geblieben ist. Rechts dagegen beobachtet man noch ein grösseres Bruchstück des Kiemensacks mit den charakteristischen niedrigen Falten und dicht beisammen gestellten inneren Längsgefässen. In Flächengrösse stellt dieser Rest ungefähr ein Drittel der rechten Kiemenhälfte dar. Der Rand ist überall unregelmässig abgebrochen, wie mit Gewalt zerrissen. Weder die gröberen Längs- und Quergefässe noch die feineren interstigmatischen Gefässe lassen Rückbildungszeichen nachweisen. Vom Endostyl hat sich nur die distale Hälfte als ein noch mit dem Flimmerbogen zusammenhangendes, sonst aber frei schwebendes Stäbchen erhalten.

Der *Darmkanal* ist vollkommen verschwunden.

Die *Gonade* sind wohl entwickelt und zeigen die gewöhnlichen Verhaltnisse, wie man sie bei der von Huntsman *Katatropa* genannten Gruppe der Gattung *Styela* vorfindet. Die Ovaren, jederseits in Zweizahl vorhanden, sind langgestreckte wurstförmige Gebilde, die unmittelbar der Innenfläche der Leibeswand aufliegen; sie ragen ziemlich stark nach innen vor und erscheinen wie mit Eizellen prall gefüllt. Die zahlreichen, ebenfalls wurstförmigen, aber viel kleineren Hoden umgeben die Ovarien, ohne aber mit ihnen in Zusammenhang zu stehen; sie hangen nach innen frei, indem sie nur mit einem Ende befestigt sind (In der nebenstehenden Figur sind eine Anzahl Hoden weggelassen, um die Ovarien deutlicher zu zeigen). Sämtliche Hoden erschienen wie vollkommen reif. Offenbar hat der gewaltsame Umstürz der übrigen Eingeweide keinen merkbaren Einfluss auf die Geschlechtsdrüsen geübt.



Styela clavata. Von der Ventralseite geöffnet. × 2.

Fundort. "Albatross" Station 4777 (52° 11′ N, 179° 47′ Ö); Tiefe 52 Faden. 5. VI. 1906.

Was aus solchen darm- und kiemenlosen Tieren werden, ob sie bald zu Grunde gehen, oder ob sie weiter leben und die fehlenden Organe regenerieren, darüber lässt sich natürlich nichts Bestimmtes sagen. Dazu ist eine direkte Beobachtung nötig. Berücksichtigt man jedoch, in wie hohem Grade die Ascidien im allgeminen befähigt sind, verlorene Körperteile wieder herzustellen, so würde man die Annahme nicht abweisen können, dass die Tiere nicht sofort sterben, sondern sich zu normal organisierten Individuen regenerieren. Ob dabei der zurückgeblieben Bruchteil der Kieme ohne Weiteres als Respirationsorgan zu funktionieren fortsetzt, oder ob er nachträglich hcua abgestossen wird, muss für den Augenblick unerledigt bleiben. Wenn der Darm und die Kieme in solcher Weise von Zeit zu Zeit sich erneuerten, leuchtet sich von selbst ein, dass es ganz unstatthaft ist, beim Systematik der Ascidien—mindestens der Styeliden—der Grösse dieser Organe den Wert eines spezifischen Charakters beizumessen, denn eine erst angelegter Darmkanal resp. Kiemensack muss unbedingt viel kleiner sein, als ein ausgebildeter. Eine Art, wie *Ascidia mikrenterica* Sluiter, die sich hauptsächlich durch die ausserordentliche Kleinheit des Darmkanals auszeichnet, dürfte wohl identisch sein mit einer andern Form, die normal mit einem Verdauungsapparat von gewöhnlicher Grösse ausgestattet ist. Ebenso verhält es sich mit dem Kiemensack, dessen Fehlen keineswegs als ein Art- oder gar Gattungsmerkmal aufgefasst werden darf, wie es früher irrtümlicher Weise geschehen ist.

Bemerkenswert ist auch, dass alle Ascidienarten, die bisher ohne Kieme und Darm gefunden worden sind, ohne Ausnahme der Familie der Styelidæ angehören, einer Familie, die nach neuerer Auffassung sowhl einfache wie koloniebildende Formen in sich einschliesst.

Tokio, 20. III. 1918.

Megalodicopia hians n. g. n. sp., eine sehr merkwürdige Ascidie aus dem japanischen Meere.

Von

Dr. Asajiro Oka, *Tokio.*

Mit 2 Figuren.

Die hier kurz beschriebene, sehr eigentümliche Ascidie liegt mir leider nur in einem einzigen, etwas beschädigten Exemplar vor, welches in 1906 durch den amerikanischen Fischerei-Dampfer "Albatross" im japanischen Meere nördlich von der Insel Sado aus einer Tiefe von 200 Faden erbeutet wurde. Dieselbe weicht sowohl in der äusseren Gestalt wie auch in der inneren Organisation so erheblich von allen bisher bekannten Formen ab, dass eine besondere Gattung dafür aufgestellt werden muss. Für letztere schlage ich, auf gewisse Ähnlichkeit zu der aberranten Tiefseegattung *Dicopia* hinweisend, den Namen *Megalodicopia* vor und benenne die Art *M. hians.* Eine ausführliche Beschreibung mit nötigen Abbildungen hoffe ich bald an einer andern Stelle veröffentlichen zu können.

Megalodicopia hians n. g. n. sp.

Aeussere Kennzeichen. Der Körper besteht aus einem rundlich ovoiden Rumpf, der durch einen kurzen, stielartig verjüngten Teil auf der Unterlage befestigt ist. Die grösste Dicke liegt in der distalen Hälfte des Rumpfes, so dass das Tier einer Birne nicht unähnlich aussieht. Der Stiel, der sich gegen den Rumpf nicht scharf abgrenzen lässt, ist ungefähr halb so lang wie dieser und ebenso dick wie lang;

am untern Ende ist er zum Zwecke des Festhaftens etwas scheibenartig verbreitert. Was bei der äusserlichen Betrachtung des Tieres zunächst auffällt, ist die ausserordentliche Grösse der Branchialöffnung, die in Gestalt einer riesigen Querspalte die ganze Breite der Ventralseite (d. h. Vorderseite, wenn man sich das Tier als stehend vorstellt) des Rumpfes einnimmt. Eine undeutlich begrenzte, breite, rahmenartig erscheinende Partie der Testa, die ohne Zweifel den Ingestionssipho in stark modifiziertem Zustande repräsentiert, umfasst die Öffnung allseitig. Der Atrialsipho befindet sich am Scheitelpol des Rumpfes gerade gegenüber der Ansatzstelle des Stieles; er ist sehr kurz, abgeflacht, deutlichsechs lappig. Die Körperöberflache ist im allgemeinen glatt, doch beobachtet man überall unregelmässig verlaufende seichte Furchen oder Runzelungen, die in der Umgebung der Branchialöffnung, wo sie auch zahlreicher vorkommen, mehr senkrecht zum freien Rande derselben gerichtet sind. Am Stiel verlaufen die Runzeln meist horizontal. Abgesehen von wenigen feinen Schlammpartikeln, die in den Furchen stecken, ist die Oberfläche vollkommen nackt. Die Farbe des in Formalin konservierten Exemplars ist blass gelblich grau, durchscheinend.

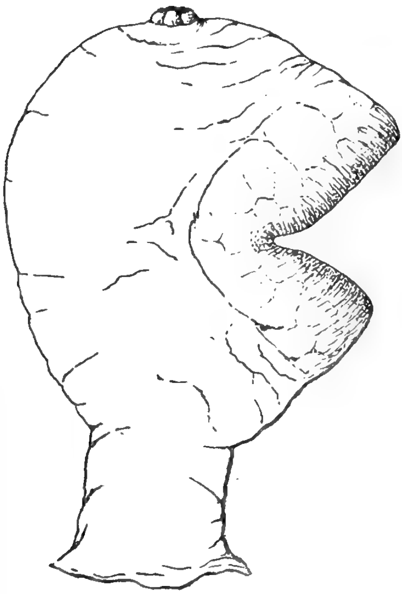
Das Tier hat folgende Dimensionen: Länge (Höhe) des ganzen Körpers 107 mm wovon 82 mm auf den Rumpf entfallen; dorsoventraler Durchmesser an der dicksten Körperregion 70 mm; Dicke des Stieles 27 mm. Die Grösse der Branchialöffnung, dem Rande der oberen Lippe entlang gemessen, beträgt 86 mm.

Die *Testa* bekleidet nicht nur die ganze Aussenseite des Körpers sondern auch die Innenfläche der geräumigen Mundhöhle. Sie ist überall ziemlich dünn, nicht mehr als 1 mm., farblos und vollkommen durchsichtig. Ihre Konsistenz ist weich gallertig, besonders weich aber innerhalb der Branchialöffnung, wo sie nach innen umgeschlagen ist. Hier unterscheidet man zwei Zonen, eine distale, die unmittelbar in die äussere, die Branchialöffnung umfassende Testapartie übergeht, und eine proximale, die sich dahinter bis an den Tentakelkranz erstreckt.

Erstere ist sehr dünn, fast wie Papier, und zeigt verschiedene Breite je nacn dem Abstand von der Mittellinie, wo sie am breitesten (32 mm.) ist, während die letztere bedeutend dicker ist (wohl infolge der Aufquellung durch Formalin) und überall die gleiche Breite (ca. 12 mm.) aufweist. Beide sind glasig durchsichtig und haben vollkommen glatte Oberfläche.

Beim Fangen des Tieres hat sich die Testa der linken Seite zusammen mit der entsprechenden Partie der Tunica vom Mundwinkel ab für eine Strecke zerrissen, und damit wurde die ursprunglich nach innen gekehrte Partie der Testa von der unterliegenden Muskelschicht losgelöst und in eine ganz unatürliche Lage versetzt, ein Umstand, der anfangs die Erkenntnis der wirklichen Verhältnisse äusserst erschwerte. In der nebenstehenden Figur habe ich das Tier so dargestellt, wie es aussieht, nachdem die Testapartien in die richtige Stellung gebracht worden sind.

Fig. 1.



Megalodicopia hians. Von der rechten Seite gesehen. × $\frac{2}{3}$.

Die *Tunica* ist im allgemeinen zart und dünn, weist aber an gewissen Stellen mächtig entwickelte Muskulatur auf. Es finden sich nämlich in der Umgebung der Branchialöffnung zwei Systeme von wohl ausgebildeten Muskelbändern, von denen das eine dem Lippenrande parallel, das andre senkrecht zu diesem verläuft, so dass sie zusammen ein regelmässiges rechtwinkliges Gitterwerk bilden. Diejenigen Ringfasern, die unmittelbar dem Lippenrande anliegen, sind bedeutend stärker als die übrigen. Dazu kommen jederseits noch vier übermassig dicke Muskelbänder, die halbmondförmig den Mundwinkel von aussen umklammern. Der Atrialsipho zeigt die gewöhnlichen Längs- und Ringmuskelfasern, von denen die ersteren nur schwach entwickelt sind. Im Stiel findet man ein Bündel mächtig entwickelter Muskelfasern, die ausschliesslich in der Längsrichtung verlaufen. An der Oberfläche des eigentlichen Rumpfes, wo die Eingeweide enthalten sind, habe ich nur ganz feime, spärlich zerstreute Muskelfasern wahrnehmen können. Die stark spezialisierte Ausbildungsweise der Muskulatur lässt vermuten, dass unser Tier im Leben befähigt war, die Grösse der Branchialöffnung sowie die Länge des Stieles beliebig zu verändern, wie es kaum eine andre Ascidie zu tun imstande ist. Aller Wahrscheinlichkeit nach konnte die riesige Mundspalte zu einer Trichter- oder Trompetenform erweitert und dann wieder vollständig geschlossen werden, um die Nahrung zu erbeuten. Ebenso konnte der Stiel, nach den Querrunzeln an seiner Oberfläche zu urteilen, um ein Beträchtliches verlängert werden.

Die *Tentakel* sind im Vergleich zur Körpergrösse sehr klein, aber sehr zahlreich. Sie erreichen nicht einmal 0.5 mm. Länge und dürfen vielleicht als rudimentäre, nicht funktionierende Organe betrachtet werden. Sie sind einfach, abgeflacht, und vielfach etwas breiter am freien Ende als an der Basis. Ihre Zahl konnte nicht genau festgestellt werden, da der Tentakelkranz am rechten Mundwinkel einen Riss aufweist; möglicherweise beträgt sie über 200. Eine schmale, dünne Membran vereinigt die basalen Teile der Tentakel zu einem einheitlichen Saum, der die proximale Grenze der nach innen umgeschlagenen Testapartie markiert.

Der *Dorsaltuberkel* ragt in Form eines halbkugeligen Buckels in einiger Entfernung vom Tentakelkranz nach innen vor. Die darauf befindliche Flimmergrube ist S-förmig, in der Mitte etwas unregelmässig geschlängert. Der peripharyngeale Flimmerbogen, der den Vorderteil des Kiemendarms allseitig umfasst, erstreckt sich bis an die Seitenflächen des Tuberkels, wo die beiden Schenkel des Bogens wie abgewischt verschwinden, ohn sich in der Mittellinie zu vereinigen.

Das *Nervenganglion* lässt sich schon von aussen als eine dreieckige blass gelbliche Flecke an der Basis des Atrialsiphos deutlich erkennen. Die von den Ecken desselben ausstrahlendeu Nervenstämme sind auch sehr gut sichtbar. Die Neuraldrüse ist ziemlich gross, weisslich, rundlich, und liegt gerade unterhalb des Ganglions.

Die *Dorsalfalte* ist vollkommen reduziert. An der Stelle, wo sie sonst zu finden ist, zeigt der Kiemensack eine ganz schmale undurchbohrte Zone, die sich jedoch gar nicht über die allgemeine Ebene der Innenfläche erhebt.

Der *Kiemensack* hat die Gestalt eines niedrigen, schwach aufgetriebenen Trichters. Seine Wand ist ziemlich dick (fast 1 mm.) und fest, und besteht aus einem ganz unregelmässigen Netzwerk von verschieden dicken Balken, unter denen weder Länge- noch Quergefässe zu unterscheiden sind (Fig. 2). Die Balken sind nicht in einer einfachen Lage geordnet, sondern liegen vielfach übereinander; diejenigen, die an der Aussenfläche liegen, zeigen durchschnittlich etwas grössere Dicke wie die nach innen gelagerten. Die zwischen diesen befindlichen Löcher sind keine echten Stigmata, denn sie entbehren der eigentlichen Flimmerzellen, die solche beständig auskleiden. Die Innenfläche des Kiemensacks als Ganzes ist vollkommen eben, indem keine Falten resp. Undulationen zur Ausbildung gelangen.

Fig. 2.

Stück des Kiemensacks, × 30.

Der *Endostyl* ist wohl entwickelt. Er verläuft die ganze Länge des Kiemensacks hindurch und eindigt in der Nähe der Oesophagealöffnung.

Der *Darmkanal* bildet eine einfache Schlinge, die grösstenteils horizontal liegt, indem sie den unteren Teil der zentral gelagerten Gonade umgürtelt. Die beiden Organe sind zu einem Nukleus zusammengeballt, an dem es schwer fällt, die einzelnen Teile auseinanderzuwickeln. Eine besondere Verdauungsdrüse kommt nicht vor. Die Analöffnung befindet sich auf einer niedrigen Papille an der dorsalen Oberfläche der Eingeweidemasse; sie ist glattrandig mit Andeutung einer zweiteiligen Lappenbildung.

Die *Geschlechtsorgane* liegen im Zeutrum des Rumpfes und bilden, wie gesagt, zusammen mit dem mittleren Teil des Darmkanals eine kompakte kugelförmige Masse. Man unterscheidet an ihr eine grössere rötlich gelbliche Partie, das Ovarium, und einen viel kleineren weisslich opaken Abschnitt, die Hodenfollikeln. Beide sind aus ganz kleinen, zu polygonalen Feldern gruppierten Läppchen zusammengesetzt und sehen, wenn man die Farbe ausser Acht lässt, ziemlich ähnlich aus. Der Ovidukt, der übrigens äusserst kurz ist, öffnet sich auf einer kleinen Papille in der Nähe des Afters. Das Vas deferens verläuft an der Innenseite des Ovariums und endet in der unmittelbaren Nähe der Ovarialöffnung in Form einer feinen, frei nach oben vorragenden Röhre.

Fundort. "Albatross" Station 4812 (38° 35′ N, 138° 41′ Ö); Tiefe 200 Faden. 18. VII. 1906.

Anmerkung. Wie aus der obigen kurzen Beschreibung hervorgeht, zeigt unser Tier merkwürdiger Weise gewisse Ähnlichkeit zu den beiden höchst aberranten, unter sich aber ganz verschiedenen Tiefseegattungen *Dicopia* Sluiter und *Hexacrobylus* Sluiter, die ich in einer früheren Mitteilung neben einander geschildert habe ("Zur Kenntnis der zwei aberranten Ascidiengattungen *Dicopia* Sluit. und *Hexacrobylus* Sluit." Zool. Anz. Bd. XLIII. 1913). Die Ähnlichkeit zu *Hexacrobylus* ist jedoch nur eine äusserliche, indem sie auf die Lage und Grösse der beiden Körperöffnungen beschrankt ist. Wenn man genauer untersucht, findet man auch in den äusseren Merkmalen sehr tiefgreifende Unterschiede. Bei *Hexacrobylus* ist die Branchialöffnung mit sechs gefiederten, an die

Tentakel der Alcyoniden erinnernden Fangarmen ausgestattet, deren Analoga man vergebens bei unserm Tier sucht. Auch der Atrialsipho ist verschieden gebaut, indem er bei *Megalodicopia* sechs deutliche Lappen trägt, was bei der Vergleichsform keineswegs der Fall ist. In der inneren Organisation weichen die Tiere so wesentlich von einander ab, dass von einer näheren Verwandtschaft derselben keine Rede sein kann. Trägt doch *Hexacrobylus* unverkennbare Zeichen seiner Affinität zu den Molguliden, während unsre Form den Ascidiiden am nächsten zu kommen scheint. Die regelmässige Anordnung der mächtig entwickelten Längs- und Quermuskelbänder im Umkreis der Branchialöffnung, die bei beiden Formen so überraschend ähnlich ist, steht ohne Zweifel mit der ungewöhnlichen Grösse der Mundspalte im Zusammenhang, und muss daher als eine durch die Ähnlichkeit der Lebensweise bedingte Konvergenzerscheinung aufgefasst werden.

Mit der Gattung *Dicopia*, der es äusserlich weniger ähnlich ist als dem *Hexacrobylus*, scheint unser Tier enger verbunden zu sein. Es sind vor allem die Geschlechtsorgane, die für eine nahe Verwandtschaft beider Formen sprechen. Die charakteristische zentrale Lage der Gonade, die vom Darmkanal umschlossen werden, sowie der Bau der Geschlechtsdrüsen selbst stimmt bei beiden Gattungen ziemlich gut uberein, so dass es gerechtfertigt erscheint, dieselben als phylogenetisch nahe stehend zu betrachten. Auch an andern Organsystemen habe ich nichts gefunden, was diese Annahme widersprechen würde. Ich stelle demgemäss unser neues Genus zu der Familie der Ascidiidæ, wie ich es seinerzeit mit *Dicopia* getan habe. Diejenigen Charaktere, welche diese Gattungen von allen andern Formen weit entfernen, lassen sich als an besondere Lebensweise angepasste Modifikationen erklären und können daher, wenn auch ganz eigenartig, nicht von grossem systematischen Wert sein.

Die einzige andre Ascidiengattung, mit welcher *Megalodicopia* einigermassen nahe verwandt sein dürfte, ist *Benthascidia* Ritter, bekannt in einer Spezies *B. michælseni* aus der Küste von Kalifornien.

Da die beiden von Ritter untersuchten Exemplare stark beschädigt waren und zahlreiche systematisch wichtige Organe, wie Dorsaltuberkel, Dorsalfalte, Endostyl, sogar der Atrialsipho selbst, nicht aufgefunden werden konnten, so ist eingehender Vergleich beider Gattungen nicht möglich. Wegen der Ungunst des Materials konnte nicht einmal die äussere Gestalt des Tieres festgestellt werden. Diese fragliche Gattung stimmt mit der hier geschilderten Form in folgenden Punkten überein: "pedunculate,....the branchial orifice very large and not closable, tentacles simple, very numerous,....branchial membrane without true stigmata." Die auffälligste Übereinstimmung findet man in der Gestalt der Tentakel, die "simple but irregular in shape, many larger at the free end somewhat flattened" sind. Andrerseits weichen die Tiere in einer Reihe äusserer und innerer Merkmale entschieden ab; so hat *Benthascidia* einen 220 mm. langen Stiel, dessen unteres Ende in einen Büschel Wurzelfaden aufgelöst ist, es kommen keine Siphonen und keine Lappenbildung an den Körperöffnungen zur Ausbildung, die Testa zeigt stellenweise verschieden grosse kreisförmige Verdickungen, der Kiemensack soll äusserst zart und schwer aufzufinden sein, und innerhalb des Kiemensacks zwischen den Oesophageal und Analöffnung findet sich ein Bündel fadenförmiger Organe von fraglicher Natur, die Ritter als dorsale Languette in Anspruch nimmt. Wie gesagt, lässt sich die systematische Stellung dieser merkwürdigen Tiefseeform erst dann eingehender erörtern, wenn besser erhaltenes Material zur Untersuchung gelangt.

Tokio, 20. III. 1918.

On a Collection of Japanese Cheilostomatous Bryozoa. I.

By

Naokatsu Yanagi, *Rigakushi*

and

Yaichirō Okada.

With Plate VI.

As a result of our studies on the Cheilostomatous Bryozoa of Japan, we propose in this paper to report on the Cellulariidæ and the Bicellariidæ. Both the families are well represented in the Japanese waters, altogether some seven genera and twenty-eight species having so far come to our knowledge. Of the latter, ten seem to be new to science. The collection, including the types, is preserved in the Science College, Imperial University of Tokyo.

Cellulariidæ Johnston (pars) 1849.

Key to the genera.

1. Zoarium jointed .... 2.
1. Zoarium not jointed.. 3.
2. Zoœcia not exceeding 10 in number to one internode; vibracula absent........ .... *Menipea.*
2. Zoœcia not exceeding 40 in number to one internode; vibracula present, not covering the dorsal surface of zoœcium........................*Scrupocellaria.*
3. Vibracula present, covering the dorsal surface of zoœcium ....*Caberea.*

Menipea Lamouroux 1812.

Key to the species.

1. Zoœcia usually 3 to an internode; without frontal avicularia .... 2.
1. Zoœcia numerous on internode; with frontal avicularia.................... 3.

2. Scutum not divided .... *M. occidentalis.*
2. Scutum divided .... *M. occidentalis*, var. *catalinensis.**
3. Scutum present .... *M. longispinosa.*
3. Scutum not present .... 4.
4. Zoœcium with a single spine .... *M. sympodia.*
4. Zoœcium with two or more spines .... *M. sympodia*, var. *sagamiensis.*

1. ***Menipea longispinosa***, n. sp.

Pl. VI., fig. 3; textfig. 1.

Zoarium forming a white delicate tuft, 27 mm. in height, dichotomously branching. Internodes consisting of a variable number (4–10) of zoœcia, with distinct joints of a faintly yellowish colour. Zoœcia biserial, alternate, rather loosely connected laterally, attenuated below, convex in front; their aperture elliptical, about one-third as long as zoœcium, with slightly thickened marginal wall. Zoœcium provided with very long and delicate curved spines segmented at base: three of them occur close together on the upper outer angle of the aperture, projecting sideways; a fourth, situated lateral to the lower end of aperture, is obliquely distally directed; a fifth, similarly directed may arise from a somewhat lateral point on

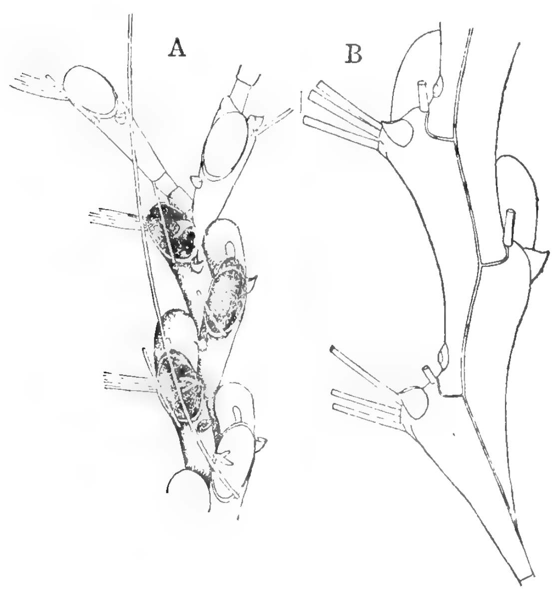


Fig. 1. *Menipea longispinosa*, n. sp.

A. Portion of a branch enlarged, showing oœcium and apertural spines. Frontal view. ×32.

B. Dorsal view of zoœcia, showing root-chambers and the position of dorsal spines. ×57.

the anterior end of zoœcium. The last mentioned spine is limited in its occurrence to the zoœcia which constitute the outer branchlet of a biforked branch. Scutum small, commonly bifid, though not unfrequently trifid. Lateral avicularium with the triangular mandible hooked, sharply pointed at the end; present on each zoœcium at the upper outer angle, just behind the three laterally outstanding spines. Frontal avicularium small, raised, with triangular transversely directed mandible; present on each zoœcium to one side below the aperture. Oœcium prominent, rounded, slightly expanded anteriorly, smoothly surfaced, with a semi-orbicular thin area marked out at the basal margin. Unsegmented rootlets given off from a small projection with elliptical peristome and situated near the inferior end of zoœcium on the dorsal side.

Of this new species, there exist in the collection: a large fragment from Okinosé in the Sagami Sea, depth 312 fms., and a complete zoarium attached on a Brachiopod, from off Ukishima (Prov. Izu ?). The species is characterized by the slender and delicate nature of the parts of colony and especially by the loose arrangement of zoœcia, which latter character seems to indicate relationship with Bicellarian genera.

2. ***Menipea occidentalis*** Trask.

Menipea occidentalis, Trask 1857, Proc. Cal. Acad. Sci., 113, pl. iv, fig. 4.—Robertson 1905, Univ. Calif. Publ. Zool., vol. II, 254, pl vi, figs. 22–25.

Menipea compacta, Hincks 1882, Ann. Mag. Nat. Hist., 5, X, 461.—Hincks 1884, Ann. Mag. Nat. Hist., 5, XIII, 208, pl. ix, fig. 8.

A few large colonies referable to typical *M. occidentalis* are contained in the collection. They were obtained from the shallow water near Misaki, in the Yokohama harbour and at Ôzu in the Ebaraki prefecture.

3. ***Menipea occidentalis***, var. ***catalinensis*** Robertson.

Menipea occidentalis, var. *catalinensis*, Robertson 1905. Univ. Calif. Pub. Zool., vol. II, 255, pl. vii, figs. 26, 27.

This form is quite common in shallow water near Hakodate, attached on stones and shells. Compared with the description and figures given by Robertson of var. *catalinensis*, the specimens before us differ somewhat in the less number of zoœcia in internodes. On main and secondary branches each internode is made up of three zoœcia, and on tertiary branches it consists of five or seven zoœcia, while in the Catalina form, all the internodes should contain from five to six zoœcia. In main features of the scutum the Hakodate specimens seem to agree entirely with those from Catalina.

4. *Menipea sympodia*, n. sp.

Pl. VI., fig. 1; textfig. 2.

Zoarium delicate, forming a tufted growth, 40–60 mm. high, greyish white, attached to substratum by numerous root-fibres. These are given off from either the lateral walls or the dorsal wall of the branches, in both cases extending downwards along the dorsal surface; they are closely adherent and form a bundle. Branches slender, somewhat depressed, forming pinnate ramifications; the mode of branching regularly sympodial; each pinnate ramification consisting, as it appears, of an axis from which secondary branches arise in alternate disposition, these bearing tertiary branches in a like manner. Joints distinct, yellowish in colour, arising from distinct chambers. Zoœcia elongate, broad, slightly truncated above, attenuated below; their aperture suboval, occupying usually less than quarter length of zoœcium, with thin margin, armed with a stout long (about 2 mm.) spine on the upper inner angle and frequently also on the outer. Scutum is unknown, probably absent altogether. Lateral avicularia generally present and occasionally absent, placed at the upper outer angle of zoœcium, widened above, with a hooked triangular mandible directed transversely. Frontal avicularia unusually elongate, trumpet-shaped, placed immediately below the aperture, projecting upwards and forewards over and reaching beyond the middle of this; beak pointed, with triangular mandible. Oœcia situated usually on certain internode of terminal branches, large, semi-orbicular, rounded above, the lower margin projecting like a curved penthouse; surface smooth with faintly radiate lines and with a thin-walled area marked out from the base. Rootlets given off by certain zoœcia from lateral wall near base.

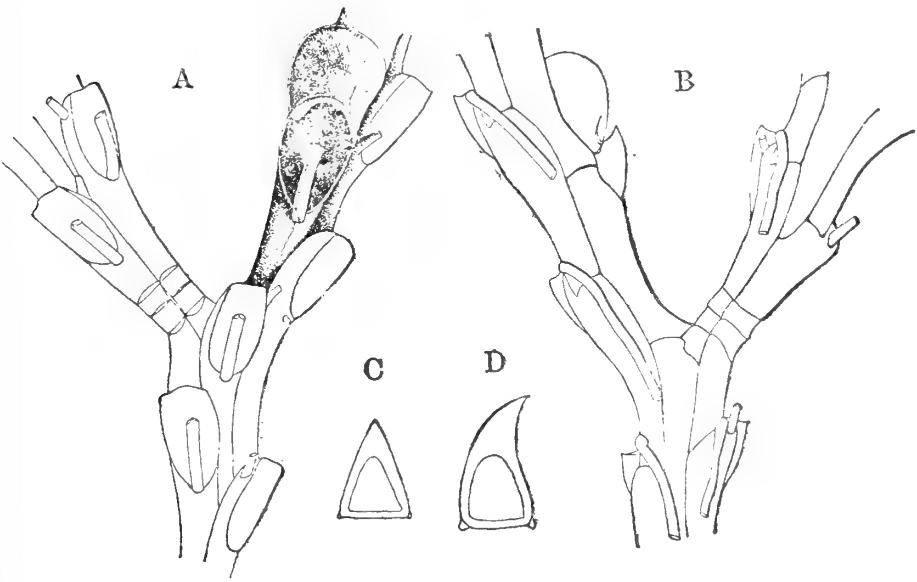


Fig. 2. *Menipea sympodia*, n. sp.

A. Portion of a branch at the bifurcation, showing peculiar frontal avicularia and an oœcium. Frontal view. × 32.
B. Same to show lateral avicularia and the position of projecting rootlets. Dorsal view. × 32.
C. Mandible of frontal avicularium. × 160.
D. Mandible of lateral avicularium. × 160.

This new species is represented in the collection by a large colony, obtained in the Sagami Bay, off the coast of Izu, from a depth of about 250 fms. Remarkable are the delicate structure of the colony, the sympodial arrangement of the branches, and the peculiar trumpet-shaped frontal avicularia, which characters may serve to easily distinguish the species.

5. ***Menipea sympodia*, var. *sagamiensis*, n. var.**

Pl. VI., fig. 2; textfig. 3.

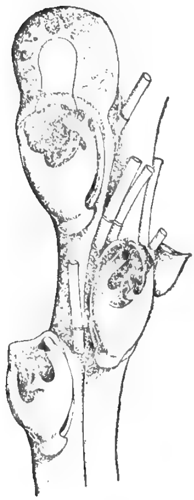


Fig. 3. *Menipea sympodia*, var. *sagamiensis*. Frontal view. × 32.

At Yodomi in the Sagami Bay, from a depth of 321 fms., was dredged a specimen which may be considered to represent a variety of the species just described. In general appearance, it is quite like the typical species, but differs from it in the peculiar shape of frontal avicularia and in the better development of spines. The frontal avicularia are developed usually on every zoœcium and present a complicated shape in that their basal parts are prolonged on both sides into broad horn-like projections, either simple or bifid at tip, extending along the inner apertural border. The avicularium covers up the greater part of the aperture. Scutum unknown. The spines arise from the same place as in the typical form, but are more numerous and more strongly developed.

Scrupocellaria van Beneden 1844.

Key to the species.

1.	Vibracular chamber on all zoœcia	2.
1.	Vibracular chamber not on all zoœcia	4.
2.	With frontal avicularia	3.
2.	Without frontal avicularia	*S. macandrei.*
3.	Zoœcium with five spines	*S. diadema.*
3.	Zoœcium with three spines	*S. scrupea.*
4.	Zoœcial aperture without spines	*S. aviculariæ.*
4.	Zoœcial aperture with spines	*S. scabra.*

6. *Scrupocellaria aviculariæ*, n. sp.

Pl. VI., fig. 4; textfig. 4.

Zoarium erect, dichotomously branching, forming a tufted growth 30–40 mm. in height, glossy white. Internodes stiff, consisting of from 5 to 16 or more zoœcia. Joints bright yellowish. Zoœcia arranged alternately in two series, elongate, widened above, gradually narrowed below; their aperture oval, with thin margin, unarmed, occupying more than half the front. Scutum very large, exceeding the orifice in area, widened and raised above, slightly narrowed below, with irregular vein-like sculpturing on surface. Lateral avicularia small, usually present on every zoœcia, placed at the upper outer angle on the dorsal surface. Frontal avicularia rounded, raised, with short and broad mandibles, present on all zoœcia, placed on the inner apertural margin a little below the middle and at

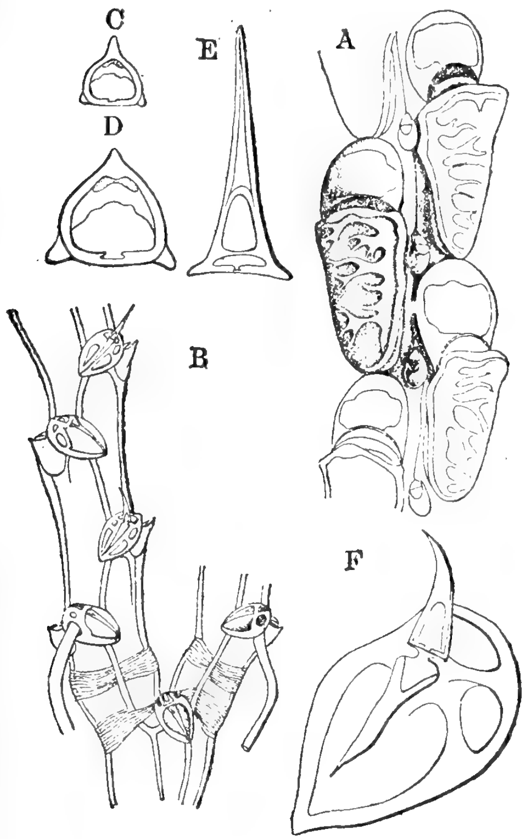


Fig. 4. *Scrupocellaria aviculariæ*, n. sp.

A. Portion of a branch in frontal view, showing oœcia, frontal avicularia and operculum. × 48.
B. Dorsal view of the bifurcating parts of a branch, to show the position of vibracula and the origin of rootlets. × 32.
C. Mandible of frontal avicularium. × 150.
D. Mandible of lateral avicularium. × 150.
E. Vibraculum. × 150.
F. Vibracular chamber. × 120.

the same level as the peduncle of the scutum of adjacent zoœcium. Vibracular chamber wedge-shaped, slightly swollen in the middle and pointed at the distal extremity; placed at the outer lower corner of zoœcium on the dorsal side, stretching obliquely downwards over the back of zoœcium. Vibraculum very short, elongate triangular, not exceeding the cell in length. Oœcia large, prominent, globose, with smooth surface on which a thin and irregularly quadrate area exists at base; expanded and nearly reaching the lower margin of the aperture of the zoœcium situated next above. Rootlets developed only on zoœcia in the lower parts of zoarium and given off from near the base of vibracular chamber.

This new species is based on two large colonies in the collection. Both were obtained from a depth of 78 fms. at Yodomi. The species seems to agree closely with *Scrupocellaria scabra* van Beneden in the general habit of growth and in the prominent features of vibracular appendages, but differs from it in the absence of oral spines and in the larger size of zoœcia.

7. ***Scrupocellaria diadema*** Busk.

Scrupocellaria diadema, Busk 1852, Cat. Brit. Mar. Poly., I, 24, pl. xxviii, figs. 1–3.—Busk 1852, Voy. Ratt., I, 370.—Ortmann 1890, Jap. Bry., 22, pl. i, fig. 4. —Thornely 1905, Rep. Pearl Oyst. Fish., IV, 109.—Thornely 1907, Rec. Ind. Mus. vol. I., 181.

Numerous colonies collected from a depth of 54 fms., off Jôgashima, in the Sagami Sea, are referable to the above species. The margin of zoœcial aperture is usually armed with five slender spines, this number being not variable as in the specimens previously described from other localities. The species resembles *Scrupocellaria varians* H. in many respects, but may be easily distinguished from it by the greater thickness of apertural margin, the more numerous spines and the different position and shape of lateral avicularia.

8. ***Scrupocellaria macandrei*** Busk.

Scrupocellaria macandrei, Busk 1852, Cat. Brit. Mar. Poly, I, 24, pl. xxiv, figs. 1–3.—Busk 1861, Quart. Journ. Mic. Sc., n. s., I, 77.—Busk 1884, Chall. Rep., vol. X, pt. XXX, 23.—Heller 1867, Bry. Adr., 87.—Phillips 1899, Will. Zool. Res., pt. IV, 442.—Calvet 1906, Exp. Scient. Trav. Talism., pt. VIII, 375.—Waters 1913, Proc. Zool. Soc., 477, pl. lxviii, figs. 5, 6.

There exist in the collection numerous colonies which may be identified with the above species. The localities are: off Odawara (120 fms.); off Jôgashima (50–70 fms.); Senkai Bay, Tsushima I. (depth unknown). All the specimens differ from those described by Waters from Zanzibar under the same name, in the larger number of inner oral spines and in the shorter groove of vibraculum. In the specimens on hand, the groove of vibraculum stops short of the median line of zoœcium, while in the Zanzibar specimens it should reach the median line. The inner oral spines situated near the peduncle of scutum always number two, instead of being single.

9. ***Scrupocellaria scabra*** (van Beneden).

Cellaria scabra, van Beneden 1849, Bull. Brux., vol. XVI, I, 73.

Scrupocellaria scabra, Hincks 1880, Hist. Brit. Mar. Poly., 48.—Norman 1868, Quart. Journ. Mic. Sc., n. s., VIII, 214.—Busk 1882, Jour. Linn. Soc., XV, 231.—Hincks 1888, Ann. Mag. Nat. Hist., 6, III, 427.—Bidenkap 1897, Zool. Jahrb., X, 614.—Bidenkap 1900, Fauna Arct., I, 507.—Waters 1900, Journ. Linn. Soc., XXVIII, 54, pl. vii.—Robertson 1900, Proc. Wash. Acad. Sci., II, 318, pl. xix, figs. 3, 4.—Norman 1903, Ann. Mag. Nat. Hist., 7, XI, 579.--Osburn 1912, Proc. Nat. Mus. U.S.A., 43, 277.—Osburn 1912, Bull. Bur. Fish., 1910, XXX, 223, pl. xxi, fig. 20, pl. xxxi, fig. 95.

Numerous colonies which may be identified with the above species are found in the collection. They hail from the shallow water near Hakodate. They are attached to stones and shells.

10. ***Scrupocellaria scrupea*** Busk.

Scrupocellaria scrupea, Busk 1851, Ann. Mag. Nat. Hist., 2, VII, 83.—Busk 1852, Cat. Brit. Mar. Poly., I, 24.—Heller 1867, Bry. Adr., 86.—Norman 1868, Quart. Junrn. Mic. Sci. n. s., VIII, 214.—Hincks 1880, Hist. Brit. Mar. Poly., 50, pl. vii, figs. 11-14.—McCoy 1886, Prod. Zool. Vict., decade XIII, 101, pl. cxxvi, fig. 8.—Waters 1887, Ann. Mag. Nat. Hist, 5, XX, 88.—MacGillivray 1887, Cat. Mar. Poly. Vict., 14.—Ortmann 1890, Japan. Bry., 21, pl. i, fig. 3.—Jullien 1903, Result. Camp. Scient., XXIII, 34, 125.—Thornely 1907, Rec. Ind. Mus., vol. I, 180.

Cellularia scrupea, Alder 1857, Trans. Tyn. Fill. Club., sep. 58.—Waters 1879, Ann. Mag. Nat. Hist., 5. III, 117.

There exist in the collection a few dried fragments of this species. They were all obtained at Ojiya, on the island of Ôshima or Vries Island in the Sagami Sea.

Caberea Lamouroux 1816.

Key to the species.

1. Zoœcia biserial .... 2.
1. Zoœcia multiserial .... 3.
2. Zoœcium without lateral avicularia .... *C. gigantoceras.*
2. Zoœcium with lateral avicularia .... *C. darwinii.*
3. Zoœcial aperture with spines........ 4.
4. Lateral avicularia present .... *C. rudis.*
4. Lateral avicularia not present .... *C. rudis*, var. *minor.*
5. Zoœcial aperture with transverse spines........ *C. climacina.*
5. Zoœcial aperture without transverse spines. .... *C. lata.*

11. ***Caberea climacina*** Ortmann.

Caberea climacina, Ortmann 1890, Jap. Bry., 22, pl. I, fig. 6.

A large well-grown colony, which was obtained at Yodomi (78 fms.) in the Sagami Bay, seems to be referable to Ortmann's *Caberea climacina.* The species closely resembles *Caberea lata* Busk, a species which also occurs in the Sagami Sea. It was pointed out by Ortmann that the former may be distinguished from the latter by the presence of a transverse apertural spine in intermarginal zoœcia and by the total absence of lateral avicularia. We should note that, while the latter negative character is a useful one, the former can not always be relied upon for the differential purpose, since we find that in the specimen now before us, the zoœcia in the distal parts of the zoarium are mostly entirely destitute of the spine in question. On the other hand, we have noticed that, while in *C. lata*, the zoœcial aperture is elliptical and simply margined, in the specimen under consideration of *C. climacina* it is of a somewhat quadrangular shape with rounded corners and exhibits a small mucronate-like projection in the middle of its lateral margins. Further, we find in the specimen that frontal avicularia are directed upwards,—not obliquely downwards as in *C. lata*.

12. ***Caberea darwinii*** Busk.

Caberea darwinii, Busk 1884, Chall. Rep., vol. X, pt. XXX, 29, pl. xxxii, fig. 6.—McCoy 1887, Prod. Zool. Vict., decade XIV, 141, pl. cxxxvii, figs. 1 & 5.—Waters 1898, Journ. Linn. Soc., XXVI, 10, pl. i, figs. 13, 21–25.

There exists in the collection a moderately large colony which may be identified with the above species. It was obtained from a depth of 100 fms. at Yodomi in the Sagami Sea. In this specimen, there always exists a single oral spine on the outer side of each zoœcium, instead of two as in the specimens hitherto known.

13. ***Caberea megaceras***, n. sp.

Pl. VI., fig. 5; textfig. 5.

Zoarium a flabellate tuft, 25–50 mm. high, with delicately textured surface. Branches dichotomously dividing at rather wide intervals. Zoœcia biserially arranged, elongate, nearly uniformly wide throughout length; their aperture orbicular, occupying about half the front of zoœcium, with broad, minutely granulated and outwardly recurved margin; the margin armed with four spines, of which three are at the upper outer angle and one on the upper inner. Scutum ovate. Lateral avicularia wanting. Frontal avicularia dimorphic: on zoœcium partially covered over by the oœcium of the next lower zoœcium, the avicularium is usually small and is turned to one side of the aperture, with the triangular mandible directed upwards; while on freely exposed

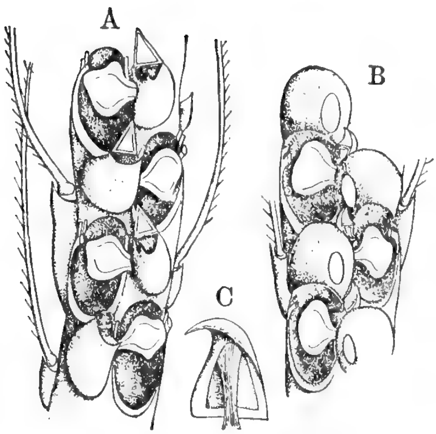


Fig. 5. *Caberea megacereas*, n. sp.

A. Frontal view, showing large frontal avicularia. ×32.
B. Frontal view, showing small frontal avicularia and oœcia. ×32.
C. Mandible of small frontal avicularium. ×150.

zoœcium, the avicularium is considerably larger and is placed below the aperture with the mandible directed downwards. Vibracular appendage exhibits nearly the same feature as that of *C. lata* B. Oœcia large, prominent, rounded, its summit reaching to the lower apertural margin of superjacent zoœcium, smooth surfaced, the wall on one side with elliptical membranous fenestra. Root-fibres occur in the same manner as in *C. lata* B.

Three colonies of this new species exist in the collection. Localities: Okinosé 234-312 fms.; Yodomi 78 fms. Characteristic of the species is the dimorphism of frontal avicularia. The two forms of these differ not only in size, but also in the opposite direction taken by the mandible.

14. ***Caberea lata*** Busk.

Caberea lata, Busk 1852, Cat. Brit. Mar. Poly., I, 39, pl. xlvii.—Busk 1852, Voy. Ratt., I, 378.—Busk 1884, Chall. Rep., vol. X, pt. XXX, 30.—Ortmann 1890, Jap. Bry., 22, pl. i, fig. 5.—Thornely 1907, Rec. Ind. Mus., vol. I, 183.

Of this species, there exist in the collection a few large and perfectly preserved colonies, besides numerous fragments. Localities: off Jògashima 54 fms.; Meranosé 312 fms.; Yodomi 62-100 fms.; off Odawara 120 fms., in the Sagami Sea. In all the specimens, the spinous processes are situated on zoœcial border. Their presence, as also that of oœcia, are confined to the majority of intermarginal zoœcia. The oœcium which appears to have hitherto remained unknown is of a quadrangular form with flattened and marginally thickened surface. Frontal avicularia are frequently wanting.

15. ***Caberea rudis*** Busk.

Caberea rudis, Busk 1852, Cat. Brit. Mar. Poly., I. 38, pl. xlvi, figs. 1, 2.—McCoy 1887, Prod. Zool. Vict., decade XIV, 137, pl. cxxxvi, fig. 1.—Busk 1884, Chall. Rep., vol. X, pt. XXX, 30.—Ortmann 1890, Jap. Bry., 23, pl. i, fig. 8.

This species is represented in the collection by numerous colonies. The localities are: off Jôgashima 80 fms., of the Sagami Sea; Senkai Bay (depth unknown) in Tsushima; Tomo (depth unknown) in Prov. Bingo; Hamajima (2 fms.) in Prov. Shima; Kanayama (3 fms.) in Prov. Kii. In all the specimens from above localities, the number of oral spines does not agree with that recorded from previously known specimens. Of them, there are generally to each marginal zoœcium four or three on the outer side and two on the inner, while on intermarginal zoœcia there are two of them on each side. The vibracular seta is not serrated.

16. ***Caberea rudis*** Busk, var. ***minor***, n. var.

Pl. VI., fig. 6.

This new form occurs in the shallow water of Aburatsubo, close to the Misaki Marine Biological Station, attached on stones. The chief differences between the typical species and the form under consideration, lie in the absence of the large lateral avicularia in the latter and in the direction taken by frontal avicularia. In the present form, the frontal avicularia are directed always obliquely downwards, instead of mostly upwards as in the typical species.

Bicellariidæ Hincks 1880.

Key to the genera.

1. Colony erect .... 2.
1. Colony creeping .... *Beania*.

2. Colony unstalked .... *Bugula.*
2. Colony stalked .... 3.
3. Branches forming a tuft-like group at the upper end of stalk ...... *Kinetoskias.*
3. Branches arising at rather wide intervals .... *Stirparia.*

Bugula Oken 1815.

Key to the species.

1. Zooecia biserial .... 2.
1. Zooecia multiserial .... 5.
2. Avicularia present .... 3.
2. Avicularia absent .... 4.
3. Zooecial aperture with spines .... *B. dentata.*
3. Zooecial aperture without spines .... *B. scaphoides*, var. *constricta.*
4. Zooecial aperture rounded above .... *B. johnstoniæ.*
4. Zooecial aperture truncated above .... *B. neritina.*
5. Avicularia placed at base of the aperture .... 6.
5. Avicularia placed half way between base and summit of the aperture .... *B. pugeti*, var. *umbelliformis.*
6. Beak of avicularia with two rostra .... *B. birostrata.*
6. Beak of avicularia with one rostrum .... 7.
7. Zooecial aperture with robust spines, exceeding six in number .... *B. laxa.*
7. Zooecial aperture with slender spines, not exceeding six in number.. *B. japonica.*

17. ***Bugula birostrata***, n. sp.

Pl. VI., fig. 10; textfig, 6.

Zoarium forming a tuft of 30–65 mm. height, consisting of numerous band-like and dichotomous branches; most branches joined together by fibres arising from indefinite parts of the colony. Zooecia multiserial, slightly broader above than below, 3–5 or even 7–9 of them forming an alternately interrupted transverse row; their aperture occupying two-thirds of the front, armed with numerous spines at margin: usually 7–9 spines on the outer and 4–5 on the inner border; uppermost two spines short, inconspicuous, situated close together; the second spine on each side somewhat broadened towards end; all the remaining spines pointed at end. Frontal avicularia occurring just below lower margin of zooecial aperture, conspicuously large, with tolerably long peduncle; their mandible relatively long and distinctly curved near the sharply

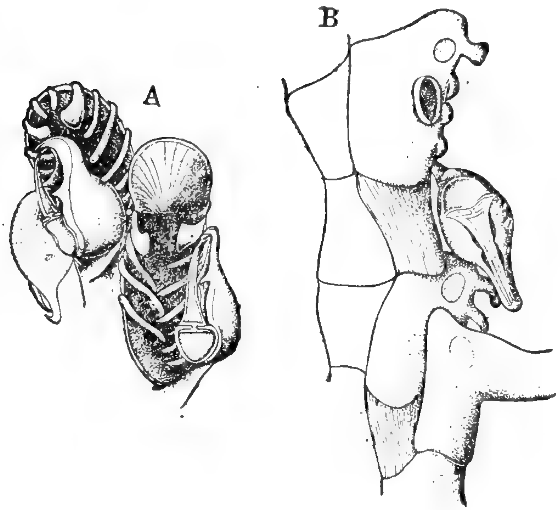


Fig. 6. *Bugula birostrata*, n. sp.

A. Frontal view. ×32.
B. Dorsal view. ×32.

pointed end; their beak also long and curved, with a prominent pointed tooth on each side, so that the jaws do not come in contact with each other except at the tip. There frequently exist large marginal avicularia, situated at the lower end of the outer side of marginal zoœcia and turned to the dorsal side. Oœcia globose, large, with straight lower margin, marked with faint radiate striation on the surface. Rootlets very abundant, especially in the lower parts of colony; arising from a large pore situated at the upper outer angle of marginal zoœcia on the dorsal surface.

This new species is represented in the collection by numerous large colonies. They were obtained at spots in the Sagami Bay, viz., Yodomi 70–100 fms. and off Odawara 93 fms. In the habit of growth, the present species closely resembles *B. curvirostrata* R., but differs from it in the oral spines being longer, more robust and more numerous. Moreover, the two species differ in the characters of avicularia. Further, the new species somewhat resembles *B. murrayana* (J.) in the features of zoœcia, but differs from it in the shape of spines as well as in the features of avicularia.

18. ***Bugula dentata*** (Lamouroux).

Acamarchis dentata, Lamouroux 1816, Hist. Poly. Coral. Flex., 135, pl. iii, figs. 3a, 3b.—Lamouroux 1821, Expos. Méth, 6, pl. xLv, figs. 1-3.—Blainville 1834, Man. d'Act., 459.

Bugula dentata, Busk 1852, Cat. Brit. Mar. Poly., I, 46, pl. xxxv.—McCoy 1883, Prod. Zool. Vict., decade VIII, 30, pl. lxxviii, fig. 3.—Waters 1887, Ann. Mag. Nat. Hist., 5, XX, 91, pl. iv, fig. 14.—Ortmann 1890, Jap. Bry., 25, pl. i, fig. 20.—Phillips 1899, Willey's Zool. Res., IV, 443.—Hutton 1904, Ind. Faun. Novæ-Zeland., 295.

Numerous colonies in the collection are referable to the above species. The localities are: shallow water of Moroiso; off Jôgashima; near Miyake I., one of the Seven Islands of Izu; Yokohama Harbour; Tomo in Prov. Bingo; Kushimoto in Prov. Kii.

19. ***Bugula japonica*** Ortmann.

Bugula japonica, Ortmann 1890, Jap. Bry., 25, pl. i, fig. 19.
Bugula hexacantha, Ortmann 1890, Jap. Bry., 25, pl. i, fig. 21.

Numerous large colonies of this species from Sagami Sea: viz., Mochiyama (depth unknown), Okinosé 312 fms., and off Jôgashima 234-312 fms. Ortmann has described *B. hexacantha* as distinct from *B. japonica*, on the ground of the former being provided with oral spines which are wanting in the latter. However, from examination of a large number of colonies, we have come to the conclusion that the presence or absence of oral spines can scarcely be made a criterion for the specific distinction, since both armed and unarmed apertures may occur in one and the same colony. Thus, in certain colonies, oral spines were found on proximal, but not on distal, zooecia; while, in certain other colonies, the reverse was the case as regards the relative position of zooecia with armed and unarmed aperture. *B. japonica* comes near to *B. sinuosa* B. as well as to *B. curvirostrata* R. However, it may be distinguished from the former by the presence of connecting fibres between the branches and by the elongate subquadrangular (instead of elongate-fusiform) shape of zooecia, and from the latter by the absence of the longer avicularia and by the branches being narrower.

20. *Bugula johnstoniæ* (Gray).

Halophila johnstoniæ, Gray 1848, Cat. Brit. Anim.—Busk 1875, Cat. Brit. Mus. Poly., I, 43, pl. xxx.—Smitt 1872, Flor. Bry., I, 17, pl. v.

Bugula longissima, Busk 1879, Chall. Rep., vol. X, pt. XXX, 42, pl. xxxi, fig. 7.

Bugula johnstoniæ, Ortmann 1890, Jap. Bry., 24, pl. i, fig. 16.

Numerous large colonies of the above species from following localities in Sagami Sea: off Niijima; off Odawara (93 fms.); Yodomi (78 fms.); Mochiyama (312 fms.).

21. *Bugula laxa* Robertson.

Bugula laxa, Robertson 1905, Univ. Calif. Pub. Zool., vol. II, 275, pl. xii, figs. 61, 62.

A few small colonies in the collection is referable to the above species. They were collected at Okinosé from a depth of 234–312 fms. The oral spines are characteristically developed. On all young, as also on all marginal, zoœcia, there are usually two spines on each side of the aperture, and those of the two sides arch over the aperture. The same spines in the older zoœcia of intermarginal rows number 3 or 4 on each side. A large number of rootlets, by means of which the colonies are attached to the substratum, arise from the outer frontal angle of proximal zoœcia on the dorsal side. The Californian specimens, on which Robertson based the species, were without avicularia; whereas, the specimens now before us exhibit avicularia on all intermarginal zoœcia, and occasionally on some marginal zoœcia also. The avicularia of marginal zoœcia are much larger than those of others. In this respect, the present species resembles *B. murrayana* (J.), but differs from it in the shape of avicularia. The species also closely agrees with *B. japonica* Ort., but there exists difference between the two in the shape of zoœcia and in the stronger apertural spines of the former.

22. ***Bugula neritina*** (Linnæus).

Sertularia neritina, Linnæus 1758, Syst. Nat., ed. X, 38.

Bugula neritina, Oken 1815, Lehl., der Nat., Abt. 2.—Heller 1867, Ad. Bry., 90.—McCoy 1881, Prod. Zool. Vict., decade VI, 41, pl. lix, fig. 7.—Busk 1884, Chall. Rep., vol. X, pt. XXX, 42.—Waters 1887, Ann. Mag. Nat. Hist., 5, XX, 91, pl. iv, figs. 3, 15.—Carus 1889, Prod. Faun. Medit., vol. ii, 6.—Ortmann 1890, Jap. Bry., 24, pl. i, fig. 17.—Phillips 1899, Willey's Zool. Res., IV, 440.—Robertson 1905, Univ. Calif. Pub. Zool., vol. II, 266, pl. ix, fig. 47, pl. xvi, fig. 97.—Calvet 1906, Bull. Mus. Paris, 12—Thornely 1907, Rec. Ind. Mus., vol. I, 183.

Acamarchis neritina, Lamouroux 1816, Hist. Poly. Coral., 58, pl. iii, fig. 2.

Cellularia neritina, Johnston 1847, Brit. Zooph., 340, pl. lx, figs. 3, 4.

Very numerous colonies represented in the collection. It is quite a common species in the shallow water of the Misaki coast, found attached on submerged timber and other objects. Localities: Yokohama and Yokosuka harbours (attached to bottom of ship); Tokyo Bay; Kushimoto in Prov. Kii. The colonies are usually of a reddish brown or a dark brown colour, sometimes bearing a purple tint. Busk has given that the specimens he had of the species from Australia and Asia, were always in possession of avicularia. The same did not exist in Japanese specimens, so far as came under our examination.

23. ***Bugula pugeti*** Robertson, var. ***umbelliformis***, n. var.

Pl. VI., fig. 8.

Bugula flabellata, Robertson 1900, Proc. Wash. Acad. Sci., vol. II, 321.

Bugula pugeti, Robertson 1905, Univ. Calif. Pub. Zool., vol. II, 271, pl. x, figs. 53, 54; pl. xi, fig. 55.

The chief difference between typical *B. pugeti* and this new variety lies in the habit of growth and in the absence of the additional spine on marginal zoœcium. The zoarium consists of a number of dichotomously dividing, narrowly flabellate, frond-like branches truncate at the free end. The branches form several superiorly expanding groups, all which basally converge to the common point of origin of the branches making up the zoarium. The zoœcia show on the summit a small rounded knob, similarly as in the typical form. The rootlets arise from the dorsal surface of intermarginal zoœcia in the lower parts of zoarium. They terminate each with an elliptical expansion, with which they adhere to the substratum.

This form occurs in considerable abundance in the shallow water of Aburatsubo, close to the Misaki Marine Station.

24. ***Bugula scaphoides*** Kirkpatrick, var. ***constricta***, n var.

Pl. VI., fig. 7.

Bugula scaphoides, Kirkpatrick 1890, Ann. Mag. Nat. Hist., 6. V, 18, pl. iv.

The specimens from a depth of 350 fms. at Meranosé in the Sagami Sea seem to be a form of *B. scaphoides* K. They differ from the typical form chiefly in the existence of an indentation on the outer lateral wall of each zoœcium near base, and in the shorter spinous process at the outer angle of zoœcial aperture. The variety bears a strong resemblance to *B. sinuosa* Busk, but differs from it by the biserial zoœcia and the pedunculated avicularia.

Kinetoskias Busk 1881.

25. ***Kinetoskias mitsukurii***, n. sp.

Pl. VI., fig. 11; textfig. 7.

Zoarium consists of an umbellate or inverted-conical crown of branches and of a long stalk. The crown, 30–40 mm. long, is made up of numerous, slender dichotomously dividing, main branches, which can be traced down to a single primary zoœcium. The branches exhibit zoœcia in biserial arrangement; in the preserved state they may appear to form a simple tuft, but in reality lie in a plane so rolled as to take the form of the wall of a funnel, with the primary zoœcium at the apex; they are gently bent outwards at the distal end, giving the funnel a somewhat out-flaring rim. The stalk, 60–75 mm. long, is tubular with thin membranous wall; it gradually narrows superiorly from the lower attached end. At the superior end, close to the primary zoœcium, the stalk lumen opens externally by an aperture; dorsally to this aperture, the stalk wall is prolonged into a narrow membranous strip. This retains the curvature of the tubular stalk wall, so that it presents a weak arc-like bending in cross-section. It is on the concave side of this membranous strip that the primary zoœcium is attached, at the level of which point the strip is narrowest, being constricted on the sides, as it were. It expands above and can be traced for some distance along the bases of the dividing branches, itself dividing in the same way as these, and covering the zoœcia of the parts on the dorsal side.

Zoœcia oblong, nearly uniformly wide throughout the length, rounded above, with a so-called "step" on the outer border a little below the middle; with strongly convex and smooth (without trans-

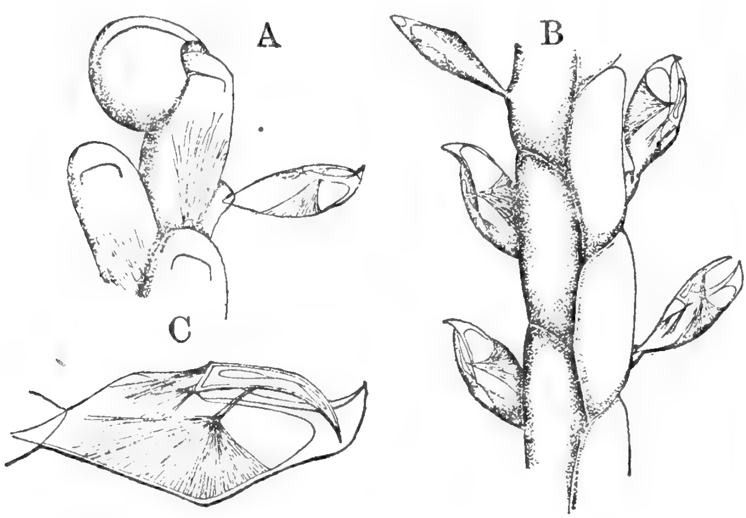


Fig. 7. *Kinetoskias mitsukurii*, n. sp.

A. Zoœcia, one of them with an oœcium. ×25.
B. A small portion of a branch in dorsal view. ×25.
C. Avicularium in lateral view. ×75.

verse lines) dorsal surface. The bottom of each zoœcial cell shows a small inward projection of conical shape; from its tip springs a peculiar fan-shaped muscle, about half as long as the cell or longer and inserting on the lateral and dorsal walls of the cell. The above conical projection is more strongly developed in the lower parts of branches than in the upper. Polypids with 27 or 29 tentacles. Avicularia very large, of a somewhat rhomboidal outline in lateral view; mandible acute, beak slightly arched and pointed at end; attached to zoœcium at the "step" with the narrowed and pointed base. Oœcia conspicuous, rounded, smooth, hood-like, with crescent-shaped aperture.

A few complete colonies of this new species exist in the collection. Localities: Okinosé, 80 fms.; Dôketsuba, 150 fms.; off Cape Sunosaki, 120 fms. This species closely resembles *Kinetoskias cyathus* Wyv. Thomson, but distinctly differs from it, not only in the much longer size of avicularia, but also in the total absence of the spiny process at the upper outer angle of zoœcium.

Beania Johnston 1838.

26. ***Beania hexaceras*** (Ortmann).

Diachoseries hexaceras, Ortmann 1890, Jap. Bry., 26, pl. 1, fig. 30.

Numerous specimens examined, growing on seaweed. Localities: shallow water along the Misaki coast; Hamajima in the Miye prefecture. In all the specimens, many zoœcia are provided with a spine at the summit of zoœcial aperture, a fact of which no mention was made by Ortmann for the specimens he had from the Sagami Sea.

27. ***Beania magellanica*** (Busk).

Diachoris magellanica, Busk 1852, Cat. Brit. Mar. Poly., pt. I, 54.—Busk. 1884, Chall. Rep., vol. X, pt. XXX, 59.—Hincks 1885, Ann. Mag. Nat. Hist., 5, XV, 246, pl viii, fig. 2.—McCoy 1880, Prod. Zool. Vict., decade V, 32, pl. xlvi, fig. 2.

Beania magellanica, MacGillivray 1887, Cat. Mar. Poly. Vict., 17.—Waters 1897, Journ. Linn. Soc., vol. XXVI, 16, pl. ii, figs. 11-14.—Hutton 1904, Ind. Faun. Novæ-Zeland, 295.

Diachoseries magellanica, Ortmann 1890, Jap. Bry., 25, pl. i, fig. 22.

A large colony in the collection may be identified with the above species. It is attached on a specimen of *Steganoporella magnirablis*, which came from Yodomi and a depth of 62 fms.

Stirparia Goldstein 1879.

28. ***Stirparia ciliata*** Robertson.

Stirparia ciliata, Robertson 1905, Univ. Calif. Pub. Zool., vol. II, 279, pl. xii, figs. 67-69; pl. xiii, figs. 70-71.

Small colonies which may be identified with the above species, exist in the collection in a few number. They were collected from shallow water at Kushimoto in the Wakayama prefecture. Compared with the description and figures given by Robertson for Californian specimens of the species, those on hand differ from them only in the much less conspicuous development of the zoarial stalk.

Zoological Institute, Tokyo Imp. Univ.
July 1st, 1917.

Explanation of Plate VI.

Fig. 1. Menipea sympodia, n. sp. × 1.
Fig. 2. Menipea sympodia, *var.* sagamiensis, n. var. × 1.
Fig. 3. Menipea longispinosa, n. sp. × 1.
Fig. 4. Scrupocellaria aviculariæ, n. sp. × 1.
Fig. 5. Caberea megaceras, n. sp. × 1.
Fig. 6. Caberea rudis, *var.* minor, n. var. × 1.
Fig. 7. Bugula scaphoides, *var.* constricta, n. var. × 1.
Fig. 8. Bugula pugeti, *var.* umbelliformis, n. var. × 1.
Fig. 9. Bugula japonica Ortmann. × 1.
Fig. 10. Bugula birostrata, n. sp. × 1.
Fig. 11. Kinetoskias mitsukurii, n. sp. × 1.

Bestimmungsschlussel für die japanischen Polycladen.

von

Megumi Yeri, *Rigakushi,*
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und

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Vorläufig zur Veröffentlichung, an anderer Stelle, unsrer ausführlicher Mitteilung über die japanischen Polycladen, werden hier kurze Notizen derselben gegeben in der Form eines Bestimmungsschlussels. Unser Material stammt hauptsächlich aus der Umgebung von Misaki und dem angrenzenden Meeresgebiete; es enthält 9 bisher bekannte und 17 neue Arten, welche sich auf 8 Familien und 14 Gattungen verteilen, wie folgt:

Unterordnung **Acotylea.**

A. Sectio **Craspedommata.**

I. Fam. Discocelidæ.

1. *Discocelis japonica,* n. sp.

II. Fam. Stylochidæ.

2. *Stylochus rutilus,* n. sp.
3. „ *ijimai,* n. sp.
4. *Bergendalia diversa,* n. sp.

B. Sectio **Schematommata.**

III. Fam. Leptoplanidæ.

5. *Notoplana humilis* (Stimpson).

6. „ *delicata*, n. sp.

7. *Hoploplana ornata*, n. sp.

IV. Fam. Planoceridæ.

8. *Neoplanocera elongata*, n. gen., n. sp.

9. *Planocera reticulata* (Stimpson).

10. „ *purpurea*, n. sp.

11. *Paraplanocera misakiensis*, n. sp.

V. Fam. Diplosolenidæ.

12. *Pseudostylochus takeshitai*, n. gen., n. sp.

13. „ *fulvus*, n. sp.

14. „ *obscurus* (Stimpson).

15. *Callioplana marginata* Stimpson.

Unterordnung **Cotylea.**

VI. Fam. Pseudoceridæ.

16. *Thysanozoon brocchii* (Grube).

17. *Pseudoceros reticulatus*, n. sp.

18. „ *lacteus* (Collingwood)?

19. „ *luteomarginatus*, n. sp.

20. „ *nigromarginatus*, n. sp.

VII. Fam. Euryleptidæ.

21. *Cycloporus papillosus* Lang.

VIII. Fam. Prosthiostomidæ.

22. *Prosthiostomum siphunculus* (Delle Chiaje).

23. „ *grande* Stimpson.

24. „ *marmoratum*, n. sp.

25. „ *awaense*, n. sp.

26. „ *rubropunctatum*, n. sp

In der Anordnung der Familien und Gattungen, sowie auch in der Terminologie der Geschlechtsorgane haben wir im wesentlichen S. Bock

("Studien über Polycladen," Zoologiska Bidrag fråu Uppsala, Bd. 2, 1913) gefolgt.

I. Ohne bauchständigen Saugnapf. Unterordnung **Acotylea.**

A. Mit Augen am Körperrand. Sectio **Craspedommata.**

a[1]. Nackententakeln fehlen.

a[2]. Eine Geschlechtsöffnung.

Männlicher Begattungsapparat mit einem grossen muskulösen Penis. Zahlreiche Körnerdrüsenblase in der Wand des Penis und des Antrums. Accessorische Blase der Vagina hufeisenförmig.

Genus *Discocelis* Ehrbg.

Körper breit-oval; Rückenseite schmutzig-zimt, im Mittelfeld dunkler, überall gleichmässig mit kleineren dunkelbraunen Fleckchen besetzt. Tentakelaugen in zwei dichtgedrängten rundlichen Haufen; Gehirnhofaugen in zwei langgestreckten, aber in zwei Partien getrennten Gruppen.

1. *D. japonica*, n. sp.
(Misaki; Enoura in Prov. Suruga; Shirahama in Prov. Awa).

b[2]. Drei Geschlechtsöffnungen.

Echte Samenblase nicht ausgebildet. Körnerdrüsenblase frei, besizt ihren eigenen Ausführungsgang, der sich mit dem Ductus ejaculatorius zu einem gemeinsamen Gang vereinigt. Penis unbewaffnet. Vor oder hinter der functionellen männlichen Geschlechtsöffnung liegt eine zweite Körnerdrüsenblase, die auch einen eigenen Gang besitzt. Dieser Körnerdrüsenapparat hat eine selbständige äussere Öffnung mit einem kleinen Antrum. Vagina nicht sehr lang, teilweise spiralgewunden. Ductus vaginalis vorhanden, öffnet sich gemeinsam mit der Vagina externa.

Genus *Bergendalia* Laidlaw.

Körper: langgestreckt; Oberfläche hellbräunlich rosenrot, mit einem ziegelroten, medianen Längsstreife. Augen in ein- order mehrreihiger Anordnung längs des ganzen Körpers und in grosser Anzahl zerstreut auf dem Kopfteil.

2. *B. diversa*, n. sp.
(Shirahama in Prov. Awa.)

b¹. Nackententakeln vorhanden.
Echte Samenblase vorhanden. Körnerdrüsenblase selbständig, Penis unbewaffnet. Accessorische Blase der Vagina fehlt.

Genus *Stylochus* Ehrbg.

a². Körper elliptisch, rötlichorange oder ziegelrot, mehr oder minder gleichmässig mit kleineren rötlichen Tüpfelchen gesprenkelt. Tentakelaugen im Innern der Tentakeln, nur in der Spitze fehlend; Gehirnhofaugen dicht zerstreut zwischen den Tentakeln.

3. *St. rutilus*, n. sp.
(Mera in Prov. Awa).

b². Körper breit-elliptisch; Rückenfarbe tief gelblich, mehr oder minder gleichmässig mit zahlreichen kleineren grauvioletten Tüpfelchen besetzt. Tentakelaugen dicht im Innern der Tentakeln; Gehirnhofaugen in zwei wohl abgegrenzten Gruppen, die nach vorn divergiren.

4. *St. ijimai*, n. sp.
(Enoura in Prov. Suruga).

B. Ohne Augen am Körperrand. Sectio **Schematommata**.
a¹. Körnerdrüsenblase vom Ductus ejaculatorius durchzogen.
a². Echte Samenblase und accessorische Blase der Vagina vorhanden. Mit oder ohne Tentakeln. Penis bewaffnet oder nicht bewaffnet.

Genus *Notoplana* Laidlaw.

a[3]. Nackententakeln sehr klein, stumpf-spitzig. Penisstylett nicht vorhanden.

Körper langgestreckt, nach vorn gerundet, nach hinten stumpf zugespitzt; Farbe hellolivengelb. Tentakelaugen in je einem dichtgedrängten Haufe an der Basis jedes Tentakels; Gehirnhofaugen in zwei Gruppen über dem Gehirn.

5. *N. humilis* (Stimpson).
(Misaki; Shirahama in Prov. Awa; Otaru auf Hokkaido).

b[3]. Nackententakeln fehlen. Penisstylett vorhanden.

Körper wie bei den obigen Art, durchscheinend, bräunlichgelb, mit einem bräunlichorange gefärbten, medianen Längsstreife. Tentakel- und Gehirnhofaugengruppen miteinander blenden auf jeder Seite.

6. *N. delicata*, n. sp.
(Misaki; Shirahama in Prov. Awa).

b[2]. Keine echte Samenblase. Vagina ohne accessorische Blase.

Mit Nackententakeln. Accessorische Samenblase mächtig. Penis nicht Stylett versehen.

Genus *Hoploplana* Laidlaw.

Körper breit-oval; Grundfarbe milchweiss oder ziemlich hellbraun, mit ziegelrot oder rötlichbraun gefärbten, querverlaufenden Streifen, die im Mittelfeld ein Netz bilden; Zwischenräume stellen nur einige hellere grundfärbige Fleckchen von ungleichmässigen Grösse dar. Tentakeln schlank, kegelförmig. Tentakelaugen in je einem Zirkel an der Basis jedes Tentakels; Gehirnhofaugen in geringer Anzahl in je einem Gruppe neben jedem Tentakel.

7. *H. ornata*, n. sp.
(Misaki).

b[1]. Körnerdrüsenblase frei; ihr eigener Ausführungsgang vereinigt sich mit dem Ductus ejaculatorius zu einem gemeinsamen Gang.

a[2]. Penis fehlt.

a[3]. Nackententakeln fehlen. Körnerdrüsenblase ventral vom Ductus ejaculatorius. Mit echter Samenblase. Cirrusbeutel mit Stacheln bewaffnet. Accessorische Blase der Vagina rudimentär.

Genus *Neoplanocera*, n. gen.

Körper langgestreckt-oval, blassgelblich gefärbt. Tentakel-und Gehirnhofaugen miteinander blenden auf jeder Seite der Medianlinie.

8. *N. elongata*, n. sp.

(Shirahama und Sunosaki in Prov. Awa).

b[3]. Nackententakeln vorhanden. Körnerdrüsenblase dorsal vom Ductus ejaculatorius.

a[4]. Bursa copulatrix nicht ausgebildet.

Mit echter Samenblase. Geräumiger Cirrusbeutel mit Stacheln. Vagina bulbosa ausgebildet. Accessorische Blase der Vagina rudimentär.

Genus *Planocera* De Blainville.

a[5]. Körper breit-oval, gross, verschieden gefärbt, gewöhnlich überall mit deutlichem schwärzlichem Netzwerk, welche Zwischenräume nur kleine hellere Flecke der Grundfarbe darstellen. Tentakeln häufig in zwei Gruppen geordnet. Tentakelaugen in je einem Zirkel an der Tentakelbasis; Gehirnhofaugen in zwei lockeren Gruppen über dem Gehirn.

9. *Pl. reticulata* (Stimpson).

(Masaki; Loo-choo.)

6[5]. Körper oval, relativ klein, dunkelviolett. Tentakelaugen in je einem

Zirkel an der Basis jedes Tentakels; Gehirnhofaugen in zwei paaren Gruppen.

10. *Pl. purpurea*, n. sp.

(Shirahama in Prov. Awa).

b⁴. Bursa copulatrix ausgebildet.

Accessorische Samenblase vorhanden. Vagina bulbosa nicht bewaffnet. Vagina mit grosser accessorischer Blase.

Genus *Paraplanocera* Laidlaw.

Körper breit-elliptisch, am Rande in einige Falten gelegt. Rückenseite hellolivenbraun, überall unregelmässig mit zahlreichen kleineren milchweissen Tüpfelchen, die in weniger Anzahl mit dunkelbraunen Punkten gesprenkelt sind. Ferner, kleinere gelb und weiss gefärbte Fleckchen in ein- oder mehrreihiger Anordnung längs des ganzen Körpers. Tentakelaugen in zwei Zirkel; Gehirnhofaugen in zwei wohl abgegrenzten, langgestreckten Haufen zwischen den Tentakeln.

11. *P. misakiensis*, n. sp.

(Misaki).

b². Penis vorhanden.

a³. Vagina mit einer einzigen accessorischen Blase.

Tentakeln vorhanden, jedoch unbekannt. Mit echter Samenblase. Körnerdrüsenblase dorsal vom Ductus ejaculatorius. Penis nicht bewaffnet.

Genus *Pseudostylochus*, n. gen.

4⁴. Grundfarbe hellolivenbraun.

a⁵. Körper oval, überall mit gleichmässig zerstreuten, kleinen braunen Punkten. Tentakelaugen in zwei unregelmässig dichtgedrängten

Haufen; Gehirnhofaugen in zwei lateralen Gruppen über dem Gehirn.

12. *P. takeshitai*, n. sp.
(Matsuwa in Prov. Sagami).

b[5]. Körper breit-oval, dicht fein bräunlichorange punktiert. Tentakelaugen in zwei unregelmässig dichtgedrängten Haufen; Gehirnhofaugen in zwei Längsstreifen.

13. *P. fulvus*, n. sp.
(Misaki).

a[4]. Grundfarbe tief olivenbraun.

Körper oval oder elliptisch, überall auf der Rückenseite mit dichtgedrängten dunkelgrünen Pigmentpunkten.

14. *P. obscurus* (Stimpson).
(Misaki; Mera in Prov. Awa; Otaru auf Hokkaido).

b[3]. Vagina mit einpaaren accessorischen Blasen.

Mit Tentakeln. Echte Samenblase vorhanden. Freie Körnerdrüsenblase dorsal vom Ductus ejaculatorius; ihr eigener Ausführungsgang vereinigt sich mit dem letzt genannten Ductus bei der Penisspitze. Penis unbewaffnet.

Genus *Callioplana* Stimpson.

Körper oval, am Rande in einige radiäre Falten gelegt. Rückenseite tief blaulichschwarz mit violetten Lichttönen, mit einer den Rand ringsum begleitenden, schmalen, rotbraunen Linie, die am äussersten Körperrand einen noch schmäleren, farblosen Saum frei lässt. Tentakelaugen im Innern der Tentakeln, nur in der Spitze fehlend; Gehirnhofaugen in zwei Längsstreifen.

15. *C. marginata* Stimpson.
(Oshima Insel; Misaki; Sunosaki in Prov. Awa).

II. Mit bauchständigen Saugnapf Unterordnung **Cotylea.**

A. Randtentakeln vorhanden. Darmäste anastomosierend.

a¹. Randtentakeln faltenförmig; Pharynx reich gefaltet; Darm zahlreich verzweigt.

a². Mit zottenförmigen Papillen auf dem Rücken.

Randtentakeln spitzohrähnlich. Männlicher Begattungsapparat doppelt.

Genus *Thysanozoon* Grube.

Körper breit-oval; Rückenseite grauviolett oder gelblichviolett, mit einem weisslichen oder gelblichen medianen Längsstreife.

16. *Th. brocchii* (Grube).
(Misaki und Matsuwa in Prov. Sagami).

b². Ohne Papillen auf dem Rücken.

Randtentakeln spitzig oder stumpf zugespitzt. Männlicher Begattungsapparat einfach oder doppelt.

Genus *Pseudoceros* Lang.

a³. Penis einfach.

a⁴. Körper fast oval, am Rande in einige wellenförmigen Falten gelegt. Rückenseite zeigt eine netzförmige Zeichnung von verschieden breiten olivengrauen Bändern. Die Zwischenräume zwischen den Bändern stellen die ziemlich grosse, ebenso gefärbte, aber hellere Flecken dar. Überall auf der Grundfarbe befinden sich zahlreiche fast gleichmässig stehende schwarze Punktchen.

17. *P. reticulatus*, n. sp.
(Misaki; Loo-cho).

b⁴. Körper oval; Rand wellenförmig. Rückenfarbe licht rosenrot, mit einem helleren medianen Längsstreife und ziemlich zerstreuten schwarzen Flecken. Rings um den Körper herum verläuft ein schmaler ziegelbrauner Streife, der am äussersten Körperrand eine schmalen schwarzen Saum frei lässt.

18. *P. lacteus* (Collingwood)?
(Misaki).

b³. Penis doppelt.

a⁴. Körper oval; Rand wellenförmig. Rückenseite schwarz mit violetten Lichttönen, mit zwei den Rand ringsum begleitenden, rosenrötlichbraunen marginalen und lichtgelben submarginalen Bändern.

19. *P. luteomarginatus*, n. sp.
(Misaki).

b⁴. Körper breit-elliptisch, am Rande in Falten gelegt. Rückenseite bräunlichschwarz, mit zwei helleren Längsstreifen im Mittelfeld und einer den Körperrand ringsum begleitenden, wohl abgegrenzten, schmalen dunkelbraunen Linie.

20. *P. nigromarginatus*, n. sp.
(Matsuwa in Prov. Sagami; Shirahama in Prov. Awa).

b¹. Randtentakeln zipfelförmig; Pharynx cylindrisch; Darm wenig verzweigt.

Mit oder ohne Wärzchen oder Papillen auf der Rückenseite. Die letzten peripherischen Zweige der Darmäste münden am ganzen Körperrande durch feine Poren im Epithel nach aussen.

Genus *Cycloporus* Lang.

Körper oval; Rückenseite ocherfärbig, mit zahlreichen rötlichen und wenigen dunkleren Fleckchen zerstreut.

21. *C. papillosus* Lang.
(Misaki).

B. Tentakeln fehlen. Darmäste nicht anastomosierend. Pharynx cylindrisch, nach vorn gerichtet. Penis mit Stylett. Körnerdrüsenblase doppelt.

Genus *Prosthiostomum* Quatrefages.

a[1]. Gehirnhofaugen in zwei linearen Gruppen.
Körper langgestreckt, hellbräunlichgelb, ungefähr zimtfärbig im Mittelfeld.

22. *P. siphunculus* (Delle Chiaje).
(Misaki und Matsuwa in Prov. Sagami; Shirahama in Prov. Awa).

b[1]. Gehirnhofaugen in zwei dichtgedrängten ovalen Haufen.
a[2]. Randaugen wenig an Anzahl.
a[3]. Körper langgestreckt, nach vorn und hinten abgerundet. Rückenseite hellblassbräunlich, mit überall gleichmässig zerstreuten, zahlreichen ocherfärbigen Tüpfelchen.

23. *P. grande* Stimpson.
(Oshima Insel; Misaki und Matsuwa in Prov. Sagami; Mera in Prov. Awa).

b[3]. Körper langgestreckt; Rückenseite hellbräunlichgelb, mit unregelmässig alle miteinander verbundenen, schmutzigbraunen Flecken, die nur am Vorderende fehlen.

24. *P. marmoratum*, n. sp.
(Shirahama in Prov. Awa).

b[2]. Randaugen zahlreich.
a[3]. Körper langgestreckt, tief blassfleischfärbig, mit einem braunen medianen Längsstreife.

25. *P. awaense*, n. sp.
(Shirahama in Prov. Awa).

b[3]. Körper langgestreckt; Rückenseite hellbräunlich, mit einem dunkleren medianen Längsstreife, überall rötlichbräunlich, fein und dicht punktiert.

26. *P. rubropunctatum*, n. sp.
(Shirahama in Prov. Awa).

Notes on Japanese Triclads. II.[1]

By

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4. On the Formation of the Spermatophore.

The spermatophore of Triclads has hitherto been known from several species, always contained in the cavity of the receptaculum seminis or the so-called uterus. By some authors (Kennel,[2] Micoletzky[3]) it was alleged that the spermatophore originates in that organ, the substance of the capsule being supposed to be the secretory product of the latter; while others (Schultze,[4] Woodworth,[5] Bergendal,[6] Weiss[7]) assumed its formation in the penis, ascribing the source of the capsule to the penis glands, and that it is introduced, by the act of copulation, into the receptaculum seminis of a second individual. In view of this disparity in the views of authors, it will be of interest to place on record a case, observed by me, of *Planaria vivida* Ij. et Kab., in which

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1) Continuation of "Notizen üb. jap. Tricladen," p. 325 of this volume of the journal.

2) Kennel, J., 1889. Untersuchungen an neuen Turbellarien. Zool. Jahrb., Abteil. f. Anat. u. Ontog.. Bd, III, Heft 3, p. 458.

3) Micoletzky, H., 1907. Zur Kenntnis des Nerven- und Excretionssystems einiger Süsswassertricladen nebst andern Beiträgen zur Anatomie von *Planaria alpina*. Zeitschr. f. wiss. Zool. Bd. LXXXVII, pp. 426, 427.

4) Schultze, M., 1852. Zoologische Skizzen. Zeitschr. f. wiss. Zool. Bd. IV, 1853, pp. 186, 187.

5) Woodworth, W. M., 1891. Contribution to the Morphology of the Turbellaria. I. On the Structure of *Phagocata gracilis* Leidy. Bull. Mus. Comp. Zool. Harvard Coll. Vol. XXI, pp. 31, 32.

6) Bergendal, D., 1890. Studien über nordische Turbellarien und Nemertinen. Vorl. Mitt. Ofversigt Kongl. Vetenskaps- Acad. Förhandl. Nr. 6, p. 326.—1892. Einiges über den Uterus der Tricladen. Festschrift z. 70 Geburtstag R. Leuckarts. p. 318.

7) Weiss, A., 1910. Beiträge zur Kenntnis der australischen Turbellarien. Zeitschr. f. wiss. Zool. Bd. XCIV, Heft 4, pp. 584-586.

a spermatophore was found lodged in the penis and was evidently formed there.

In fig. 1 is given a sagittal longitudinal section through the penis and adjoining parts of the *Planaria* individual in question. A spermatophore, apparently completely formed and ready for ejection by the penis, occupies the position of the terminal swelling of vas deferens impar or the vesicula seminalis, completely filling it up and to a degree distending the same. It is nearly of a pyriform shape, bent at the pointed end and measuring 216 μ by 133 μ. The body is so oriented that its pointed end is directed towards, and projects somewhat into, the distal end of the vas deferens impar. (For the parts of the genital end-organs of *Pl. vivida*, see this volume of the journal p. 164, fig. 17). The capsule is 0.5–3 μ thick, being thickest towards the pointed end. Its substance is not homogeneous but exhibits a porous structure when seen under the high power. Microchemically it shows special affinity for eosin, quite agreeing in this respect with the secretion of the penis gland, found abundantly in the parenchyma round the penis bulb and more sparsely in the wall of the penis itself.

Fig. 1.

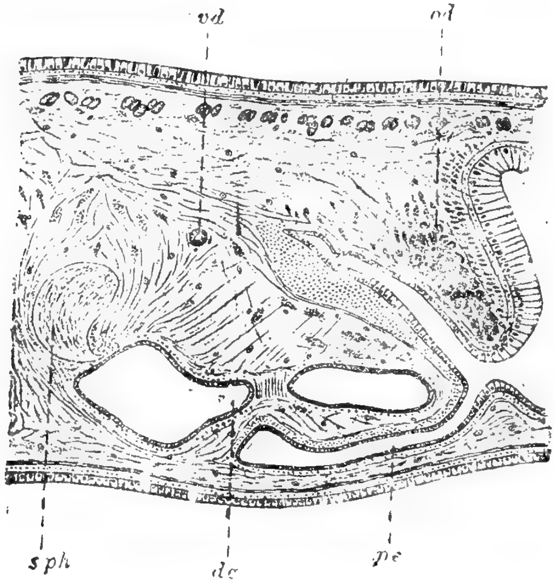

Fig. 1. A sagittal longitudinal section through genital end-organs of *Planaria vivida*, showing the spermatophore in situ.
de ductus ejaculatorius, *od* oviduct, *ps* penis sheath, *sph* spermatophore, *vd* vas deferens.

As regards the spermatophores contained in the receptaculum seminis, e.i., those which, in my opinion, had been transfered by copulation from one individual into the receptaculum of another, I have met with such on several occasions in *Pl. vivida.* They occurred either singly or two together at a time, not infrequently represented only by incomplete capsules which had emptied their proper contents. It is important to note that the spermatophore thus found in the receptaculum is of a shape and size well agreeing with the one described above from the vesicula seminalis.

As already indicated, the pyriform shape of the spermatophore of *Pl. vivida* apparently stands in relation with the shape of the space of its origin, viz., the vesicula seminalis and the adjoining parts of vas deferens impar. In this connection I may mention that in both *Pl. burmaensis* Kab. and *Pl. annandalei* Kab. the spermatophores I have found in the receptaculum were also of a shape corresponding to that of the part of penis lumen known as vesicula seminalis. In the former species the shape was elongate ovoid, and in the latter tubular.

The eosinophil nature of the substance of the spermatophore capsule decidedly differentiates it from the cyanophil secretion of the glandular cells discharging into the receptaculum seminis. Micoletzky assumed that the receptaculum secretion changes from cyanophil into eosinophil during the process of the capsule formation in that organ. This he based on his observation of the staining property of the receptaclum fluid enclosing a spermatophore, using hæmatoxylin-eosin for the stain. He found in sections that the fluid coagulum in immediate contact with the spermatophore capsule stained red—i.e., was eosinophil,—though in more remote parts it was cyanophil, the red and blue grading over into each other in the intermediate parts. A similar result I have obtained with *Pl. vivida* under the same circumstances of condition and treatment; however I am inclined to interpret the differential staining to be due to the receptaculum fluid being in the process of dissolving up the substance of the spermatophore capsule.

5. Reproduction by Fission.

Planaria gonocephala Dugès, as observed by me in Japan, seems to reproduce to a large extent by fission. I have never yet met with individuals which were doubtlessly right in the process of dividing, but those bearing evident marks of foregone fission are rather common. To judge from these, it seems that this always takes place at a point immediately behind the pharynx or a short distance farther back, much as is known from *Pl. maculata* Curtis. Instances of division in front of the pharynx, known to obtain in *Pl. albissima* Sekera, was never observed in the species in question. The severed end of the two pieces produced by division presents for some time a transverse and nearly straight edge, exposing the parenchyma in a thin white line. For some time after the healing of the wound, there is observed at the body-end concerned a colourless area of regeneration, which area, bounded off from the old parts by a zone of concentrated pigmentation, is at first of a crescentic, and then takes a more or less triangular, shape. In the tail piece that area develops into the part of the new head anterior to the auricles, while in the head piece it merely forms the new tail-end. In the former case the regenerated area increases considerably in extent, and the eyes appear as two minute dots close to its border against the pigmented old body-parts. The points of the auricles begin to show themselves somewhat later.

Pl. vivida and *Polycelis* ijimai Kab. also very frequently reproduce by fission. In the former the division takes place quite similarly as is known in *Pl. alpina* Dana. First a furrow appears at the place where division is to occur; it deepens, finally leading to separation of the parts. There were not infreqnently found cases in which the dividing body-parts were still connected by a narrow band of tissue, which no doubt will soon break off by the motion of crawling.

In all the species mentioned, reproduction by fission takes place most actively during June, July and August, in which period it is exceedingly rare, if at all, to discover individuals with developed sexual organs. So far as my observations go, the fission ceases in the autumn and then the reproductive organs begin to develop. It may therefore be said, in unison with Curtis,[1] that the life history of those planarians presents alternate periods of asexual and sexual reproduction.

6. Budding.

A very curious case of budding was observed in a specimen of *Sorocelis sapporo* Ij. et Kab., captured by Professor Ijima in the rivulet flowing through the Sapporo college ground in Hokkaido. It is shown in fig. 2. The mother individual is of quite normal appearance and structure, possessing well-developed genital end-organs. Only it bears on the left lateral body-margin in the pharyngeal region two branch-like buds of considerable dimensions. One of them represents an additional posterior body-part and the other, an additional anterior body-part. Both are structurally very distinctly differentiated. The former contains developing pharynx and sexual end-organs, besides two branch-bearing gut-trunks which are simply elongations of as many lateral branches of the left posterior gut-trunk of the mother individual. The latter may be said to represent nearly an entire young individual organically connected to the mother individual by the tail-end; the eye-spots near the free truncate end number 5 or 7 on either side, distributed in the usual way; nearly in the middle there exists a well-developed but as yet small pharynx; two gut-branches originating from the left posterior trunk of the mother individual enter into the bud as the paired posterior gut-trunks of this; these unite in front of the bud pharynx, and from this point of union there arises an unpaired short gut-trunk directed towards the head-end of the bud. A glance at the accompanying figure will make clear the relations of the supernumerary parts or partial individuals to the mother individual.

1) Curtis, W. C., 1902, The life history, the normal fission and the reproductive organs of *Planaria maculata*. Proc. Boston Soc. Nat. Hist. Vol. XXX, No. 7, pp. 515-559.

Fig. 2. Fig. 3. Fig. 4. Fig. 5.

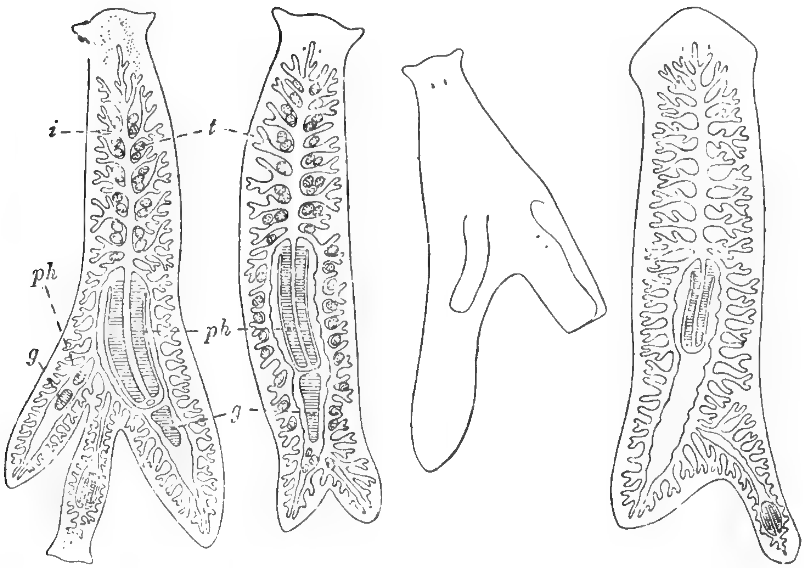

Fig. 2. *Sorocelis sapporo* Ij. et Kab.
Fig. 3 and 4. *Planaria vivida* Ij. et Kab.
Fig. 5. *Planaria gonocephala* Dugès.
i intestine, *g* position of genital end-organs,
ph pharynx, *t* testis.

In Professor Ijima's notes taken at the time of his collecting this interesting specimen, it stands that the small daughter individual with the head-end directed posteriorly in relation to the mother individual, was passively dragged along as the latter crawled forewards, though at times it made efforts to make foreward crawling in its own sense.

Among *Pl. vivida* obtained in the Nikko region I have found a case which had the tail-end split into two. This is shown in fig. 3. The right tail tip contains two lateral branches of the right posterior gut-trunk, and may possibly be looked upon as a formation by budding. In another case of the same species (shown in fig. 4) the body has produced, on the right lateral margin at about the level of the pharynx insertion, an obliquely posteriorly directed process of a considerable size and an irregular contour. It shows a pair of eyes near the junction with the mother body. From the state of things it is probable that we have here to do with an abnormal state of budding.

Finally, as regards *Pl. gonocephala* it may be recorded that specimens with double tail-ends, one of which might be regarded as a budding product of the other, are not infrequent. In fig. 5 is represented a case, in which an individual has budded out, from the right margin of the posterior parts, a daughter individual. Of the latter, the free end is the head-end; though still eyeless, it is already provided with a distinct pharynx and with three gut-trunks which have manifestly arisen from two adjoining lateral branches of the right posterior gut-trunk of the mother body.

On Ctenophores of the Neighbourhood of Misaki.

By

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With Plate VII.

During the last two years I have had several opportunities to collect ctenophores in the neighbourhood of the Misaki Marine Station. The sketches and notes taken on those occasions have formed the basis of this report. To supplement my observations I have also examined the preserved materials in custody of the Zoological Institute, Science College, and of the Tokyo Higher Normal School, all which materials were collected chiefly at Misaki and to some extent at Tateyama in Prov. Awa. In all eleven species have come under my observation. The number includes two *Cœloplana* species, of which I have prepared a special report to be published in another journal. The present paper deals with the remaining nine species. The descriptions are based exclusively on my own observation of the specimens at my disposal.

Genus **Hormiphora,** L. Agassiz.

1. ***Hormiphora palmata*** Chun. (Pl. VII, fig. 1.).

Hormiphora palmata, Chun, 1898, p. 17, Pl. iii, figs. 1, 2.——Moser, 1903, p. 11, Bestimmungstabelle.——Bigelow, 1912, p. 381, Pl. i, figs. 1-6.

Lampetia fusiformis, Agassiz and Mayer, 1902, p. 171, Pl. xiii, figs. 59, 60.

Hormiphora fusiformis, Moser, 1903, p. 12, Bestimmungstabelle.——Mayer, 1903, p. 1141, Pl. iii, fig. 12.

Hormiphora japonica, Moser, 1907, p. 450.——Moser, 1908, p. 10, Pl. i, figs. 6-8.

? *Euplokamis californensis*, Torrey, 1904, p. 46.

? *Mertensia ovum*, Torrey, 1904, Pl. i, fig. 1.

The ovoid body is slightly compressed, the tentacular axis being a little longer and the pharyngeal axis slightly shorter than half the vertical axis. In large specimens (length over 30 mm.) the body is relatively more slender. The ribs are of equal length, beginning close to the apical sense-organ and terminating below usually a short distance above the level of the oral end of tentacle-basis. The comb-plates are closely set; in individuals of 20–30 mm. length, they number 40–50 in each rib. The perradial intercostal spaces are about equally wide, and somewhat wider than the interradial intercostal spaces. The pharynx is nearly 2/3 as long as the vertical axis. Adradial canals open into meridional canals slightly above the level of the infundibulum. The meridional canals are all of the same length; they are distinctly longer than the ribs, their oral end nearly reaching the level of the oral end of tentacle-sheaths, or somewhat farther beyond. The tentacle-basis is situated quite close to pharyngeal canals; it is nearly straight or slightly curved and sometimes even double-curved. The tentacle-sheaths open at a level of between 1/2 and 2/3 the distance from infundibulum to apex; very rarely they open nearer the former than the latter. The tentacles are long and are provided only with simple filiform branches. The sexual products develop in the entire length of meridional canals excepting a small part at their oral end.

Colour.—When living, the animal is colourless, only the tentacle-basis being whitish. In preserved specimens, the branches of tentacles are yellowish, due to the presence of colloblasts.

Specimens examined.—At Misaki, during the interval of Dec. 27, 1917 and Jan. 9, 1918, I have examined twelve individuals of 18.5–43 mm. length in the living state. Also the following specimens, all in the preserved state, were at my disposal: One (l. 26 mm.), Misaki, in formalin; three (l. 14.5–30.5 mm.), Misaki, April, 1901, in formalin; six (l. 18–31 mm.), Bonin Islands, Feb.–March, 1894, in alcohol; three (l. 29–43.5 mm.), Tateyama, April, 1909–1912, in formalin.

Some of the specimens which I obtained at Misaki in the winter of 1917, contain a number of Cercariæ in the jelly of the body. The Cercariæ, apparently all of the same species, are provided with a pair of eye-spots and a tail bearing long setæ.

Remark.—MOSER described the ctenophore in question as a new species under the name of *H. japonica* holding it distinct from the Atlantic *H. palmata.* According to that authoress, the Japanese form should differ from the species just mentioned, chiefly in the length of ribs and meridional canals, and in the configuration of tentacle-basis. It was given by her that in *H. japonica* the ribs are considerably shorter than the meridional canals, which latter stop some distance short of the margin of mouth, and that the tentacle-basis describes a simple curve, so that its middle point, whence issues the stem, is situated farthest away from the pharyngeal vessel. In *H. palmata*, on the other hand, the ribs and meridional canals should be nearly equally long, and both should reach down very close to the mouth; the tentacle-basis should present a double curvature, placing its middle point very close to the pharyngeal vessel. However, BIGELOW found (1912, p. 381), after careful examination of the characters referred to, that these are subject to much variations and do not form decisive differential criterion between the two forms in question. So far as concerns the tentacle-basis, my observations on the Japanese material stand decidedly in agreement with BIGELOW's view, inasmuch as I have found that structure to be sometimes simply curved and at other times doubly curved or to run nearly or quite straight in different individuals. With respect to the length of ribs and meridional canals, the material before me conform to MOSER's account rather than to BIGELOW's, the ribs being very much shorter than the canals and the latter ending distinctly short of the mouth margin. Under the circumstances and in view of the very close agreement in all other respects of structure, I deem it advisable to unite the Japanese and Atlantic forms under one species, though a more extented knowledge than we have at present concerning the latter may possibly necessitate making racial distinction between the two. The specific identity of the Japanese form with *H. fusiformis* (originally named *Lampetia fusiformis*) of A. AGASSIZ and MAYER, which was described from the Eastern Pacific, seems to be nearly certain, especially since the larger examples of the former tend to be of a relatively more slender shape than the smaller and thus approach the latter form.

Genus **Bolinopsis,** L. Agassiz.

(*Bolina*, Mertens.)

2. ***Bolinopsis mikado*** (Moser) (Pl. VII, fig. 2).

Bolina mikado, Moser, 1907, p. 451.—Moser, 1908, p. 56, Pl. ii, fig. 1.

The body is ovoid, moderately compressed; at the level of the base of lappets, the tentacular axis is about 2/3 the length of pharyngeal axis and about 1/2 that of body proper. The body narrows gradually towards the rounded aboral extremity. The lappets are of medium size and usually occupy a little more than half of the entire body-length. The auricles in full-grown animals are 1/3–1/2 as long as the length of body proper, their end reaching somewhat beyond the margin of mouth. The deeply sunken aboral sense-organ is situated at the bottom of a cleft which is 1/5 as deep as the length of body proper. The comb-plates of the ribs begin to exist at the apical end of meridional canals; the last comb-plate of subtentacular ribs lies at base of auricles, that of subpharyngeal ribs close to lappet margin. The pharynx is long and nearly half as long as the total length of body including lappets. The pharyngeal folds are 1/4–1/3 as long as the pharynx. The interradial canals divide at the level of the sense-organ into the adradial canals which run alongside the wall of the aboral cleft. The lappet-canals make some winding which is rather simple and resembles the condition represented by BIGELOW for *Bolinopsis vitrea* (1912, p. 391). The tentacles are small and inconspicuous.

Colour.—Transparent and almost colourless; only the canals are rosy when living.

Specimens examined.—A number of specimens were obtained at Misaki and in the Gulf of Tokyo.

This species may be said to be the commonest ctenophore in those localities. In the Gulf of Tokyo, during late-summer, the species sometimes swarms in such abundance that the fishermen are compelled to give up using their nets, owing to the meshes becoming choked up with the ctenophores. At Misaki, this species appears in large quantities generally during summer and winter. After stormy weather, individuals showing mark of injury in the aboral region are very commonly met with.

Remark.—MOSER, the original describer of the species, established it on the basis of a single preserved specimen taken by DOFLEIN in the Sagami Bay. Of the characters pointed out by her as distinctive of the species, the deep situation of the sense-organ is apparently the most striking. This, taken together with the unusual length of subpharyngeal ribs, seems to afford the most important distinctive criterion between this species and allied forms. The size of lappets and of auricles in relation to that of the entire body varies considerably with age of the animal, as in other species of the same genus.

Genus **Leucothea,** Mertens.

(*Eucharis,* Eschscholtz.)

3. ***Leucothea japonica,*** n. sp. (Pl. VII, fig. 3).

Body compressed, rectangular in cross-section. Tentacular axis about 2/3 as long as pharyngeal axis, and slightly over 1/4 the length of body proper. Lappets moderately large and about as long as body proper. Auricles very long and worm-like, often coiled into helices; attached to the oral 1/4–1/3 of body. Aboral sense-organ deeply sunken; being situated at the bottom of a cleft as deep as 1/4 the length of body proper. Prominences above the sense-organ tolerably conspicuous, passing over into the intercostal ridges at interradial corners of body. Surface of body beset with conical papillæ. All ribs originate at the same level and at that of the aboral end of meridional canals. Subtentacular ribs reach somewhat beyond base of auricles, subpharyngeal ribs a little beyond margin of mouth. Combs fairly numerous; in a specimen 80 mm. in length of body proper, they numbered about 75 in each subtentacular, and about 110 in each subpharyngeal, rib Pharynx about 2/3 as long as body proper; pharyngeal folds not so long as in *L. multicornis*, being restricted to the aboral 2/5–1/2 of pharyngeal wall. Subtentacular adradial canals open into meridional canals at a point somewhat below the aboral end of latter, as is usual in the genus. The course of the internal branches of lappet-canals could not be followed out, owing to damages of those parts in all specimens at my disposal. Sexual products develop in blind-sacs of meridional canals, a pair of which sacs occur to each comb. Both primary and secondary tentacles are present; the former is simple, without branches. The long blind sacs on either side of the broader surface of body is similar to the same in other species of the genus.

Colour.—Body faintly brick-red; pharyngeal canals and lateral blind-sacs of meridional canals somewhat more deeply so than other parts. Margin of lappets tinged with amber-yellow, generally deeper in tone in lateral than in inferior parts.

Specimens examined.—Four specimens, 53–120 mm. in length of body proper, were examined at Misaki between Dec. 30, 1917 and Jan. 9, 1918.

The ctenophore is extremely delicate in texture and becomes very readily injured by influences of disturbed water. It comes to the surface of water only when the sea is smooth after a succession of some days of calm weather.

Remark.—Without doubt this ctenophore is very closely related to the Atlantic *L.* (*Eucharis*) *multicornis*. However, all the ribs seem to be somewhat longer, and the pharyngeal folds are distinctly shorter than in the latter; and moreover, the yellowish hue of lappet margin is peculiar to the former. These facts, coupled with distinctness in their geographical distribution, may suffice to specially distinguish the two forms. ESCHSCHOLTZ (1829, p. 30, Pl. I, fig. 2) has recorded a form which he referred to the genus *Eucharis* from the North Pacific, east of Japan. But his description as well as the accompanying figure are too imperfect to form any clear idea of that form. Some recent authors (among whom is MOSER, 1908, p. 47) have expressed the view that the ctenophore is nearer to *Lesueuria* rather than to *Eucharis*. This view is not unwarranted, since the ctenophore in question was represented by him to be without lappets though provided with well-developed auricles. And yet there seem to be sufficient grounds left for the assumption that ESCHSCHOLTZ may have been quite right in referring his form to *Eucharis*. The colour of the body, the papillæ on the surface, and also the dimensional proportions of the body, apparently stand in favour of this assumption. Moreover, his description of the auricules as "vier vierkanntige zolllange Fortsätze, die sehr schmal sind, in ihrer ganzen Länge eine gleiche Dicke behalten, und an ihren Kanten mit Reihen von Schwimmfäden besetzt sind," conforms precisely to the condition of the same organ in *Eucharis*, but not to that in *Lesueuria*. Furthermore, the lappets in *Eucharis* are, as CHUN (1880, p. 297) has remarked, body parts which present a high degree of variation as regards development. Thus, an individual (l. 53 mm.) came under my examination in which the lappets were merely represented by a pair of inconspicuous processes. Also it should not be forgotten that the lappets are extremely liable to damages and are easily torn off unless handled with great care. It is therefore not altogether impossible that ESCHSCHOLTZ had before him really an *Eucharis* but with the lappets either torn off or not normally developed. As to the question whether or not ESCHSCHOLTZ's *E. tiedemanni* is specificially identical with the form under treatment, no positive answer can be given. In spite of this uncertainty, I have deemed it advisable for the present to describe the latter as a new and distinct species.

Genus **Ocyropsis,** Mayer.

(*Ocyroë*, Rang.)

4. ***Ocyropsis fusca*** (Rang.) (Pl. VII, fig. 4).

Ocyroë fusca, Moser, 1903, p. 17.——Moser, 1908, p. 65.

Ocyroë crystallina, Mayer, 1900, p. 81, Pl. xxxi, fig. 105.——Moser, 1903, p, 17.——Moser, 1908, p. 65.

Ocyropsis crystallina, Mayer, 1912, p. 38, Pl. x, figs. 55, 56.

Ocyroë maculata, Fewks, 1881, p. 137, Pl. iv, figs. 1-4.——Moser, 1903, p. 18.——Moser, 1908, p. 66.

Ocyropsis maculata, Mayer, 1912, p. 40.

The body is strongly compressed in the direction of tentacular axis; this is especially marked in large specimens (body proper over 40 mm. high), in which the pharyngeal axis is nearly three times as long as the tentacular axis, while in smaller ones, the former is only about twice as long as the latter. Vertical axis is moderately shorter than pharyngeal axis. The aboral pole is subtruncate, presenting but a slightly arched surface of a considerable extent. The sense-organ is situated at the bottom of a shallow depression. The polar plates are very narrow and unusually long, being only slightly shorter than half the length of subpharyngeal rib. All ribs run parallel with one another and with the pharyngeal plane of body. They begin close to the sense-organ and terminate at base of lappets. The subpharyngeal ribs are nearly twice as long as the subtentacular and may comprise twice as many comb-plates as the latter. The comb-plates in large individuals number 60–75 in a subpharyngeal and 30–40 in a subtentacular rib. Lappets are well-developed, somewhat longer than 1.5 times the body height, and nearly 1.5 times broader than long. They contain powerful muscles which enable the ctenophore to swimm very actively by flapping movements of the lappets. The lappet margin is simply rounded, not divided into two wings as was said to be by some authors. Auricules are roughly cylindrical; their distal end falls usually somewhat short of the margin of mouth, probably never reaching beyond it. The pharynx is very long, occupying nearly 4/5 the height of body, and is strongly constricted at a point about 3/5 the pharyngeal length from mouth. Pharyngeal folds present at aboral end of pharyngeal wall as a pair of transverse semilunar areas of a whitish colour. The meridional canals are provided with lateral branches, which occur not only in the parts beyond the oral end of subpharyngeal ribs but also in those parts which underlie ribs, subpharyngeal as well as subtentacular. As a rule, a branch occurs on either side below each comb-plate. All these branches are thin and very delicate, showing only a few furcations in their course. The branches departing from subpharyngeal canals in the parts not covered by the rib, are much better developed than those more superiorly situated, and are more conspicuous on account of the milky colour of the genital element lodged in them. In all the individuals examined, the branches in question showed considerable difference both in length and breadth on the two sides of the canal, being much longer and broader on perradial than on interradial side. The winding of lappet canals as well as of the branches of pharyngeal canals are highly complicated as shown in the figure. A diversity of opinion prevails among the previous authors concerning the presence or absence of the tentacle apparatus in *Ocyropsis*. MOSER stood for its presence (1908, p. 66), but this fact was denied by MAYER (1912, p. 40); whereas, FEWKS has given a rather ambiguous statement that, "the tentacles, if present, are short and inconspicuous" (1881, p. 138). The result of my examination stands in confirmation of MOSER's view. The tentacle apparatus is certainly very small and inconspicuous for the size of the animal; nevertheless, its presence can be ascertained without difficulty with the naked eye. It is situated a little below the level of the constricted point of the pharynx, presenting itself as a tiny knob-like body, connected as usual with the infundibulum by the tentacular canal. Sections show that the knob consists of the terminal bifurcated part of the tentacular canal and of a rudimentary tentacle basis intercalated between the canalar branches. The tentacle apparatus is thus in a very reduced condition in the adult; in younger stages, however, it is more typically represented, as will be described further on.

Colour.—Judging from the statements of previous authors, the three species of *Ocyropsis* originally described by RANG, viz., *O. fusca*, *O. crystallina* and *O. maculata*, seem to have been distinguished exclusively on the basis of colouration. According to my observation, however, this seems to be a very variable character. Among more than twenty fresh specimens taken from a great swarm which appeared at Misaki on April 1 of this year, I have met with some representatives of all the above three forms. All the individuals observed on that day showed a suffusion of chestnut-brown colour on the entire inner surface of lappets. This suffusion varied considerably in degree. In many cases it was fairly deep, making the individuals referable to "*O. fusca*." In other cases the suffusion was so slight as to be barely discernible, apparently representing the state of colouration ascribed to "*O. crystallina*." Finally, a few individuals bore two conspicuous dark patches on the suffused ground, a condition which without question identifies them with "*O. maculata*." The fact that all the three states of colouration are represented in individuals of the same swarm, makes it highly probable that we have here to do merely with individual variations within a species. The above specimens were 15–55 mm. in the height of body proper. In individuals smaller than 20 mm. in height, the gonads are not yet developed, but the winding of lappet-canals and of the branches of pharyngeal canals have nearly attained the condition seen in the adult.

Of the three alcoholic adult specimens from Tateyama Bay, which were examined, two showed clearly the chestnut-brown suffusion, one with and the other without the patches, while the third showed neither the suffusion nor the patches.

A very young specimen closely approaching both in size and in structure the one figured by MAYER (1912, Pl. X, fig. 55) was captured at Misaki, Dec. 29, 1916. It measures about 10 mm. from end to end of horizontally extended lappets. The auricles are short and semilunar in shape. In each octant of the body only a single comb is fully developed; the second exists but in a rudimentary state, although it may bear a few cilia in some octants. The condition of lappet-canals is nearly precisely the same as depicted in the figure above referred to. The tentacles are distinct and are furnished with a few number of branches. The tentacular canals are also very distinct. These proceed from the infundibulum and terminate each in two branches at the base of tentacle. The animal was perfectly colourless in the fresh state. In sections of this specimen I have ascertained the presence of colloblasts in the tentacles.

Genus **Cestum,** Lesueur.

(*Cestus*, Chun.)

5. *Cestum amphitrites* Mertens.

Cestum amphitrites, Bigelow, 1912, p. 396.
Cestus amphitrites, Moser, 1908, p. 14.
Cestus veneris, Chun, 1880, p. 301 (partim).
Cestum veneris, Mayer, 1912, p. 44 (partim).
Cestus pectinalis, Bigelow, 1904, p. 267, Pl. viii, fig. 30.——Moser, 1908, p. 13.

There seems to exist no important structural difference between this species and *C. veneris*, as far as can be judged from the existing descriptions of the latter species. The body is long and ribbon-shaped, slightly narrowing towards both extremities which are broadly rounded. The aboral margin is vaulted, and is 2.5 times as wide as the oral margin which is pronouncedly concave. The body is thickest midway between the oral and aboral margins along the line of subtentacular canals. The apical sense-organ is slightly depressed beneath the level of the aboral body surface. The condition of the polar plates as well as of the crest-like prominences on either side of them seems to be precisely the same as in *C. veneris.* The comb-plates are very numerous and closely set; their number in a subtentacular rib is 12–14 in the larger individuals and 8 or less in the smaller. The pharynx in large individuals is about six times and in smaller ones about three times as long as the infundibular canal. The arrangement of gastrovascular canals are perfectly similar to the condition described from *C. veneris.* Primary tentacles are absent.

Colour.—The tentacle sheath and the area adjoining it are generally tinged with amber-yellow. Frequently a line of the same colour runs along the subtentacular meridional canals. More rarely, the lateral extremities of body show each a patch of the same colour. The surface of the body, especially near the lateral extremities, is besprinkled with minute dots of a light-bluish colour which displays iridescence. In large individuals, the subpharyngeal meridional canals are faintly brick-red, and the areas between the branches of pharyngeal canal and the basal edge of body are of a bright vermilion colour.

Specimens examined.—Eight (length 15–50 cm.) from Misaki, Dec. 28, 1917; one (length about 60 cm.) from the same locality, April 1, 1918.

Remark.—As stated above and also remarked by BIGELOW (1912, p. 396), scarcely any structural difference seems to exist between *C. amphitrites* and *C. veneris.* As the only noticeable point of difference between them, it was pointed out by the author just mentioned (p. 397), that the oral margin of the band-like body is about as broad as the aboral margin in the former, instead of being very much narrower as in the latter. But in all the individuals of *C. amphitrites* examined by me, I found the aboral margin to be considerably broader than the oral margin, precisely as is the case with *C. veneris.* It may not be superfluous to note that the number of comb-plates representing a subtentacular rib is somewhat larger than that usually given for *C. veneris.* While both CHUN (1880, p. 83, Pl. xiii, figs. 4, 8) and MAYER (1912,

p. 44) have given the number of combs in the rib in question in that species to be four, I find it to be 12–14 in the larger, and 8 or less in the smaller, specimens of *C. amphitrites* at my disposal, It appears that in *C. veneris* also, the number is not constant, since DELAGE and HÉROUARD mention it to be 4–6 (1901, p. 751), while FOL has represented 6–7 combs in his figure (1869, Pl. ii, fig. 6). Thus, it seems futile to lay much weight on this point. The difference of colouration between the two species probably affords a more reliable criterion for distinguishing them. As remarked by BIGELOW (1912, p. 397), the occurrence of the yellowish tint in various parts of the body, coupled with the presence of a vermilion band along the oral margin on either side of body, constitutes a characteristic feature of *C. amphitrites*.

Cestum amphitrites has hitherto been recorded exclusively from the Eastern Tropical Pacific. BIGELOW described a form from the Maldives under the name of *C. pectinalis* (1904, p. 267, Pl. viii, fig. 30), but this is probably specifically identical with the form just mentioned. It is doubtful if ESCHSCHOLTZ's *C. najadis* (1829, p. 23, Pl. i, figs. 1–1 c) from the South Seas can likewise be referred to *C. amphitrites*, since he has mentioned the occurrence of primary tentacles in his form and has given clear figures of these.

Genus **Beroë**, Browne.

6. ***Beroë cucumis*** Fabricius (Pl. VII, fig. 5).

Beroë cucumis. Eschscholtz, 1829, p. 36.——Vanhöffen, 1903, p. 7.——Moser, 1903, Bestimmungstabelle.——Römer, 1903, p. 81.——Moser, 1907, p. 453.——Moser, 1908, p. 24.——Mortensen, 1912, p. 83 (partim).——Mayer, 1912, p. 52, Pl. xv, fig. 67, Pl. xvii, fig. 76.

Idya roseola, L. Agassiz, 1860, pp. 270, 296, Pls. i, ii.——A. Agassiz, 1865, p. 36.

The body is fleshy and mitre-shaped, compressed in the direction of the tentacular axis. It varies markedly in the ratio of length and breadth; the pharyngeal axis may be 3/4 as long as the vertical axis, but may fall under 1/3 of the latter. The length of tentacular axis measures generally about half the pharyngeal axis. Viewed at on the pharyngeal plane, the body is broadest at some distance below the aboral pole and gently narrows towards the oral end which is about half as broad as the greatest width of body. The ribs are all roughly of the same length, although the subtentaculars are really slightly shorter than the subpharyngeals; they occupy the aboral 3/4–5/6 of the entire length of meridional canals. The comb-plates are very numerous and closely set; in large individuals as many as 300 of them occur in each rib. The distance between subtentacular ribs measures usually about twice that between subpharyngeal ribs. The sabre-shaped cilia on the wall of pharynx are rather short and inconspicuous (length about 25 μ, breadth about 2.5 μ). The meridional canals send out on either side several branches, which in large examples, show some anastomoses among them. These branches do not join with the pharyngeal canal, except in large specimens which may exhibit such communication at a few places. This communication usually numbers only one or two to each pharyngeal canal, though in a single case there existed eight communications to one of the canals and nine to the other. In small specimens the branches of meridional canals anastomose neither among themselves nor with pharyngeal canals. The sexual products develop in the wall of meridional canals alone.

Colour.—Small specimens are transparent and dotted with dark reddish spots; the larger ones are translucent and faintly rosy, covered all over with minute pinkish dots.

Specimens examined.—This is one of the commonest ctenophores in the vicinity of Misaki. The following specimens were studied either in the living state or after preservation:—One (l. 75 mm.), Dec. 26, 1916; one (l. 50 mm.), Feb. 24, 1917; four (l. 45—88 mm.), between Dec. 30, 1917 and Jan. 9, 1918; five (l. 78–127 mm.), April 1, 1918; one (l. 142 mm.).

Remarks.—Most of the recent authors have accepted CHUN'S view in making distinction between *B. cucumis* and *B. ovata.* According to that view, the branches of meridional canals in the latter species should show communications not only among themselves but also with the pharyngeal canal; whereas, in the former such communications should be altogether lacking. MORTENSEN (1912, p. 83) alone has stood against this distinction and has maintained that the character in question is too variable to rely on and that the two "species" only represent two phases of one and the same species. In the specimens of *B. cucumis* examined by me, as already described, the lateral branches of meridional canals do show a small number of anastomosis among themselves and a few communications with pharyngeal canal. Thus, it is clear that the distinction set up by CHUN can not be held up, indicating that MORTENSEN is probably right in his opinion. Possibly a point of difference between the two forms referred to consists in the size of eggs. One morning in the beginning of April, 1918, some individuals of *B. cucumis*, kept alive in a glass jar at Misaki, were found to have laid eggs. These measured 0.4–0.5 mm. in diameter. AGASSIZ should have given 0.5–0.6 mm. for the size of eggs of the same species (called by him *Idya roseola*) of the coast of North America (known to me through CHUN, 1880, p. 100). Now the eggs of *B. ovata*, according to YATSU (1912, p. 2) should have a diameter of 1–1.2 mm. CHUN (1880, p. 100) also has mentioned that the largest ova of that species measured 1.2 mm. in diameter. It must then be said that the egg of *B. cucumis*, in comparison with that of *B. ovata*, is half as small or even smaller.

7. ***Beroë campana,*** n. sp. (Pl. VII, figs. 6, 6 a).

The body is mitre-shaped, and distinctly compressed, the ratio of the three main axes being on the average approximately 10 : 7 : 2. The apex is rather acute; the polar plates are exposed. The mouth is large, being almost as wide as the body itself, and is without lip-like projections. The distance between subtentacular ribs is greater than that between subpharyngeal ribs, the ratio being usually 5 : 4 and sometimes 3 : 2. The subtentacular ribs are almost always shorter in varying degrees than the subpharyngeal ribs, the difference of length being very slight in large individuals but fairly marked in the smaller. As will be seen from the following table, the degree of difference in the length of the two kinds of ribs is, roughly speaking, inversely proportional to the size of body.

Body length.	Ratio of the length of subtentacular rib to that of meridional canal.	Ratio of the length of subpharyngeal rib to that of meridional canal.
Over 30 mm.	(Subpharyngeal rib only slightly longer than subtentacular rib).	
20–30 mm.	3 : 4	4 : 5
15–20 mm.	2 : 3	4 : 5
5–10 mm.	Less than 1 : 2	2 : 3

The comb-plates are very numerous and closely set; I have counted as many as 200 of them in each rib of an individual of 62 mm. length. The area of sabre-shaped cilia on the pharyngeal wall is not prominent. The cilia are small, measuring 25 μ in length and 2.5 μ in breadth on the average. The meridional canals are provided with a number of side-branches, which, in large specimens, repeatedly divide and present a dendritic appearance; but no anastomosis occurs, excepting a few near the oral margin of body. The level of the origin of side-branches from meridional canal differs in the same way as MOSER has described for *B. cucumis* (1908, p. 24, figs. 1, 2): on the perradial side, the branches arise from the parts near body-surface, and on the interradial side from deeper parts of the canal. The pharyngeal canals never send out branches. The marginal canal of oral aperture sends out numerous branches on both aboral and oral sides; some of these, on the narrower sides of body, join with the side-branches of meridional canals. The location of gonads is noteworthy. The ovaries, situated on the perradial side of meridional canals, are developed on the wall of those canals as well as on that of the basal parts of the canalar branches of the same side. The testes develop on the interradial side of the canals and also in special simple or branched blind-tubes arising at positions more external than ordinary canalar branches of the side. Some of the branches from the marginal canals around the mouth also contain sexual elements; this is especially the case in those branches occurring on the narrower sides of body. All the parts of canalar branches, in which the gonads are contained, become swollen and are conspicuous on account of their milky colour.

Colour.—Transparent and almost colourless, or slightly pinkish, especially along meridional canals and their larger branches. The gonads appear milky white, as indicated above.

Specimens examined.—A number of specimens were studied in the living state and also after preservation: One (l. 62 mm.) from Misaki, Dec. 30, 1916; thirty eight (l. 1.5–42 mm.) from Tokyo Bay, Sept. 2, 1917; one large specimen from Tateyama Bay, April, 1913.

This seems to be one of the commonest ctenophores in the waters of the neighbourhood of Misaki. On Sept. 2 of last year, very large swarms of the species were met with in the Gulf of Tokyo.

Remark.—It is not impossible that MOSER'S *B. hyalina* (1907, p. 450; 1908, p. 27, Pl. i, figs. 4, 5) is identical with this species, sharing, as it does, with the latter the identity of locality, the simpleness of pharyngeal canals as well as the delicacy of body texture. Nevertheless, the description given by her of that species does not accord well with the characters of the present form in the following important points: The location of gonads, as given by her for *B. hyalina*, is entirely different; all the intervals between ribs are said to be nearly equal, all the ribs to be of the same length, and the marginal canals to be without branches. Now, eight specimens before me of about the same size (l. 10–16 mm.) as those which were at MOSER's disposal (l. 11–

15 mm.), stand at variance with her description in the strongly compressed body-form, in the striking diversity of the length of ribs, in the unequalness of the intervals between ribs, and in that the marginal canals send out a number of branches. It thus seems necessary to specifically separate the present form from *B. hyalina*.

8. ***Beroë forskålii*** Milne-Edwards (Pl. VII, figs. 7, 7 a).

Beroë forskalii Chun, 1880, p. 309, Pl. xiv, figs. 3-5.——Moser, 1903, Bestimmungstabelle.——Torrey, 1904, p. 47, Pl. i, fig. 2.——Moser, 1908, p. 26.——Bigelow 1912, p. 387.

Beroë australis, Agassiz and Mayer, 1898, p. 177, Pl, xvi, figs. 49, 50.

The body is subconical and very strongly compressed, the width along tentacular axis being 1/3 or somewhat less than 1/3 that along pharyngeal axis, which is 3/5–2/3 as long as the vertical length of body. Subpharyngeal ribs of each pair are disposed very close together, especially in the aboral region where the two almost touch each other; the greatest distance between them measures somewhat less than half that between subtentacular ribs forming a pair. Superiorly the body is moderately narrowed toward the pointed apex; the mouth is very wide, its margin looking like two lips of fair thickness. The area of sabre-shaped cilia is precisely similar in outline to that shown in CHUN's monograph (1880, Pl. xiv a, fig. 8). The cilia are large (l. about 45 μ., b. about 4.5 μ) and visible to the naked eye. The ribs are all of nearly the same length and are made up of very closely set comb-plates bearing unusually stiff cilia. I have counted as many as about one hundred plates in each rib of an individual of 28.5 mm. long. The meridional canals send out numerous branches on either side; these make anastomoses profusely between them, and also communicate with pharyngeal canals, bringing about a fine-meshed network of canal-system. The branches of meridional canals are less numerous on the narrower sides of body than on the broader; and those which occur in the aboral quarter of the former scarcely undergo anastomosis. The gonads develop in the lateral branches of meridional canals to the extent of 1 mm. at their base. In two young specimens before me (l. 8.5 mm. and 10 mm.), the subtentacular ribs are moderately shorter than the subpharyngeal ribs; some ten branches arise from either side of subtentacular canal and many of them join with the pharyngeal canal.

Colour.—An individual which I could examine in the fresh state showed a conspicuous colouring. The ground colour of the entire animal was faintly pinkish, which colour deepened towards the aboral pole; the narrower sides of body were dotted all over with conspicuous round spots of a reddish brown; the mouth was bordered by a band of the same colour lighter in tone. On the broader body surface, the aboral one-third was thickly dotted with round dark-orange spots, which area gradually passed over, both above and below, into that of the general ground colour. In formalin, the colours have entirely faded away.

Specimens examined.—One in the living state (l. 36.5 mm.), Misaki, Dec. 30, 1917; one (l. 47 mm.) in alcohol, Tateyama Bay, April, 1899; one (l. 56 mm.) in alcohol, Tateyama Bay. April, 1898; one (l. 28.5 mm.) in formalin, Misaki, Dec., 1917; two (l. 8.5 mm. and 10 mm.) in formalin, Misaki, Dec., 1917.

Remark.—In agreement with MOSER (1908, p. 27), it is with some degree of hesitation that I refer the form under consideration to *B. forskålii.* At any rate, there can be no question of its very close relationship to that species. The fineness of the network of canalar branches in relation to the smallness of body, and the deep tone of colouration are points in which the Japanese form does not seem to agree quite with the descriptions of *B. forskålii.* However, since this species is known to vary considerably in those characters, it may be advisable to have the Japanese form referred to it until definitely disproved in the future.

9. *Beroë mitrata* (Moser) (Pl. VII, fig. 8).

Pandora mitrata, Moser, 1907, p. 451.——Moser, 1908, p. 34, Pl. i, figs. 1-3.——Bigelow, 1912, p. 389.

Two specimens obtained at Misaki on April 1, 1918, agree fairly well with MOSER's description and figures of the species from Hokkaido. The following description is based on the larger (l. 28 mm.) of the two. The body is mitre-shaped and much compressed, the ratio of three axial lengths being 10 : 5 : 2. The aboral pole is moderately pointed ; the polar plates are exposed and provided on the margin with the usual papilliform processes. The interval between paired subpharyngeal canals is about 2/3 that between the subtentacular. The ribs are all very short ; the subpharyngeals being nearly half, and the subtentaculars about 1/3, as long as the meridional canals. The former consists of abont 50 comb-plates and the latter of about 30. The mouth is large and the pharynx very spacious. The sabre-shaped cilia on the wall of pharynx are of an enormous size, being nearly as long and thick as those found in *B. forskålii*. The branches of meridional canals are not very numerous. They are rather simple, showing only a few furcations and run in the main obliquely towards the mouth. No anastomosis occurs among them. Further, there exist branches which, issuing from the deeper parts of meridional canals, are distributed on the surface of pharynx and unite with pharyngeal canals. Such branches occur mainly in the oral parts of body, forming a coarse-meshed network in the pharyngeal wall. The gonads develop from the wall of meridional canals, except for a short stretch at their oral end.

Colour.—This individual was faintly rosy-coloured along the meridional canals. A patch of orange colour occurred on either broad surface of body between subtentacular canals.

The second smaller specimen (l. 17 mm.) agrees with the above-described in all essential features.

This ctenophore is very active in movement. One of the specimens tried to swallow an *Ocyropsis*, several times larger in size. It was further observed that the animal sometimes turned itself inside out, to return to the normal condition after some time.

Remark.—*B. mitrata*, first described by MOSER under the name of *Pandora mitrata*, may be distinguishable from all allied species by the two sets of ribs differing considerably in length, by the characteristic distribution of branches of meridional canals, and by the presence of a network of canals in the oral parts of pharyngeal wall. The genus *Pandora*, first established by ESCHSCHOLTZ, was later merged into *Beroë* by CHUN, and has recently been reinstated by MOSER. According to the last-named authoress, the genus comes very near to *Beroë*, but is distinguishable from it chiefly by the shortness of ribs and by the subpharyngeal ribs being longer than the subtentacular ribs. Such a condition of the ribs, however, is very commonly presented by various species of *Beroë*, especially in their young stages, as for instance, by half-grown individuals of *B. campana*. In the species just mentioned, I may say, on the basis of my own observation, that the shortness and unequalness of ribs in length is a normal character in the young. The same apparently holds true for *B. forskålii* also. MAYER has likewise pointed out (1912, p. 54) that the same condition is very often met with in the young of *B. ovata*. Now *Pandora* was made to comprise three species besides two doubtful ones, all of which have been described from animals of a small size (*P. flemmigii*, 3–25 mm.; *P. pandorina*, 2–6 mm.; *P. mitrata*, 5–28 mm.). From this it may be assumed that all the forms stand represented by young individuals with ribs of unequal length, which character later diminishes considerably or disappears altogether. If that be so, *Pandora* would lose almost all grounds for being held separate from *Beroë*.

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Explanation of Plate VII.

Fig. 1.	*Hormiphora palmata* Chun.	×2.
Fig. 2.	*Bolinopsis mikado* (Moser).	×6/5.
Fig. 3.	*Leucothea japonica*, n. sp.	×1.
Fig. 4.	*Ocyropsis fusca* (Rang).	×4/5.
Fig. 5.	*Beroë cucumis* Fabricius.	×1.

An individual with some anastomoses among branches of meridional canals and with one communication between one of such branches and a pharyngeal canal.

Fig. 6.	*Beroë campana*, n. sp.	×1.5.
Fig. 6a.	The same, young individual.	×3.
Fig. 7.	*Beroë forskålii* Milne-Edwards.	×2.5.
Fig. 7a.	The same, young individual.	×4.
Fig. 8.	*Beroë mitrata* (Moser).	×1.5.

On a Collection of Ophiurans from the Vicinity of Kinkwasan, with Description of a New Species.

By

H. Matsumoto, *Rigakushi, Rigakuhakushi.*

With 2 figures in text.

Of the ophiuran fauna of the vicinity of Kinkwasan, Rikuzen, *Asteronyx loveni* MÜLLER & TROSCHEL, *Ophiolebes asaphes* CLARK, *Ophiopholis mirabilis* (DUNCAN), *O. aculeata* var. *japonica* (LYMAN), *Ophiothrix marenzelleri* KŒHLER (= *O. hylodes* CLARK), *Stegophiura sculpta* (DUNCAN), *S. sterea* (CLARK), *S. sladeni* (DUNCAN) (= *Ophiura stiphra* CLARK), *Ophiura sarsii* LÜTKEN, *O. flagellata* (LYMAN) and *Ophionereis eurybrachiplax* CLARK have been recorded by CLARK, and *Ophiophragmus japonicus* MATSUMOTO by me. In July, 1915, I made some collection in that vicinity on board the "Tôkwamaru" and obtained representatives of the majority of these species besides two additional ones, one of which appears to be new to science. I here propose to make some notes on them.

1. *Asteronyx loveni* MÜLLER & TROSCHEL.

CLARK, Mem. Mus. Comp. Zool., XXV, No. 1, 1915, p. 180; MATSUMOTO, Journ. Sci. Coll., Tokyo, XXXVIII, Art. 2, 1917, p. 33.

Five specimens; S. E. E. of Kinkwasan; 104 fathoms.

2. *Astrothrombus chrysanthi*[1], sp. nov.

Two specimens; S. E. S. of Enoshima, N. from Kinkwasan; 43 fathoms.

1) This specific name is derived from the name of the type locality, "Kinkwasan," which means "Gold Flower Mountain."

Diameter of disk 6.5 mm. Length of arm 25 mm. Width of arm at base 1.5 mm.

Disk five-lobed, with indented interbrachial borders. Dorsal surface of disk covered with granules and rounded convex plates of unequal size. The plates are coarser and more close-set along the radii and interradii, where the granules are not so numerous as to form belts around the plates. The more convex ones of the plates are nearly hemispherical. The radial and interradial parts covered by these plates are more elevated than the surrounding parts covered with the granules; so that, the dorsal surface of the disk presents ten radiating ridges alternating with ten radiating furrows. Radial shields partly naked; the naked parts are pear-seed shaped or irregularly oval, rather unequal in size, one third to two fifths as long as the disk radius, about twice as long as wide, widely separated from each other.

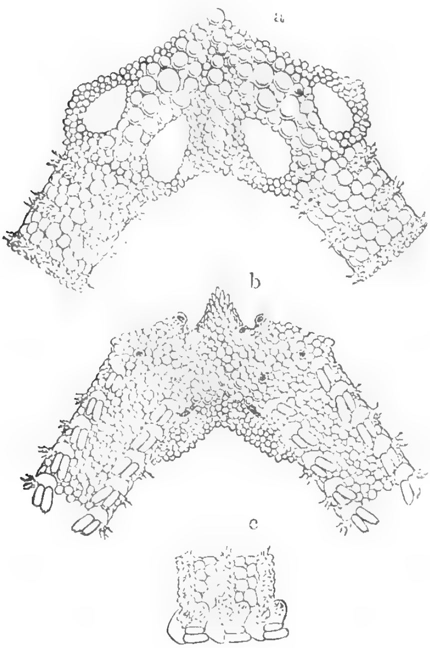

Fig. 1.

Astrothrombus chrysanthi, sp. nov. ×8.
a. From above. *b*. From below.
c. Lateral view of three arm joints near disk.

Interbrachial ventral surfaces covered with granules similar to those of the dorsal side, but without plates. Genital slits very small, short, situated at the inner, adradial corners of the interbrachial ventral surfaces; those of the same interradius diverging outwards. The areas just inside the interbrachial ventral surfaces are covered with a pavement of coarse, polygonal or rounded, flattened grains of unequal size, and mingled among them are a number of coarse, hemispherical tubercles. A single madreporic shield, situated at the inner angle of an interbrachial ventral surface, small and rather insignificant. Oral angles constricted off from the outer parts by a shallow groove, covered by a pavement of coarse, polygonal or rounded grains. The grains near the apices of the oral angles show a tendency to be papilla-like. Dental papillæ and teeth alike, spiniform, acute. Oral papillæ absent. Second oral tentacle pores visible from below, situated on either side of the outer end of the oral slit, opening by means of a short cutaneous tube, which contains very fine granules.

Arms stout at the base, gradually tapered outwards. Dorsal and lateral surface annulated with double rows of granules, which bear minute compound hooks. Interannuli covered with coarse, polygonal or rounded, more or less flattened grains, which are arranged irregularly in two, or sometimes three, transverse rows. The hook-bearing annuli of one or two first free arm joints interrupted at the dorsal median parts by coarse, polygonal or rounded, flattened grains similar to those of the interannuli. At the lower lateral end of each interannulus, there is a large, rounded plate, which also bears minute hooks. Ventral surface of arm covered with a pavement of coarse, polygonal or rounded, flattened grains, which are coarser within the disk and finer outwards. First brachial tentacle pores without any naked lateral arm plate and arm spine. Those beyond protected by a small, convex, ridge-like, naked lateral arm plate and by two, or sometimes three, peg-like arm spines with thorny tips. The adradial spine is longer and stouter than the abradial, and slightly longer than, or about as long as, half the corresponding arm joint. The abradial one is shorter than half the same.

Colour in alcohol, light brown or whitish.

This new species is evidently near to both *Astrothrombus rugosus* CLARK[1] from New South Wales and *Astrothorax misakiensis* DÖDERLEIN from the Sagami Sea. The former is stated to have the disk plates and radial shields of very irregular size and two or three arm

1) Mem. Austr. Mus., IV, 1909, p 548.

spines to each tentacle pore, and the latter to have the disk plates and radial shields of very regular size and arrangement and three to seven arm spines to each tentacle pore. The disk coverings of the present species are not so irregular as in the former, and not so regular as in the latter. In the number of the arm spines, the present species is nearer to the former than to the latter. Moreover, I have some doubts as to the generic distinction of *Astrothorax* from *Astrothrombus*. So that, I am inclined to refer the present species to *Astrothrombus* at least for the present.

3. ***Ophiopholis mirabilis*** (DUNCAN).

CLARK, loc. cit., p. 268; MATSUMOTO, loc. cit., p. 160.

Numerous specimens; off Ayukawa, 17 fathoms. Numerous specimens; S. E. S. of Enoshima, N. from Kinkwasan; 43 fathoms.

4. ***Ophiophragmus japonicus*** MATSUMOTO.

CLARK, loc. cit., p. 239; MATSUMOTO, loc. cit., p. 183.

Numerous specimens; off Oginohama, as already reported by me.

5. ***Amphipholis pugetana*** (LYMAN).

CLARK, loc. cit., p. 242; MATSUMOTO, loc. cit., p. 191.

One specimen; S. E. S. of Enoshima, N. from Kinkwasan; 43 fathoms.

So far as known, this locality is the southern limit of the present species along the western border of the North Pacific.

6. ***Ophiothrix marenzelleri*** KŒHLER.

CLARK, loc. cit., p. 273 (*O. hylodes*); MATSUMOTO, loc. cit., p. 273.

One specimen; off Ayukawa; 17 fathoms.

7. ***Stegophiura sterea*** (CLARK).

CLARK, loc. cit., p. 317; MATSUMOTO, loc. cit., p. 258.

Numerous specimens; S. E. S. of Enoshima, N. from Kinkwasan; 43 fathoms. Two specimens; S. E. E. of Kinkwasan; 104 fathoms.

8. ***Stegophiura sladeni*** (DUNCAN).

CLARK, loc. cit., p. 317; MATSUMOTO, loc. cit., p. 259.

Numerous specimens; S. E. S. of Enoshima, N. from Kinkwasan; 43 fathoms. Numerous specimens; S. W. S. of Enoshima, N. from Kinkwasan; 31 fathoms.

9. ***Ophiura sarsii*** LÜTKEN.

CLARK, loc. cit., p. 323; MATSUMOTO, loc. cit., p. 272.

Numerous specimens; off Ayukawa; 17 fathoms. Numerous specimens; S. E. S. of Enoshima, N. from Kinkwasan; 43 fathoms. Three specimens; S. W. S. of Enoshima, N. from Kinkwasan; 31 fathoms.

10. ***Ophionereis eurybrachiplax*** CLARK.

CLARK, loc. cit., p. 289; MATSUMOTO, loc. cit., p. 336.

Three specimens; E. of Kinkwasan; 43 fathoms.

In the very rudimentary condition of the supplementary dorsal arm plates, the present species stands nearest to *Ophiodoris*, of all the known species of *Ophionereis*. The same holds true also of certain internal structures. The peristomial plates are double, the common outline of the oral and dental plates in dorsal view is II-shaped and the teeth are quadrangular, quite as in the majority of the *Ophionereidinæ*. The lateral wings of the oral frames are of course well developed, and better developed than in *Ophiodoris pericalles* CLARK (MATSUMOTO, loc. cit., pl. VI, figs. 10 and 11), but less so than in *Ophionereis annulata* LE CONTE (ditto, pl. VII, fig. 1), *O. reticulata* LÜTKEN (ditto, pl. VII, fig. 2) and *Ophiocrasis marktanneri* MATSUMOTO (ditto, pl. VII, fig. 3). The shortest one of the basal vertebræ is not the first as in *Ophiodoris*, but the second as in the other *Ophionereis* and in *Ophiocrasis*. The dorsal side of the vertebræ of the free arm joints is notched inwards more strongly than in *Ophiodoris*, but much more feebly than in the other *Ophionereis* and in *Ophiocrasis*. In short, so far as these characters are concerned, the present species stands between

Ophiodoris and the other *Ophionereis*, as *Ophiodoris* does between the *Ophiochitoninæ* and the other *Ophionereidinæ*.

Further, the present species reminds us of the *Ophiocomidæ*, though in a minor degree, in the wide arms and dorsal arm plates and in the presence of four, instead of three, arm spines. I have already pointed out that, the notched dorsal side of the vertebræ is a character of a different line of specialisation of the *Ophionereidinæ* in contrast to the *Ophiocomidæ*, and that, the less specialised forms of the *Ophionereidinæ* in this character, such as *Ophiodoris*, may be nearer to the phylogenetic base of the *Ophiocomidæ* (MATSUMOTO, loc. cit., pp. 380 and 381). So far as this character goes, the present species is also nearer to the *Ophiocomidæ* than the other *Ophionereis* and *Ophiocrasis*.

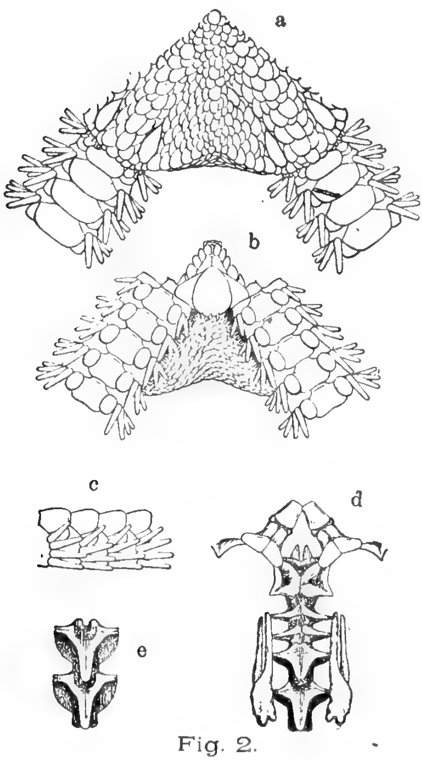

Fig. 2.

Ophionereis eurybrachiplax CLARK.
a. From above. ×4. *b*. From below. ×4. *c*. Lateral view of four arm joints near disk. ×4. *d*. Dorsal view of the skeleton of two oral angles and one arm base. ×7. *e*. Dorsal view of two vertebræ somewhat near disk. ×6.

I have observed on board the "Tôkwamaru" that, the arms of the present species are not so freely mobile in life as those of *Ophiocrasis marktanneri*, though more freely so than those of many other ophiurans. In alcohol, they are rather straight and not so strongly flexed as is commonly the case in the other *Ophionereis* and *Ophiocrasis*. This relatively lesser flexibility of the arms is correlated with the very well developed dorsal arm plates, the rudimentary supplementary dorsal arm plates and the not very strongly notched dorsal side of the vertebræ.

Mallophaga from Birds of the Ponapé I. (Carolines) and the Palau Is. (Micronesia).

By

Seinosuke Uchida, *Jūigakushi.*

With 2 figures in text.

The specimens of Mallophaga, upon which this paper is based, were obtained by Mr. Naoshi Teraoka during the spring of 1914, while engaged in collecting birds for the Ornithological Society of Japan, in Micronesia and in the Caroline Islands. They hail principally from two localities, viz. the Palau or Pelew Ids. (Micronesia) and the Ponapé Id. (Carolines).

The collection includes 9 genera and 21 species, taken from 15 species of birds. Of the above number of Mallophaga species, two are apparently new to science and will be called *Psittaconirmus harrisoni* and *Myrsidea teraokai.* The former, obtained from the Red Lory, *Eos rubiginosa,* is the second species of the genus *Psittaconirmus* Harrison (1915); the latter was taken from the Eastern Reef-heron, *Demiegretta jugularis grayi.*

The list of the host species and of the parasites found on them is as follows :

Host	Parasite
Phæthon candidus	*Colpocephalum epiphanes* Kell. and Chap. *Menopon eulasius* Kell.
Sula sula	*Lipeurus potens* Kell. and Kuw. *Menopon brevipalpe* P.

Phalacrocorax melanoleucus ...	*Lipeurus subsetosus* P.
Demiegretta jugularis grayi	*Nirmus orarius* Kell. *Colpocephalum importunum* N. *Colpocephalum nyctardæ* D. *Myrsidea teraokai* n. sp.
Nycticorax caledonicus	*Lipeurus baculus* N.
Megapodius laperousi	*Goniocotes minor* P. *Lipeurus lineatus* Tasch.
Strepsilas interpres	*Colpocephalum pediculoides* Mjöb.
Anous stolidus	*Nirmus separatus* Kell. and Kuw. *Colpocephalum milleri* Kell. and Kuw.
Sterna bergii	*Docophorus albemarlensis* Kell. and Kuw. *Colpocephalum importunum* N.
Sterna melanauchen	*Docophorus albemarlensis* Kell. and Kuw. *Colpocephalum milleri* Kell. and Kuw. *Colpocephalum importunum* N.
Globicera oceanica	*Goniocotes carpophagæ* Rud. *Colpocephalum importunum* N.
Eos rubiginosa	*Psittaconirmus harrisoni* n. sp. *Eomenopon denticulatus* Harr.
Halcyon sordidus	*Docophorus alatoclypeatus* P.
Halcyon pelewensis	*Docophorus alatoclypeatus* P.
Halcyon chloris teraokai..	*Docophorus alatoclypeatus* P.

Several species of the parasites known before were discovered on hosts different from those from which they were originally known, as will be seen from the following table:

Parasite.	Host previously reported.	Host in the present collection.
D. albemarlensis.	*Camarhynchus affinis.*	*Sterna bergii.* *St. melanauchen.*
N. orarius.	*Charadrius dominicus.*	*Demiegretta jugularis grayi.*
L. baculus.	Several species of the Columbidæ.	*Nycticorax caledonicus.*
C. importunum.	Several species of Ardea.	*Sterna bergii.* *St. melanauchen.*

It may be remarked that, in the cases of one and the same species of the parasite having been taken from more than one host species, these are birds which often occur together in company on rocks of the islands.

Gen. **Docophorus** Nitzsch.

1. ***Docophorus alatoclypeatus*** Piaget.

Piaget, Les Pediculines, Supplement, p. 10, pl. i, fig. 11.

Four females of the species were collected from *Halcyon pelewensis* shot in the Palau Ids. (May 25), and two females and twenty one males from *Halcyon chloris teraokai* shot in the same islands (May 23). Further a male and a young specimen were obtained from *Halcyon sordidus* collected in the Palau Ids. (March).

2. ***Docophorus albemarlensis*** Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Wash. Acad. Sci., IV, p. 465, pl. xxviii, fig. 5.

Three females were collected from *Sterna melanauchen* obtained in the Ponapé Id. (April 29); and two males and three females were obtained on *Sterna bergii* shot in the same island (April 26).

Gen. **Nirmus** Nitzsch.

3. *Nirmus orarius* Kellogg.

Kellogg, New Mallophaga I, p. 104, pl. v, fig. 5.

A single female specimen was taken from *Demiegretta jugularis grayi* obtained in the Ponape Id. (April).

The type specimen of this species was taken from the Golden plover, *Charadrius dominicus* (Lawrence, Kansas, U.S.A.). This is a somewhat strange instance of distribution, but I entertain no doubt as to the correct identification of the parasite before me, since it agrees quite well with Kellogg's description of *orarius*.

4. *Nirmus separatus* Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Wash. Acad. Sci. IV, p. 472. pl. xxix, fig. 6.

A male and a female, both immature, were obtained from *Anous stolidus* shot in the Palau Ids. (Feb. 22).

:Gen. **Psittaconirmus** Harrison.

5. *Psittaconirmus harrisoni* n. sp. (fig. 1).

A single female specimen of this new species was obtained on *Eos rubiginosa* shot in the Ponapé Id. (April 20).

This second species of the Genus Psittaconirmus is closely allied to Harrison's species[1] *P. australis* from the Purple-crowned lorikeet, *Glossopsittacus porphyrocephalus*, but is distinguished by the following points :

1. Size larger. Length of body 2.02 mm., instead of 1.73 mm.
2. Head much broader, especially behind antennæ. Measurements of head being .44 mm. by .39 mm., instead of .42 mm. by .32 mm. as in *P. australis*.

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1) Parasitology Vol. VII, 1915, p. 403, pl. xxvi, fig. 7 and xxvii, figs. 12, 13.

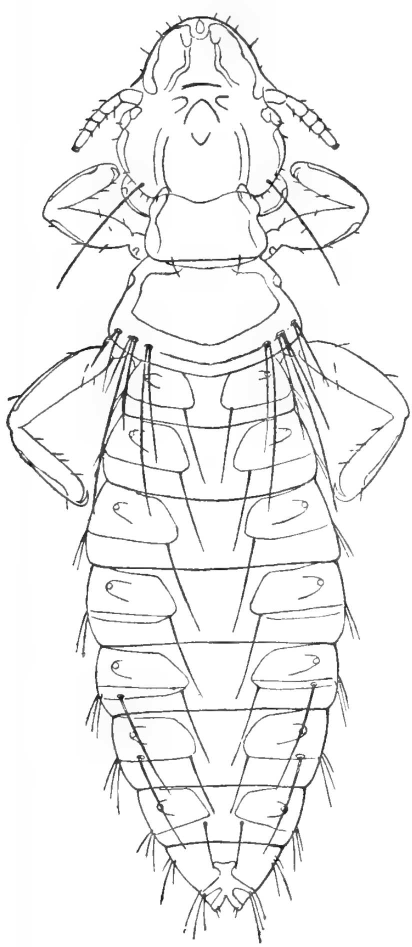

Fig. 1.
Psittaconirmus harrisoni n. sp., female. ×60.

3. The oval emargination in front of the frontal margin is bounded all around by a broad chitinous band, which, in *P. australis,* bounds only the posterior margin of the emargination.

4. Eye with a very fine spine instead of a hair.

5. Antennæ somewhat shorter and broader.

6. The inner row of hairs on the metathoracic border contains two hairs instead of three.

7. The first abdominal segment much narrower, bringing about a distinct constriction between metathorax and abdomen.

8. Thoracic and lateral abdominal bands much darker in colour.

9. Transverse bands of abdomen darker in colour and well defined.

The specimens which Mr. Harrison[1] obtained from the Blue-bellied lorikeet, *Trichoglossus novæ-hollandiæ*, closely resemble the present species as regards the size of body, the shape of head, the chætotaxy of metathorax, and the colour of body markings. They were provisionally assigned by him to *P. australis*, but are, in my opinion probably identical with the present new species.

1) Parasitology Vol. VII, p. 405, fig. 3, pl. xxvii, fig. 14.

MEASUREMENTS.

	P. harrisoni.	Typical *P. australis.*	*P. australis* Harrison from the blue-bellied lorikeet.
Length of body,	2.02 mm.	1.73 mm.	1.86 mm.
Width of body,	·54 "	·53 "	·47 "
Length of head,	·44 "	·42 "	·44 "
Width of head,	·39 "	·32 "	·35 "
Length of thorax,	·37 "	·28 "	·31 "
Width of thorax,	·38 "	·37 "	·39 "

Gen. **Goniocotes** Burmeister.

6. ***Goniocotes carpophagæ*** Rudow.

Zeitschr. f. ges. Naturwiss. XXXV, p. 478; Giebel, Insecta Epizoa, p. 187; Taschenberg, Die Mallophagen, p. 99, Taf. ii, Fig. 10, 10a.

A single female specimen was obtained from *Globicera oceanica,* shot in the Palau Ids. (June 2).

7. ***Goniocotes minor*** Piaget.

Piaget, Les Pediculines, p. 241, pl. xxi, fig. 2.

One female and two males of this species were collected from a skin of *Megapodius laperousi* collected by Mr. Sukeyo Fujita in the Palau Ids. (March 6, 1915).

Gen. **Lipeurus** Nitzsch.

8. ***Lipeurus subsetosus*** Piaget.

Piaget, Les Pediculines, p. 336, pl. xxvii, fig. 5.

A male individual from *Phalacrocorax melanoleucus* shot in the Palau Ids. (May 25).

9. ***Lipeurus baculus*** Nitzsch.

Denny, Monogr. Anopl. Brit., p. 172, pl. xiv, fig. 3; Giebel, Insecta Epizoa, p. 216; Piaget, Les Pediculines, p. 303, pl. xxv, fig. 2; Taschenberg, Die Mallophagen,

p. 123; Osborn, Bul. No. 5 (n. ser.), Div. Ent. U. S. Dept. Agr., p. 199, fig. 121; Kellogg, New Mallophaga, II, p. 506, pl. Lxviii, figs. 4 and 6.

A male specimen of this cosmopolitan parasite of the pigeon was obtained from *Nycticorax caledonicus* collected in the Palau Ids. (May).

10. *Lipeurus potens* Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Wash. Acad. Sci. Vol. IV, p. 477, pl. xxx, fig. 1.

Six male, eight female, and eleven young individuals of the species were collected from *sula sula* shot on sea, off the Mariana Ids. The size of body in the present specimens is somewhat smaller than in the type specimens. Measurements of the specimens on hand are as follows:

	♂	♀
Length of body,	3.50 mm.	3.00 mm.
Width of body,	.66 ,,	.76 ,,
Length of head,	.66 ,,	.66 ,,
Width of head,	.63 ,,	.63 ,,
Length of thorax,	.46 ,,	.40 ,,
Width of thorax,	.60 ,,	.57 ,,

11. *Lipeurus sinuatus* Taschenberg.

Taschenberg, Die Mallophagen, p. 180, Taf. vi, fig. 6.

A male specimen was taken from *Megapodius laperousi* obtained in the Palau Ids. (March 6).

The specimen agrees with Taschenberg's description and figure, except in the smaller size of body and in the shape of the last abdominal segment which is less conspicuously emarginated. The differences are, however, probably due to the immaturity of the specimen examined by me.

Measurements (those in parenthesis are Taschenberg's):

Length of body,	2.14 (2.61) mm.
Width of body,	.40 (.53) ,,
Length of head,	.54 (.66) ,,

Width of head,	.36 (.45) mm.
Length of thorax,	.39 (.45) ,,
Width of thorax,	.35 (.46) ,,

Gen. **Colpocephalum** Nitzsch.

12. ***Colpocephalum milleri*** Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Wash. Acad. Sc., IV, p. 483, pl. xxx, fig. 6.

Eleven female, two male and numerous young specimens were collected from *Anous stolidus* shot in the Ponapé Id. (April 21); and further, a young specimen was obtained from *Sterna melanauchen* shot in the same Island (April 29).

13. ***Colpocephalum importunum*** Nitzsch.

Denny, Monogr. Anopl. Brit., p. 214, pl. xviii, fig. 1; Giebel, Insecta Epizoa, p. 272; Piaget, Les Pediculines, p. 548, pl. xlv, fig. 8.

Seven male, ten female and numerous young individuals were collected from *Demiegretta jugularis grayi* shot on the Ponapé Id. (April 28). Further, three females from *Sterna bergii*; and one male, three females and a young from *Sterna melanauchen* (both *Sterna* species obtained on the Ponapé Id. (April 29).

This species has heretofore been found only on birds of the Ardeidæ (*Ardea cinerea, A. minuta* and *A. garzetta*). The specimens from the two species of terns may be attributed to straggling from the reef-heron which often occurs on same rocks in the island.

14. ***Colpocephalum nyctardæ*** Denny.

Denny, Monogr. Anopl. Brit., p. 215, pl. xx, fig. 9.

A male specimen from *Demiegretta jugularis grayi* (date and Exact locality unknown).

15. *Colpocephalum unicolor* Rudow.

Rudow, Zeitsch. f. d. ges. Nat. XXXIV, p. 392, Piaget, Les Pediculines, p. 535, pl. xliv, fig. 7.

A male, two female and seven young specimens were collected from *Globicera oceanica* obtained in the Palau Ids. (April 2).

16. *Colpocephalum pediculoides* Mjöberg.

Mjöberg, Arkiv. för Zoologi, Bd. VI, p. 44, Taf. 2, fig. 6.

One male from *Strepsilas interpres* shot on the Ponape Id. (April 14).

17. *Colpocephalum epiphanes* Kellogg and Chapman.

This species was first described in 1904 by Kellogg and Chapman,[1] from three female specimens obtained from *Anous stolidus* collected at Kahului, Maui Island. The present specimens were found on *Phæthon candidus* shot in the Palau Ids. (April 2) and consist of three females and three males.

The male is paler in colour than the female and much smaller in size of body but especially in that of abdomen. Head comparatively larger, with a constriction on the lateral margin in front of ocular emargination; front more rounded, expanded, with two strong spines near each lateral margin. Genitalia indistinctly distinguishable through the body-wall, extending forward into segment 6.

MEASUREMENTS:

	♂	♂	♂	♀	♀	
Length of body,	1.58	1.50	1.64	1.98	1.97	mm.
Width of body,	.48	.47	.48	.60	.60	„
Length of head,	.33	.31	.34	.35	.34	„
Width of head,	.52	.51	.52	.54	.54	„
Length of thorax,	.40	.40	.41	.43	.43	„
Width of thorax,	.42	.42	.42	.47	.47	„

1) Fauna Hawaiensis III, p. 313, pl. x, fig. 7; Journ. N.Y. Entm. Soc., X, p. 160, pl. xiv, fig. 2.

Gen. **Myrsidea** Waterston.

18. ***Myrsidea teraokai*** n. sp. (Fig. 2)

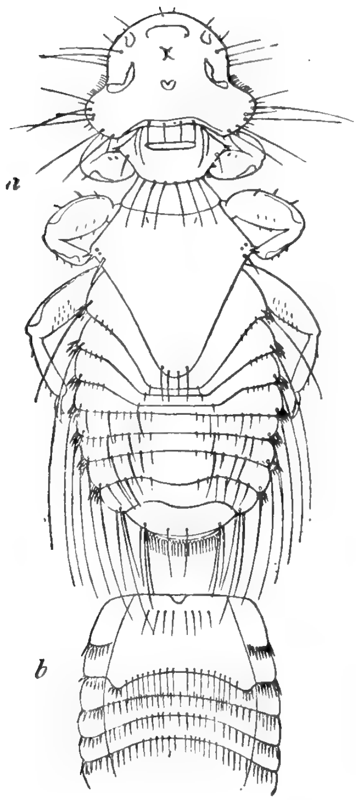

Fig. 2.

a. Myrsidea teraokai n. sp., female. ×50. *b.* Ventral aspect of the anterior part of abdomen. ×50.

A single female specimen was taken from *Demiegretta jugularis grayi* shot in the Ponape Id. (April 26).

This new species somewhat resembles *Myrsidea insolita* Kellogg and Paine,[1] and also *M. extranea* Carriker,[2] but differs from both in the more developed metathorax as well as in the shape of abdominal segments. The members of *Myrsidea* have heretofore been found chiefly on Passerine birds, especially on the higher groups such as the Corvidæ. *Myrsidea diffusa* Kellogg and Chapman, which was taken from the Ardeidæ as well as from several passerine hosts, was the only species of the genus which was recorded to have been ever taken from the Ardeidæ.

Description of the female:—Body short, broad, 1.41 mm. long and 0.55 mm. wide; with enormously developed metathorax. Ground colour of body pale brownish; with distinct markings of pitchy brown on head and with smoky brownish lateral bands on abdomen.

Head 0.31 mm. long, 0.46 mm. wide; front broadly rounded, with two short hairs at middle and two long and a few short marginal

1) Kellogg and Paine, Rec. Ind. Mus., X, 1914, p. 238, fig. 4.

2) Carriker, Univ. Stud. Nebr., III, 1903, p. 173, pl. vi, fig. 3.

hairs on each side of forehead; a long hair at the angle in front of each shallow ocular emargination; ocular fringe distinct, composed of long stiff hairs; palpi projecting to an extent of half the length of the apical segment; the eye is large, emarginate and with a brownish fleck; temples broad, rounded, each bearing four long pustulated hairs and a few prickles; occipital margin concavo-convex, with four short hairs. Colour of head clear brownish; temples with narrow brownish margin; the curved line bounding the antennal region pitchy brown; occipital margin edged with pitchy brown, paler in the middle; a brownish spot on the margin, just in front of each palpus.

Prothorax 0.15 mm. iong, 0.29 mm. wide, hexagonal in outline, with produced and sharp lateral angles, each bearing two spines and a hair; anterior lateral margin straight; posterior margin flatly convex, bearing six long and pustulated hairs; transverse and longitudinal chitin bars distinct, of a clear brownish colour. Mesothorax 0.066 mm. long, 0.32 mm. wide; distinctly divided from metathorax by lateral emargination and a sutural line, with convex lateral and truncate posterior margins; two short prickles on the posterior margin; a reddish brown band around sides and anterior angles, broken medially. Metathorax pentagonal, 0.49 mm. long, 0.46 mm. wide, and about three-fourths as long as abdomen; anterior lateral margin bare, straight, diverging posteriorly; posterior lateral angles obtuse, each bearing four spines and a short submarginal hair; posterior margin parabolical, with four short submarginal hairs on the summit; the region posterior to posterior lateral angles very large. Ground colour of metathorax pale brownish; each lateral margin with a brownish submarginal band, curving at the lateral angle; smoky brown indistinct bands running inward from the median part of the bands, nearly meeting together medially. Legs long and stout, somewhat paler than thorax, with darker marginal markings on femoræ and tibiæ.

Abdomen broad, elliptical; widest at the fourth segment; lateral margin of segments rounded; the first segment the longest; posterior angles projecting, furnished on segments I–VII each with a long hair and three or four spines and on segment VIII with a short and two long hairs ; the last segment broad, with a fringe of hairs on the flatly rounded posterior margin ; two long hairs on each side of that fringe. Posterior margin of first and second segments strongly curved posteriorly, almost parallel to metathorax ; posterior margin of third segment convex : that of the fourth straight ; that of the fifth to eighth concave. Dorsal surface of first to third segments with several short hairs on each side of the posterior margin ; dorsal surface of the fourth to seventh with a row of hairs of different length, interrupted in the middle. Ground colour of abdomen pale brownish, with broad smoky brown lateral bands which become darker on posterior segments and end on the eighth segment ; no transverse bands on dorsal surface, but those of ventral surface show themselves through the body ; the transverse bands of first and second ventral segments indistinct ; those of seventh to nineth segments form one continuous blotch covering the whole space between the lateral bands. Sternite of first abdominal segment reduced ; that of second segment the longest, with a group of four very strong spines on each side of the concave posterior margin ; posterior margin of third to eighth segments concave and thickly covered with hairs of different lengths.

Gen. **Menopon** Nitzsch.

19. ***Menopon eulasius*** Kellogg.

Kellogg, Sjöstedts Kilimandjaro-Meru Expedition, 1908, 15, 4, p. 54. Taf. 7, Fig. 11.

Six female and four male specimens were collected from *Phæthon candidus* obtained in the Palau Ids. (April 2). The males agree very closely with Kellogg's description and figure of a specimen taken from *Phalacrocorax africanus.* The female, which remained unknown to Kellogg, is larger and slightly darker than the male ; abdomen more elongate-elliptical, the posterior margin of eighth abdominal segment slightly convex and not concave as in the male; the last segment more rounded, with a fringe of hairs. Measurements of the present specimens are as follows:

	♂	♂	♂	♂	♀	♀	♀	♀	♀	
Length of body,	1.80	1.80	1.78	1.70	2.17	2.17	2.17	2.08	2.08	mm.
Width of body,	.79	.78	.75	.75	.93	.93	.94	.98	.94	"
Length of head,	.40	.37	.40	.40	.43	.44	.44	.43	.43	"
Width of head,	.74	.72	.71	.71	.78	.78	.78	.78	.78	"
Length of thorax,	.47	.47	.46	.46	.47	.47	.47	.47	.47	"
Width of thorax,	.56	.54	.56	.56	.62	.62	.62	.63	.64	"

20. *Menopon brevipalpe* Piaget.

Piaget, Les Pediculines, p. 498, pl. xl, fig. 5.

Five females and one young were obtained from *sula sula* shot on sea off the Marina Ids., July 7th 1916.

Gen. **Eomenopon** Harrison.

21. *Eomenopon denticulatus* Harrison.

Parasitology Vol. VII, 1915, p. 385, fig. 5, pl. xxvi, fig. 5, pl. xxvii, figs. 6, 16.

One male, three female, and three young individuals were taken from *Eos rubiginosa* shot on the Ponapé Id. (April 20).

Tokyo, Oct. 30, 1917.

CORRIGENDA.

Page 500, line 28, for "Bianch" read "Bianchi."
,, 502, line 7, for "23." read "23. I."
,, 504, line 15, for "neat" read "near."
,, 509, line 5, for "emale" read "female"
,, ,, line, 10, for "Corca" read "Corea."
,, 510, line 2, for "Part" read "Port."
,, 513, line 18, for "thts" read "this"
,, 518, line 5, for "It it" read "It is"
,, 531, omit "lines 4–6."
,, 533, line 24, for "river" read "rivers."
,, 541, line 8, for "Kokuryō" read "Hokuryō."
,, 542, line 23, for "migraties" read "migrations."
,, 546, line 10, for "traggler" read "straggler."
,, 550, line 15, for "tall" read "tail."
,, 553, line 14, for "n" read "in."
,, ,, line 14, omit "i."

Notes on Corean and Manchurian Birds.

By

Nagamichi Kuroda, *Rigakushi.*

The following notes on Corean and Manchurian birds are based in part on my own collection made during my visit to those regions in April and May of last year, and in part on specimens preserved in some other collections, but chiefly in the Seoul museum, in the Seoul Higher Common School and in the Government Middle School at Port Arthur. As regards the avifauna of Corea, I have been able to add 47 species and subspecies to what has hitherto been known of it, bringing up the total number of forms in it to 361; and as regards that of Manchuria, I have added 16 forms, which would make the avifauna of that region, as known at the present, to consist of 313 forms.

Mr. S. Shimokōriyama of the Seoul Museum, Mr. T. Mori of the Seoul Higher Common School and Mr. S. Wakiyama of the Middle School at Port Arthur have given me exceptional facilities in the examination of the specimens under their care. Messrs. U. Tanaka and Y. Kuroda of Seoul, Mr. Z. Kōno of Mukden, and Messrs. T. Yano and K. Yamamoto of Port Arthur have all rendered me very useful help to my collecting work. Messrs. T. Mori and K. Mori of Seoul, Mr. Z. Kōno of Mukden, Mr. S. Wakiyama of Port Arthur and Mr. O. Yoshikura of Dalni have presented me many valuable specimens. To all above gentlemen my best thanks are due.

Fam. **Colymbidæ.**

1. ***Colymbus septentrionalis*** Linn.

Abi.

Gavia stellata (Pontoppidan), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 148.

Two females in non-breeding plumage obtained on the Naktung River (or Rakutōkō) near Fusan, Apr. 6. The species was observed in the harbour of Fusan (Apr. 5), in the mouth of the River Yēzankō near Mok-po (Apr. 13) and in the harbour of Genzan (Apr. 26).

2. ***Colymbus adamsi*** Gray.

Hashijiro-abi.

A specimen of this species is preserved in the Seoul Museum. It was collected at Juntatsumen, Tsūsen, Kōgen District, Apr. 7, 1914.

Fam. **Podicipedidæ.**

3. ***Podicipes cristatus*** Linn.

Kammuri-kaitsuburi.

Ingram, Ibis, 1909, p. 469.

Specimens of this species are preserved in the Seoul Higher Common School (near Seoul, Nov. and Dec., 1916) and in the Seoul Museum (Chōsen, Kōgen Distr., Apr.) the species was observed in non-breeding plumage on the Naktung River, Apr. 6. This has been already recorded from Manchuria, but not from Corea.

Fam. **Pelecanidæ.**

4. ***Pelecanus crispus*** Bruch.

Garan-chō.

Kuroda, "Dōbutsugaku Zasshi" (Tokyo Zoological Magazine), 1916, p. 189.

An immature specimen, taken at Chemulpo, Kēki Distr., Nov. 3, 1914, is preserved in the Seoul Museum.

Fam. **Ardeidæ.**

5. ***Herodias intermedia*** (Wagler).

Chūsagi.

An adult male in breeding plumage was collected at Issan, Kēki

Distr., Apr. 19. I have purchased another specimen of the species from the same locality. This egret is a common summer resident in the middle parts of Corea. There exists as yet no report of its occurrence in Manchuria.

6. ***Herodias alba alba*** (Linn).

Daisagi, Momojiro.

A specimen of this typical form is preserved in the Seoul Higher Common School. It was collected at Hēkai, Kōgen Distr., Apr. (?), 1916. Four specimens from Corea but without dates are in my possession; they measure as follows:

Loc.	Exp. culm.	Wing	Tail	Exp. thigh	Tarsus	Middle toe with claw	Breed. pl. or non-br. pl.
Fusan?	1·5 mm.	450 mm.	164 mm.	142 mm.	205 mm.	124 mm.	Non-br. pl.
,, ?	123.5 ,,	445 ,,	169 ,,	135 ,,	200 ,,	115 ,,	,,
Issan, Kēki Distr.	129 ,,	450 ,,	1,4 ,,	123 ,,	210 ,,	122 ,,	,,
Suishoku, ,,	125 ,,	440 ,,	172.5 ,,	125 ,,	198 ,,	117 ,,	,,

The smaller form, *H. alba timoriensis* (Cuv.), also occurs in Corea as well as in Manchuria, as was reported by Giglioli and Salvadori and by Taczanowski. Two specimens measured by them of that form show the wings to be only 385 mm and 370 mm. respectively in length.

7. ***Demiegretta eulophotes*** (Swinhoe).

Kara-shirasagi.

Herodias eulophotes Sw, David et Oust., Ois Chine, p. 441; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 152.

A fine male in breeding plumage was obtained in the Bay of Sōtōwan, near Port Arthur, May 8. Exposed culmen 81 mm., wing 271 mm., tail 93 mm., tarsus 93.5 mm., middle toe and claw 63 mm.

This species is found also in Corea during summer only. It is very remarkable that the true *Herodias garzetta* has yet been recorded from neither Corea nor Manchuria. But it is said that dorsal plumes of that species were once procured by a native in the northern part of Corea.

8. ***Phoyx purpurea manillensis*** (Meyen).

Murasaki-sagi.

An adult bird in breeding plumage was given me by Mr. S. Wakiyama. It was collected at Ying-kou or Yingtzu, S. Manchuria, and is preserved in my collection.

9. ***Ardea cinerea jouyi*** Clark.

Awo-sagi.

Clark, Broc. U. S. Nat. Mus., Vol. XXXII, 1907, p. 498; Clark, op. cit., Vol. XXXVIII, 1910, p. 152; *A. cinerea* (nec. L.), Giglioli and Salvadori, P. Z. S., 1887, p. 588; Tacz., P. Z. S., 1887, p. 611; Tacz., op. cit., 1888, p. 468; Campbell, Ibis, 1892, p. 244; Ingram, Ibis, 1909, p. 458.

River Yēzankō near Mok-po: 1 ♂ ad. and 1 ♀ ad., Apr. 13; near Hekitēri, Kēri Distr.: 1 ♂ ad., Apr. 18; Kuppapari, Kēki Distr.: 1 ♂ ad. and 1 ♀ ad., Apr. 20; Giseifu, Kēki Distr.: 1 (sex ?) ad., Apr. 22. Very common on the plains, fields, and river-sides in Corea from spring to summer. Once during a journey from Fusan to Shingisū, I have counted 136 individuals of this species from the railway car. I have collected seven eggs from four nests on pine trees in a small delta of the River Yēzankō, Apr. 13. These eggs are pale blue or greenish blue in colour, with some small white chalky markings. They measure 55–63.5 mm. by 40.5–44 mm.

In the north of Corea and in southern Manchuria, this heron is not abundant.

It is remarkable that *Nycticorax nycticorax* has never yet been collected in the peninsula of Corea but has obtained on the island of Quelpart.

10. ***Butorides javanica amurensis*** (Schrenk).

Sasagoi.

An adult male in breeding plumage was obtained at Kuppapari, Kēki Distr., Apr. 4. The species is rare near Seoul.

11. ***Nannocnus eurythmus*** (Swinhoe).

Ō-yoshigoi.

Mr. T. Mori has reported to me that this species was obtained at Riuganpo, N. Heian Distr., May–June, 1917. It is found also in Manchuria.

Fam. **Ciconiidæ.**

12. ***Platalea minor*** Temm. & Schl.

Kurotsura-hera-sagi.

Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 151.

An adult specimens was purchased at Seoul. It was collected at Kaishū, Kōkai Distr. Date unknown. Further, six eggs of this species were purchased in Corea. They were obtained at Ito, N. Zenra Distr., July 22, 1917. They measure 64–67.5 mm. by 41–45 mm.

It is said that *P. leucorodia* occurs in S. Corea.

Fam. **Anatidæ.**

13. ***Mergus serrator*** Linn.

Umiaisa.

Taczanowski, P. Z. S., 1888, p. 460.

An immature male was collected in the Bay of Genzan, Apr. 26. The species was seen in abundance on the Naktung River, Apr. 6.

14. ***Oidemia fusca stejnegeri*** (Ridgw.).

Birōdo-kinkuro.

Three adult males were obtained on the Bay of Genzan (Apr. 26), where this subspecies occurs in abundance.

15. ***Harelda glacialis*** (L.)

Kōri gamo.

Momiyama, "Tori" (Aves). No. IV, 1917. 44.

The Seoul Museum is in possession of several examples of this interesting duck from Juntatsumen, Tsūsen, Kogen Distr., Apr., 1914. Mr. T. Momiyama reported this bird from the harbour of Seishin, N. Kan-kyo Distr., Jan. 2, 1915. I have a male specimen in non-breeding plumage from Issan, Kēki Distr., end of March, 1916. One male and one female, both in breeding plumage, were collected by me at Genzan, Apr. 26, 1917. In the harbour of Genzan it is very abundant, but I have seen only a single case of a male in non-breeding plumage.

16. ***Clangula clangula glaucion*** (Linn.).

Hōjiro-gamo.

C. glaucion (L.), Tacz., P. Z. S., 1887, p. 611; *C. clangula clangula* (L.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 150; *Fuligula clangula*, Campbell, Ibis, 1892, p. 245.

An immature male (sex ?) was captured at Genzan, Apr. 26. I have seen a group of some twenty birds at the same locality.

17. ***Nyroca bæri*** Radde.

Akahajiro.

Ingram, Ibis, 1909, p. 461.

An immature bird is preserved in the Seoul Museum. It was collected on the Han River near Seoul, Oct. 18, 1912. This duck was reported by Bianch and Ingram from S. Manchuria.

18. ***Fuligula marila*** (L.)

Suzugamo.

Campbell, Ibis, 1892, p 245; *Fulix marila* (L.), Tacz. P. Z. S., 1888, p. 460; *Fuligula affinis mariloides*, Ingram, Ibis, 1909, p. 460.

Entrance of Mok-po Harbour: 2 ♂s juv. and 1 ♂ ad., Apr. 11; mouth of Yēzan River near Mok-po: 1 ♂ juv., Apr. 13; Genzan: 4 ♂s ad. and 1 ♀ ad., Apr. 26. Very common in harbours and on rivers.

19. ***Spatula clypeata*** (L.)

Hashibiro-gamo.

Tacz., P. Z. S., 1888, p. 460.

An adult male in breeding plumage was shot near Riuganpo, N. Heian Distr., May 3. Another male from Dasenjō, Keiki Distr., early of Apr., 1917. is in my possession.

20. ***Nettion crecca*** (L.)

Kogamo.

Ingram, Ibis, 1909, p. 460; Clark, Proc. U.S. Nat. Mus., Vol. XXXVIII, p. 150; *Anas crecca* L., Tacz., P. Z. S., 1888, p. 460; Campbell, Ibis, 1892, p. 245.

An adult male was obtained at Orikol or Goriudō, Keiki Distr., Apr. 25

21. ***Anas boschas*** Linn.

Magamo.

Tacz., P. Z. S., 1888, p. 460; Ingram, Ibis, 1909, p. 459.

I have two abnormally coloured specimens of this species: a female entirely in buffy plumage was collected at Kinpo, Keiki Distr., end of Mar., 1916, and another male in melanistic plumage was obtained at Bun-san, Keiki Distr., Feb. 1917. I have seen this species at Mok-po on Apr. 14.

22. *Æx galericulata* (L.).

Oshidori.

Ingram, Ibis, 1909, p. 459; *Aix galericulata* (L.), Tacz., P. Z. S., 1888, p. 640; *Anas galericulata*, Campbell, Ibis, 1892, p. 245.

A female with a large white patch at base of bill was purchesed at Fusan. It was collected at Shintokuri, S. Keishō Distr., Jan. 9, 1917. An adult female was shot at Kōryō, Keiki Distr., Apr. 23. have a male specimen from Hēkō, Kōgen Distr., end of Dec., 1915.

23. *Pseudotadorna*[1] *cristata* Kuroda.

Kammuri-tsukushi-gamo.

Tadorna casarca × *Querquedula falcata* (?), Sclater, P. Z. S., 1890, p. 1. Pl. I; Kuroda, "Senman Chōrui Ippan," p. 45, 1917 (Coloured plate); id., "Tori," Vol. I, No. 5, 1917, p. 1–3, Fig. 1.

The type specimen is probably an adult bird. It was obtained on the Naktung River near Fusan, Dec. (3 ?), 1916.[2]

This interesting sheldrake is easily distinguishable from its allies by a distinct pendent crest, by a white ocular patch and by the upper and the lower surface being dark brown vermiculated with narrow but distinct white lines. The wing pattern is nearly the same as in other sheldrakes, except in the first tertiary being black in basal parts and

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1) This genus was described in the author's papers referred to, as follows:—Edges of upper mandible with moderately prominent lamellæ; indentations of upper mandible inconspicuous; colour of bill and feet pale; culmen not concave, almost straight; anterior border of loral feathering at base of bill convex; outer web of tertiaries chestnut; tail somewhat graduated.

2) According to Mr. Uchida ("Tori," Vol. II, No. 6, 1918, pp. 6–8), birds of this species seem to have been, some two hundred years ago, imported from Corea into Japan by the hand of bird dealers. It may be that in those times the species was not so rare in Corea as at present. Amusing the Japanese it was known by the name of "Chōsen-oshi." In the old Japanese ornithological work "Kanbun-kinpu," there stands a description of both male and female of the species. From it, it is plain that the type specimen, from which I have described the species in 1917, is a female. An old drawing of the male ("Tori," l. c., fig. 2) should be in the possession of Viscount Matsudaira

also very narrowly along its outer margin. Total length about 535 mm., exposed culmen 41.5 mm, bill from gape 66 mm., wing 310 mm., tail 115 mm., tarsus 47 mm., middle toe with claw 54 mm. long.

24. ***Tadorna cornuta*** (S. G. Gmelin).

Tsukushi-gamo.

Ingram, Ibis, 1909, p. 459.

I have received a fine pair of this sheldrake from an acquaintance in Shuan, Keiki Distr. They were shot at that locality, Nov. 11, 1917. This duck is very common in spring on the Yēzankō River, near Mok-po.

25. ***Casarca rutila*** (Pall.).

Aka-tsukushi-gamo.

Tadorna rutila, Campbell, Ibis, 1892, p. 245; *Casarca ferruginea* (Pall.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 150; *Cairina rutila* (Pall.), Tacz., P. Z. S., 1887, p. 611.

A female was presented me by Mr. Y. Kuratsuka. It was shot at Kinsū or Chin-chou. S. Manchuria, Nov. 25, 1916. This species is not uncommon in Corea and Manchuria, but during winter only.

26. ***Anser anser*** (L.).

Koma-karigane.

Alphéraky, Geese of Eur. and Asia, p. 24, Pl. 3.

A specimen preserved in the Seoul Museum. It was collected at Goshōri, Quelpart Island, S. Corea, Feb. 13, 1915. Mr. Shimokōriyama told me that the collector of the Museum had obtained two more birds at the same place.

27. ***Anser minutus*** Naumann.

Kokarigane.

Anser finmarchicus Gunner, Alph., Geese of Eur. and Asia, p. 59, Pl. 5 and 6.

Mr. Yasukichi Kuroda has shot two birds from a group of this species at Dasenjō, Keiki Distr., early in April, 1917.

28. ***Melanonyx segetum segetum*** (Gm.).

Hime-hishikui.

Anser segetum (Gm.), Tacz., P. Z. S., 1888, p. 460.

Two specimens, doubtless of the form, are preserved in the Seoul Museum. One of them was collected near Tsūsen, Kōgen Distr., Sept. 30, 1914; and the other at Jōzan-po, Quelpart Island, S. Corea, Feb. 25, 1915.

The larger form, *M. segetum serrirostris*, also occurs in Corea and Manchuria.

29. ***Cygnopsis cygnoides*** (Linn.)

Sakatsuragan.

Tacz., P. Z. S., 1888, p. 460.

I have observed a group of some ten birds of this Goose neat Riugan-po, N. Heian Distr., May 3. It is said that the species breeds on the Shinto Island in the mouth of the Yalu River.

30. ***Cygnus bewicki*** Yarrell.

Haku-chō.

Giglioli and Salvadori, P. Z. S., 1887, p. 589; Ingram, Ibis, 1909, p. 459.

A specimen (sex ?) was given me by Mr. Z. Kōno. It was shot by him on the Gaihei River, Mukden Province, March 31, 1917.

Fam. **Falconidæ.**

31. ***Gypaëtus barbatus*** (L.).

Higewashi.

Kuroda, "Dōbutsugaku Zasshi," Vol. XXVIII, 1917, p. 95; Mori, "Tori," Vol. I, No. 4, 1917, p. 41.

An immature bird was collected near Sam-bang, S. Kankyō Distr., Dec. 21, 1916. Another immature specimen was obtained at Port Arthur.

32. *Circus spilonotus* Kaup.

Siberia-chūhi.

A specimen is preserved in the Seoul Museum. Locality: Sosha, Keiki Distr., Nov. 10, 1914.

33. *Circus melanoleucus* (Forster).

Madara-chūhi.

Ingram, Ibis, 1909, p. 456.

An adult male is preserved in the Seoul Museum. It was obtained at Kōgen Distr., June, 1909. This species occurs not uncommonly in Manchuria, but rarely in Corea.

34. *Accipiter virgatus gularis* (Temm. & Schl.).

Essai, Tsumi.

Ingram, Ibis, 1909, p. 456.

An adult male was obtained by Mr. O. Yoshikura near Dalni, May 9, and was presented to me by him. The iris of this bird was dark carmine red, instead of orange as usual.

35. *Aquila clanga* Pall.

Karafuto-washi.

A specimen, collected near Port Arthur, Oct. 1914, is preserved in the Middle School at Port Arthur.

Another specimen was obtained at the Seoul market, Feb., 1915, and is preserved in the Seoul Higher Common School.

36. ***Aquila heliaca*** Savign.

Katashiro-washi.

A nearly adult bird was purchased at Seoul. It was obtained at Risen, Keiki Distr., 1913. Another immature bird is preserved in the Seoul Higher Common School; it was collected near Mok-po, May, 1916. This is the first time this species is recorded from Corea.

37. ***Haliaëtus pelagicus*** (Pall.).

Ō-washi.

An adult bird was purchased at Seoul; it was captured at Genzan, Jan., 1917. Another bird, obtained at the same locality, Feb., 1917 is preserved in the Seoul Higher Common School. This species is less common in Corea than *H. branickii* Tacz.

38. ***Spizaëtus nipalensis*** (Hodgson).

Kumataka.

A specimen is preserved in the Seoul Higher Common School. It was collected at Kōgen Distr., Jan., 1914.

39. ***Buteo leucocephalus*** (Hodgs.).

Ō-nosuri.

A specimen, obtained at Risen, Keiki Distr., Jan., 1917, was purchased at Seoul.

40. ***Archibuteo lagopus*** (Gm.).

Keashi-nosuri.

A specimen, collected at Mok-po, Dec., 1915, is preserved in the Seoul Higher Common School. I have purchased a specimen of this bird at Seoul. This buzzard is not common in Corea.

41. ***Falco peregrinus calidus*** Lath.

Hayabusa.

Hartert, Vög. Pal., p. 1046; *F. communis* (nec. Gm.), Tacz, P. Z. S., 1888, p. 459; *F. peregrinus anatum* (nec. Bonap.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 158.

An adult specimen, obtained at Shichikoku Mt., N. Chūsei Distr., middle of Apr., 1917, was purchased at Seoul. Another adult specimen was received by me from Corea; it was shot at Risen, Keiki Distr., middle of June, 1917.

42. ***Falco tinnunculus tinnunculus*** L.

Chōsen-magusodaka.

Harterf, Vög. Pal., p. 1082; *Cerchneis perpallida* Clark, Proc. U S. Nat. Mus., Vol. XXXII, p. 470; *C. tinnunculus* (L.), Ingram, Ibis, 1909, p. 457; *F. tinnunculus perpallidus* Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 158.

An adult male was purchased at Seoul; it was shot at Yōshū, Keiki Distr., Mar. 18, 1917. Bill (without cere) 15 mm., wing 252 mm., tail 168 mm., tarsus 41.5 mm. in length. *F. tinnunculus japonicus* is also found in Corea and Manchuria.

43. ***Falco æsaloa insignis*** (Clark).

Ko-chōgenbō.

Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 158; *Dendrofalco æsalon* (nec. Tunst.), Tacz. P. Z. S., 1887, p. 598; Tacz., op. cit., 1888, p. 461; *F. æsalon* (nec. Tunst.), Campbell, Ibis, 1892, p. 243; Ingram, op. cit., 1909, p. 457; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 158; *Æsalon regulus insignis* Clark, Proc. U. S. Nat. Mus, Vol. XXXII, p. 470; *F. columbarius insignis* (Clark), Hartert, Vög. Pal., p. 1076.

A specimen, obtained at Yōshū, Keiki Distr., Mar. 18, 1917, was purchased at Seoul.

44. *Erythropus vespertinus amurensis* (Radde).

Aka-ashi-chōgenbō.

E. amurensis (Radde), Ingram, Ibis, 1909, p. 457, *Falco vespertinus amurensis* Radde, Hartert, Vög. Pal., p. 1080.

A fine male was obtained near Hoku-Ryō, Mukden Province, S. Manchuria, May 5. I have recently received another specimen from Corea; it was collected at Teishū, N. Heian Distr. This is the first time this falcon is reported from Corea.

Fam. **Phasianidæ.**

45. *Phasianus colchicus karpowi* Buturlin.

Kōrai-kiji.

P. torquatus karpowi But., Ingram, Ibis, 1909, p. 461; *P. torquatus* (nec. Gm.), Gigl. and Salvad., P. Z. S., 1887, p. 584; Tacz., op. cit., 1887, p. 610; Tacz., op. cit., 1888, p. 467; Campbell, Ibis, 1892, p. 248; *P. karpowi* But, op. cit, 1904, p. 405; *P. karpowi karpowi* But.,' Clark, Proc. U. S. Nat. Mus.. Vol. XXXVIII, p. 155.

A male was obtained at Shuan, Keiki Distr., Apr. 19; another male at Shikusekirei, Keiki Distr., Apr. 22. I have two abnormally coloured specimens of this subspecies: An adult male nearly entirely in silvery white plumage with very long tail from Mitsuyō, S. Keishō Distr., Apr. 20, 1916, and a female with long tail like male from Kahei, Keiki Distr. Further I have seen a specimen in white-and-brown spotted plumage and entirely albinistic individuals of this pheasant. The latter were collected near Mok-po and Reizan, S. Chūsei Distr. The pheasant is very common in bushes in all parts of the peninsula as well as of outlying islets. Very rare, near Port Arthur and Dalni, S. Manchuria.

46. *Coturnix coturnix japonica* Temm. and Schl.

Uzura.

Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 156; *C. vulgaris japonica* T. and

S., Tacz., P. Z. S., 1888, p. 467; *C. japonica* T. and S., Ingram, Ibis, 1909, p. 463; *C. communis* (nec. Bonnat.), Tacz., P. Z. S., 1887, p. 610; Bianchi, Ann. Mus. Zool. St. Pétersb., 1902; Ingram, Ibis, 1909, p. 462.

A female was obtained at Kuppapari, Keiki Distr., Apr. 20. A emale was shot by me at Sōto Bay, near Port Arthur, May 8. The Japanese quail, together with *Turnix blanfordi*, is found around Port Arthur in greatest abundance early in Autumn (Sept.–Oct.), but very rarely in winter and spring.

I have already pointed out that the European quail, *C. coturnix coturnix*, is found neither in Japan nor in Corea ("Dōbutsugaku Zasshi" (Tokyo Zoological Magazine), Vol. XXVI, Sept., 1914, pp. 435–440). The Japanese birds are shorter in wing which never exceeds much over 100 mm. Dr. Hartert (Nov. Zool., XXIV, 1917, pp. 420-425) arrived at the same conclusion and remarked that "since *C. c. coturnix* is never found in East Asia, hybrids between it and *C. c. japonica* do not and cannot occur."

Fam. **Rallidæ.**

47. ***Porzana fusca paykulli*** (Ljungh).

Kōrai-hikuina.

Rallina mandarina Sw., Tacz., P. Z. S., 1888, p. 459.

One male specimen was presented to me by Mr. S. Wakiyama. It was obtained near Port Arthur, Sept. 23, 1911. A specimen from Corea, obtained near Dokuritsumon, Seoul, July, 1917, was procured by purchase.

48. ***Gallicrex cinereus*** (Gmelin).

Tsuru-kuina.

Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 153; *G. cinerea* (Gm.), Tacz., P. Z. S., 1887, p. 611.

A young specimen was purchased at Seoul. It was shot at Suishoku, Keiki Distr., Sept., 1916. A specimen is found in the Government Middle School at Part Arthur.

49. ***Fulica atra*** Linn.

Ō-ban.

Ingram, Ibis, 1909, p. 465.

An adult male was shot from a pair on the River Daidōkō near Heijō, S. Heian Distr., Apr. 29.

Fam. **Gruidæ.**

50. ***Grus leucauchen*** Temm.

Manazuru.

Tacz., P. Z. S., 1887, p. 611; Tacz., op. cit, 1888, p. 468; *Pseudogeranus* leucauchen (T.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 152.

A female was presented to me by a friend in Seoul. It was obtained near Giseifu Station, Keiki Distr., 1916.

Fam. **Charadriidæ.**

51. ***Squatarola squatarola*** (L.).

Daizen.

S. helvetica (L.), Giglioli and Salvad., P. Z. S., 1887, p. 585; Tacz., op. cit., 1888, p. 456; *Charadrius helveticus*, Campbell, Ibis, 1892, p. 246.

A female in non-breeding plumage was collected at Shuan, Keiki Distr., Apr. 19.

52. ***Ægialitis placida*** (Gray).

Ikaru-chidori.

Tacz., P. Z. S., 1887, p. 610; Tacz., op. cit., 1888, p. 468; Ingram, Ibis, 1909, p. 466; Clark, Proc. U. S. Nat. Mus. Vol. XXXVIII, p. 155.

An adult male and another adult bird of doubtful sex were obtained at Riusen, near Taiden, S. Chūshin Distr., Apr. 8.

53. *Ægialitis dubia curonicus* (Gm).

Ko-chidori.

Æ. minor (Meyer et Wolf), Tacz., P. Z. S., 1887, p. 610; Tacz., op. cit., 1888, p. 467; *Charadrius minor*, Campbell, Ibis, 1892, p. 246; *Æ. dubia* (nec. Scop.), Clark, Proc. U. S. Nat., Mus., Vol. XXXVIII, p. 155.

Two adult males and two adult females were colleted at Riusen, near Taiden, S. Chūsei Distr.; a male and a female, both adults, at Yuson, near Taiden, Apr. 8; four adult males and an adult female, along the River Taiden, Apr. 9; an adult female, near Giseifu, Keiki Distr., Apr. 22; an adult male and two adult females, on the River Daidōkō, S. Heian Distr., Apr. 29; an adult female, at Mukden, May 5; and an adult female, near Port Arthur, May 9. Length of exposed culmen in all these specimens is tabulated below:

Loc.	Exp. culm.	Sex.
River Riusen	13.5 mm.	♂ ad.
"	14 "	♂ ad.
"	13 "	♀ ad.
"	13.5 "	♀ ad.
Yuson	13.5 "	♂ ad.
"	12.5 "	♀ ad.
River Taiden	13.5 "	♂ ad.
"	13.5 "	♂ ad.
"	13 "	♂ ad.
"	13.5 "	♂ ad.
"	13 "	♀ ad.
Giseifu	14 "	♀ ad.
River Daidōkō	13 "	♂ ad.
"	14.2 "	♀ ad.
"	13.5 "	♀ ad.
Mukden	13 "	♀ ad.
Near Port Arthur	13 "	♀ ad.

In None the exposed culmen reaches to 15 mm. This indicates that the long-billed form, *Æ. dubia dubia*, is probably not found in Corea, nor in S. Manchuria. It is certain that this short-billed form breeds in Corea along rivers. I have taken out an undeposited egg from a female collected on the Daidōkō, Apr. 29.

54. ***Ægialitis alexandrina alexandrina*** (L.).

Hashiboso-shirochidori.

Chadrarius cantiana, Campbell, Ibis, 1892, p. 246.

An adult male was obtained at Shuan, Keiki, Distr., Apr. 19; an adult male, on the River Daidōkō, S. Heian Distr., Apr. 29. Length of exposed eulmen in both the specimens measures 16 mm.

55. ***Ægialitis alexandrina dealbatus*** Sw.

Shirochidori.

An adult male was obtained at Shuan, Keiki Distr., Apr. 19; an adult female, on the River Daidōkō, Apr. 29; two adult males, Sōtō Bay, near Port Arthur, May 8. In all these specimens the bill is longer and stronger than *Æ. alexandrina alexandrina* and measures from 16.5 mm. to 18.5 mm. in length.

56. ***Microsarcops cinereus*** (Blyth).

Keri.

Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 155; *Lobivanellus cinereus*, Campbell, Ibis, 1892, p. 246; *L. inornatus* (nec. Sw.), Tacz., P. Z. S., 1888, p. 457.

An adult specimen was given me by Mr. Z. Kōno. It was colleted at Konka, Mukden Prov., May, 1916.

57. ***Hæmatopus ostralegus osculans*** Sw.

Miyakodori.

Ingram, Ibis, 1909, p. 497; *H. osculans* Sw., Tristram, Ibis, 1885, p. 195; Tacz.,

P. Z. S., 1888, p. 459; Campbell, Ibis, 1892, p. 246; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 155.

An adult male was obtained on the mouth of the River Yēzankō, near Mok-po, Apr. 13. Two eggs of this bird were collected by me on the gravelly ground of a small and low delta near the mouth of the same river. The eggs of this oyster-catcher are stone-buff with greyish underlying shell-markings and spotted and blotched on surface with blackish or pale brown. The two taken measure respectively 58.5 mm. × 40 mm. and 56 × 39.5.

58. ***Recurvirostra avocetta*** L.

Sorihashiseitakashigi.

Mr. N. Okada sent me for inspection a specimen of this interesting shore bird, collected near Kunsan, N. Zenra Distr., Jan. 4, 1914.

59. ***Numenius arquatus lineatus*** Cuv.

Daishakushigi.

Ingram, Ibis, 1909, p. 468; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 154.

A specimen was presented to me by Mr. T. Nakano. It was collected at Chemulpo, Keiki Distr. I have observed this form on the Naktung River, Apr. 6; near Mok-po, Apr. 10–13; and near Riuganpo, N. Heian Distr., May 3. In a marshy place near Mukden, on May 5, I have observed a bird undoubtedly belonging to this form.

60. ***Numenius cyanopus*** Vieill.

Hōroku-shigi.

Giglioli and Salvad., P. Z. S, 1887, p. 588; Tacz., op. cit.. 1888. p. 459, Ingram, Ibis, 19̄9, p. 468; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 154.

An adult female was obtained on the Naktung River, near Fusan, Apr. 6; and an adult female, at Genzan, Apr. 26. This curlew is not uncommon in Corea on its spring and autumn migrations; it is there more common than the preceding form, as in Japan.

61. ***Numenius phæopus variegatus*** (Scop.).

Chūshaku-shigi.

Tacz., P. Z. S, 1888. p. 457.

A female was shot at one of the deltas of the Yalu River., May 5; two males were obtained at Sōtō Bay, near Port Arthur, May 8. This bird is also not uncommon in Corea and S. Manchuria.

62. ***Limosa lapponica baueri*** (Naum.).

Ō-sorihashi-shigi.

Tacz.. P. Z. S., 1888, p. 457; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 154.

An adult male in beautiful breeding plumage was captured at the mouth of the River Yēzankō, near Mok-po, Apr. 13. It was the only individual of the form that came under observation during the trip.

63. ***Terekia cinerea*** (Güldenst.).

Sorihashi-shigi.

Giglioli and Salvad., P. Z. S., 1887, p. 587.

An adult male was obtained out of a pair at the mouth of the River Yēzankō, Apr. 13. This species is rare bird in Corea, as in Japan.

64. ***Totanus fuscus*** (L.).

Tsuru-shigi.

Campbell, Ibis, 1892, p. 246.

Two adult males and an adult female in breeding plumage were obtained in the paddy-field at Daijōri, Kōsei, S. Heian Distr., Apr. 30. At that place I have observed a flock of some twenty or thirty birds in a group; they were all in the dark summer dress.

65. *Totanus totanus* (L.).

Akaashi-shigi.

Tacz., P. Z. S., 1888, p. 457.

An adult female was obtained at Sōtō Bay, near Port Arthur, May 8.

66. *Glottis nebularius* (Gunner.).

Awo-ashi-shigi.

Totanus glottis (Lath.), Tristram, Ibis, 1885, p. 195; Tacz., P. Z. S., 1888, p. 457; Campbell, Ibis, 1892, p. 246; *T. nebularius glottoides* (Vig.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 154.

Two specimens of this species were collected for me by Mr. K. Mori, at Orikol, Keiki Distr., Apr. 25.

67. *Pseudoglottis guttifer* (Nordm.).

Karafuto-awoashishigi.

A specimen of this interesting bird, taken at Shinpo, S. Kankyō Distr., Sept. 13, 1912, is preserved in the Seoul Higher Common School.

68. *Rhyacophilus glareola* (L.).

Takabushigi.

Totanus glareola (L.), Tacz., P. Z. S., 1888, p. 457; Ingram, Ibis, 1909, p. 468.

A female was obtained near Mukden, May 5; another female, at Sōtō Bay, near Port Arthur, May 8; and a male and a female, near Port Arthur, May 9.

69. *Helodromas ochropus* (L.).

Kusa-shigi.

Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 154; *Totanus ochropus* (L.), Tacz., P. Z. S., 1888, p. 457; Ingram, Ibis, 1909, p. 468.

A female obtained near Port Arthur, May 9.

70. ***Pavoncella pugnax*** (L.).

Yerimaki-shigi.

A young specimen, obtained at Shinpo, Kankyō Distr., Sept. 9, 1913, is preserved in the Seoul Higher Common School.

71. ***Eurynorhynchus pygmæus*** (L.).

Hera-shigi.

Three Corean specimens of this species in non-breeding plumage were obtained by purchase. They were collected at Fuan, N. Zenra Distr., Oct. 2, 1917. Mr. T. Mori has informed me that he collected two specimens of the species on the shore of Han River, near Seoul, Oct. 7, 1917.

72. ***Limonites minuta ruficollis*** (Pall.).

Tōnen.

Tringa ruficollis, Campbell, Ibis, 1892, p. 246; *T. minuta* (nec. Leisl.), Tacz., P. Z. S., 1887, p. 610; Tacz., op. cit., 1888, p. 468; Ingram, Ibis, 1909, p. 467.

An adult male in the red-necked breeding dress was obtained at Shuan, Keiki Distr., Apr. 19; and one female also in breeding plumage, at Sōtō Bay, near Port Arthur, May 8. The typical form, ***L. minuta minuta***, probably does not occur in Corea and S. Manchuria.

73. ***Limonites minutilla subminuta*** (Middend.).

Hibarishigi.

Tringa subminuta Midd., Tacz., P. Z. S., 1888, p. 457.

A male specimen was obtained at Sōtō Bay, near Port Arthur, May 8.

74. *Tringa canutus rogersi* (Mathews).

Ko-obashigi.

A young specimen is preserved in the Seoul Higher Common School. It was obtained at Nisen, N. Kankyo Distr., Sept. 3, 1912. *T. tenuirostris* (=*crassirostris*) is also found in Corea.

75. *Heteropygia acuminata* (Horsf.).

Uzura-shigi.

Tringa acuminata Horsf., Tacz., P. Z. S., 1888, p. 457.

Two males and a female were obtained at Sōtō Bay, near Port Arthur, May 8; and two males near Port Arthur, May 9.

76. *Pelidna alpina alpina* (L.).

Ko-hamashigi.

A male in full breeding plumage was obtained on a delta near Riuganpo, N. Heian Distr., May 3. At the same place I have observed a flock of some ten birds of the species. Measurements of the above mentioned specimen in comparison with those of a British example:

Loc.	Date.	Exp. culum.	Wing.	Tail.	Taisus.	Sex.
Corea	3/5 1917.	31 mm.	111.5 mm.	53.5 mm.	25 mm.	♂ ad.
England	Sept., 1911.	30 „	114 „	52.5 „	24 „	♂ juv.

I find no tangible difference between the two specimens before me. In Corea this typical does not seem to be common.

77. *Pelidna alpina pacifica* Coues.

Hama-shigi.

Tringa cinclus (nec. L.), Tacz., P. Z. S., 1887, p. 610; Tacz., op. cit., 1888, p. 468; *T. alpina* (nec. L.), Campbell, Ibis, 1892, p. 246; *Pelidna alpina sakhalina* (Vieill.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 153.

Two adult males in non-breeding dress were collected at the entrance to Mok-po, Apr. 11; and five adult males and three adult females, also in non-breeding dress, at the mouth of the River Yēzankō, near Mok-po, Apr. 13. In all these examples the bill and wing are distinctly longer than in the preceding form. It it noticeable that in young males of this form the bill is generally much shorter than in adult birds, though these nor infrequently possess bill of an intermediate length.

78. ***Gallinago gallinago*** (L.).

Tashigi.

G. scolopacina Bp., Tacz., P. Z. S., 1887, p. 610; Tacz., op. cit., 1888, p. 468; *Scolopax gallinago*, Campbell, Ibis, 1892, p. 246; *G. cœlestis* (Frenz.), Ingram, Ibis, 1909, p. 467; *G. gallinago uniclavus* Hodgs., Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 153.

An adult male with nearly white axillaries was obtained at Riusen, near Taiden, S. Chūsei Distr., Apr. 8. A female and four specimens of doubtful sex with distinct barred axillaries, were collected at Mukden, May 5; a male was captured near Port Arthur, May 9. In S. Manchuria this species is not uncommon in the spring.

Fam. **Glareolidæ.**

79. ***Glareola pratincola maldivarum*** Lath. & Davies.

Tsubame-chidori.

A young specimen of this interesting form is preserved in the Middle School at Port Arthur. It was collected on Sōtō Bay, near Port Arthur.

Fam. **Laridæ.**

80. ***Larus argentatus vegæ*** Palm.

Seguro-kamome.

Ingram, Ibis, 1909, p. 469; *L. cachinnans* (nec. Pall.), Tacz., P. Z. S., 1888, p. 458.

An adult male was collected near the entrance to Mok-po Harbour, Apr. 11. A young male was obtained at Shuan, Keiki Distr., Apr. 19.

81. ***Larus crassirostris*** Vieill.

Umineko.

Tristram, Ibis, 1885, p. 195; Giglioli and Salvad., P. Z. S., 1887, p. 593; Campbell, Ibis, 1892, p. 246; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 149.

Two adult males and a young female were obtained at Genzan, Apr. 26. This species is very common in all bays, harbours and river mouths in Corea and S. Manchuria.

82. ***Rhodostethia rosea*** (Macgill.).

Hime-kubiwakamome.

An adult specimen in non-breeding plumage partly winter and partly summer dress was presented to me by Mr. S. Wakiyama. It was collected at Sōtō Bay, near Port Arthur; date unknown. This measurement is as follows: total length about 310 mm., exposed culmen 20 mm., wing 246 mm., tail 112 mm., difference of length between middle and outer tail feathers 23.5 mm., tarsus 29 mm. This little and rare gull is undoubtedly a new addition to the avifauna of Manchuria.

83. ***Sterna bergii,*** subsp.

Ōajisashi.

I have a specimen of this species, said to have come from an island about 72 miles north of Chemulpo, Keiki Distr., July 5, 1917. It is an adult not yet in full nuptial plumage: the forepart of crown white with some black feathers, and the bill chrome-yellow with dark parts in the distal third of its length. The entire dorsal side, including wings and tail, is much paler than in *S. bergii boreotis*, the back and tails being nearly white or faintly greyish. Size also smaller exposed culmen 59 mm., wing 325 mm., tail 163 mm., tarsus 25 mm.

84. ***Sterna longipennis*** Nordm.

Ajisashi.

Two specimens are preseved in the Seoul Higher Common School: one from near Shinshō, S. Kankyō Distr., Sept. 12, 1912, and the other from Issan, Keiki Distr., Apr. 11, 1913. I have purchased a Corean specimen collected near Tōdaimon, Seoul, Apr. 1917.

85. ***Hydrochelidon leucoptera*** (Schinz.).

Hajiro-kurohara-ajisashi.

A young male specimen was presented to me by Mr. S. Wakiyama. It was collected near Port Arthur, Sept. 1916. Mathews claimed this eastern bird to be identical with *H. leucoptera grisea* (Horsf.), but which identification does not seem acceptable.

Fam. **Pteroclidæ.**

86. ***Syrrhaptes paradoxus*** Pall.

Sakei.

Izuka, "Dobutsugaku Zasshi," Vol. XXIV, p. 103.

An adult female, collected near Mukden, Oct. 1915, was presented to me by Mr. Z. Kōno. Dr. A. Izuka has reported this species from Corea, in which peninsula it is only an accidental visitor. In Manchuria it is not uncommon.

Fam. **Columbidæ.**

87. ***Turtur orientalis*** (Lath.).

Kijibato.

Campbell, Ibis, 1892, p. 243; Ingram, op. cit., 1909, p. 461; *T. rupicola* (Pall.), Tacz., P. Z. S., 1887, p. 609; Tacz., op. cit.. 1888, p. 467; *T. gelastis* (Temm.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 156.

A male was obtained at Shuan, Keiki Distr., Apr. 19; two specimens (sex ?) at Kuppapari, Keiki Distr., Apr. 20; a specimen (sex ?) at Kōryō, Keiki Distr., Apr. 22; a specimen (sex ?) at Chokudōri, Keiki Distr., Apr. 22; and a male and an unsexed specimen at Hokuryō, Mukden, May 5.

88. ***Columba rupestris taczanowskii*** Stejn.

Kōrai-bato.

C. rupestris (nec. Pall.), Tacz., P. Z. S., 1887, p. 609; Tacz., op. cit, 1888, p. 467; Campbell, Ibis, 1892, p. 242; *C. taczanowskii* Stejn., Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 156.

An adult male was collected near Mok-po, Apr. 11; another adult, male, two adult females and a young male at Giujisan, near Riukō, S. Heian Distr., Apr. 30; and a young female at Riuganpo, N. Heian Distr., May 5. I have found this bird most abundant on a cliff at the mouth of River Daidōkō, S. Heian Distr. On the roof of the old palace in Mukden it was found mixed among a flock of domestic doves.

Fam. **Cuculidæ.**

89, ***Cuculus micropterus micropterus*** Gould.

Seguro-kakkō.

Hartert, Vög. Pal., p. 952.

An adult female obtained at Riuganpo, N. Heian Distr., May 30 1917, is now preserved in the Seoul Higher Common School. A specimen obtained at the same locality, May 31, 1917, was sent to me by Mr. T. Mori.

90. ***Hierococcyx fugax nisicolor*** (Blyth).

Jiuichi.

Hartert, Vög. Pal., p. 9'3.

An adult specimen is to be seen in the Seoul Higher Common School. It was obtained at Riuganpo, N. Heian Distr., Corea, Sept., 1915. I have purchased a male specimen obtained at Riusen, N. Heian Distr.

Fam. **Coraciidæ.**

91. ***Eurystomus orientalis calonyx*** Sharpe.

Buppōsō.

Hartert, Vög. Pal., p. 875; *E. orientalis* (nec. L.), Tacz., P. Z. S., 1887, p. 600; Tacz., op. cit., 1888, p. 462; *E. calonyx* Sharpe, Ingram, Ibis, 1909, p. 454; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 161 (Tsushima).

A young specimen was presented to me by Mr. K. Mori. It was obtained near Seoul. I have procured by purchase an adult specimen obtained Seiryōri, Keiki Distr., July 1917. An adult specimen was sent to me by Mr. Y. Aioi; it was collected at Dalni, middle of May, 1917. This bird is found in Corea and S. Manchuria in the nesting season only.

Fam. **Alcedinidæ.**

[92. ***? Halcyon smyrnensis fusca*** (Bodd.).]

Awo-shōbin.

Hartert, Vög. Pal., p. 884.

On the Yellow Sea, off the coast of S. Corea, May 11, I have observed a bird which undoubtedly belonged to this form, flying about the ship I was journeying.

93. ***Halcyon pileata*** (Bodd.).

Yamashōbin.

Hartert, Vög. Pal., p. 885; *H. pileatus* (Bodd.), Tacz., P. Z. S., 1887, p. 600; Tacz., op. cit., 1888, p. 462; *H. atricapilla* (Gm.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 161.

I have purchased two eggs of this bird, collected at Seiryōri, near Seoul, June 6, 1917. They measure 33–33.5 mm. by 29–29.5 mm.

94. ***Halcyon coromanda major*** T. and S.

Miyama-shōbin.

Hartert, Vög. Pal., p. 886; *H. coromanda* (nec. Lath.), Tacz., P. Z. S., 1888, p. 454; Ingram, Ibis, 1909. p. 454.

I have purchased an adult specimen of this bird collected at Eyō, N. Keishō Distr., June 12, 1917.

95. ***Alcedo ispida bengalensis*** Gm.

Kawasemi.

Campbell, Ibis, 1892, p. 243; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 161; Hartert, Vög. Pal., p. 882; *A. bengalensis* Gm., Giglioli and Salvad., P. Z. S., 1887, p. 581; *Ispida bengalensis* Briss., Tacz., op. cit., 1887, p. 600; Tacz., op. cit., 1888, p. 463; *A. ispida* (nec. L.), Ingram, Ibis, 1909, p. 454.

An adult specimen, collected at Dalni, middle of May, 1917, was presented to me by Mr. Y. Aioi. I have also purchased seven eggs of the form taken from two nests at Ojūri, near Seoul, June 2, 1917.

96. ***Ceryle lugubris lugubris*** (Temm.).

Yamasemi.

Hartert, Vög. Pal., p. 878; *C. lugubris* (T.), Tacz., P. Z. S., 1888, p. 463.

An adult male collected near Seoul, was given me by Mr. K. Mori.

Fam. **Upupidæ.**

97. ***Upupa epops saturata*** Lönnberg.

Yatsugashira.

Hartert, Vög. Pal., p. 869; *U. epops* (nec. L.), Tacz., P. Z. S., 1888, p. 454; Campbell, Ibis, 1892, p. 242; Ingram, Ibis, 1909, p. 454.

An adult specimen, obtained on the island of Yēsōtō, near Chemulpo, end of March, 1917, was presented to me by Mr. Y. Onishi. I have observed two birds of this form on one side of the Anpō railway, near the Yao-chien-hu-tun Station, during a journey from Antung to Mukden, May 4.

Fam. **Strigidæ.**

98. ***Bubo bubo kiautschensis*** Reichenow.

Washi-mimizuku.

Hartert, Vög. Pal., p. 966; *B. ignavus* (nec. Forst.), Tacz., P. Z. S., 1887, p. 599, Tacz., op. cit., 1888, p. 461; *B. maximus* (nec. Flem.), Campbell, Ibis, 1892, p. 243; ? *B. tenuipes* Clark, Broc. U. S. Nat. Mus., Vol. XXXII, p. 470; Clark, op. cit, Vol. XXXVIII, p. 160; Hartert, Vög. Pal., p. 967.

An adult specimen of this form was purchased in Seoul; it was collected at Seiryōri, Seoul, Nov. 1916. A downy young of the same was purchased at the same place; it was obtained at the same locality as above, Apr., 1917. Measurements of two Corean specimens and of a Japanese Specimen are as follows:

Loc.	Date.	Wing.	Tail.	Tarsus.	Midd. tœ.	Claw of Midd. tœ.	Sek.
Issan, Keiki Dist.	—	435 mm.	230 mm.	79 mm.	47 mm.	33 mm.	♂?
Seiryōri, Keiki Distr.	Nov. 1916.	430 "	250 "	79 "	46.5 "	36 "	♂?
Amami-ōshima.	Mar. 12, 1912.	430 "	2[illegible]0 "	79 "	50 "	31.5 "	♂

Clark's *B. tenuipes* is prodably identical with this form.

99. ***Scops japonicus*** (Temm. and Schl.).

Konohazuku.

Tacz., P. Z. S., 1888, p. 454; *S. stictonotus* Sharpe, Tristram, Ibis, 1885, p. 194; *S. giu stictonota*, Ingram, Ibis, 1909, p. 455; *Otus japonicus* T. and S., Hartert, Vög. Pal., p. 983.

An adult male collected at Kyōryō, Keiki Distr., Apr. 23.

100. ***Scops semitorques ussuriensis*** Buturlin.

Sameiro-ōkonohazuku.

Otus bakkamoena ussuriensis (But.), Hartert, Vög. Pal., p. 976.

A specimen of this form obtained near Chinnanpo, S. Heian Distr., was presented to me by Mr. T. Nakano. It is much paler in colour and much smaller in its length, than *S. semitorques semitorques*. The wing measures only 170 mm. in length. The typical form also occurs in Corea.

101. ***Ninox scutulata scutulata*** (Raffl.).

Awobazuku.

Hartert, Vög. Pal., p. 992; *N. japonicus* (T. and S.), Tacz., P. Z. S., 1887, p. 598; Tacz., op. cit., 1888, p, 461; Campbell, Ibis, 1892, p. 243; *N. scutulatus japonicus* T. and S., Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 160.

A downy young, obtained near Dokuritsumon, Seoul, July, 1917, was procured by purchase. As in Japan, it is a summer visitor to Corea.

102. ***Syrnium aluco nivicolum*** Blyth.

Himaraya-fukuro.

S. nivicolum Blyth, Tacz., P. Z. S., 1887, p. 599; Tacz., op. cit., 1888, p. 462; ? *S. ma* Clark, Proc. U. S. Nat. Mus., Vol. XXXII, p. 471; ? *Strix ma* Clark, op. cit., Vol. XXXVIII, p. 159; *Strix aluco nivicola* (Blyth), Hartert, Vög. Pal., p. 1026.

An adult female and a white downy young were obtained at Kōryō, Keiki Distr., Apr. 23. I have purchased a young bird, collected near Dokuritsumon, Seoul, May, 1917. The adult specimen agrees exactly with Clark's description of *S. ma*. I have almost no dout that *S. ma* is identical with *nivicolum*. The female bird is of somewhat smaller dimensions in comparison with the measurements given by Clark and Hartert as will be seen from the following:

Loc.	Wing.	Tail.	Tarsus.	Measured by.
Corea.	280 mm.	183 mm.	55 mm.	N. Kuroda.
"	297 "	192 "	57 "	Clark.
India.	295-310 mm.	——	——	Hartert.

Fam. **Caprimulgidæ.**

103. ***Caprimulgus indicus jotaka*** Temm. & Schl.

Yotaka.

Hartert, Vög. Pal., p. 855; *C. jotaka* T. and S., Tristram, Ibis, 1885, p. 194; Tacz., P. Z. S., 1887, p. 599; Tacz., op. cit., 1888, p. 462; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 163.

A male specimen, obtained near Riusen, N. Heian Distr., was purchased.

Fam. **Cypselidæ.**

104. ***Cypselus pacificus*** (Lath.).

Ama-tsubame.

Ingram, Ibis, 1909, p. 449; *Micropus pacificus* (Lath.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 163; *Apus pacificus* (Lath.), Hartert, Vög. Pal., p. 841.

A male specimen purchased from Corea. I have observed this species on Daidōkō River, near Heijō, S. Heian Distr., Apr. 29. I have also seen the species near Port Arthur, May 9.

Fam. **Picidæ.**

105. ***Dryobates major tscherskii*** (Buturlin).

Kita-akagera.

Hartert, Vög. Pal., p. 908; *Dendrocopus major* (nec. L.), Ingram, Ibis, 1909, p. 449.

A young male of this form was presented to me by Mr. S. Wakiyama. It was obtained near Port Arthur, Sept., 1911. Length of wing 138 mm.

106. *Dryobates major japonicus* (Seebohm).

Akagera.

Hartert, Vög. Pal., p. 908; *Picus major* (nec. L.), Tacz., P. Z. S., 1887, p. 608; Tacz., op. cit., 1888, p. 466; Campbell, Ibis, 1892, p. 242; *Dryobates japonicus* (Seeb.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 161.

Two males and a female were obtained at Kōryō, Keiki Distr., Apr. 22, and another male at Shikusekirei, Keiki Distr., Apr. 22. A female was shot at Hokuryō, Mukden, May 5. The Corean specimens before me do not differ from the Japaneses specimens. It is clear that this form is common to Japan and in Corea. It seems that *D. major tscherskii* does not occur in Corea. The Mukden specimen above mentioned is somewhat doubtful in that it has the bill somewhat stouter and the white patch in median-coverts much wider than in Corean and Japanese specimens, though the innermost secondaries have white spots quite like the Japanese form. So that, it may be said that the Mukden specimen in question is intermediate between *japonicus* and *tscherskii*.

107. *Dryobates cabanisi cabanisi* (Malh.).

Kara-akagera.

Hartert, Vög. Pal., p. 910.

An adult female collected at Hokuryō, Mukden, May 5.

108. *Dryobates leucotos uralensis* (Malh.).

Chōsen-ōakagera.

Hartert, Vög. Pal., p. 914; *Dendrocopus leuconotus* (nec. Bechst.), Tacz., P. Z. S., 1887, p. 609; Tacz., op. cit., 1888, p. 466; *Dryobates leucotos coreensis* Clark, Proc. U. S. Nat. Mus., Vol. XXXII, p. 472; *Dryobates leucotos ussurianus*

Clark, op. cit., p. 473; *Dendrodromas leucotos ussuriensis* (But.), Clark, op. cit., Vol. XXXVIII, p. 162.

A female purchased at Seoul. It was obtained at Suishoku, Keiki Distr., Apr., 1916.

Both Dresser and Ingram have reported *Dendrocopus leuconotus* from Manchuria, but it can not be ascertained if they really referred to this subspecies.

109. ***Ingipicus kizuki seebohmi*** Hargitt.

Kogera.

Jungipicus seebohmi Harg., Tacz., P. Z. S., 1887, p. 609; *Ingipicus seebohmi*, Tacz., op. cit., 1888, p. 467; *Yungipicus kizuki seebohmi* (Harg.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 162; *Dryobates kizuki seebohmi* (Harg.), Hartert, Vög. Pal., p. 928.

An adult female was obtained at Kōryō, Keiki Distr., Apr. 22, and an adult male at the same locality, Apr. 23. It seems that this form is not common in Corea.

110. ***Ingipicus scintilliceps doerriesi*** Hargitt.

Amūru-kogera.

Jungipicus dörriesi Harg., Tacz., P. Z. S., 1887, p. 609; *Ingipicus dörriesi*, Tacz., op. cit., 1888, p. 466; *Ingipicus doerriesi*, Campbell, Ibis, 1892, p. 242; *Yungipicus scintilliceps doerriesi* (Harg.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 163; *Dryobates pygmaeus doerriesi* (Harg.), Hartert, Vög. Pal., p. 927.

A female obtained at Chokudōri, Keiki Distr., Apr. 23.

111. ***Hypopicus hyperythrus subrufinus*** (Cab. and Heine).

Chabara-akagera.

Hypopicus poliopsis (Sw.), Bianchi, Ann. Mus. Zool. St. Pétersb., 1902; Ingram, Ibis, 1909, p. 452; *H. poliopsis manchuricus* Ingram, op. cit., p. 453; *Dryobates hyperythrus subrufinus* (Cab. and Heine), Hartert, Vög. Pal., p. 926.

An adult male was presented to me by Mr. S. Wakiyama who collected in near Port Arthur, Sept., 1916.

112. *Gecinus canus jessoensis* (Stejneger).

Yamagera.

Picus canus jessoensis Stejn., Proc. U. S. Nat. Mus., Vol. IX, p. 106 (Yezo); Hartert, Vög. Pal., p. 895; *P. canus perpallidus* Stejn., Proc. U. S. Nat. Mus, Vol, IX, p. 107 (Eastern Siberia); *Gecinus canus* (nec. Gm.), Ingram, Ibis, 1909. p. 453.

A male specimen was presented to me by Mr. Z. Kōno. It was collected by him at Hokuryō, Mukden, Oct., 1916. Dr. Hartert stated that the Manchurian bird is the same as the Hokkaidō bird. The Manchurian specimen now before me is much more gray on head and the lower parts than specimens from Hokkaidō. The measurements are: bill from gape 40 mm., wing 145 mm., tail 97.5 mm., tarsus 25 mm.

113. *Gecinus canus griseoviridis* Clark.

Chōsen-yamagera.

Clark, Proc. U. S. Nat. Mus., Vol. XXXII, p. 473; Clark, op. cit., Vol. XXXVIII, p. 168; *G. canus* (nec. Gm.), Tacz., P. Z. S., 1887, p. 607; Tacz., op. cit., 1888, p. 466; Campbell, Ibis, 1892, p. 242; *Picus canus griseoviridis* (Clark), Hartert, Vög. Pal., p. 896.

Two males and one female were obtained at Kōryō, Keiki Distr., Apr. 22; and a male, at Shikusekirei, Keiki Distr., Apr. 22. Length of wing 144.5–150 mm. in the three ♂s, and 142.5 mm. in the single ♀.

114. *Iynx torquilla japonica* Bp.

Arisui.

Hartert, Vög. Pal., p. 940.

Mr. T. Mori has informed me that this bird was collected near Riuganpo, N. Heian Distr., early in May to middle of June, 1917. This is probably a new addi ion to the avifauna of Corea.

Fam. **Pittidæ.**

115. ***Pitta nympha*** T. & S.

Yairochō.

Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 160 (Tsushima).

From Mr. T. Mori I have learned that this species was collected at Chōen, Kōkai Distr., Apr. 29, 1917.

Fam. **Alaudidæ.**

116. ***Alauda arvensis cinerea*** Ehmcke.

Ko-hibari.

Hartert, Vög. Pal., p. 247; Ingram, Ibis, 1909, p. 444; *A. arvensis* (nec. L.), Tacz., P. Z. S., 1887, p. 603; Tacz., op. cit., 1888, p. 464; Campbell, 1892, p. 240.

A male was collected at Riusen, Taiden, S. Chūsei Distr., Apr. 8; another male at Shuan, Keiki Distr., Apr. 19; and a female at Daijōri, Kōsei, S. Heian Distr., Apr. 30. Mr. T. Mori has sent me a male specimen from Kōryō Bay, S. Heian Distr., May 24. A male and a female were obtained at Kokaton, Port Arthur, May 8. Measurements of the above six specimens as follows:

Loc.	Exp. culm.	Wing.	Tail.	Tarsus.	Difference of length between the 5th primary and the longest quill.	Sex.
Riusen, S. Chūsei Distr.	9 mm.	88 mm.	62 mm.	21 mm.	4 mm.	♂ ad.
Shuan, Keiki Distr.	9.5 „	92 „	68 „	19.5 „	4 „	♂ ad.
Daijōri, S. Heian Distr.	10 „	80 „	56 „	20 „	3.5 „	♀ ad.
Kōryō Bay, S. Heian Distr.	9 „	91 „	66.5 „	19 „	5 „	♂ ad.
Kokaton, Port Arthur.	9 „	92 „	68 „	19 „	3 „	♂ ad.
Ditto.	10 „	83 „	59.5 „	19.5 „	3.5 „	♀ ad.

Both wing and tail are distinctly longer in the male than in the female. The Japanese subspecies, *A. arvensis japonica*, seems not to occur in Corea and Manchuria.

117. ***Alauda arvensis intermedia*** Sw.

Chūhibari.

Hartert, Vög. Pal., p. 948; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 166; *A. arvensis pekinensis* (nec. Sw. !), Bianchi, Ann. Mus. Zool. St. Pétersb., 1902; Ingram, Ibis, 1909, p. 445; *A. arvensis blakistoni* (nec. Stejn !), Clark, Proc. U. S. Nat. Mus., Vol., XXXVIII, p. 166.

Five males and one female were collected on a small delta in the River Daidō kō, near Heijō, S. Heian Distr., Apr. 29. All these specimens are intermediate size and the length of wing between *A. arvensis pekinensis* and *A. arvensis japonica*, though the female is smaller than male. The measurements are as follows:

Wing.	Tarsus.	Sex.
110 mm.	23 mm.	♂ ad.
109 "	23 "	♂ ad.
108.5 "	23 "	♂ ad.
107.5 "	22 "	♂ ad.
107 "	23 "	♂ ad.
95 "	23 "	♀ ad.

I have a specimen from Port Arthur which is likewise smaller than *A. arvensis pekinensis* (=*blakistoni*). This form was undoubtedly breeding on a delta in the River Daidōkō.

118. ***Galerida cristata coreensis*** Tacz.

Kammuri-hibari.

Hartert, Vög. Pal., p. 236; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 166; *Galerita cristata coreensis* Tacz., P. Z. S., 1887, p. 603; Tacz., op. cit., 1888, p. 464; *Galerita cristata* (nec. L.), Campbell, Ibis, 1892, p. 240.

An adult female was collected at Taiden, S. Chūsei Distr., Apr. 8; and an adult pair near Taiden, Apr. 9. In Manchuria, this subspecies is replaced by the closely allied form, *G. cristata leautungensis.*

119. ***Melanocorypha mongolica*** (Pallas).

Kōtenshi.

Hartert, Vög. Pal., p. 212.

A male specimen was procured by purchase at Mukden. It was obtained near that city. In winter this species moves in groups from Mongolia into S. Manchuria. It is a favourite cage-bird in S. Manchuria, whence it is imported as such into Corea.

Fam. **Motacillidæ.**

120. ***Motacilla boarula melanope*** Pall.

Kisekirei.

Hartert, Vög. Pal, p. 300; Ingram, Ibis, 1909, p. 434; *Calobates melanope* (Pall.), Tacz. P. Z. S., 1887, p. 603; Tacz., op. cit., 1888, p. 464; *M. boarula* (nec. L.), Campbell, Ibis, 1892, p. 239; *Budytes boarula melanope* (Pall.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 171.

A male in breeding plumage was obtained at Kōryō, Keiki Distr., Apr. 22, and two males also in breeding plumage, at the same locality, Apr. 23. A male in breeding plumage was collected at Sōtō Bay, Port Arthur, May 8.

121. ***Motacilla flava simillima*** Hartert.

Mamijiro-tsumenaga-sekirei.

Hartert, Vög. Pal., p. 289; *Budytes flavus simillima* Hart, Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 171.

A male of this form was obtained near Port Arthur, May 9. A male and two females, obtained May 19 at the same locality, were presented to me by Mr. S. Wakiyama.

122. ***Motacilla flava borealis*** Sundev.

Kita-tsumenaga-sekirei.

Hartert, Vög. Pal, p. 291; Ingram, Ibis, 1909, 435.

A male was obtained at Hokuryō, Mukden, May 5, and another male near the Mukden Station, May 5. In these localities, this subspecies is the most abundant. In Corea it is very rare; a specimen of it preserved in the Seoul Museum was collected at Kakunimen, Tsūsen, Kōgen Distr., Apr. 4, 1914.

123. ***Motacilla alba grandis*** Sharpe.

Seguro-sekirei.

Hartert, Vög. Pal., p. 309.

A specimen is preserved in the Seoul Museum. It was obtained at Jōhokumen, Ryōzan, S. Keishō Distr., Dec. 18, 1914. I have collected one female on the River Taiden, S. Chūsei Distr., Apr. 9. This wagtail is one of the rarest birds in Corea.

124. ***Motacilla alba leucopsis*** Gould.

Hōjiro-sekirei.

Hartert, Vög. Pal., p. 304; *M. leucopsis* Gould, Tacz., P. S. Z., 1887, p. 603; Tacz., op. cit., 1888, p. 464; Campbell, Ibis, 1892, p. 240; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 170; *M. lugubris leucopsis*, Iugram, Ibis, 1909, p. 433.

Fusan: 1 ♂ ad., Apr. 6; Katan, near Fusan: 1 ♂ ad., Apr. 6; River Taiden, S. Chūsei Distr.: 1 ♂ ad., Apr. 9; Mok-po Harbour: 1 ♀ ad., Apr. 11; Giseifu, Keiki Distr.: 1 ♀ ad., Apr. 22; Shikusekirei, Keiki Distr.: 1 ♂ ad. and 1 ♀ ad., Apr. 22. I have purchased a nest with five eggs from Corea; they were obtained at Ojūri, near Seoul, June 10, 1917. This subspecies is very common on the plains and near river in Corea, and apparently less so S. Manchuria as in Corea.

125. ***Motacilla alba ocularis*** Sw.

Taiwan-hakusekirei.

Hartert, Vög. Pal., p. 307; Ingram, Ibis, 1909, p. 434; *M. ocularis* Sw., Tacz., P. Z. S., 1887, p. 603; Tacz., op. cit, 1888, p. 464.

A female in breeding plumage was obtained at Mukden, May 5.

126. ***Dendronanthus indica*** (Gm.)

Iwami-sekirei.

Hartert, Vög., Pal., p. 309, Fig. 53; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 171; *Limonidromus indicus* (Gm.), Tacz., P. Z. S., 1887, p. 603; Tacz., op. cit., 1888, p. 464; Campbell, Ibis, 1892, p. 237; *Nemoricola indica* (Gm.), Tristram, Ibis, 1885, p. 194.

An adult specimen (sex ?) was presented to me by Mr. S. Wakiyama. It was obtained on Hakugyokusan, Port Arthur, May 19.

127. ***Anthus trivialis yunnanensis*** Uch. & Kurod.

Kobashi-binzui.

? *A. trivialis maculatus* (nec. Jerdon !), Ingram, Ibis, 1909, p. 435; *A. maculatus yunnanensis* Uchida & Kuroda, Annot. Zool. Japon., Vol. IX. 1916, p. 134.

An adult bird (sex ?) was obtained at Hokuryō, Mukden, May 5, and an adult male near Port Arthur, May 9. The dimensions of bill are as follows:

Loc.	Bill from gape.	Culmen.	Sex.
Hokuryō	15 mm.	14 mm.	?
Near Port Arthur	15 „	13.5 „	♂ ad.

These short-billed birds agree exactly with the form occurring in Formosa, Yunnan, and Tonkin. Mr. Uchida and I noticed that the *A. maculatus* occurring in Yunnan and Formosa has a shorter bill in comparison with the series of Japanese birds, and so proposed to call it by the name of *A. m. yunnanensis* in a paper published in Annot. Zool. Japon., Vol. IX., 1916, p. 134. Having since learned that those occurring in Tonkin and S. Manchuria are of the same subspecies, I doubted the appropriateness of the name. I accordingly consulted Sharpe and Dresser's works, which give the culmen of the typical Indian form to be 0.55 in (=14 mm.) in length. This being of the same dimension as the culmen of Yunnan specimen (14.5 mm.–15.5 mm.), I am now confident that the bird of Yunnan is not to be distinguished from the typical Indian form. On the contrary, the culmen of Japanese specimen measures markedly longer (15.5 mm.–17 mm.), and, therefore, I think it better to consider the bird breeding in Japan as a new subspecies. A Corean example, examined by me, was the same as Japanese form.

128. ***Anthus spinoletta japonicus*** T. & S.

Tahibari.

Hartert, Vög. Pal., p. 282; ? *A. pratensis* (nec. L.), Finsch, Verh. z.-b. Wien, XXII, 1872, pp. 253, 272; *A. japonicus*, Campbell, Ibis, 1892, p. 240.

An adult male obtained at Fusan, Apr. 6; another adult male at Hadan, near Fusan, Apr. 6; and an adult female near Riuganpo, N. Heian Distr., May 3.

129. ***Anthus gustavi*** Sw.

Sejirotahibari.

Hartert, Vög. Pal., p. 274; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 171.

Six males and a female were presented to me by Mr. S. Wakiyama. They were obtained on the Hakugyokusan, Port Arthur, May 19.

Fam. **Timelidæ.**

130. ***Rhopophilus pekinensis pekinensis*** (Sw.).

Kara-chimedori.

Hartert, Vög. Pal., p. 614.

Two males, collected at Yenmudō, Sanya, Kōkai Distr., March 24, 1914, are preserved in the Seoul Museum. This is the first record of the occurrence of this species in Corea.

131. ***Suthora webbiana webbiana*** Gray.

Zuaka-hashibuto-chimedori.

Hartert, Vög. Pal., p. 411; *S. webbiana* Gr., Tacz., P. Z. S., 1887, p. 604; Tacz., op. cit., 1888, p. 464; *S. longicanda* Campbell, Ibis, 1892, p. 237 (♀ ad !); *S. fulvicauda* Campbell, op. cit., p. 237 (juv. !); Clask, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 173; *S. webbiana mandschurica* (nec. Tacz.), Clark, op. cit., p. 173.

An adult male was collected on an islet in the harbour of Mok-po, Apr. 11; three males and six females at Hekitēri, Kōyō, Keiki Distr., Apr. 18; and two males at Kōryō, Keiki Distr., Apr. 22.

All these specimens undoubtedly belong to one and the same form. The tail measures: In 6 ♂s: 62.5 mm.–65.5 mm.; in 6 ♀s: 55.5 mm.–66.5 mm. in length. The wing is on the average longer in the male than in the female, measuring in 6 ♂s: 49.5 mm.–52 mm. and in as many ♀s: 49 mm.–50 mm. It is assumable that Campbell's *longicauda* and *fulvicauda* are both identical with the present species, inhabiting, as they all do, the same locality.

Fam. **Muscicapidæ.**

132. ***Terpsiphone incei*** (Gould).

Kawari-sankōchō.

Tchitrea incei (Gould), Hartert, Vög. Pal., p. 471.

A male and a female, both adults in the maroon coloured dress, were obtained at Shinkō-dō, near Riusen, N. Heian Distr., May 31, 1917. They are preserved in the Seoul Higher Common School. An adult male in the white dress was captured at Hōkaton, near Port Arthur. It is preserved in the Middle School at Port Arthur.

133. ***Terpsiphone atrocaudata atrocaudata*** (Eyton).

Kiusiu-sankōchō.

T. atrocaudata (Eyton), Jony, Proc. U. S. Nat. Mus., Vol. XXXVII, p. 652; Clark, op. cit., Vol. XXXVIII, p. 164; *Tchitrea princeps princeps* (nec. Vigors), Hartert, Vög. Pal., p. 471 (pt).

I have purchased an adult male and an adult female from Corea. They were obtained at Fuan, N. Zenra Distr., Nov. 18, 1916. In Hondō, Japan, as well as in S. China, this subspecies is replaced by a very closely allied form, *T. atrocaudata owstoni* Jouy. Jouy stated that the specific name *princeps* was applied by Vigors in 1831 to a totally different bird, a *Pericrocotus*, which at that time was included in the genus *Muscipeta*.

134. ***Hemichelidon griseisticta*** Sw.

Yezo-bitaki.

Muscicapa griseisticta (Sw.), Hartert, Vög. Pal., p. 478; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 164.

Mr. S. Wakiyama has sent me an adult specimen of this species. It was obtained on the Hakugyokusan, Port Arthur, May 19.

135. ***Xanthopygia narcissina tricolor*** (Hartl.).

Mamijiro-kibitaki.

X. tricolor (Hartl.), Tacz., P. Z. S., 1887, p. 605; Tacz., op. cit., 1888, p. 465; Campbell, Ibis, 1892, p. 234; *Muscicapa narcissina zanthopygia* Hay, Hartert, Vög. Pal., p. 490; *M. n. xanthopygia*, Ingram, Ibis, 1909, p. 437, *X. xanthopygia* (Hay), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 165.

An adult male was obtained at Kōryō, Keiki Distr., Apr. 22; and four adult males obtained at the same place, Apr. 23. A female was sent me by Mr. S. Wakiyama from Port Arthur.

136.* ***Cyanoptila cyanomelana*** (Temm.).

Ō-ruri.

C. cyanomelæna (T. and S.), Tacz., P. Z. S., 1887, p. 605; Tacz., op. cit., 1888, p. 465; *Muscicapa cyanomelana* T., Hartert, Vög. Pal., p. 493; *C. bella* (Hay), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 165.

An adult male obtained at Shingishū, N. Heian Distr., May 4.

Fam. **Turdidæ.**

137. ***Turdus fuscatus*** Pall.

Tsugumi.

Tacz., P. Z. S., 1887, p. 610; Tacz., op. cit., 1888, p. 463; Hartert, Vög. Pal., p. 658; *T. dubius*, Ingram, Ibis, 1909, p. 424; *T. eunomus* Temm., Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 175.

Near Taiden Station, S. Chūsei Distr.: 1 ♂, Apr. 9; Shuan, Keiki Distr.: 1 ♂, Apr. 19; Kuppapari, Keiki Distr.: 5 ♂s and 8 ♀s, Apr. 20; Kōryō, Keiki Distr: 1 ♀, Apr. 22; near Riuganpo, N. Heian Distr.: 1 ♂, May 3, Hokuryō, Mukden: 1 ♂, May 5; near Port Arthur: 1 ♀, May 9. Very common near Seoul.

138. ***Turdus naumanni*** Temm.

Hachijō-tsugumi.

Tacz., P. Z. S., 1887, p. 601; Tacz., op. cit., 1888, p. 463; Hartert, Vög. Pal., p. 657; Ingram, Ibis, 1909, p. 425; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 175; *Merula naumanni*, Campbell, Ibis, 1892, p. 232.

A female was obtained at Gainanmen, Taiden, S. Chūsei Distr., Apr. 8; a male (?) at Yuson, Taiden; Apr. 8; and another male at Kuppapari, Keiki Distr., Apr. 20. I have purchased a male specimen at Seoul; it was obtained at Kōryō, Keiki Distr.

139. ***Turdus hortulorum*** Sclater.

Kara-akahara.

Hartert, Vög. Pal., p. 654.

An adult bird (sex ?) was obtained at Hokuryō, Mukden, May 5; an adult male was obtaind at Kokaton, Port Arthur, May 8; and another adult male near Port Arthur, May 9. By purchase was secured an adult male specimen at Seoul; it was collected near Tōdaimon, Seoul, Apr. 1916. This species does not seem to be common in both Corea and S. Manchuria.

140. ***Turdus pallidus*** Gm.

Shirohara.

Tacz., P. Z. S., 1888, p. 454; Hartert, Vög. Pal., p. 655; Ingram, Ibis, 1909, p. 425; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 175.

A male obtained at Kuppapari, Keiki Distr., Apr. 20.

141. ***Turdus sibiricus sibiricus*** Pall.

Shiberia-mamijiro.

Hartert, Vög. Pal., p. 644; *Geocichla sibirica* Pall., Ingram, Ibis, 1909, p. 425; *Cichloselys sibiricus* (Pall.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 175.

A male and a female from purchased at Seoul. They were obtained near Kōryō, Keiki Distr.

142. ***Monticola solitarius philippensis*** (P.L.S. Müll.).

Isohiyodori.

Hartert, Vög. Pal., p. 675; *M. solitarius* (nec. L.), Tacz., P. Z. S., 1887, p. 602; Tacz., op. cit., 1888, p. 463; *Petrophila manilla* (Bodd.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 175.

An adult male was obtained at Giujisan, near Riukō, S. Heian Distr., Apr. 30. Another male specimen procured at Seoul; it was captured at Seiryōri, near Seoul, middle of June 1917. In Corea this bird is sometimes met with on the rocky mountains.

143. ***Monticola gularis*** (Sw.).

Hime-isohiyo.

Hartert, Vög. Pal., p. 673; Ingram, Ibis, 1909, p. 426.

An adult male and an adult female from Riuganpo, N. Heian Distr., (Sept. 1915), are preserved in the Seoul Higher Common School. Mr. T. Mori has sent me a pair of this fine bird, collected at the same locality, May 27, 1917.

144. *Erithacus sibilans* (Sw.).

Shimagoma.

Compbell, Ibis, 1892, p. 232; Clark, Proc. U. S Nat. Mus., Vol. XXXVIII, p. 176; *Larvivora sibilans* Sw., Tacz., P. Z. S., 1888, p. 455; *Luscinia sibilans* (Sw.), Hartert, Vög. Pal., p. 743.

A specimen obtained near Tōdaimon, Seoul, Apr. 1917. This species seems to be not uncommon in the neighbourhood of Seoul. Its notes are musical.

145. *Cyanecula svecica robusta* Buturlin.

Ogawa-komadori.

Luscinia svecica robusta (But.), Hartert, Vög. Pal., p. 748, *Erithacus cyaneculus caeruleculus* (nec. Pall.), Kuroda, "Dōbutsugaku Zasshi," Vol. XXVIII, pp. 508–510.

A young male is preserved in the Middle School at Port Arthur; it was obtained on the Hakugyokusan, Port Arthur, Oct. 5, 1915. In Japan, as yet only a single example of this form was obtained at Suruga by late Mr. M. Ogawa.

146. *Larvivora cyane* (Pall.).

Koruri.

Ingram, Ibis, 1909, p. 427; *Luscinia cyane* (Pall.), Hartert, Vög. Pal., p. 744.

A female was presented to me by Mr. S. Wakiyama. It was obtained on the Hakugyokusan, Port Arthur, May 19.

147. ***Tarsiger cyanurus*** (Pall).

Ruribitaki.

Campbell, Ibis, 1892, p. 233; Hartert, Vög. Pal., p. 712; *Nemura cyanura* (Pall), Ingram, Ibis, 1909, p. 427.

A young male, a female and a specimen of doubtful sex were obtained at Kōryō, Keiki Distr., Apr. 22; a young male at Shikusekirei, Keiki Distr., Apr. 22; a female at Kōryō, Apr. 23; a female and a specimen of doubtful sex at Kokuryō, Mukden, May 5; and a female near Port Arthur, May 9.

148. ***Pratincola torquata stejnegeri*** Parrot.

Nobitaki.

Hartert, Vög. Pal., p. 708; *maura* (nec. Pall.), Campbell, Ibis, 1892, p. 233; Ingram, op. cit., 1909, p. 426; Clark, Proc. U. S Nat. Mus, Vol. XXXVIII, p. 176.

Two adults in summer plumage, a male and a female, were obtained at Chokudōri, Keiki Distr., Apr. 22; an adult male in summer plumage at Hokuryō, Mukden, May 5; and an adult female collected near Dalni, May 9 and presented to me by Mr. O. Yoshikura.

149. ***Accentor montanellus*** (Pall.).

Yama-hibari.

Tacz., P. Z. S., 1887, p. 601; Tacz., op. cit., 1888, p. 463; Campbell, Ibis, 1892, p. 232; *Prunella montanella* (Pall.), Hartert, Vög. Pal., p. 768.

Two males purchased in Seoul: One obtained near Seoul, Apr. 24, and the other at Riuganpo, N. Heian Distr. The species seems to be not uncommon in Corea.

Fam. **Sylviidæ.**

150. ***Locustella fasciolata*** (Gray).

Yezo-senniu.

Tacz., P. Z S., 1888, p. 445; Hartert, Vög. Pal., p. 545; Ingram, Ibris, 1909, p. 431.

A specimen of this species was purchased in Corea. Exact locality unknown.

151. *Locustella certhiola* (Pall.).

Shiberia-senniu.

Hartert, Vög. Pal, p. 550; Ingram, Ibis. 1909, p. 430.

Several specimens are contained in the Seoul Museum. In the Seoul Higher Common School two adult specimens are preserved of which one was obtained at Jōshin, N. Kankyō Distr., Aug. 1912, and the other at Riuganpo, Sept., 1915. Numerous specimens are preserved in the Government Middle School at Port Arthur. They were obtained on Hakugyokusan, Port Arthur. Mr. S. Wakiyama has sent to me two specimens which were obtained at the same locality.

152. *Locustella lanceolata* (Temm.).

Makino-senniu.

Hartert, Vög. Pal., p. 553; Ingram, Ibis, 1909. p. 430.

Several specimens collected in the Kōgen Distr. are preserved in the Seoul Museum. An adult male collected at Riuganpo, N. Heian Distr., May 24, 1917 is preserved in the Seoul Higher Common School. Further, numerous specimens obtained on Hakugyokusan are to be seen in the Government Middle School at Port Arthur. Mr. S. Wakiyama has sent me a specimen, collected at the same locality, May 19. In S. Manchuria, this species is more abundant than *L. certhiola* during spring and autumn migraties.

153. *Phragamaticola aëdon* (Pall.).

Hashibuto-ōyoshikiri.

Hartert, Vög. Pal., p. 554; *Arundinax aëdon* (Pall.), Ingram, Ibis, 1909, p. 429.

A male, either a young bird or one in autumn plumage, was presented to me by Mr. S. Wakiyama, who obtained it on Hakugyoku-san, Port Arthur; date unknown.

154. *Acrocephalus arundinaceus orientalis* (T. & S.)

Ōyoshikiri.

Hartert, Vög. Pal., p. 558; Ingram, Ibis, 1909, p. 429; *A. orientalis* (T. & S.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 174.

An adult male specimen purchased in Corea. It was obtained on the island of Taikeitō, N. Heian Distr.

155. *Acrocephalus bistrigiceps* Sw.

Koyoshiklri.

Hartert, Vög. Pal., p. 565; Ingram, Ibis, 1909, p. 429.

Mr. T. Mori has informed me that this bird was obtained near Riuganpo, N. Heian Distr., from May to June, 1917.

156. *Horeites cantans borealis* (Campbell).

Chōsen-uguisu.

Hartert, Vög. Pal., p. 532; *C. minuta* (nec. Sw.), Campbell, Ibis, 1892, p. 234; *C. minuta borealis* Campbell, op. cit., p. 235; *C. canturiens septentrionalis* Campbell, op. cit., p. 235; *C. canturians* (nec. Sw.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 174.

An adult male was obtained at Chokudōri, Keiki Distr., Apr. 23. On the plains in Corea this form is not very common.

157. *Phylloscopus borealis borealis* (Blas.).

Komushikui.

Hartert, Vög. Pal., p. 517; *Phyllopneuste borealis* Blas., Tacz., P. Z. S., 1887, p. 602; Tacz., op. cit., 1888, p. 463; *Phylloscopus borealis* (Blas.), Ingram, Ibis, 1909, p. 427.

A male specimen purchased in Corea; it was obtained at Funaimen, near Riusen, N. Heian Distr. A specimen collected on the Hakugyokusan, Port Arthur, was presented to me by Mr. S. Wakiyama.

158. ***Phylloscopus proregulus proregulus*** (Pall.).

Karafuto-mushikui.

Hartert, Vög. Pal., p. 523; *P. proregulus*, Ingram, Ibis, 1909, p. 428.

The Seoul Museum contains a specimen of this form, obtained among the Keum-kang Mountains, Kōgen Distr., Sept. 14, 1914. I have collected an adult male at Shingishu, May 2.

Four adult males, four adult females and a bird of doubtful sex were collected at Hokuryō, Mukden, May 5. An adult female was obtained at Kokaton, near Port Arthur, May 8; and another adult male presented to me by Mr. O. Yoshikura, near Dalni, May 9. This subspecies is probably a rare visitor in Corea, though it was met with in abundance at Hokuryō on small trees, such as willow tree, etc. The notes are very musical.

159. ***Phylloscopus nitidus plumbeitarsus*** Sw.

Yanagi-mushikui.

Hartert, Vög. Pal., p. 511; *P. plumbeitarsus* Sw., Ingram, Ibis, 1909, p. 427.

Three adult males were obtained at Shingishu, N. Heian Distr., May 3–4; an adult male near Riuganpo, N. Heian Distr., May 3. Five adult males, three adult females and a specimen of doubtful sex at Hokuryō, Mukden, May 5; three adult males and an adult female at Kokaton, near Port Arthur, May 8. This form is also abundant at Hokuryō on willow trees and other small trees, together with the preceding species.

160. ***Regulus regulus japonensis*** Blak.

Kikuitadaki.

Hartert, Vög. Pal., p. 397; *R. japonicus* Bp, Sw., P. Z. S., 1870, p. 602; Tacz., op. cit., 1888, p. 455; *R. cristatus* (nec. Koch), Campbell. Ibis, 1892, p. 235.

An adult male was collected near Taiden Station, S Chūsei Distr., Apr. 9; and another adult male at Kōryō, Keiki Distr., Apr. 22.

Fam. **Troglodytidæ.**

161. ***Troglodytes troglodytes peninsulæ*** (Clark).

Chōsen-misosazai.

Hartert, Vög. Pal., p. 783; *T. fumigatus dauricus* (nec. Tacz.), Tacz., P. Z. S., 1887, p. 601; Tacz., op. cit., 1888, p. 463; *T. fumigatus* (nec. Temm.), Campbell, Ibis, 1892, p. 236; *Olbiorchilus fumigatus peninsulæ* Clark, Proc. U. S. Nat. Mus., Vol. XXXII, p. 474; *Nannus fumigatus peninsulæ* Clark, op. cit., Vol. XXXVIII, p. 171.

A specimen purchased at Seoul.

Fam. **Hirundinidæ.**

162. ***Hirundo rustica gutturalis*** Scop.

Tsubame.

Campbell, Ibis, 1892, p. 242; Ingram, Ibis, 1909, p. 438; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 170; *H. gutturalis* Scop., Swinhœ, P. Z. S., 1870, p. 601; Tacz., op. cit., 1887, p. 600; Tacz., op. cit., 1888, p. 463; *Chelidon rustica gutturalis* (Scop.), Hartert, Vög. Pal, p. 803.

An adult male obtained near Port Arthur, May 9.

163. ***Hirundo rustica erythrogastra*** Bodd.

Meriken-tsubame.

Ingram, Ibis, 1909, p. 438; *Chelidon rustica erythrogastra,* Hartert, Vög. Pal., p. 803.

I have examined two specimens of this form, sent me by Mr. S. Shimokōriyama of the Seoul Museum. One of them was collected on the island of Rōshima, N. Heian Distr., June 10, 1917, and the other on the island of Shinyatō, N. Heian Distr., June 12, 1917. Both the specimens show much paler underparts when of compared with American specimens.

Fam. **Dicruridæ.**

164. ***Buchanga atra*** (Herm.).

Ōchū.

A specimen of this species is preserved in the Government Middle School at Port Arthur. It was obtained on Hakugyokusan, of that place. The species is common in S. China as well as in Formosa, but has never before been collected at the latitude of Port Arthur, where it is probably only a traggler from the south.

Fam. **Amperidæ.**

165. ***Ampelis japonica*** (Siebold).

Hirenjaku.

Campbell, Ibis, 1892, p. 239; *Bombycilla japonica* (Sieb.), Hartert, Vög. Pal, p. 457.

An adult bird was obtained at Shikusekirei, Keiki Distr., Apr. 22. I have seen a group of some ten birds of the species at the same locality.

Fam. **Laniidæ.**

166. ***Lanius tigrinus*** Drap.

Toramozu.

Ogilvie-Grant, Nov. Zool, 1902, p. 480; Hartert, Vög. Pal., p. 442; *L. magnirostris*, Campbell, Ibis, 1892, p. 238; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 170.

An adult male purchased in Corea. It was obtained on the island Taikeitō, N. Heian Distr.

167. *Lanius cristatus lucionensis* L.

Shimamozu.

Hartert, Vog. Pal., p. 447; *Otomela lucionensis* (L.), Tacz., P. Z. S., 1887, p. 605; Tacz., op. cit., 1888, p. 464; *L. lucionensis*, Campbell, Ibis, 1892, p. 239; Ogilvie-Grant, Nov. Zool., 1902, p. 483; Ingram, Ibis, 1909, p. 436; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 170.

An adult female specimen was sent me by Mr. S. Wakiyama. It was obtained on the Hakugyokusan, Port Arthur, May 19. I have purchased in Corea a female, in which was collected at Riuganpo, N. Heian Distr.

168. *Lanius sphenocercus sphenocercus* Cab.

Ō-karamozu.

Hartert, Vög. Pal., p. 433; *L. sphenocercus* Cab, Tacz., P. Z. S., 1887, p. 605; Tacz., op. cit., 1888, p. 464; Campbell, Ibis, 1892, p. 239; Ogilvie-Grant, Nov. Zool., 1902, p. 455, Pl. XXVI, fig. 5; Ingram, Ibis, 1909, p. 436; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 170.

An adult specimen was presented to me by Mr. Z. Kōno, who obtained it at Hokuryō, Mukden, Sept., 1916.

Fam. **Sittidæ.**

169. *Sitta europæa amurensis* Sw.

Gojūkara

Hartert, Vög. Pal., p. 331; Hellmayr. Fam. Sittidæ, 1911, p. 8; *S. amurensis* Sw., Tacz., P. Z. S., 1887, p. 601; Tacz., op. cit., 1888, p. 463; Ingram, Ibis, 1909, p. 433; *S. cæsia amurensis*, Campbell, op. cit., 1892, p. 236.

Two adult males were obtained at Kōryō, Keiki Distr., Apr. 23.

Fam. **Paridæ.**

170. *Parus major minor* T. & S.

Shijūkara.

Hartert, Vög. Pal., p 345; *P. minor* T. & S., Tacz., P. Z. S, 1887, p. 604; Tacz., op. cit., 1888, p. 464; *P. atriceps minor*, Campbell, Ibis, 1892, p. 236; *P. cinereus minor* T. & S., Ingram, Ibis, 1909, p. 432.

Katan, near Fusan: 1 ♂, Apr. 6; near Taiden Station: 1 ♀, Apr. 9; Hekiteiri, Keiki Distr.: 2 ♂s and 1 ♀, Apr. 18; Giseifu, Keiki Distr.: 1 ♂, Apr. 22; Chokudōri, Keiki Distr.: 1 ♀, Apr. 22; Kōryō, Keiki Distr.: 1 ♀, Apr. 22 and 1 ♀, Apr. 23.

Hokuryō, Mukden: 3 ♂s and 2 ♀s, May 5.

171. ***Parus major quelpartensis*** Kuroda.

Shima-shijūkara.

Kuroda, "Tori" (The Aves), Vol. I, No. 5, 1917, p. 3, Pl. VI, fig. 1 and 2.

Three specimens preserved in the Seoul Museum were examined by me. The Subspecies is similar to *P. major minor* or *P. major commixtus* Sw., but has somewhat shorter wing, tail and tarsus; moreover, the olive green of mantle extends farther backward and even to the rump; the white band on wing is somewhat tinged with pale olive, instead of being pure white; the entire lower parts, except the median black patch, is tinged with pale greyish olive, this being not limited to the flanks only. Total length 135–143 mm., culmen 11 mm., wing 64.5–68 mm., tail 58–63 mm., Tarsus 17–18 mm. in length. All the three specimens were obtained by Mr. N. Toda from Quelpart Island.

172. ***Parus varius varius*** T. & S.

Yamagara.

Hartert, Vög. Pal., p. 354; *P. varius* T. & S., Tacz., P. Z. S., 1887, p. 604; Tacz., op. cit., 1888, p. 464; *Proparoides varius varius* (T. & S.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII. p. 172.

An adult male obtained at Kōryō, Keiki Distr., Apr. 22.

173. ***Parus ater insularis*** Hellmayr.

Higara.

Hartert, Vög. Pal., p. 359; *P. ater* (nec. L.), Tacz., P. Z. S., 1888, p. 455; Campbell, Ibis, 1892, p. 236.

Two adult males, six adult females and one bird of doubtful sex were obtained near Taiden Station, S. Chūsei Distr., Apr. 9. All these examples are rather greyer than but otherwise very similar to, the Japanese specimens, and are without the elongate occipital plumes of *P. ater pekinensis.* I have not observed this form at any other locality during my journey.

174. *Parus palustris hellmayri* Bianchi.

Chōsen-kogara.

Hartert, Vög. Pal., p. 375; *P. palustris* (nec. L.), Campbell, Ibis, 1892. p. 235.

Kōryō, Keiki Distr.: 4 ♂s and 4 ♀s, Apr. 22, 1 ♂, Apr. 23; Chokudōri, Keiki Distr.: 1 ♂ and 1 ♀, Apr. 22.

175. *Parus palustris crassirostris* (Tacz.).

Hashibuto-kogara.

Hartert. Vög. Pal.. p. 374; Ingram, Ibis, 1909, p. 433; *Pœcilia palustris crassirostris* Tacz, P. Z. S., 1887, p. 604; Tacz., op. cit., 1888, p. 464; *Penthestes palustris crassirostris* (Tacz.,) Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 172.

One male, three females, and one specimen of doubtful sex were obtained at Hokuryō, Mukden, May 5. The measurements are as follows:

Sex.	Wing.	Tail.
♂	65 mm.	64 mm.
♀	65 „	61.5 „
♀	64 „	62 „
♀	60 „	58 „
?	62 „	63 „

176. ***Acredula caudata trivirgata*** (T. & S.).

Enaga.

Mecistura trivirgata (T. & S.), Tacz., P. Z. S., 1887, p. 604; Tacz., op. cit., 1888, p. 464; *Aegithalos caudatus trivirgatus* (T. & S.), Hartert, Vög. Pal., p. 385; ? *Acredula trivirgata magna* Clark, Proc. U. S. Nat. Mus., Vol. XXXII, p. 475; Clark, op. cit., Vol. XXXVIII, p. 173.

A male and a female were obtained at Kōryō, Keiki Distr., Apr. 22. They both compare well with the Japanese specimens measurements as follows:

Sex.	Wing.	Tail.
♂	59.5 mm.	69 mm.
♀	60 „	80 „

The single specimen which was subspecically called *magna* by Clark was probably of the same form as the two specimens now before me; only it had much longer tall the latter. In Corea I have found this form to be rather rare

Fam. **Corvidæ.**

177. ***Corvus frugilegus pastinator*** Gould.

Miyama-garasu.

Hartert, Vög. Pal., p, 14; Ingram, Ibis, 1909, p. 448; *Frugilegus pastinator* (Gould), Tacz., P. Z. S., 1887, p. 605; Tacz., op. cit., 1888, p. 465; *C. pastinator*, Campbell, Ibis, 1892, p. 238.

An adult male was secured near the Mukden Station, May 5, and a young female near Hokuryō, Mukden, May 5. This form was observed most abundantly in Mukden city as well as along the railway. I have seen a number of its nest in Mukden on trees near houses. In Corea I have not observed this form during my journey in the spring though *C. macrorhynchos japonensis* and *C. corone orientalis* were very common there. Campbell reported that a group of this bird were seen near Seoul in winter.

178. ***Colœus dauricus*** (Pall.).

Kokumaru-garasu.

Hartert, Vög. Pal., p. 18; Ingram, Ibis, 1909, p. 447; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 167; *Monedula daurica* (Pall.), Tacz., P. Z. S., 1887, p. 605; Tacz., op. cit., 1888. p. 465.

Six adult males were collected at Hokuryō, Mukden, May 5. In that locality this species was seen nesting together with *C. neglectus*. I have seen on May 7 a group of this bird at Hoshigaura, near Dalni. It seems probable that in Corea this species is found during winter only, like the preceding rook.

179. ***Colœus neglectus*** (Schlegel).

Tō-garasu.

Hartert, Vög. Pal, p. 18; Salvadori, Ibis, 1909, pp. 134–137; Ingram, op. cit., 1909, p. 447; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 168.

Three adult males and one adult female were obtained at Hokuyrō, Mukden, May 5. I am inclined to think that this species or form is merely a melanistic form of *C. dauricus*, in agreement with Dr. Hartert's opinion and contrary to Salvadori's. I have observed that this black bird is much less numerous than the preceding species in all parts visited by me of S. Manchuria. Moreover, I have always seen this bird in associative with *C. dauricus*.

180. ***Pica pica sericea*** Gould.

Kasasagi.

Hartert, Vög. Pal., p. 22; Ingram, Ibis, 1909, p. 447; *P. pica serica* Gould, Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 167; *P. caudata japonica* (T. & S.), Tacz., P. Z. S., 1887, p. 605; Tacz., op. cit., 1888, p. 465.

Hadan, near Fusan : 2 ♀s, 6 youngs and one egg, Apr. 6 ; Tandō, near Taiden Station : 2 ♀s, Apr. 8 ; Gainanmen, near Taiden Station : 6 eggs, Apr. 8 ; Kōshū, S. Zenra Distr. : 4 eggs, Apr. 12 ; near Chokudōri, Keiki Distr. : 1 ♂, Apr. 22. Hokuryō, Mukden : 1 ♂, May 5. In Corea this form is very common on the plains ; but somewhat less in the Northern parts of that peninsula. In S. Manchuria, it seems to be in general much less common than in Corea. Once during a journey form Fusan to Shingishū I have counted 274 individuals of this form from the railway car. I have collected above 11 eggs from three nests. The eggs are pale bluish white, sparsely marked with pale purplish blotches and closely spotted with brown. The markings are always most numerous around the larger end. The long axis of eggs is 34.5 mm.–38.5 mm. long and the diameter 22.5 mm.–25.5 mm.

181. ***Cyanopica cyanus interposita*** Hartert.

Koma-onagadori.

Hartert, Nov. Zool. XXIV, 1917, p. 493 ; *Cyanopolius cyanus* (nec. Pall.), Tacz.. P. Z. S.. 1887, p. 605 ; Tacz., op. cit., 1888, p. 465 ; Campbell, Ibis, 1892, p. 238 ; *Cyanopica cyanus* (nec. Pall.), Ingram, Ibis, 1909, p. 446.

Two males and two females were obtained at Kōryō, Keiki Distr., Apr. 22. At Kōryō this bird is not uncommon, but I have not seen it in any other part of Corea. On the Anpō railway, Antung to Mukden, May 4, some individuals came under observation.

182. ***Garrulus glandarius brandti*** Eversm.

Miyama-kakesu.

Hartert, Vög. Pal, p. 33 ; *G. brandti* Eversm., Tacz., P. Z. S, 1887, p. 605 ; Tacz., op. cit., 1888, p. 465 ; Ingram, Ibis, 1909, p. 446.

Two males obtained at Kōryō, Keiki Distr., Apr. 22.

Fam. **Zosteropidæ.**

183. ***Zosterops palpebrosa ijimæ*** Kuroda.

Ijima-mejiro.

Kuroda, "Tori" (the Aves), Vol. I, No. 5, 1917, p. 4, Pl. VI, fig. 3; fig. 2; *Z. japonica* (nec. T. & S.), Ijima, Journ. Coll. Sci. Imp. Univ., Vol. V., Part I, 1891, p. 109 (Tsushima); Seebohm, Ibis, 1892, p. 90 (Tsu-sima); *Z. stejnegeri* (nec. Seeb.), Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 166 (Tsushima, Fusan and Oshima) (pt.).

I have examined two specimens from Tsushima (Feb. 19, 21, 1891), three specimens from Quelpart Island (Jan. 11; Feb. 6, 1915), one from near Mok-po (Apr. 14, 1917), and one yellow variety from near Fusan (Sept. 1917). The subspecies is very similar to *Z. palpebrosa insularis* from Tanegashima and Yakushima, but on the average longer n bill, wing, tail and tarsus. Exposed culmen 12.5–13 mm., wing 59–62 mm., tail 44–46 mm., tarsus 18–19 mm. It is distinctly larger than *Z. p. japonicus* and *Z. p. loochooensis*, but decidedly smaller than *Z. p. alani* and *Z. p. stejnegeri*.

Fam. **Fringillidæ.**

184. ***Eophona personatus magnirostris*** Hartert.

Hashibuto-ikaru.

Hartert, Vög. Pal., p. 58, Fig. 15.

An adult female specimen was recently sent to me by Mr. T. Mori from Seoul. It was purchased at the Seoul market, Jan. 9, 1918. Bill 24.5 mm., wing 115 mm., tail 83 mm. It agrees in colour exactly with Dr. Hartert's description. The specimen is preserved in the Seoul Higher Common School. This is the first record of the occurrence of this bird in Corea.

185. ***Uragus sibirica sibirica*** (Pall.).

Onaga-benima hiko.

Hartert, Vög. Pal., p. 86

Two adult females were purchased at Seoul., Apr. 24. The smaller form, *U. sibirica sanguinolenta,* also occurs in Corea.

186. ***Fringilla montifringilla*** L

Atori.

Swinhœ, P. Z. S, 1870, p. 602; Tacz, op. cit., 1887, p. 606; Tacz., op. cit., 1888, p. 466; Campbell, Ibis, 1892, p. 241; Hartert, Vög. Pal., p. 130; Ingram, Ibis, 1909, p. 441; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 169.

A female was obtained at Kōryō, Keiki Distr., Apr. 22; another male in summer plumage at Giuzisan, near Riukō, S. Heian Distr., Apr. 30; a male in summer plumage at Hokuryō, Mukden, May. 5.

187. ***Chloris sinica ussuriensis*** Hartert.

Chōsen-kawarahiwa.

Hartert, Vög. Pal., p. 64; *Chlorospiza sinica* (nec. L.), Tacz., P. Z. S., 1887, p. 606; Tacz, op. cit., 1888, p 466; *Fringilla sinica* (nec. L.), Campbell, Ibis, 1892, p. 241; *Chloris sinica* (nec. L.), Ingram, Ibis, 1909, p. 440.

An adult female and an adult male were obtained at Kōryō, Keik Distr., Apr. 22–23. A male, obtained near Dalni, May 9, was presented to me by Mr. O. Yoshikura.

188. ***Chloris sinica minor*** (T. & S.).

Ko-kawarahiwa.

Hartert, Vög. Pal., p. 64.

I have examined two specimens from Quelpart Island; one from Kanrasan, Jan. 11, 1915, and the other from Jōzanpo, Feb. 13, 1915.

Both are now preserved in the Seoul Museum ; they agree exactly with the form which occur in Japan.

189. ***Passer montata saturatus*** Stejn.

Suzume.

Hartert, Vög. Pal., p. 161 ; *P. montanus* (nec. L.), Tacz., P. Z. S., 1887, p. 606 ; Tacz., op. cit., 1888, p. 466 ; Campbell, Ibis, 1892, p. 241 ; Ingram, Ibis, 1909, p. 440 ; *P. montanus orientalis* Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 169.

Hadan, near Fusan : 2 ♂ s, Apr. 6 ; Riusen, near Taiden Station : 2 ♂ s, Apr. 8 ; Yuson, near Taiden : 1 ♂ and 2 ♀ s, Apr. 8 ; Hekitēri, Keiki Distr. : 1 ♂, Apr. 18 ; Shuan, Keiki Distr. : 1 ♂ and 2 ♀ s, Apr, 19.

Mukden : 7 ♂ s and 4 ♀ s, May 5 ; Hokuryō, Mukden : 4 ♂ s, May 5 ; Kokaton, Port Arthur ; 1 ♂ and 1 ♀, May 8. Very Common.

190. ***Passer rutilans rutilans*** (Temm.).

Niunai-suzume.

Hartert, Vög. Pal., p. 161.

An adult male was obtained at Kōryō, Keiki Distr., Apr. 23. This sparrow is no doubt less abundant.

191. ***Emberiza fucata fucata*** Pall.

Hōaka.

Hartert, Vög. Pal., p. 187 ; *E. fuscata* Pall., Giglioli and Salvad., P. Z. S., 1887, p. 583 ; *E. fucata* Pall., Tacz., op. cit., 1887, p. p. 606 ; Tacz., op. cit., 1888, p. 465 ; Campbell, Ibis, 1892, p. 241 ; Ingram, Ibis, 1969, p. 443 ; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 169.

A male, presented to me by Mr. O. Yoshikura, was obtained near Dalni, May 9.

192. ***Emberiza pusilla*** Pall.

Ko-hōaka.

Hartert, Vög. Pal., p. 188; Ingram, Ibis. 1909, p. 413.

Mukden: 1 ♂, May 5; Hokuryō Mukden: 1 (sex?), May 5; Kokaton, Port Arthur: 3 ♂ s and 9 ♀ s, May 8; near Port Arthur: 3 ♀ s, May 9; near Dalni, 1 ♀, May 9. A large flock of this bird was observed by me near Port Arthur. A specimen of this species has been obtained in Corea.

193. ***Emberiza cioides ijimæ*** Stejn.

Ijima-hōjiro.

Stejn., Proc. U. S. Nat. Mus., Vol. XXVI, p. 638 (Tsushima).

I have examined some specimens from Tsushima, as well as some from Seikiho, Quelpart Island (Jan. 12, 1915). The form is separable from *E. cioides ciopsis* of Japan and *E. cioides castaneiceps* of Corea. It has never yet been found on the Corean peninsula.

194. ***Emberiza cioides castaneiceps*** Moore.

Chōsen-hōjiro.

Hartert, Vög. Pal., p. 186; Ingram, Ibis, 1909, p. 443; *E. castaneiceps* Moore, Giglioli and Salvad., P. Z. S., 1887, p. 582; Tacz., op. cit., 1888, p. 465; Clark, Proc. U. S. Nat. Mus, Vol. XXXVIII, p. 169; *E. cioides* (nec. Brandt), Tacz., P. Z. S.. 1887, p. 606; Campbell, Ibis, 1892, p. 241.

Hadan, near Fusan: 3 ♂ s, 1 ♀ and 2 (sex?), Apr. 6; Taiden: 2 ♂ s and 1 ♀, Apr. 8; Yuson, Taiden: 2 ♂ s, 1 ♀ and 2 (sex?), Apr. 8; Yukutō, Mok-po harbour: 1 ♀, Apr. 11; Shuan, Keiki Distr.: 1 ♂, Apr. 19; Chokudōri, Keiki Distr.: 1 ♂, Apr. 22; Daijōri, S. Heian Distr.: 1 ♂, Apr. 30; Giuzisan, Riukō, S. Heian Distr.: 1 ♂, Apr. 30. Very common in Corea, especially in the southern parts. I have purchased a male specimen from Riusen, N. Heian Distr. Mr. S.

Wakiyama has sent me a male specimen from near Port Arthur. It seems that this bunting is rather rare in S. Manchuria.

195. ***Emberiza tristrami*** Sw.

Shirohara-hōjiro.

Campbell, Ibis, 1892, p. 241; Hartert, Vög. Pal., p. 192; Clark, Proc. U. S. Nat. Mus., Vol. XXXVIII, p. 169.

A female obtained near Tōdaimon, Seoul., Apr, 1917, and a male from uncertain locality in Corea were procured by me by purchase.

196. ***Emberiza chrysophrys*** Pall.

Kimayu-hōjiro.

Hartert, Vög. Pal., p. 189.

Mr. O. Yoshikura has presented to me an adult male obtained near Dalni, May 9. This is the first time that this interesting species is recorded from S. Manchuria. It has obtained in Corea.

197. ***Emberiza elegans*** Temm.

Miyama-hōjiro.

Campbell, Ibis, 1892, p. 241; Hartert, Vög. Pal., p. 174; Clark, Proc. U. S. Nat. Mus, Vol. XXXVIII, p. 169.

Four adult males were obtained at Kōryō, Keiki Distr.; Apr. 22. It is an interesting fact that the female of this species comes to collector's hand much less frequently than the male.

198. ***Emberiza spodocephala spodocephala*** Pall.

Kara-awoji.

Hartert, Vög. Pal., p. 176; *E. spodocephala* Pall., Tacz., P Z. S., 1887, p. 606; Tacz., op. cit., 1888, p. 466; Campbell, Ibis, 1892, p. 241. Ingram, Ibis, 1909, p. 442.

An adult male and a female (?) were obtained at Kōryō, Keiki Distr., Apr. 22; a female (?) at Kokaton, Port Arthur, May 8.

199. ***Emberiza aureola*** Pall.

Shima-awoji.

Hartert, Vög. Pal., p. 173; Ingram, Ibis, 1909, p. 442.

Three adult males were obtained at Hokuryō, Mukden, May 5. An adult male from Dalni (May 9) was presented to me by Mr. O. Yoshikura. Mr. S. Wakiyama has sent to me two females obtained on Hakugyokusan, Port Arthur, May 19.

200. ***Emberiza rustica*** Pall.

Kashiradaka.

Tacz., P. Z. S., 1888, p. 455; Campbell, Ibis, 1892, p. 241; Hartert, Vög. Pal., p. 188; Ingram, Ibis, 1909, p. 443.

A male was obtained near the Taiden Station, S. Chusei Distr., Apr. 8.

201. ***Emberiza leucocephalos*** S. G. Gm.

Shiraga-hōjiro.

Hartert, Vög. Pal., p. 169; Ingram, Ibis, 1909, p. 442.

A female specimen is preserved in the Science College, Tokyō. It was presented by Mr. N. Okada from Corea. I have a male specimen also from that peninsula, Feb. 25, 1911.

202. ***Emberiza yessoënsis*** (Sw.).

Kojurin.

Hartert, Vög. Pal., p. 193.

A male specimen is preserved in the Seoul Museum. It was obtained at Usan, Keiki Distr., Jan. 25, 1914. Mr. T. Mori has informed me that this species has been obtained at Riuganpo, N. Heian Distr., early in May to the Middle of June, 1917.

203. *Emberiza pallasi* (Cab.).

Shiberia-jurin.

Hartert, Vög. Pal., p. 194; Ingram, Ibis, 1909, p. 444; *Schœnicola polaris* (Midd.), Tacz., P. Z. S., 1887, p. 606; Tacz., op. cit., 1888, p. 466; *E. passerina* (nec. Pall.), Campbell, Ibis, 1892, p. 241.

Four males in summer plumage were purchased by me at Seoul. I have seen this species at Riuganpo, N. Heian Distr., May 3. One female specimen was presented to me by Mr. S. Wakiyama from Port Arthur. This bird is probably rather common in the reed-bushes in Corea.

204. *Emberiza schœniclus pyrrhulinus* Sw.

Ō-jurin.

Hartert, Vög. Pal., p. 197, Fig. 38.

Three specimens of this subspecies are preserved in the Seoul Museum. One of them is a male in summer plumage, obtained at Suishoku, Keiki Distr., Apr. 3, 1914. The second is a female (?) obtained on the coast of Ansan, Keiki Distr., Nov. 15, 1913. The third specimen is a female (?), collected on the coast of Kakusanmen, Tsūsen, Kōgen Distr., March 3, 1914. The wing is shorter (71–77 mm. only) than the length given by Dr. Hartert (86 mm.). I have compared the above three specimens with a series of Japanese examples, and have found that there exists no difference between the two sets. That is the males are somewhat larger than females, the wing of males in Japanese specimens being 75–86 mm. and in the females 74–83 mm. long. Dresser has stated that *E. schœniclus* occurs in Manchuria, and I am greatly inclined to think that the distribution of the present subspecies extends into Manchuria.

A List of Birds known from Corea and Manchuria.

In the following list I have given the names and the distribution of all the bird species and subspecies now known from Corea and Manchuria.

The mark × indicates simply the occurence of the species or subspecies concerned in the region named at top of the column; the mark *, that the same is known to breed, or is probably a breeder, in the region; and either of the above marks enclosed in a circle (⊗ or ⊛), that the same is a new addition, not recorded before.

Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
1. *Colymbus septentrionalis* L.	×	×	×	×	......	×
2. *C. arcticus arcticus* L.	×	×	×	×		
3. *C. arcticus pacificus* (Lawr.)	×	......	×			
4. *C. adamsi* Gray.	×	⊗	×	×		
5. *Podicipes fluviatilis* (Tunst.)	*	*	*			
6. *P. auritus* (L.)	×	×	×	×	......	×
7. *P. nigricollis* Brehm	×	* ?	×	×	......	×
8. *P. griseigena holboelli* (Rienh.)	×	×	......	×		
9. *P. cristatus* L.	×	⊗	×	......	×	
10. *Diomedea albatrus* Pall.	*	×	......	×	......	×
11. *Puffinus leucomelas* T.	*	*				
12. *P. tenuirostris* (T.)	×	×	......	×		
13. *Phalacrocorax carbo sinensis* (Shaw & Nodd.)	*	×	*	×		
14. *P. capillatus* (T. & S.)	*	×	*	×	......	×
15. *P. pelagicus* Pall.	*	×	×	×	......	×
16. *P. bicristatus* Pall.	×	......	×	×		
17. *Pelecanus crispus* Bruch.	?	×	......	......	×	×
18. *Herodias intermedia* (Wagl.)	*	*	......	......	......	×
19. *H. alba alba* (L.)	×	×	......	?		
20. *H. alba timoriensis* (Cuv.)	*	×	×	×	......	×
21. *Bubulcus coromandus* (Bodd.)	×	×	......	×	......	×
22. *Demiegretta jugularis* (Wagl.)	×	×				
23. *D. eulophotes* (Sw.)	......	*	⊛	......	......	×
24. *Phoyx purpurea manillensis* (Meyen)	×	×	*			

Species and subspecies	Japan	Corea	Man-churia	Siberia	Mon-golia	China
25. *Ardea cinerea jouyi* Clark	*	*	*	×		×
26. *Nycticorax nycticorax* (L.)	*	× (Quelpart Is.)	×			
27. *Butorides javanica amurensis* (Schr.)	*	*	×	×		×
28. *Ardetta sinensis* (Gm.)	*	*	⊗			×
29. *A. cinnamomea* (Gm.)	×		×	×		×
30. *Nannocnus eurythmus* (Sw.)	*	⊗	×	×		×
31. *Botaurus stellaris* (L.)	×	×	×	×		×
32. *Ardeola prasinosceles* Sw.	×		×		×	×
33. *Ciconia boyciana* Sw.	*	*		×	×	?
34. *Ciconia nigra* (L.)	×	×	×	×	×	×
35. *Ibis nippon* Temm.	×	×	×	×		×
36. *I. melanocephala* (Lath.)	×		×			×
37. *Platalea leucorodia* L.	×	?	×	×		×
38. *P. minor* T. & S.	×	*				×
39. *Mergus merganser merganser* L.	×	×	×	×	×	×
40. *M. serrator* L.	*	×	×	×		×
41. *M. albellus* L.	×	×	×	×		×
42. *Oidemia americana* S. & R.	*	×		×		
43. *O. fusca stejnegeri* (Ridgw.)	×	×	×	×	×	×
44. *Cosmonetta historionica* (L.)	×	×		×		
45. *Harelda glacialis* (L.)	×	×	×	×		
46. *Clangula clangula clangula* (L.)	×	×	×	×		×
47. *Nyroca bæri* Radde	×	⊗	×	×		×
48. *N. ferina* (L.)	×	×		×		
49. *Fuligula marila* (L.)	×	×	×	×		×
50. *F. cristata* (Leach)	×	×	×	×		×
51. *Mareca penelope* (L.)	×	×	×	×		×
52. *Spatula clypeata* (L.)	×	×	×	×		×
53. *Dafila acuta* (L.)	×	×	×	×	×	×
54. *Nettion crecca* (L.)	*	×	×	×		×
55. *N. formosum* (Georgi)	×	×	×	×	×	×
56. *Querquedula circia* (L.)	×	×	×	×		×
57. *Eunetta falcata* (Georgi.)	×	×	×	×		×
58. *Chaulelasmus streperus* (L.)	×	×	×	×		×
59. *Anas boschas* L.	*	×	*	×		

Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
60. *A. zonorhyncha* Sw.	✱	✱	✱	×	×	×
61. *Æx galericulata* (L.)	✱	✱	×	×		×
62. *Pseudotadorna cristata* Kuroda		⊗		×		
63. *Casarca rutila* (Pall.)	×	×	✱	×	×	×
64. *Tadorna cornuta* (Gm.)	×	×	×	×	×	×
65. *Anser anser* (L.)		⊗		×		×
66. *A. albifrons* (Scop.)	×	×	×	×	×	×
67. *Anser minutus* Naum.	×	⊗	×	×	×	×
68. *Melanonyx arvensis sibiricus* Alph.	×	×		×		×
69. *M. segetum segetum* (Gm.)		×		×		?
70. *M. segetum serrirostris* (Sw.)	×	×	×	×		×
71. *M. segetum mentalis* (Oates)	×	×	×	×		
72. *Cygnopsis cygnoides* (L.)	×	✱	×	×	×	×
73. *Branta bernicla nigricans* (Lawr.)	×	×	×	×		
74. *Chen hyperboreus hyperboreus* (Pall.)	×	×		×		
75. *Cygnus musicus* Bechst.	×	×	×	×		×
76. *C. bewicki* Yarr.	×	×	×	×	×	×
77. *C. olor* (Gm.)		×			×	
78. *Vultur monachus* (L.)		×				×
79. *Gypaëtus barbatus* (L.)		×	×	×	×	×
80. *Circus æruginosus* (L.)	×	×	×			×
81. *C. spilonotus* Kaup.	×	⊗		×	×	×
82. *C. cyaneus* (L.)	×	×	?	×	×	×
83. *C. melanoleucus* (Forst.)		⊗	✱	×	×	×
84. *Astur palumbarius* L.	✱	×	×	×		×
85. *A. cuculoides* (T.)		×				×
86. *A. soloensis* (Lath.)		×				×
87. *Accipiter nisus* (L.)	✱	×	×	×		×
88. *A. virgatus gularis* (T. & S.)	✱	×	×	×		×
89. *Aquila chrysaëtus* (L.)	×	×	×	×		×
90. *A. clanga* Pall.		⊗	⊗	×		
91. *A. heliaca* Savig.		⊗		×	×	×
92. *Haliaëtus albicilla brooksi* (Hume.)	×	×	×	×		×
93. *H. pelagicus* (Pall.)	×	⊗		×	×	×
94. *H. branickii* Tacz.		✱				

	Species and subspecies	Japan	Corea	Man-churia	Siberia	Mon-golia	China
95.	*Spizaëtus nipalensis* (Hodgs.)	*	×			×	×
96.	*Buteo leucocephalus* (Hodgs.)	×	×		×		×
97.	*B. buteo plumipes* Hodgs.	*	×	*			
98.	*Archibuteo lagopus*? (Gm.)	×	×		×		
99.	*Butastur indicus* (Gm.)	×	×	×	×		×
100.	*Pernis apivorus* (L.)	*	×				
101.	*Milvus ater melanotis* T. & S.	*	*	*	×	×	×
102.	? *Microhierax chinensis* David.[1]			× ?			×
103.	*Falco peregrinus calidus* Lath.	*	×	×	×		×
104.	*F. subbuteo jakutensis* But.	×	×	×	×		×
105.	*F. tinnunculus tinnunculus* L.		×	×	×		×
106.	*F. tinnunculus japonicus* T. & S.	*	×	×	×		×
107.	*F. æsalon insignis* (Clark)	×	×	×	×		×
108.	*F. cherrug milvipes* Jerdon		×			×	×
109.	*Erythropus vespertinus amurensis* (Radde)		⊗	×	×		×
110.	*Pandion haliaëtus* (L.)	×	×	×	×		×
111.	*Turnix blanfordi* Blyth		×	×		×	×
112.	*Phasianus colchicus karpowi* But.	* (Tsushima)	*	*			
113.	*P. colchicus pallasi* Roths.			*	×		
114.	*Pucrasia xanthospila* Gray.			×			×
115.	[*Crossoptilum mantchuricum* Sw.]			?			×
116.	*Perdix daurica* Pall.			×	×	×	×
117.	*Coturnix coturnix japonica* T. & S.	*	×	×	×	×	×
118.	*Lyrurus tetrix* (L.)			*	×		?
119.	*Tetrastes bonasia* (L.)	*	*	*	×		×
120.	*Porzana pusilla* (Pall.)	*	×	*	×	×	×
121.	*P. fusca paykulli* (Ljungh)	× (Tsushima)	×	⊗	×		×
122.	*Rallus aquaticus indicus* Blyth.	*	×	×		×	×
123.	*Gallicrex cinereus* (Gm.)	×	×	⊗			
124.	*Gallinula chloropus parvifrons* Blyth	*	⊘		?		×
125.	*Fulica atra* L.	*	×	×	×	×	×
126.	*Otis dybowskii* Tacz.	×	×	×	×		×
127.	*Grus japonensis* (Müll.)	*	×	×	×		×

1) Observed by Mr. Y. Enomoto at Riujuton, S. Manchuria.

Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
128. *Grus communis lilfordi* Sharpe.	×	⊗	×	×		×
129. *G. nigricollis* Przew.		×				
130. *G. monachus* Temm.	*	*	* ?	×	×	×
131. *G. leucauchen* Temm.	×	×	×	×	×	×
132. *G. leucogeranus* Pall.	×		×	×	×	×
133. *G. virgo* (L.)	×		×	×	×	×
134. *Arenaria interpres oahuensis* (Bloxh.)	×	×	×	×		×
135. *Squatarola squatarola* (L.)	×	×	×	×		
136. *Charadrius dominicus fulvus* Gm.	×	×	×	×		×
137. *Ægialitis placida* (Gray)	*	*	*	×		×
138. *Æ. dubia curonicus* (Gm.)	*	*	*	×	×	×
139. *Æ. alexandrina alexandrina* (L.)	×	×	×	×		×
140. *Æ. alexandrina dealbatus* Sw.	*	⊗	⊗			×
141. *Ochthodromus veredus* (Gould)		×			×	×
142. *O. geoffroyi* (Wagl.)	×	×	×			×
143. *O. mongolus mongolus* (Pall.)	×	×	×	×	×	×
144. *Microsarcops cinereus* (Blyth)	*	×	×		×	×
145. *Vanellus vanellus* (L.)	×	×	×	×		×
146. *Hæmatopus ostralegus osculans* Sw.	×	*	×	×		×
147. *Recurvirostra avocetta* L.	?	×		×	×	×
148. *Numenius arquatus lineatus* Cuv.	×	×	×	×	×	×
149. *N. cyanopus* Vieill.	×	×	×	×		×
150. *N. phæopus variegatus* (Scop.)	×	×	×	×		×
151. *N. minutus* Gould	×	×	×	×	×	×
152. *Limosa lapponica baueri* (Naum.)	×	×		×	×	×
153. *L. limosa melanuroides* Gould	×	×	×	×	×	×
154. *Terekia cinerea* (Güld.)	×	×		×		×
155. *Heteractitis incanus brevipes* (V.)	×	×	×	×		×
156. *Tringoides hypoleucus* (L.)	*	×	*	×	×	×
157. *Totanus fuscus* (L.)	×	×		×	×	×
158. *T. totanus* (L.)	×	×	×	×	×	×
159. *T. stagnatilis* Bechst.	×	×	×	×		
160. *Glottis nebularius* Gunn.	×	×	×	×		×
161. *Pseudoglottis guttifer* (Nordm.)	×	⊗		×		×
162. *Helodromas ocrophus* (L.)	×	×	×	×		×

	Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
163.	*Rhyacophilus glareola* (L.)	×	×	×	×		×
164.	*Pavoncella pugnax* (L.)	×	⊗		×		
165.	*Phalaropus hyperboreus* (L.)	×	×		×		×
166.	*Limonites minuta ruficollis* (Pall.)	×	×	×	×	×	×
167.	*Limonites minutilla subminuta* (Midd.)	×	×	×	×		×
168.	*Heteropygia acuminata* (Horsf.)	×	×	⊗	×		
169.	*Tringa canutus rogersi* (Mathews)	×	⊗	×	×		
170.	*T. tenuirostris* (Horsf.)	×	×	×	×	×	×
171.	*Calidris leucophaea leucophaea* (Vr.)	×	×		×		×
172.	*Pelidna alpina alpina* (L.)		⊗				
173.	*P. alpina pacifica* Coues	×	×	×	×		×
174.	*Eurynorhynchus pygmaeus* (L.)	×	⊗		×		×
175.	*Limicola platyrhyncha sibirica* Desser	×	×		×		×
176.	*Gallinago gallinago* (L.)	✱	×	×	×		×
177.	*G. stenura* (Kuhl.)	×	×	✱	×		×
178.	*G. megala* Sw.	×	×		×	×	×
179	*G. solitaria* Hodgs.	✱ ?	✱ ?	×	×	×	×
180.	*G. gallinula* (L.)	×	×		×		×
181.	*Scolopax rusticola rusticola* L.	✱	×	×	×		×
182.	*Rostratula capensis capensis* (L.)	✱	×				×
183.	*Glareola pratincola maldivarum* Lath. & Dav.	×		⊗	×	×	×
184.	*Larus ridibundus* L.	✱	×	×	×		×
185.	*L. saundersi* (Sw.)	×	×	×	×	×	×
186.	*L. canus* L.	×	×	×	×		×
187.	*L. crassirostris*	✱	×	×	×		×
188.	*L. marinus schistisagus* Stejn.	✱		×	×		
189.	*L. argentatus vegae* Palm.	✱	×	×	×		×
190.	*Rissa tridactyla pollicaris* Ridg.	✱ (Saghalin)		×	×		
191.	*Rhodostethia rosea* (Macgill.)			⊗	×		
192.	*Sterna bergii*, subsp.		⊗ ?				
193.	*Sterna anglica* Montag.			×		×	
194.	*S. longipennis* Nordm.	×	⊗	×	×		×
195.	*S. sinensis* Gm.	✱	×	×			×
196.	*Hydrochelidon leucoptera* (Schinz.)			⊗	×	×	×

	Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
197.	*Alca troile* (L.)	*	*		×		
198.	*Cerorhyncha monocerata* (Pall.)	*	×	×	×		
199.	*Uria carbo* (Pall.)	*	×		×		
200.	*Synthliborhamphus antiquus* Gm.	*	×	×	×		
201.	*S. wumizusume* (T.)	*	×				
202.	*Syrrhaptes paradoxus* (Pall.)	×	×	×	×		×
203.	*Turtur orientalis* (Lath.)	*	×	×	×	×	×
204.	*T. decaocta torquatus* (Bodg.)	*	×	×	×	×	×
205.	*Columba rupestris taczanowskii* Stejn.		*	⊗	?		×
206.	*Cuculus canorus telephonus* Heine	*	×	×	×		×
207.	*C. optatus* Gould	*	×	×	×		×
208.	*C. poliocephalus* Lath.	*	*	?	×		×
209.	*C. micropterus* Gould	×	⊗		×		×
210.	*Hierococcyx fugax nisicolor* (Blyth.)	*	⊗		×		×
211.	*Eurystomus orientalis calonyx* Sharpe	*	*	*	×		×
212.	[? *Halcyon smyrnensis fusca* (Bodd.)]		⊗ ?				×
213.	*H. pileata* (Bodd.)	×	*				×
214.	*H. coromanda major* T. & S.	*	×	×			×
215.	*Alcedo ispida bengalensis* Gm.	*	*	*	×		×
216.	*Ceryle lugubris lugubris* (T.)	*	×				
217.	*Upupa epops saturata* Lönnb.	×	*	×	×	×	×
218.	*Nyctea nyctea* (L.)	×	×		×		
219.	*Bubo bubo kiautschensis* Reich.[1]	×	*	×			×
220.	*B. bubo tibetanus* Bianchi.[2]			× ?			
221.	*Scops japonicus* (T. & S.)	×	×	×	×		×
222.	*S. semitorques semitorques* (T. & S.)	*	×		×		×
223.	*S. semitorques ussuriensis* But.		⊗		×		
224.	*Asio otus* (L.)	×	×	×	×		
225.	*A. flammeus* (Pontop.)	*	×	×	×		
226.	*Ninox scutulata scutulata* (Raffl.)	*	*	×	×		×
227.	*Ægolius tengmalmi sibiricus* (But.)	×		×	×		

1) Dr. Hartert has mentioned that *Bubo bubo* subsp. = *B. b. doerriesi* But. (non Seeb.) also occurs in Manchuria.

2) According to Dr. Hartert, the range of *Bubo blakistoni doerriesi* Seeb. reaches the frontier of Corea.

Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
228. *? Athene noctua plumipes* Sw.[1]			× ?			×
229. *Syrnium aluco nivicolum* Blyth.		✱	?			×
230. *Caprimulgus indicus jotaka* T. & S.	✱	×	×	×	×	×
231. *Chætura caudacuta caudacuta* (Lath.)	✱	×	×	×	×	×
232. *Cypselus pacificus* (Lath.)	✱	✱	✱	×	×	×
233. *Dryobates major tscherskii* (But.)			×	×		
234. *D. major japonicus* (Seeb.)	✱	✱	?			
235. *D. leucotos uralensis* (Malh.)		✱	?			
236. *D. cabanisi cabanisi* (Malh.)			×			×
237. *? D. minor minutillus* (But.)	×		× ?	×		
238. *Iyngipicus kizuki seebohmi* Harg.	✱	✱		×		
239. *I. scintilliceps doerriesi* Harg.		✱	×	×		
240. *Hypopicus hyperythrus subrufinus* (Cab. & Heine)			×			×
241. *Gecinus canus jessoensis* (Stejn.)	✱		✱	×	×	
242. *G. canus griseoviridis* Clark.		✱				
243. *? Ficoides tridactylus crissoleucus* (Reich.)			× ?	×		
244. *Picus martius martius* L.	✱ (Hokkaido)	✱	✱	×		×
245. *P. richardsi* (Tristr.)	✱ (Tsushima)	✱				
246. *Iynx torquilla japonica* Bp.	✱	×	×	×		×
247. *Pitta nympha* T. & S.	×	⊗				
248. *Alauda arvensis cinerea* Ehm.		⊗	✱	×		?
249. *A. arvensis intermedia* Sw.		✱	✱	×		×
250. *A. arvensis pekinensis* Sw.	×	×	×	×		×
251. *Galerida cristata coreensis* Tacz.		✱				
252. *G. cristata leautungensis* (Sw.)			✱			×
253. *Melanocorypha mongolica* (Pall.)			×	×	×	×
254. *Motacilla boarula melanope* Pall.	✱	✱	✱	×		
255. *M. flava simillima* Hart.		×	×	×		×
256. *M. flava borealis* Sund.		⊗	×	×		
257. *M. citreola citreola* Pall.			✱	×	×	×
258. *M. alba grandis* Sharpe.	✱	⊗				
259. *M. alba leucopsis* Gould.	×	✱	✱	×	×	×
260. *M. alba lugens* Kittl.	✱ (Tsushima)	✱ ?	×	×		×

1) Collected and reported by Mr. Y. Enomoto under the name of *Glaucidium whitelyi*, which identification is probably a mistake.

Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
261. *Mottacilla alba ocularis* Sw.		×	*	×	×	×
262. *M. alba baicalensis* Sw.			*	×		×
263. *Dendronanthus indica* (Gm.)	×	×	⊗	×		×
264. *Anthus trivialis maculatus* Jerd.	*	×	?	×	×	×
265. *A. trivialis yunnanensis* Uch. & Kur.			×			×
266. *A. spinoletta japonicus* T. & S.	*	×		×		×
267. *A. cervina* (Pall.)	×	×		×		
268. *A. roseatus* Blyth		×				×
269. *A. gustavi* Sw.		×	×	×		×
270. *A. richardi richardi* Vieill.			×	×		×
271. *A. richardi striolatus* Blyth		×	×	×	×	
272. *? Brachypteryx* Sp.[1]			× ?			
273. *Rhopophilus pekinensis pekinensis* Sw.		⊗			×	×
274. *Suthora webbiana webbiana* Gray.[2]	?	*				×
275. *Hypsipetes amaurotis amaurotis* (T.)	*	×	×			×
276. *H. amaurotis hensoni* Stejn.	*	×				×
277. *Terpsiphone incei* (Gould)		⊗	×			×
278. *T. atrocaudata atrocaudata* (Eyton)	*	×	×			
279. *Hemichelidon sibirica* Gm.	×	×	×	×	×	×
280. *H. griseisticta* Sw.	×	×	⊗	×		×
281. *Alseonax latirostris* (Raffl.)	*	×	×	×		×
282. *Xanthopygia narcissina narcissina* (T.)	*	×				×
283. *X. narcissina tricolor* (Hartl.)	×	*	*	×	×	×
284. *Muscicapa parva albicilla* Pall.		×	×	×		×
285. *M. mugimaki* Temm.	×	×		×		×
286. *Cyanoptila cyanomelana* (T.)	*	*	*	×		×
287. *Geocichla dauma aureus* (Hol.)	*	×		×		×
288. *Turdus fuscatus* Pall.	×	×	×	×	×	×
289. *T. naumanni* T.	×	×	×	×	×	×
290. *T. chrysolaus* T.	*	×		×		×
291. *T. obscurus* Gm.	×	×	×	×	×	×

1) Mr. Y. Enomoto has collected and reported this bird from S. Manchuria, but the description and dimentions given by him show that it probably is a male of *Larvivora cyane*.

2) Salvadori and Giglioli have reported that this bird was procured in Japan, but it seems probable that they had to do with an escaped cage-bird.

	Species and subspecies	Japan	Corea	Man-churia	Siberia	Mon-golia	China
292.	*Turdus hortulorum* Scl.	×	*	*	×		×
293.	*T. pallidus* Gm.	×	×	*	×	×	×
294.	*T. sibiricus sibiricus* Pall.		×	×	×		×
295.	*T. cardis* Temm.	*	*				×
296.	*Monticola solitarius philippensis* (Müll.)	*	*	*	×		×
297.	*M. gularis* (Sw.)		⊗	*	×		×
298.	*Erithacus sibilans* (Sw.)	×	×		×		×
299.	*Cyanecula svecica robusta* But.	×		⊗	×		×
300.	*Calliope calliope* (Pall.)	*	×	*	×	×	×
301.	*Larvivora cyane* (Pall.)	*	×	*	×	×	×
302.	*Tarsiger cyanurus* (Pall.)	*	×	×	×	×	×
303.	*Ruticilla aurorea* (Pall.)	*	*	×	×	×	×
304.	*Pratincola torquata stejnegeri* Parrot	*	*	*	×		×
305.	*Accentor collaris erythropygius* Sw.	*	×	×	×		×
306.	*A. montanellus* (Pall.)	×	×		×		×
307.	*Locustella fasciolata* (Gray)	×	×	*	×		×
308.	*L. ochotensis* (Midd.)	*	*	×	×		×
309.	*L. certhiola* (Pall.)[1]	?	⊗	×	×		×
310.	*L. lanceolata* (T.)	*	⊗	×	×		×
311.	*Phragamaticola aëdon* (Pall.)		×	*	×		×
312.	*Acrocephalus arundinaceus orientalis* (T. & S.)	*	*	×	×		×
313.	*A. bistrigiceps* Sw.	*	⊗	×	×		×
314.	*Lusciniola schwarzi* (Radde)		×	×	×		×
315.	*Urosphena squamiceps* (Sw.)	*	*		×		×
316.	*Horeites cantans borealis* (Campb.)		*	*	×		×
317.	*Sylvia curruca affinis* Blyth			*	×		×
318.	*Phylloscopus fuscatus* (Blyth)	?		×	×	×	×
319.	*P. borealis borealis* (Blass.)	×	×	×	×	×	×
320.	*P. borealis xanthodryas* Sw.	*	×		×	×	×
321.	*P. occipitalis coronatus* (T. & S.)	*	*		×		×
322.	*P. superciliosa superciliosa* (Gm.)		×	×	×	×	×
323.	*P. proregulus proregulus* (Pall.)		⊗	*	×		×

1) This species was observed by Ingram during his sea voyage from Japan to Vladivostock in June, 1907.

	Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
324.	*Phylloscopus nitidus plumbeitarsus* Sw.		⊗	*	×		×
325.	*P. tenellipes* Sw.	*	*		×		×
326.	*Regulus regulus japonensis* Blak.	*	×		×		×
327.	*Cinclus pallasi pallasi* T.	*	*	*	×		
328.	*Troglodytes troglodytes peninsulæ* Clark		*		×		
329.	*Hirundo rustica rustica* L.			×	×		×
330.	*H. rustica gutturalis* Scop.	*	*	*	×	×	×
331.	*H. rustica erythrogastra* Bodd.	?	⊗	×	×	×	×
332.	*H. rustica tytleri* Jerd.			×	×		×
333.	*H. daurica daurica* L.			*	×	×	
334.	*H. daurica nipalensis* Hodgs.	*	*	×			
335.	*Chelidon urbica whiteleyi* Sw.			*	×	×	×
336.	*Cotile riparia ijimæ* (Lönnb.)	*	×	× ?	?		
337.	*C. paludicola chinensis* (Gray)		×	×	×		×
338.	*Pericrocotus cinereus* Lafr.	*	*	*	×		×
339.	*P. brevirostris* (Vigors)			×			×
340.	*Buchanga atra* (Herm.)			⊗			×
341.	*Ampelis garrulus garrulus* (L.)	×	×	×	×		
342.	*A. japonica* (Sieb.)	×	×		×		×
343.	*Lanius bucephalus* T. & S.	*	*	×	×		×
344.	*L. cristatus cristatus* L.			×	×		×
345.	*L. cristatus lucionensis* L.	×	*	×	×		×
346.	*L. tigrinus* Drap.	*	*	×	×		×
347.	*L. excubitor mollis* Eversm.	×		×	×	×	
348.	*L. sphenocercus sphenocercus* Cab.	?	×	×	×	×	×
349.	*Sitta europæa amurensis* Sw.	*	×	×	×		×
350.	*S. europæa bedfordi* Grant		* (Quelpart Is.)				
351.	*S. canadensis corea* Grant.		*				
352.	*Parus major minor* T. & S.	*	*	*	×	×	×
353.	*P. major quelpartensis* Kuroda		⊗ (Quelpart Is.)				
354.	*P. varius varius* T. & S.	*	×				
355.	*P. ater pekinensis* David			×	×	×	×
356.	*P. ater insularis* Hellm.	*	×				
357.	*P. palustris brevirostris* (Tacz.)			×	×		
358.	*P. palustris crassirostris* (Tacz.)		×	×	×		

Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
359. *Parus palustris hellmayri* Bianchi		*				×
360. *P. atricapillus baicalensis* (Sw.)	×		×	×		
361. *Acredula caudata caudata* (L.)	×	×	×	×		
362. *A. caudata trivirgata* (T. & S.)	*	×				
363. *Aegithalus consobrinus suffusus* (Clark)		×				
364. *Panurus biarmicus russicus* (Brehm.)			×	×	×	
365. *Oriolus indicus* Jerdon		*	*	×	×	×
366. *Corvus corax ussurianus* Tacz.			×			
367. *C. macrorhynchos japonensis* Bp.	*	*	×	×		×
368. *C. crone orientalis* Eversm.	*	*	*	×	×	×
369. *C. frugilegus pastinator* Gould[1]	×	×	*	×	×	×
370. *Coloeus dauricus* (Pall.)	×	×	*	×	×	×
371. *Coloeus neglectus* (Schl.)	×	×	*	×	×	×
372. *Nucifraga caryocatactes macrohynchos* Brehm		×	×	×		?
373. *Pica pica sericea* Gould	*	*	*			×
374. *P. pica bactriana* Bp.	×		*	×		
375. *Cyanopica cyanus interposita* Hart		*	×			×
376. *Garrulus glandarius brandti* Eversm.	×	×	*	×		×
377. *Spodiopsar cineraceus* (Temm.)	*	*	*	×	×	×
378. *? Sturnia sturnia* (Pall.)[2]			× ?	×	×	×
379. *Zosterops palpebrosa ijimae* Kuroda	*	⊙ (Tsushima)				
380. *Z. erythropleurus* Sw.		×	?	×		×
381. *Certhia familiaris familiaris* L.	×	×	×	×		×
382. *Coccothraustes coccothraustes japonicus* T. & S.	×	*	×	×		×
383. *Eophona personata magnirostris* Hart.		⊗		×		×
384. *E. melanura migratoria* Hart.	×	×	×	×		×
385. *Loxia curvirostra curvirostra* L.	×	×		×		
386. *L. curvirostra albiventris* Sw.	×	×		×		×
387. *? L. leucoptera bifasciata* (Brehm.)	×		×	×		
388. *Carpodacus roseus* (Pall.)	×	×		×	×	×

1) James and Ingram have reported *C. torquatus* Less. from Manchuria, but it seems to me improbable that that species occurs in that region.

2) Reported by Mr. Y. Enomoto under the name of *S. sinensis* from S. Manchuria, which identification is probably a mistake.

	Species and subspecies	Japan	Corea	Manchuria	Siberia	Mongolia	China
389.	*Carpodacus erythrinus grebnitskii* Stejn.			×	×		
390.	*Uragus sibiricus sibiricus* (Pall.)		⊗	×	×	×	×
391.	*U. sibiricus sanguinolenta* (T. & S.)	×	×	×	×		×
392.	*Fringilla montifringilla* L.	×	×	✱	×		×
393.	*Acanthis spinus* (L.)	×	×	×	×		×
394.	*A. flavirostris brevirostris* (Moore)			×		×	
395.	*Acanthis flammea holboellii* (Brehm)	×	×	×	?		
396.	*Chloris sinica ussuriensis* Hart.		×	×	×		
397.	*C. sinica minor* (T. & S.)	✱	× (Quelpart Is.)				
398.	*Pyrrhula pyrrhula kamtschatica* Tacz.	×		×	×		
399.	*P. pyrrhula grisciventris* Lafr.	✱	×	×	×		×
400.	*Petronia petronia brevirostris* Tacz.			×	×	×	×
401.	*Passer montanus saturatus* Stejn.	✱	✱	✱	×		?
402.	*P. rutilans rutilans* (T.)	✱	⊗				×
403.	*Emberiza fucata fucata* Pall.	✱	✱	✱	×		×
404.	*E. pusilla* Pall.	×	×	×	×	×	×
405.	*E. cia godlewskii* Tacz.			×	×	×	×
406.	*E. cioides castaneiceps* Moore.		✱	×	×		×
407.	*E. cioides ijimæ* Stejn.	✱ (Tsushima)	⊗ (Quelpart Is.)				
408.	*E. jankowskii* Tacz.		×	?			
409.	*E. tristrami* Sw.		×	×	×		×
410.	*E. chrysophrys* Pall.		×	⊗	×		×
411.	*E. elegans* Temm.	×	×	×	×		×
412.	*E. spodocephala spodocephala* Pall.	×	✱	×	×		×
413.	*E. aureola* Pall.	×	×	✱ ?	×		×
414.	*E. rustica* Pall.	×	×	×	×	×	×
415.	*E. leucocephalos* Gm.	×	⊗	✱ ?	×	×	×
416.	*E. sulphulata* T. & S.	✱	× ?				×
417.	*E. rutila* Pall.	×	×	✱	×		×
418.	*E. yessoënsis* (Sw.)	✱	⊗				
419.	*E. pallasi* (Cab.)		✱	✱	×	×	×
420.	*E. schoeniclus pyrrhulinus* Sw.	✱	⊗	?			×
421.	*Calcarius lapponica coloratus* Ridgw.	×	×	×	×		× ?
422.	*Passerina nivalis nivalis* (L.)	×		×			×

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CONTENTS.

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Notes on *Coeloplana bocki* n. sp. and its development.

By

Taku Komai,

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With 5 textfigures.

During the summer of 1918, I have had opportunities of collecting and studying in the Misaki Marine Laboratory a species of *Coeloplana* which lives commensally on stocks of an alcyonacean and which I regard to be new to science. According to verbal communication of Professor Ijima, Dr. S. Bock of Upsala should have discovered, some years ago, specimens of *Coeloplana* on *Nephthya* stocks which were collected and preserved in Misaki and taken over by him to his country. It is then more than probable that the first discovery of the *Coeloplana* in question is to be credited to him. However, so far as I am aware of, the specics has never yet been described. Therefore, I take the liberty of calling it by the name of *Coeloplana bocki* in honour of the above Swedish zoologist.

The alcyonacean, on which the *Coeloplana* habitually occurs, represents, in my opinion, a species of the genus *Dendronephthya*. It thrives in fair abundance in the littoral of the neighbourhood of Misaki. Stocks of it harbouring the *Coeloplana* are not at all uncommon. It is not seldom that as many as fifty or sixty individuals of that worm-like coelenterate are taken from one and the same stock of a moderate size. The coelenterate may be found adhering to any part of the stock surface.

Aside from what concerns its habitat, *Coeloplana bocki* may be distinguished from the two *Coeloplana* species (*C. willeyi* and *C. mitsukurii*) previously described by Abbott* from the same locality by the body being on an average much smaller and by peculiarities in colouration as well as in the structure of polar plates. In all other respects, but notably in internal organization, the new species may be said to agree completely with both the species just referred to.

C. bocki commonly measures only about 1.5 cm. in diametre in the fully extended state, although in rare and exceptional cases the body may reach about 3 cm. in diametre. In both the species of Abbott the diametre measures generally 2 or 3 cm. and sometimes even as much as 5 or 6 cm. in the fully distended state Similarly as in *C. willeyi* the colouration of body varies within a wide range, but is characterized by the presence, on the dorsal side, of markings which are generally rather conspicuous. The markings consist of a number of deeply coloured branching and anastomosing stripes which on the whole run side by side in the tentacular direction and may be deep vermilion, dark red, brick-red, pinkish, orange or even greyish in different individuals. The stripes number a dozen or more in large specimens; in the smaller ones they may be discontinuous and irregularly streaky. At all times they grow indistinct towards the margin of body. The ground colour of body is usually similar to that of the stripes though very much lighter in tone. Rarely it is of a colour which more or less contrasts with that of the stripes; as for instance, I have found some cases of individuals, in which it was of an orange hue while the stripes were vermilion. The stripe marking constitutes a feature peculiar to the species; it is found in neither of the previously known species, both which are uniformly coloured, though *C. willeyi* may show small whitish patches confined to base of "dorsal tentacles" and to the margin of body.

* Abbott, J. F. (1902). Preliminary notes on *Coeloplana*. Annot. Zool. Jap., Vol. IV, p. 103.
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Another striking distinctive feature of *C. bocki* consists in the peculiar structure of the polar plates. These are provided at their peripheral margin with 2–5 lobe-like processes, which somewhat remind one of those occurring in the same organ of *Ctenoplana*.* In large specimens of *C. bocki*, the occurrence of the processes is nearly constant, though in the smaller ones they may be merely indicated or even altogether absent. In both *C. willeyi* and *C. mitsukurii*, the lobation of polar plates is unknown to me even in largest individuals.

What is of greatest interest is the fact that a number of *C. bocki*, as they adhered on the host, were found to overlie a cluster of eggs which lay in direct contact with the ventral body-surface. The eggs contained embryos in various developmental stages. It was possible to rear up the embryos to an advanced stage in the aquarium. So that, the development of this interesting animal could be followed to a fairly satisfactory measure.

Genital Organs.—The *Coeloplana* is hermaphroditic. The gonads develop in the dorsal epithelial wall of certain canals, eight in number and which represent the meridional gastrovascular canals of pelagic ctenophores. The female gonad arises along the entire length of each of these canals as a linear tract of egg cells, exactly as in the ordinary ctenophore. The male gonad, on the other hand, occurs as separate compact masses of sperm-cells along the same canals, there being 4 or 5 such masses to each subtentacular, and about 2 of same to each subpharyngeal, canal. Each sperm-cell mass or testis is provided with a duct which opens on the dorsal surface of body and without doubt serves for leading out the spermatozoa. A corresponding duct is entirely wanting to the ovaries, the eggs apparently falling into the lumen of the gastrovascular canals to be subsequently ejected through the mouth. Along and close above each ovarial tract, the dorsal body surface forms a series of deep invaginations which are narrowly tubular in the

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* Korotneff, A. (1886). Ueber *Ctenoplana kowalevski*. Z. w. Z. Bd. 43, p. 242. Willey, A. (1896). On *Ctenoplana*. Q. J. M. S. Vol. 39, p. 324.

outer parts but expand terminally into an ampulla-like or somewhat irregular-shaped swelling. The number of the invaginations fluctuates between 7 and 13 to each subtentacular, and between 4 and 8 to each subpharyngeal, canal. Quite frequently, the invaginations, but especially their blind terminal swellings, are seen to contain a large quantity of spermatozoa; so that it is evident that they serve as sperm-receptacles. Where and how the spermatozoa meet the eggs in fertilization is not clear, but possibly they may make their way through the intervening tissues and reach the eggs in the ovaries.

Eggs.—As already indicated the laid eggs are found under the mother animal, agglutinated together by a gelatinous substance, instead of being set free as pelagic objects as in ordinary ctenophores. There they undergo development and reach the stage in which the embryo is completely formed. The number of eggs carried by an individual in the said position is generally from 10 to 50, but may sometimes be as large as 200. All those under one and the same mother individual are nearly in the same stage of development.

Newly laid eggs (Fig. 1) show essentially the same structure as those of pelagic forms. A distinct membrane envelops each egg. Directly within it is a rather narrow space which appears to be filled with a thin gelatinous substance. The size of eggs varies but little. The entire egg as surrounded by the membrane measures in average diametre about 0.3 mm., and the egg-body proper without the membrane 0.25 mm.

As in ordinary ctenophores, the egg-body consists of the ectoplasm (*ec*) presenting a finely granular appearance and of the endoplasm (*en*) showing an alveolar structure. The former occupies the entire periphery in a layer, while the latter in the central parts constitutes by far the greater portion of the entire egg-body. Two polar bodies (*p*) are frequently seen, lying on the surface of the egg-body; they are either spherical or more or less flattened. More rarely, there occur three polar bodies lying side by side, apparently as the result of division of the first polar body.

Fig. 1

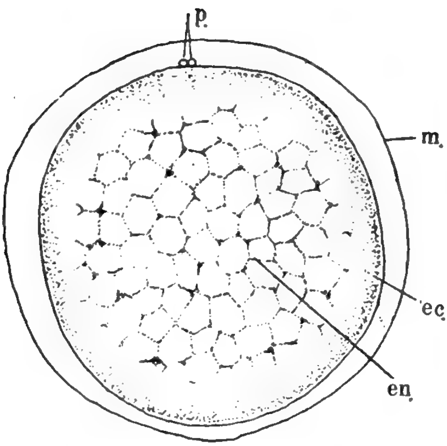

Fig. 1. Newly laid egg. × 170.
ec. Ectoplasm.
en. Endoplasm.
m. Egg membrane.
p. Polar bodies.

Fig. 2

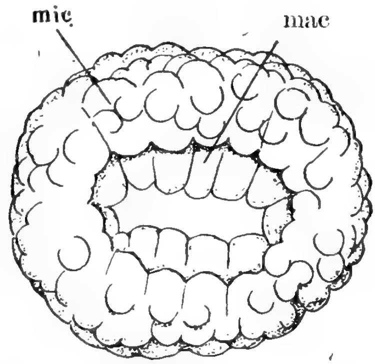

Fig. 2. A stage during gastrulation, seen from the micromere pole. × 170.
mac. Macromeres.
mic. Micromeres.

Development.—The segmentation of egg goes on in practically the same way as known from ordinary ctenophores. As in these, the third cleavage furrows are oblique and the resulting eight cells are arranged in the "disymmetrical" manner. The succeeding divisions, which lead to the formation of micromeres, are accomplished in nearly the same manner as was described by Ziegler[1] for *Beroë* and by Yatsu[2] for *Beroë* and *Callianira*.

The gastrulation occurs in precisely the same way as in ordinary ctenophores. At the close of segmentation there is a stage in which sixteen macromeres are arranged in a bowl-like group covered on the concave side (micromere pole) by an assemblage of numerous micromeres. Then, some "mesodermal" cells are budded off from the macromeres on the convex side of the group (macromere pole), while

1) Ziegler, H. E., 1898. Experimentelle Studien über die Zelltheilung. III. Die Furchungszellen von *Beroë ovata*. Arch. Entwicklungsmech. Bd. 7, p. 34.

2) Yatsu, N., 1911. Observations and experiments on the ctenophore egg: II. Notes on early cleavage stages and experiments on cleavage. Annot. Zool. Jap., Vol. 7, p. 333.

the micromeres are multiplying rapidly and gradually spreading over the macromeres (epiboly). Fig. 2 represents a stage in the above process, seen from the micromere pole of egg, where a moderately large elliptical gap exists between micromeres showing macromeres within. On the macromere pole too, there is in this stage another but somewhat smaller opening, which, however, is soon closed by the multiplying micromeres. The gap on the micromere pole persists for some time after the closure of the opening at the macromere pole, but sooner or later it too comes to be closed. Directly after the closure of the gastrula at both its poles, there appear first traces of the aboral sense-organ, tentacles and ribs, as well as of the stomodaeal invagination, all nearly at the same time. The aboral sense-organ develops on the micromere pole and the stomodaeal invagination on the macromere pole, while the tentacles and ribs do so on the lateral region of the gastrula nearer the micromere than the macromere pole. Thus, the gastrula develops into a typical cydippid embryo.

Cydippid Larva.—Fig. 3 shows an unhatched cydippid larva of a very early stage. The subspherical body exhibits at its one pole the mouth-opening (*o*) and at the opposite pole the sense-organ (*s*), besides a pair of tentacular rudiments (*t*) and the eight comb-plate rows (*c*). The sense-organ, when viewed from above, is of a rhomboid outline with the longer diametre in the sagittal plane of the larva; the otoliths form a small aggregation at both ends of the shorter diametre. The polar plates can not yet be observed. The comb-plate rows as well as the tentacle rudiments are located in the aboral half of the body. The former are arranged in four close pairs, each row containing

Fig. 3

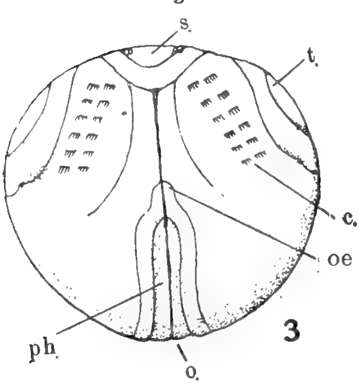

Fig. 3. A young cydippid larva, seen on the tentacular plane, × 170.
c. Comb-plate rows.
o. Mouth aperture.
oe. Oesophagus.
ph. Pharynx.
s. Aboral sense-organ.
t. Tentacular rudiments.

six or seven combs with cilia which are still very short. The tentacle rudiments appear each as a slight elevation of an elongate oval outline, which may be distinguished into a central and a peripheral part, both gently swollen and separated from each other by a slight groove-like depression. The tentacle appears to arise by prolongation of the central prominence, though the tentacular epithelium is derived by extension of that of the peripheral swelling.

The mouth (*o*) is nearly round. The pharynx (*ph*) it leads into exhibits also a roundish outline in optical cross-section. The inner end of pharynx lies nearly midway between the oral and aboral poles of the body. A short process at the inner end of pharynx indicates the oesophagus (*oe*).

In slightly more advanced larvae, the body presents a distinct lateral compression, it growing longer in the transverse axis than in the sagittal.

Meanwhile, the tentacle-stem makes its appearance in the area indicated above, at first as a tubercle-like prominence; the cilia of comb-plates lengthen; the mouth widens, elongating in the transverse direction, while the inner half of pharynx becomes compressed in the sagittal direction.

As the development still advances (Fig. 4), the lateral compression of body grows to the extent that the length of the sagittal axis measures about 2/3 that of the transverse axis. At the same time, the oral region is somewhat produced, so that the body now appears roughly heart-shaped with subtruncate oral end when viewed on the transverse plane (Fig. 4), but nearly egg-shaped when seen on the sagittal plane. The number of comb-plates in each row increases up to about ten, their cilia growing at the same time very considerably in length. A highly vaulted covering has now formed over the sensory cavity; and the otolith, forming a single mass of seven or eight granules, has assumed a central position in the cavity. The tentacles (*t*) have greatly elongated and have assumed a club-like shape; they are now thickly beset with colloblasts on the surface. The mouth (*o*) has widened remarkably in the transverse direction, while the inner half of pharynx (*ph'*) has done so in the sagittal direction. Yellowish and brownish pigment spots (*pg*) have appeared in the neighbourhood of the mouth, the sensory capsule and the tentacular apparatus. Besides, a quantity of dark spots now exists in the deeper tissues of the entire body, which fact makes difficult the inspection of the inner organization.

Fig 4

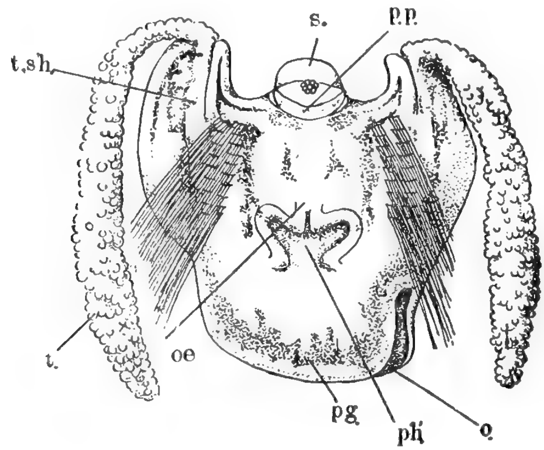

Fig. 4. The cydippid larva ready to hatch out, seen on the transverse plane, ×170.

o.	Mouth aperture.	*pg.*	Pigment spots.
pp.	Polar plates.	*s.*	Aboral sense-organ.
t.	Tentacle-stem.	*t.sh.*	Tentacle-sheath.
œ.	Oesophagus.	*ph'.*	Inner part of pharynx.

Fig. 4 represents the fully developed cydippid larva ready to hatch out. Such a larva is frequently observed to do stretching movements in the egg membrane and to press the mouth region against the latter as if in attempts to free itself. Eventually, the membrane ruptures and the larva escapes. For a short while after hatching in a vessel, the larva swims about very actively by means of the combs, sinking now and then to the bottom and adhering there by the inner surface of the inferior part of pharynx, which surface is turned outwards by excessively widely opening the mouth. Four or five hours* after hatching, the larva

* The time required for the development varies considerably with temperature.

takes to swimming much less frequently than before, but remains most of the time on the bottom, where it begins to creep about, using the above indicated pharyngeal surface as the sole. In still four or five hours, most of the cilia of comb-plates become either bent or broken off in the middle, and finally fall away altogether. The larva is then entirely incapable of swimming, and the creeping by means of the sole becomes the only way of locomotion. The pigments increase in the parenchyme; the tentacle-stem develops some ten branches; the sole flatly spreads out all around, while the inner end of the pharynx develops a few folds on the wall ("pharyngeal folds").

Fig 5

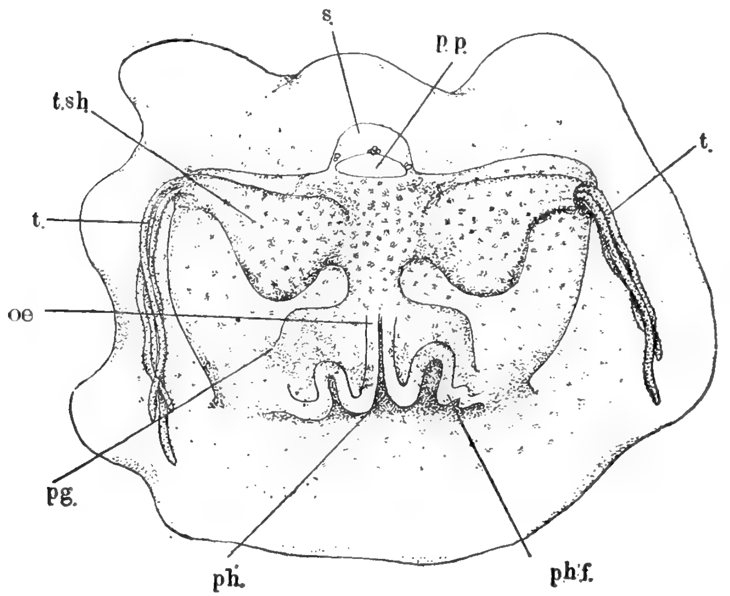

Fig. 5. A larva during metamorphosis, adhering to the substratum by the thinly spread-out sole. The main body laid back and seen on the transverse plane. × 170.
ph.f. Pharyngeal folds. Other letterings as in Fig. 4.

After two or three hours more, the adherent larva is at an advanced stage of metamorphosis. By that time the combs have completely fallen off, and the sole has extensively enlarged in all directions, flattening out in an almost film-like manner (Fig. 5). Thus, the larval body may now be said to represent a somewhat hump-like elevation in the central parts of a broad and thin basal expansion. It is easy to imagine that by gradual depression of the elevation, the entire body would assume the habitus of the adult. But stages representing this change have not come under actual observation.

Of individuals which have completely changed into the adult shape and which were taken from the alcyonacean host, the smallest and youngest observed was one only about 1 mm. in diametre. The most notable points in this little specimen were the facts that the gastrovascular system consisted of eight broad and subequal pouches arranged radially around a central cavity representing the infundibulum, and that there exists the peripheral canal-system consisting as yet of a sparse number of anastomosing canals. Of the eight radial pouches, the four in relation with the base of tentacles evidently represent the tentacular canals, and the remaining four the meridional canals, of the adult.

Conclusion.—In the light of the developmental facts noted above in brief, it goes beyond the reach of doubt that *Coeloplana* represents a highly specialized form of the Ctenophora. In fact, it will be conceded to by all that the genus appears to have been derived from a cydippid ancestral form by a loss of certain old characters and by concomitant acquirement of a series of new ones in adaptation to the change in habit of life from the pelagic to the creeping. Most remarkable is the undeniable indication that the entire creeping surface (ventral body surface) of *Coeloplana* was derived by the turning out of a large part of the inner pharyngeal surface of ordinary cydippids. It then seems that the flatness of body in this aberrant form of ctenophores may be regarded to be in a large measure due to that fact, and is not to be explained by assuming merely the reduction of vertical body-axis, as was done by Lang* and several other authors.

* Lang, A. (1884). Die Polycladen des Golfes von Neapel. Fauna u. Flora d. Golf. Neapel. Monogr. XI.

Preliminary notes on *Gastrodes parasiticum* Korotneff, with remarks on its systematic position.

By

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With 2 textfigures.

The peculiar parasitic cœlenterate, *Gastrodes parasiticum* KOROTNEFF, living in the test of *Salpa*, has been so imperfectly known that very diverse opinions were entertained as regards its systematic position. KOROTNEFF[1], the discoverer of the animal, referred it at first to the Narcomedusæ and later[2] to the Actiniæ, while HEIDER[3] regarded it to be a degenerate ctenophoran.

In the spring of 1919, it happened in Misaki that swarms of *Salpa fusiformis* appeared for several successive weeks and offered opportunities to collect specimens of the parasitic cœlenterate in question. Examination of the parasite clearly showed at once that we have to do with a ctenophore, and in fact with a ctenophore probably belonging to the remarkable group of *Platyctenea*.

The animal is found imbedded in the *Salpa* test, invariably with its ventral surface turned towards the main body of the host The

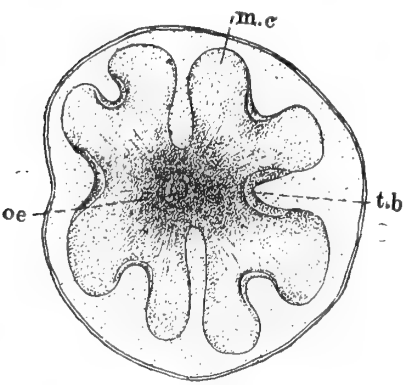
1) KOROTNEFF, A. (1888). *Cunoctantha* und *Gastrodes*. Z. w. Z. Bd. 47.

2) „ „ (1891). Zoologische Paradoxen. Z. w. Z. Bd. 51.

3) HEIDER, K. (1893). Ueber *Gastrodes*, eine parasitische Ctenophore. Sitzb. Ges. Nat.-Freund in Berlin. (This paper has remained inaccessible to me; its contents are known to me only from the citation in DELAGE and HEROUARD'S "Traité de Zoologie Concrète," T. 2, 2 me. Partie, Coelentérés, p. 759, and from the abstract in the "Zoologischer Jahresbericht" f. 1893, Coelenterata, p. 9.

colourless disc-like body is more or less convex on the dorsal side and measures 0.5—3.00 mm. in diametre. The smaller and evidently the younger of the specimens collected agree very well in general appearance and structure with the descriptions and figures given by KOROTNEFF and HEIDER, so that a detailed description of those specimens may be dispensed with. Only let the following be mentioned: The gastrovascular system is represented by a connected pair of cavities, each of which is laterally divided into four peripheral pouches; the œsophagus (*œ*) is not laterally compressed; the tentacle apparatus (*t. b*) is indicated by mere thickenings of the epidermis, and the aboral sense-organ by a shallow depression containing as yet no otolithic mass. It is evident that both KOROTNEFF and HEIDER had before them only such young individuals as above. Individuals of the above simple organization pass by gradations into those which are larger and show unmistakable ctenophoran characters.

Fig. 1.



Gastrodes parasiticum Korotneff, at an early stage of development. Dorsal view. One of the youngest individuals observed by the author. ×90. *œ* Oesophagus. *m.c* Meridional canal. *t.b* Tentacle basis.

Fig. 2 shows one of the largest individuals that came under observation, as seen from the side. Such an individual is provided with eight rows of comb-plates (*c*), besides showing distinct indications of an aboral sense-organ (*s*) and the tentacle-apparatus (*t.*, *t. b*).

The aboral sense-organ, situated at the apex of the more or less convex dorsal surface, includes a distinct otolithic mass in the centre of the cavity. In all its structural details, the organ closely agrees with that of ordinary ctenophores. Each comb-plate row consists of about twenty plates made up of fairly long cilia. The tentacle-stem (*t*) is represented by an unbranched stump-like rudiment; the tentacle-basis

Fig. 2.

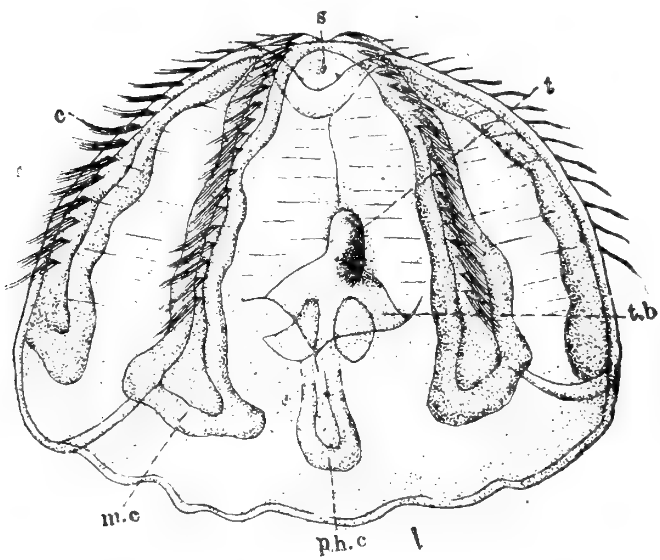


Fig. 2. *Gastrodes parasiticum* Korotn. at an advanced stage of development. One of the largest and oldest individuals observed by the author. × 50. The specimen has assumed the almost hemispherical shape as in the figure on liberation from the host. It is usually of a much more flattened shape while within the latter.

c.	Comb-plates.	*m. c.*	Meridional canal
s.	Aboral sense-organ.	*ph. c.*	Pharyngeal canal.
t. b.	Tentacle-basis.	*t.*	Tentacle-stem.

(*t. b*) is developed in essentially the same way as in ordinary cydippid ctenophores.

The ventral surface of body, which is somewhat concave, is beset with cilia all over. The ciliation is especially heavy in the central parts around the mouth opening. This leads into the well developed œsophagus, which is so flattened that its longer diametre lies in the sagittal plane. The œsophagus communicates above with the infundibulum situated directly beneath the sense-organ. The infundibulum gives rise to two perradial canals, each of which divides distally into four meridional canals (*m. c.*) running under the comb-plate rows toward the circumference of the body. The meridional canals are relatively broad, broadening gradually towards their pouch-like blind extremity where they may show a slight sign of branching. Each perradial canal also sends forth a tentacular canal and also a pharyngeal canal (*ph. c*) directed towards the body margin. Aborally from the infundibulum there proceed two excretory canals, each of which furcates into two branches. In each of the two pairs thus formed of the excretory branch-canal, one branch canal opens externally by the excretory pore, the two excretory pores being situated in a diagonal relation to each other, exactly as in ordinary ctenophores.

The epidermis is very simple as compared with that of ordinary ctenophores. It appears to be entirely devoid of glandular elements. The ventral body surface, which is ciliated, presents much folds, especially numerously in its central parts. The œsophagus is also ciliated, the ciliation here being much denser than on the ventral body surface. As in ordinary ctenophores, the endoderm presents itself either as a tall, vacuolated and non-ciliated or a low and ciliated layer. It is of the former character along the peripheral side of meridional and tentacular canals as well as along the lateral sides of pharyngeal canals. The layer in these parts frequently inclose clumps of the blood-corpuscles of *Salpa*, apparently taken up as nutriment. In the remaining parts of the canals, the endodermal layer is low and ciliated. The so-called "rosettes," usually found in the endoderm of ctenophores, have not been discovered. The mesodermal gelatinous tissue is traversed by some branching fibres of probably muscular nature.

In the epidermis of the ventral surface there is found a peculiar kind of cells, the appearance of which has led KOROTNEFF (1888, 1891) to regard it to be the egg. The cells were found in all individuals examined; they occur in especial abundance in the marginal parts of ventral surface, scattered among ordinary ciliated cells of the epidermis. The larger of these cells present a flask-like shape, directing the narrower end towards the free surface of the epidermis. They grow to a fairly large size (length up to 0.06 mm., breadth up to 0.04 mm., diametre of nucleus and nucleolus 0.03 mm. and 0.01mm. respectively), possibly by absorbing nutriment directly from the host. A few of the cells were also observed freely lying outside of the epidermis. Even in the smallest individuals examined, the same cells, nearly as large as in the older specimens, were sometimes found. In spite of this fact and of their origin apparently from the ectoderm, I am inclined to agree with KOROTNEFF in regarding them to be the egg. As points standing in favour of this view may be mentioned the very large size attained by the cells as well as by their nucleus, and also the fact that they are sometimes seen lying freely outside the body of the animal.

With regard to the systematic position of *Gastrodes*, there can be no doubt whatever that it belongs to the *Ctenophora*. Which, then, of the orders of that class should it be assigned to?

From the presence of well-developed comb-plates in the larger individuals, it may reasonably be assumed that the animal, after a period of parasitism in the early part of its life, leaves the host and becomes free. Possibly, on entering the latter period, it may undergo a more or less marked change in structure. Necessary as it appears that we should have a more complete knowledge than we at present possess about the animal in order to be able to definitely settle its position among the Ctenophora, yet from observations on its parasitic stages, so much may, I think, be now said that it shows several features which seem to point towards its affinity with the group *Platyctenea*. In the first place, the fact that the ventral surface of body is lined all over with the ciliated epithelium, as also the fact that profuse foldings are developed in the central region of that surface, makes it highly probable that the ventral surface of *Gastrodes* is morphologically of the same nature as that of platyctenids. If that be so, the surface may be regarded to have arisen, as I have shown in the article on the development of *Coeloplana* in the present journal, as the result of the turning out of the pharynx, a feature which, in my opinion, is the most characteristic of the group *Platyctenea*. Furthermore, the animal shares with the forms of that group the features that the œsophagus is very well differentiated, that the meridional canals exhibit signs - though slight—of branching, and that the infundibular canal is obliterated. From this, it appears assumable that the relationship of *Gastrodes* to the Platyctenea is such that it may probably be taken up into that group.

Notes on two new species of Japanese Polyclads.

By

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and

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Neostylochus fulvopunctatus, n. gen., n. sp.

Textfigures 1–3.

This new genus and species is based on a single individual which was obtained at Misaki between the tide-marks in the summer of 1906.

Form and Size.—The worm in the living state was of a somewhat oval form with wavy margin and with the anterior end more broadly rounded than the posterior. Without tentacles. The delicate body measured 7 mm. long by 4.5 mm. broad.

Colouration.—The body, which was translucent, presented a buffy ground colour, much paler on the ventral than on the dorsal side. The latter surface marked all over with moderately large brownish spots, more crowdedly in the central parts than in the periphery.

Eye-spots.—Tentacular and cerebral eye-spot groups blend together. The tentacular eye-spots are larger than the cerebral. The latter lie loosely scattered about in front of and between the two groups of the former. In addition there are present numerous small marginal eye-spots distributed in a crescent-shaped tract close to the head margin. The middle parts of that tract join posteriorly the area of cerebral eye-spots; in the lateral parts there exist only one or two eye-spots in its width. The ends of the tract reach posteriorly to about the level of tentacular eye-spots. The brain occupies a position about one-fourth the length of body from the anterior end.

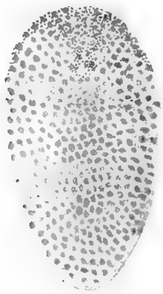

Fig. 1.

Fig. 1. *Neostylochus fulvopunctatus*, n. gen., n. sp. Drawn from the living specimen.

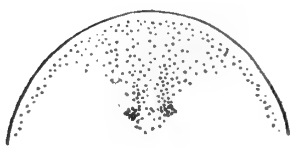

Fig. 2.

Fig. 2. Distribution of eye-spots in same.

Body-wall.—The epidermis consists as usual of a layer of columnar ciliated cells, which contain some minute rhabdites and are of a greater height on the dorsal than on the ventral side. The cilia are much more strongly developed on the dorsal side than on the ventral surface. Numerous glands, deeply situated in the body on each side, open to the exterior in a narrow zone of the ventral surface along and just within the body-margin. The basement membrane is fairly well developed. The dermal musculature, situated immediately below it, consists of the externalmost longitudinal, the middle diagonal and the innermost circular layers.

Digestive System.—The mouth is situated slightly in front of the middle of body and at nearly the centre of the pharyngeal pocket which is of a length somewhat less than one-half that of the body and is provided with at least 12 diverticula corresponding in a general way to the folds of pharynx. The rather narrow main gut, longer than the pharyngeal pocket, gives rise to numerous pairs of lateral branches with occasional, alternately standing outbulgings, which do not undergo anastomosis. The gut-epithelium presents no noteworthy features, consisting, as it does, of two sorts of cells, glandular and non-glandular, of which the latter sort is the more numerous.

Male Genital Organs.—Numerous small testes, containing spermatozoa in all stages of development, are situated in the ventral half of body between gut branches. Probably they are all connected together by an anastomosing system of testicular ductules, but these could not be definitely made out. A pair of vas deferens run along the sides of pharyngeal pocket, increasing in thickness as they proceed posteriorly. Not far behind the posterior end of pharynx each vas deferens abruptly bends inward, finally to open, side by side with its fellow of the opposite side, into a moderately large seminal vesicle with muscular wall. The vas deferens shows a definite wall consisting of a thin epithelium and a feeble layer of circular muscular fibres. The seminal vesicle rises from below upward, obliquely posteriorly inclined; at the same time it gradually narrows and passes above into the slender ejaculatory duct. This duct, after receiving that from the prostatic gland on the dorsal side, makes an abrupt, obliquely posteriorly and downwardly directed bend, soon to enter the base of penis and finally to open at the tip of this.

The prostatic gland, situated immediately anterior and dorsal to the seminal vesicle, is of an oblong shape. It is internally lined with a non-ciliated epithelium of a glandular nature and externally with a layer of parenchyma including numerous muscular fibres.

The penis is a long and slender tubular body, hanging from above subvertically in the tubular penis-sheath. The sheath forms a small, annular, obliquelly upwardly directed outbulging, the antrum, before opening externally by the male genital pore, which is situated near the anterior border of the last quarter of body.

Female Genital Organs.—The ovaries occur in the dorsal parts of body. The oviducts are only partially demonstratable. The two uteri are wide tubes containing numbers of ripe eggs; anteriorly and in front of the pharyngeal pocket they are continuous with each other across the median line. Behind the pharyngeal folds, the uteri gradually narrow as they proceed backward; slightly behind the penis, they unite in the median line to form a short unpaired uterine duct before joining the thick-walled median vaginal passage on the ventral side.

Fig. 3.

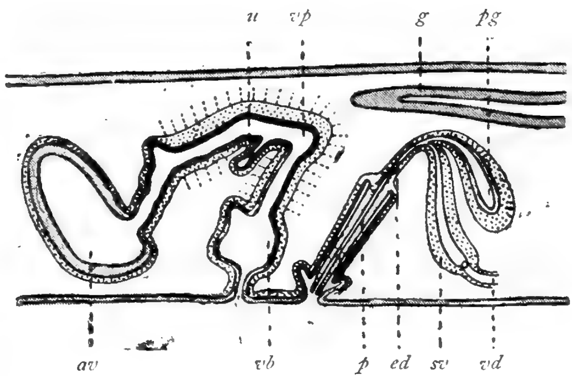

Fig. 3. Genital end-organs of *N. fulvopunctatus* in sagittal section, diagrammatically shown.

av accessory vesicle of vagina, *ed* ejaculatory duct, *g* gut, *p* penis, *pg* prostatic gland, *sv* seminal vesicle, *u* unpaired uterine duct, *vb* vagina bulbosa, *vd* vas deferens, *vp* vaginal passage.

The vaginal passage is lined with a ciliated columnar epithelium, outside which is a thick muscular coating composed of an internal longitudinal and an external circular layer of fibres. A large number of ductules from unicellular glands, which produce a secretion similar in nature to that of the prostatic gland, open into the vaginal passage through the wall. Posteriorly the passage is continued for a short distance as the wide duct of the large and sac-like accessory vesicle. This vesicle has a wall consisting of a thick glandular epithelium and a fine muscular coating; in the cavity are contained spermatozoa together with a coagulum of the secretion. In the anterior parts the vaginal passage makes an abrupt downward bend and passes over into a space with a thick and somewhat plicated wall. This space may be designated the vagina bulbosa. It opens to the exterior by the small female aperture situated close behind the male aperture.

Remarks.—This interesting new genus and species agrees with the Diplosolenid genus *Pseudostylochus*, recently instituted by us[1], in the general plan of genital end-organs. Nevertheless, it stands widely at variance from that genus in the presence of marginal eye-spots, not to speak of other minor points of difference. Taken all in all, it seems, in our opinion, to be more nearly allied to *Stylochus* than to any other known genus, notwithstanding the peculiarities it presents in organization. Hence we are inclined to place it in the Stylochidæ. If we are right in this, the diagnosis of that family, last given by BOCK[2], should be emended to run somewhat as follows:

Fam. Stylochidæ. Craspedommata of oval body-shape, with or without tentacles. Tentacular and cerebral eyes in distinct clusters; marginal eyes in a crowded row or rows running around body. Pharyngeal chamber much folded in relation to plicated pharynx. Prostatic gland a free sac-like organ opening into ejaculatory duct. With either true or accessory seminal vesicle. Penis conical or tubular. With or without vagina bulbosa; accessory vesicle to vagina paired, single, or none.

The following are the chief features which distinguish the new genus *Neostylochus*:

Stylochidæ with oval body. Tentacles absent. Marginal eyes confined to frontal margin. With true seminal vesicle. Prostatic gland situated dorsal to seminal vesicle. Penis of a slenderly tubular shape. Accessory vesicle of vagina single, large.

Now, the following seven genera have hitherto stood in the

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1) YERI and KABURAKI. 1918. Bestimmungsschlüssel für die japanischen Polycladen. Annot. Zool. Jap. Vol. IX. Part 4.—Description of some Japanese Polyclad Turbellaria. Journal of the College of Science, Imp. Univ., Tokyo. Vol. XXXIX.

2) BOCK, SIXTEN. 1913. Studien über Polycladen. Zoologiska Bidrag fräu Upsala. Bd. 2.

family: viz., *Meixneria* BOCK, *Cryptophalus* BOCK, *Parastylochus* BOCK, *Stylochus* EHRBG.. *Idioplana* WOODWORTH, *Woodworthia* LAIDLAW and *Shelfordia* STUMMER-TRAUNFELS. The present genus occupies, we think, a position intermediate between *Stylochus* and *Idioplana*. Principal differential points of all the Stylochid genera may be gleaned from the following key:

I. Without accessory vesicle to vagina.
  A. With ductus vaginalis .... *Cryptophallus.*
  B. Without ductus vaginalis.
    a. Vagina very long .... *Meixneria.*
    b. Vagina short.
      a[1]. Genital aperture closely approximated. With true (sometimes trilobed) seminal vesicle... *Stylochus.*
      b[1]. Genital apertures distinctly apart from each other. With accessory seminal vesicle.. *Parastylochus.*

II. With accessory vesicle to vagina.
  A. Accessory vesicle single.
    a. Tentacles absent. Penis slenderly tubular.......... .... *Neostylochus*, n. gen.
    b. Tentacles present. Penis conical.............. *Idioplana.*
  B. Accessory vesicle paired.
    c. Tentacles present. Prostatic gland short.... *Woodworthia.*
    d. Tentacles absent. Prostatic gland exceedingly prolonged.................................. *Shelfordia.*

Prosthiostomum trilineatum, n. sp.

Textfigures 4 and 5.

This species is based on a single specimen obtained on the coast of Hatakejima in Prov. Kii in the summer of 1918.

Form and Size.—The body in the living state isnearly similar to that of other species of the genus. The broadly rounded head is without tentacles of any sort, and passes behind into the trunk, from which it is distinctly marked off. When fully extended the trunk is elongate-slender, and is nearly uniformly broad for a great part of its length, but tapers at the posterior end to a point. The dorsal surface is slightly raised in the median parts from behind cerebral eyes. The sucker and the mouth occur as usual in the median line, the former nearly in the centre of the body and the latter close behind the brain.

In the creeping state the specimen measured about 20 mm. in length and about 4 mm. in breadth in the anterior parts.

Fig. 4.

Fig. 4. *Prosthiostomum trilineatum*, n. sp. in the living condition.

Fig. 5.

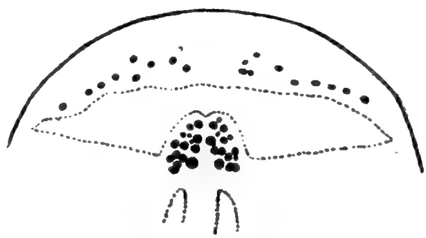

Fig. 5. Eye-spots, cerebral and marginal, of *Prosth. trilineatum.*

Colouration.—The dorsal surface is generally of a milky white colour, showing two well-defined, longitudinal, black bands, running along either side of a median yellow stripe, beginning from behind cerebral eyes and extending nearly to the posterior body-end. The head exhibits a black transverse marking of a broadly arc-like shape, of which the convex anterior side is edged with an yellow border of a crescentic shape, while the posterior side is notched in the middle.

The colourless notch contains cerebral eye-spots. The ventral surface is as usual of a pale colour.

Eye-spots.—The cerebral eye-spots are densely grouped in two oval clusters in the area indicated, each cluster comprising 15 eye-spots. Besides, there exist a sparse number of marginal eye-spots confined to the frontal margin in front of the yellow border of the head marking, forming an irregular row one or two deep.

Genital organs were unfortunately yet undeveloped in the individual examined.

Remarks.—The present species, referable to the genus *Prosthiostomum*, differs widely from any other species of the genus in the colouration of body.

On a collection of Japanese and Formosan Mammals.

By

Nagamichi Kuroda, *Rigakushi.*

The following is an annotated list of Mammals from Japan and Formosa now in my collection. Incorporated in it is the description of a Japanese noctule bat which seems to deserve being made into a new subspecies (*Nyctalus noctula namiyei*).

1. *Mogera wogura wogura* (Temminck).

A female obtained at Haneda between Tokyo and Yokohama, Nov. 28, 1908. One unsexed and one female specimen collected in Tokyo, July 29, 1909 and July 27, 1910, respectively.

2. *Chimarrogale platycephala* (Temminck).

One unsexed specimen purchased in Tokyo; date and exact locality unknown. Another specimen (sex ?) obtained at Chichibu, Prov. Musashi, Apr. 14, 1909.

3. *Pteropus dasymallus* Temminck.

Two male specimens sent me by Mr. S. Uchida; both collected on a small island, Kita-Daitojima, one of the Loo-choo-group; one of them dated July 1092, and the other without date. A rufous male from one of the Loo-choos, purchased. A skull in my collection measures: total length 63 mm., basilar length 57 mm., zygomatic breadth 34.5 mm.

4. *Pteropus pselaphon* Lay.

One female specimen from one of the Bonin Islands, Feb. 1906.

5. *Rhinolophus cornutus cornutus* Temminck.

One female from Prov. Shimotsuke, Sept. 1906. Another female collected by me in a cave at Hanedo in Kanatakemura, Prov. Chikuzen, Aug. 29, 1918; it measures as follows: head and body 38 mm., tail 25 mm., ear 16 mm., forearm 35 mm., thumb 6.5 mm., third finger 56 mm., fourth finger 47 mm., fifth finger 46 mm., tibia 15 mm., foot and claw 9.5 mm., foot 8.5 mm. Skull: total length 14 mm., basilar length 10.5 mm., zygomatic breadth 8 mm.

6. *Rhinolophus ferrum-equinum nippon* Temminck.

Two adult males collected by me in the same cave at Hanedo, Chikuzen, Aug. 29, 1918, The measurements are as follows:

No.	Head and body	Tail	Ear	Forearm	Thumb	Third finger	Fourth finger	Fifth finger	Tibia	Foot and claw	Foot	Total length of skull	Basilar length of skull	Zygomatic breadth of skull
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
165	64.5	35.5	27	55	10	86	69.5	69.5	22	16	12	21	16	13
166	63	35.5	26.5	58	10	92.5	75	73	22.5	15	13	20.5	15.5	12.5

The species is said to be common in Prov. Chikuzen and Prov. Buzen.

7. *Plecotus auritus sacrimontis* G. M. Allen.

P. sacrimontis Allen, Bull. Comp. Zool. Vol. LII, No. 3, 1908, pp. 50–51.

One female specimen, obtained at Nikkō, Aug. 1914, sent me by Viscount Nagaatsu Kuroda. This is rare in Hondō, having hitherto been taken only at Nikkō and Subashiri. It is also found in Hokkaidō as well as in the Kuriles.

8. ***Nyctalus aviator*** Thomas.

Three specimens: one of which is a female captured in Tokyo, Sept. 1906; the second a female (?) obtained in Hondō and without date; the third a male obtained along R. Tamagawa in the neighbourhood of Tokyo, Nov. 5, 1911.

9. ***Nyctalus noctula namiyei***, subsp. nov.

Vespertilio noctula (nec Schreber), Temm., Faun. Jap. Mamm., p. 15 (1842); *Vesperugo noctula* (nec Schreb.), Dobson, Monogr. Chiropt. Ind. Mus., p. 88 (1876); Namiye, "Dōbutsugaku Zasshi" (Tokyo Zoological Magazine), Vol. I, p. 256 (1889); *Nyctalus noctula* (nec Schreb.), Aoki, Annot. Zool. Japon., Vol. VIII. p. 282 (1913).

♂ ad. (type of the subspecies). Similar to *N. noctula noctula* (Schreber), but easily distinguishable from it by much shorter tail, forearm and third finger. Length of head and body also distinctly shorter. General colour of upper and lower parts much darker than in the typical form, being nearly uniformly dark chocolate-brown instead of dark yellowish-brown; head and hind neck somewhat paler brown. Fur of upper back and of lower parts tipped with buffy; chin and upper throat as well as sides of lower abdomen brownish buff.

The type specimen (No. 168) was collected by me Aug. 3, 1918, on a sea rock called Ōtsukuejima, on the coast of Prov. Chikuzen.

Measurements of six adult females, nine young males and seven young females as follows:

No.	Head and body	Tail	Head	Ear	Tragus	Forearm	Thumb	Third finger	Fourth finger	Fifth finger	Tibia	Foot and claw	Total length of skull	Basilar length of skull	Zygomatic breadth of skull	Sex	Locality	Date
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.			
168 (type)	62	43	21	15	5.5	47.5	8.5	78	67.5	52.5	18	10	15	13.5	11.5	♀ ad.	Otsukuejima, Chikuzen	3/8 1918
169	62	43	21	17	5	48	9	78	70	53.5	16.5	11	14	13.5	11.5	♀ ad.	Kurose near Genkaijima, do	,,
170	63	43	20.5	18	5.5	45	8.5	84	73	56	18	9.5	14	13	11.5	♀ ad.	,,	,,
171	64	43	22	17	5.5	48	9.5	80	69.5	53.5	17.5	10	14.5	13.5	12	♀ ad.	,,	,,
172	61	44	22	18.5	7	46	10	81.5	71	57	18	10	—	—	—	♀ ad.	,,	,,
173	62	43.5	21	17	6	45	10	78	67	53.5	18	10	15	13.5	11.5	♀ ad.	,,	,,
174	62.5	33	19	17.5	6	46.5	9	69	57	49	18	9.5	—	—	—	♂ juv.	,,	,,
175	—	—	—	—	5	45	9	70	61.5	46	16	9.5	14	13.5	11	♀ juv.	,,	,,
176	55.5	35	20	14	6	46	8.5	66.5	59	50	18	10	—	—	—	♂ juv.	,,	,,
177	53	32	20	14	6	45	8	61	51	44.5	16	10	13.5	12.5	11	♂ juv.	,,	,,
178	56	35	20	15.5	6	44.5	8.5	55	48	43	15	10	14	—	10.5	♀ juv.	,,	,,
179	59	33	20.5	16	6	44	8	67	59	50	17	10	14	13	—	♂ juv.	,,	,,
180	59	31	20.5	15	6	43	8	56	48.5	42.5	16	10	14	12.5	10	♂ juv.	,,	,,
181	59	33.5	20	15	5	42.5	9	51.5	44	42	16	9.5	14	12	10.5	♂ juv.	,,	,,
182	55.5	32	20	15	5	41.5	9	53.5	46.5	43.5	15	10	13.5	12	—	♀ juv.	,,	,,
183	55	30	19	13.5	5	41	8.5	47	40	37	14.5	9.5	—	—	—	♀ juv.	,,	,,
184	55	32	20	15	5	40.5	9	50	44.5	40	15	10	14.5	12.5	10	♀ juv.	,,	,,
185	51	31	19.5	14	5.5	40	8.5	50.5	44.5	39	15	10	13.5	11.5	10	♂ juv.	,,	,,
186	51	28.5	19	12.5	5	37	8.5	45	38	34.5	13	10	13.5	11	10	♂ juv.	,,	,,
187	57	28	19.5	13	5	35.5	8	41	36	33	12.5	9.5	14.5	13	10	♀ juv.	,,	,,
188	—	—	—	—	—	31	8	55.5	49	38	16.5	10	13	11.5	—	♂ juv.	,,	,,
189	—	—	—	—	—	26.5	8.5	46	38	34.5	14	10	13.5	11.5	9.5	♀ juv.	,,	,,

Nos. 174–189 are young examples in various stages of growth.

I have not been able to obtain adult male of the subspecies at the same locality as the type specimen, but the late Mr. Namiye (*l.c.*) has examined and recorded two adult males of evidently the same form, collected at Chichibu, Prov. Musashi. He has given comparative measurements of those specimens with the same number of European examples as follows:

No.	Tail	Head	Ear-conch	Tragus	Forearm	Thumb	Third finger	Fifth finger	Tibia	Foot and claw	Sex	Locality	Measured by:
	mm.	mm.	mm.	mm	mm.	mm.	mm.	mm.	mm.	mm.			
1	42	21	11	6	47	12	82	58	17	9	♂	Chichibu, Musashi.	Mr. Namiye
2	40	20	12	5	48	10	82	57	17	9	♂	"	"
3	50	23	11	6	52	10	93	59	18	10	♀	Marseilles, France	"
4	50	22	11	5	53	10	95	58	18	9	♀	"	"

Mr. Namiye pointed out that, whereas the typical *Nyctalus noctula* from France is not much smaller than the Japanese large noctule bat, *Nyctalus aviator* Thos., the Japanese form of that species is decidedly so.

According to Dobson (*l.c.*) the male of typical (European) *N. noctula* should measure as follows: Head and body 3 inches (76.5 mm.), tail 2 inches (51 mm.), head 0.9 inch (23 mm.), ear 0.75 in. (19.5 mm.), tragus 0.25 in. (6.5 mm.), forearm 2 in. (51 mm.), thumb 0.3 in. (7.5 mm.), 2nd finger 3.7 in. (94 mm.), 4th finger 2.1 in. (53 mm.), tibia 0.75 in. (19.5 mm.), foot and claw 0.45 in. (11.5 mm.).

In some adult female specimens of the Japanese form the fur of the dorsal and ventral parts of body is of an almost uniformly chocolate-brown colour, while in others the hairs are tipped with brownish buff. In immature specimens the fur is otter-brown or even blackish, without a tinge of a chocolate colour, the hairs in the posterior half of the dorsal and all ventral parts of body being distinctly tipped with whitish buff. Very young examples show the fur of the dorsal side hoary greyish ashy and that of the ventral parts much paler and whitish ashy.

Distribution. According to Mr. Namiye (*l.c.*), the form under consideration is probably a rarer bat than *N. aviator*. I have found it common on and around the sea-rocks (Tsukuejima, Hashirajima and Kurose) near Genkaijima, at the entrance to Hakata Bay in Prov. Chikuzen. It is said that the bat is also not uncommon in Keyano-ōto, a large basaltic rock cave on the coast of the same province.

10. ***Pipistrellus abramus*** (Temminck).

One female specimen purchased in Tokyo. Another male taken at Akasaka in the same city, Nov. 17, 1915. Two females with 6 youngs collected by me at Haneda near Tokyo, July 15, 1915.

11. ***Manis pentadactyla*** Linnæus.

A young specimen obtained at Horisha, Formosa.

12. ***Lepus brachyurus brachyurus*** Temminck.

Several specimens from Tokyō and from Prov. Sagami and Suruga.

13. ***Lepus brachyurus etigo*** Abe.

Abe, "Dōbutsugaku Zasshi" (Zool. Mag., Tokyo), Vol. XXX, p. 252, p. 330 (1918), *Lepus timidus timidus* (nec L.), Aoki, Annot. Zool. Jap., Vol. VIII. p. 290 (1913).

One male in winter pelage sent me by Mr. M. Yamayoshi; obtained near Yonezawa, Prov. Uzen, March 1908. One female in winter pelage sent me by Mr. M. Midzuno; captured near Kanazawa, Prov. Kaga, Jan. 1918. Furthur, one male in winter pelage from near Aikawa, Island of Sado, Feb. 1918; another male in winter pelage from Hanatatemura, Prov. Ugo, obtained early in March 1918.

Measurements of three specimens:

No.	Head and body	Tail	Ear	Hind foot	Total length of skull	Basilar length of skull	Zygomatic breadth of skull	Length of nasals	Length of upper molar series	Locality	Sex
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.		
139	500	25	74	146.5	93	74.5	47	40.5	15.5	Near Kanazawa, Kaga	♀
140	537	29.5	—	131	88	71	45	38.5	15.5	Sado	♂
141	485	—	97	155	87	70.5	44	36.5	14.5	Hanatate, Ugo	♂

14. *Lepus timidus ainu* Barrett-Hamilton.

One female in winter pelage collected by Mr. H. Orii at Uinai near Tomakomai in Hokkaidō, Jan. 8, 1917. Head and body 535 mm., length of tail vertebrae 75 mm., hind-foot 155 mm., ear 79 mm. Skull: total length 99 mm., basilar length 81.5 mm., zygomatic breadth 51.5 mm., length of nasals 42 mm., length of upper molar series 17 mm.

15. *Sciurus vulgaris orientis* Thomas.

One male and one female in winter pelage obtained by Mr. H. Orii at Uinai near Tomakomai, Jan. 4, 1917.

16. *Sciurus lis* Temminck.

Hondō (exact locality unknown): 1 ♂ in summer pelage and 1 (sex ?) in winter pelage. Foot of Mt. Fuji: 1 ♂ in wint. pel., Dec. 29, 1909. Urushiyama, Prov. Hida: 1 ♂ in wint. pel., Jan. 30, 1911. Near Yomozu, Prov. Kai: 1 ♂ in summ. pel., Dec. 3, 1915. Ōmiya in Chichibu, Prov. Musashi: 2 ♂s in wint. pel. and 1 ♀ in wint. pel., Jan. 1916. Nikkō: 1 ♀ in wint. pel., early in Dec. 1917.

17. *Sciurus thaiwanensis centralis* Bonhote.

One specimen (sex ?) purchased in Formosa; obtained near Horisha, Nantō Distr., date unknown.

18. ***Dremomys owstoni*** (Thomas).

One female collected by me at an altitude of 7050 ft. above sea-level, on Mt. Arisan in Formosa, May 13, 1916. The species does not occur at lower altitudes.

19. ***Eutamias asiaticns lineatus*** (Siebold).

One female obtained by Mr. N. Teraoka, at Yūbetsu, Hokkaidō, Ang. 4, 1913. Head and body 124 mm., tail 114 mm., hind foot 38 mm., ear 16 mm. Skull: total length 39.5 mm., basilar length 30.5 mm., zygomatic breadth 21.5 mm.

20. ***Tamiops macclellandi formosanus*** (Bonhote).

One specimen (sex ?) purchased in Formosa; locality Horisha; date unknown. A male collected by me on Mt. Arisan, at an altitude of 7050 ft. above sea-level. May 13, 1916. Two specimens (sex ?) colleted by Mr. Y. Kikuchi at the same locality, Sept. 1918.

21. ***Petaurista leucogenys leucogenys*** (Temminck).

One specimen (sex ?) obtained at Yamanomura, Isagōri, Prov. Satsuma, March 1908; sent me by Mr. H. Sakai.

22. ***Petaurista leucogenys nikkonis*** Thomas.

One female captured in Nikkō, Dec. 21, 1917, was sent me by Mr. S. Yamana. Another female obtained by the same collector at the same locality, May 15, 1918. Both these examples are much paler than the typical form.

23. ***Petaurista lena*** Thomas.

One specimen (sex ?) obtained near Horisha, at an altitude of about 6000 ft. above sea-level, in the spring of 1917. This fine species is undoubtedly rare in Formosa. It does not occur in localities lower than the above.

24. ***Petaurista nitidus*** (Desmarest).

One male specimen purchased in Formosa; obtained near Horisha; date unknown. The species is more common than the preceding in the district of Ho isha.

25. ***Sciuropterus momonga amygdali*** Thomas.

Two males collected by me at Shimoshiobara, Prov. Shimotsuke, Aug. 19, 1917.

26. ***Glirulus japonicus*** (Schinz).

One female obtained by Mr. S. Yamana at Nikkō, Dec. 11, 1917. Head and body 67.5 mm., tail 52.5 mm., hind foot 15 mm., ear 6 mm. Skull: total length 23.5 mm., basilar length 18 mm., zygomatic breadth 14.5 mm.

The species has been reported from various parts of Hondo and Shikoku, but not from Hokkaidō; nor from Kiusiu, though probably not absent there.

27. ***Microtus montebelli*** (Milne-Edwards).

A specimen collected at Asamushi, near Aomori, Prov. Mutsu, Aug. 11, 1915. Thirty specimens collected by Mr. T. Nibe at Hanatate, Prov. Ugo, Nov. 5—29, 1915. A male specimen from Tōgane, Prov. Kazusa, Dec. 1, 1918.

28. ***Evotomys amurensis mikado*** Thomas.

One male specimen collected by Mr. H. Orii near Tomakomai in Hokkaidō, Nov. 23, 1916.

29. *Apodemus geisha hokkaidi* (Thomas).

Two males (Nov. 8 & 19, 1916) and two females (Nov. 20, 1916) obtained by Mr. H. Orii near Tomakomai in Hokkaidō. Length of ear in these specimens, as measured by Mr. Orii, from 12 mm. to 12.5 mm. Mr. Aoki united the Hokkaidō form with the typical Hondō form, but in my opinion, Thomas is quite right in distinguishing the two subspecifically.

30. *Apodemus speciosus speciosus* (Temm. & Schl.).

One female specimen from Tōgane, Prov. Kazusa, Nov. 27, 1918.

31. *Apodemus speciosus ainu* (Thomas).

Three males (Dec. 5, 1916) and two females (Nov. 21 & 28, 1916) collected by Mr. H. Orii at the same locality with *A. geisha hokkaidi*.

32. *Rattus rattus rattus* (Linnæus).

Two males and one female obtained in Tokyo, May 8, 1908. According to Mr. Namiye, the rat is restricted in its distribution to the neighbourhood of Tokyo.

33. *Rattus rattus alexandrinus* (Geoffroy).

Several specimens obtained in Tokyo and at Haneda.

34. *Rattus norvegicus* (Erxleben).

Six specimens captured at Haneda. Mr. T. Nibe sent me nine young specimens of this rat from Hanatate, Prov. Ugo; Nov. 11—19, 1915.

35. *Mus molossinus* Temminck.

Two adults and two very young specimens sent me by Mr. T.

Nibe from Hanatate, Prov. Ugo; Oct. 7, 1915. One male sent me by Mr. H. Orii; obtained near Tomakomai in Hokkaidō, Dec. 20. 1916. This is probably the first record of this mouse from Hokkaidō,

36. *Nesokia nemorivaga* (Hodgson).

One specimen purchased in Formosa; from Horisha; date unknown.

37. *Felis bengalensis* Kerr.

One adult specimen purchased in Formosa. It was killed near Horisha in 1917.

38. *Felis viverrina* Bennett.

One young specimen from Horisha in Formosa. It was obtained in the spring of 1917.

39. *Paradoxurus larvatus* (Temminck).

One specimen (sex ?) obtained near Horisha, Formosa, Oct. 27, 1917; sent me by Mr. Y. Kikuchi.

40. *Mungs urva* (Hodgson).

Two specimens obtained near Horisha, spring (?) of 1917 and Nov. 4, 1918 (purchased). Skull of one of the above measures as follows: total length 77 mm., basilar length 72 mm., zygomatic breadth 45 mm.

41. *Nyctereutes procyonoides* (Gray).

One female from the island of Sado, Feb. 16, 1917; purchased. The colour of fur in this specimen is predominantly rufous brown, with little blackish parts. Head and body 515 mm., tail 130 mm., hind foot 102 mm., ear 46 mm. Skull: total length 111 mm., basilar length 104.5 mm., zygomatic breadth 61 mm.

42. ***Mustela erminea kanei*** (Baird).

One stuffed specimen in winter pelage from the island of Paramushir, Kurile Islands, Jan. 1918; purchased. Length of tail without hairs 58 mm., tail with apical hairs 100 mm., hind foot 33.5 mm., ear 15 mm., black apical hairs of tail about one-half as long as tail with the apical hairs; tail without black apical hairs about half an inch longer than posteriorly outstretched hind foot. The specimen is undoubtedly *M. kanei*, the type of which was obtained in one of the islands of the Strait of Bering Sea; it differs distinctly from Cabrera's *M. nippon* (Bol. Soc. Españ., Tomo XIII, pag. 391, 1913) from Prov. Shinano. It seems probable that *M. kanei* of the northern islands is replaced in Hondō by the smaller and shorter-tailed *M. nippon*.

43. ***Mustela nivalis*** Linnæus, subsp.

One skin in winter pelage sent me by Mr. S. Uchida. It was obtained near Sapporo, Dec. 20, 1899. Head and body 200 mm., tail 25 mm., hind foot 24 mm., ear 11 mm. long. The specimen probably represents *Mustela gale* of Pallas.

44. ***Mustela*** (***Lutreola***) ***itatsi*** Temminck.

Several specimens from Prov. Musashi. One adult male in winter pelage from the Island of Sado; Feb. 24, 1917.

45. ***Mustela*** (***Lutreola***) ***taivana*** Thomas.

Thos., Ann. Mag. Nat. Hist, ser. 8, 12, p. 91 (1913).

Mr. Y. Kikuchi has recently sent me a specimen of this rare

Formosan mink. It was obtained at Suizan on Mt. Arisan, at an altitude of 9000 ft. above sea-level, Sept. 1918. The measurements taken from the skin are as follows: Head and body 300 mm., tail 193 mm., hind foot 52.5 mm., ear 16 (?) mm. Skull: total length 65 mm., basilar length 56.5 mm., zygomatic breadth 35 mm. This appears to be the second specimen ever obtained of the species, the first being that obtained by Mr. Goodfellow and described by Thomas (*l. c.*).

46. ***Martes flavigula xanthospila*** Swinhoe.

Five specimens from Horisha, Formosa; one of them obtained in the spring of 1917, and the others on Nov. 13 and Dec. 12, 19, 1918. Four skulls measured as below:—

Total length	Basilar length	Zygomatic breadth
92 mm.	90 mm.	58 mm.
91 "	90 "	60.5 "
83 "	81.5 "	51 "
82.5 "	81 "	——

47. ***Cervus (Rusa) unicolor swinhoei*** (Sclater).

A pair of antlers sent me by Mr. Takabe from Formosa.

48. ***Cervus (Sika) taiouanus*** Blyth.

A head with antlers purchased at Taihoku, Formosa.

49. ***Muntiacus reevesi micrurus*** (Sclater).

A pair of horns from Musha, Nantō Distr. in Formosa; purchased.

50. ***Nemorhædus sumatrensis*** (Shaw).

A skin sent me by Mr. Y. Kikuchi from Formosa. Several horns purchased at Musha, Nantō Distr.

Notes on Some Species of *Retepora* and *Adeonella* occurring in Japan, with Descriptions of One New Variety and Five New Species.

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With Pl. VIII. and 7 textfigures.

In his paper entitled "Die Japanische Bryozoenfauna" (Arch. f. Naturgesch. Jahrg. 56. Bd. 1. 1890) Ortmann has given thirteen species of *Retepora* and three of *Adeonella*.

The list is as follows:

Genus **Retepora** Imperato. (Reteporidae).

1. *R. anatina* Ortm. (p. 33). Sagami Sea. 150–200 fms.
2. *R. sanguinea* Ortm. (p. 34). Ditto, depth?
3. *R. tenella* Ortm. (p. 34). Ditto, 200 fms.
4.* *R. tumescens* Ortm. (p. 34). Ditto, 200–230 fms.
5. *R. bimunita* Ortm. (p. 34). Ditto, 40 fms.
6. *R. semispinosa* Ortm. (p. 35). Ditto, 40 fms.
7. *R. victoriensis* var. *japonica* Busk. (Busk, Chall. Rep., p. 118). Kôbe Gulf, 8–50 fms., Ortm. (p. 35). Sagami Sea, 200 fms.
8.* *R. punctiligera* Ortm. (p. 35). Sagami Sea, 40–130 fms.
9. *R. cornuta* Ortm. (p. 35). Ditto, 40–150 fms.
10.* *R. axillaris* Ortm. (p. 36). Ditto, 40 fms.

11. *R. peripherica* (Ortm.)=*Reteporella peripherica* Ortm. (p. 36). Ditto, 100 fms. Maizuru Gulf, 35–40 fms.

12.* *R. dendroides* (Ortm.)=*Reteporella dendroides* Ortm. (p. 36). Sagami Sea, 200 fms.

13. ×*R. minor* (Ortm.)=*Reteporella minor* Ortm. (p. 37). Ditto, 100–200 fms.

Genus **Adeonella** Busk. (Adeonidæ).

1. *A. tuberculata* Busk. Sagami Sea, 100 fms. and Maizuru Gulf, 35–40 fms. (Ortm., p. 53).

2.* *A. japonica* Ortm. (p. 54). Sagami Sea, 100–200 fms.

4. *A. sparassis* Ortm. (p. 54). Ditto, depth ?

Now, in the *Retepora* and *Adeonella* materials studied by me and which are contained in the collection of the Zoological Institute, Science College, I have found the six species marked with asterisk in the above list, besides the following nine forms which are to be added as new to the Japanese Bryozoan fauna:

1. *Retepora pacifica japonica*, n. subsp.
2. *R. misakiensis*, n. sp.
3. *R. watanabei*, n. sp.
4. *R. monilifera umbonata* MacGillivray.
5. *R. tessellata* Hincks.
6. *R. phœnicea* Busk.
7. *R.* (*Reteporella*) *kinoshitai*, n. sp.
8. *R.* (*Reteporella*) *crenulata*, n. sp.
9. *Adeonella hexangularis*, n. sp.

In fact, there are contained in the Zoological Institute collection thirteen species of *Retepora* and two of *Adeonella*, as reported on in the following pages.

Reteporidae.

Genus **Retepora** Imperato.

1. *Retepora pacifica japonica*, n. subsp.

Pl. VIII., figs. 2–3.

Numerous colonies from the shallow water near the Misaki Marine Laboratory and from the deeper parts of Sagami Sea (Yodomi 60 fms.; Onigasé, 120–160 fms.) are specifically identifiable with Robertson's *Retepora pacifica*[1], but may at the same time be made to represent a new variety or subspecies, which will here be called by the name of *japonica*.

The Sagami Sea specimens seem to agree with typical *R. pacifica* of the west coast of N. America in all essential points of habitus and structure, except in this important respect that not all the reticulating zoarial trabeculae consist of biserially arranged zooecia as they seem to do in the latter, but some of them occurring in irregular distribution, are simple connectives canallated in the interior and showing no sign of zooecial structure. Trabeculae of this barren nature are on the whole thinner than those made up of zooecia; moreover, they start from, or join with, the latter at an angle considerably wider than that formed by these at the bifurcation point. So that, the barren trabeculae can usually be readily distinguished from others of ordinary structural composition. Further, the fenestrae in the Sagami Sea form are of a rather indefinite—though generally elongate—shape and of very varying dimensions, frequently reaching a length about four times as long as wide; while in the typical form they should be oval and only about twice as long as wide.

In the present form of the species I have observed that the open-

1) A. Robertson 1908, The incrusting chilostomatous Bryozoa of the west coast of N. America. Univ. of Cal. publications in Zool., Vol. IV, No. 5. p. 310; pl. 24, figs. 81-84.

ing of ovicells, as seen in ventral view, is broad and nearly semicircular in shape, but, as the ovicells approach maturity, becomes greatly narrowed owing to the downward growth of its arched upper margin, which at the same time develops a weak peak in the middle, somewhat as in *R. elongata* Smitt or *R. tessellata* var. *coespitosa* Busk.

A variation of certain constancy seems to exist in relation to the depth of localities, with respect to the numbers of dorsal avicularia and of barren trabeculæ present on the colonies. Both the structures are much more numerously found on the specimens from Yodomi and Onigasé than on those from the littoral of Misaki. While in the latter the dorsal avicularia occur in a very limited number, in the former they are profusely present, occurring, as they do, one to each and every surface area surrounded by slightly raised vibices.

2. ***Retepora misakiensis***, n. sp.

Pl. VIII., fig. 1; textfig. 1.

Zoarium erect, consisting of a number of wavy or flexuose and irregularly infundibuliform growths arising from an incrusting disk; often with a short peduncle. Fenestrae irregular in size and shape, measuring 1.9×0.8 mm.—2.6×0.5 mm. large, usually three to four times as long as wide, mostly rhomboidal, not infrequently very narrow; trabeculae 0.8 mm. wide on an average, nearly as broad as the width of fenestrae. Zooecium oblong or irregularly rhomboidal, arranged biserially in alternate arrangement, closely connate with one another by lateral walls, and with smooth or nodulous ventral surface which is freqeυntly perforated by two or three, small, circular pores. Zooecial aperture semicircular, with thin margin and with oral fissure at the middle of the lower margin. In the younger zooecia (textfig. 1 *b*), the ventral zooecial wall slightly flares out at the rim of the aperture and is thrown into some longitudinal folds, in the adjoining part. Operculum (*c*) semicircular, thin, transparent, and with narrow marginal sclerite which bears on each side of its proximal end a small vertical flange for the attachment of the tendon of the retractor muscle. There occur two well-developed oral glands, opening on the distal margin of tentacular sheath. Avicularia (*e*) of a moderate size, not present on all and every zooecium, usually placed below zooecial aperture; provided with an elongate subrectangular mandible, pointed and bifid at end and with a small circular lucida in the centre, directed upwards or obliquely so. Avicularian gland consisting of two dissimilarly shaped vesicles, one elongate and gently constricted in the middle and the other subglobular and somewhat larger. The ducts of both the vesicles unite after a short course into one which opens externally at a point near the lower margin of the mandible. Ooecia (*a*) ovoid, broadly rounded above, smooth on surface, the wall with a narrow oblong fissure in the centre, the lower margin prolonged below into a kind of lamina, extending some way into the zooecial aperture, provided with two sinuses at the inferior margin. Dorsal surface nodulous, divided by vibices into numerous, irregularly shaped areas, some of which bear a raised avicularium (*d*) with triangular hooked mandible of nearly the same size as that of ventral avicularium.

Fig. 1.

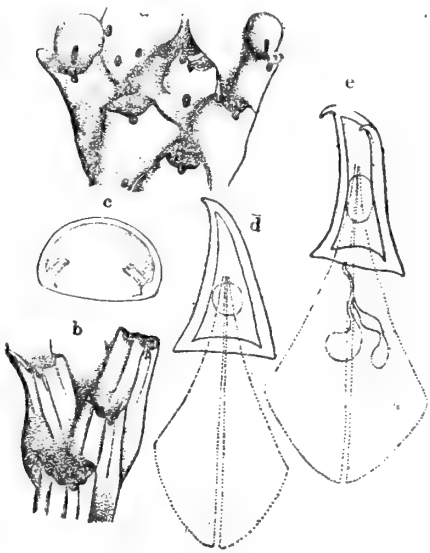

Fig. 1. *Retepora misakiensis*, n. sp.

a. A few zooecia, two of which are provided with zooecia, ×40.
b. Young zooecia, with longitudinal folds on frontal wall. ×40.
c. Operculum. ×150.
d. Mandible of dorsal avicularium ×150.
e. Mandible of frontal avicularium with bifid end. ×150.

This new species is found in abundance in the shallow water of Aburatsubo near Misaki and of Hamajima in the Miye prefecture, growing on rocks and seaweeds. In the live state, the colour is a beautiful light orange, but fades away into a milky white when preserved in spirit. The species bears neither fenestral nor reteporidan avicularia, a negative fact which seems to constitute a peculiarity of this species in contrast to all others of the genus.

3. *Retepora watanabei*, n. sp.

Pl. VIII., fig. 5; textfig 2.

Zoarium forming a convoluted mass and growing from an incrusting disk or from a short peduncle; frequently sending out from the dorsal surface some calcareous rootlets which reach to the substratum. Fenestrae nearly uniform in size and shape, being oval or elliptical, 2.2 × 0.6 – 2.9 × 0.8 mm. large and about three times as long as wide or longer. Trabeculae relatively strong, measuring 0.6—0.8 mm. broad. Zooecia (textfig. 2, *b*) small, elongate, lozenge-shaped, arranged in alternate series, with distinctly raised distal and proximal margins, the ventral wall perforated by three or four relatively small pores in irregular distribution. Zooecial aperture small, suborbicular though inferiorly somewhat narrowed; operculum (*c*) nearly orbicular with the lower margin distinctly arched in the middle parts, with submarginal sclerite hich shows a slight incurving on both its lateral limbs somewhat in

Fig. 2.

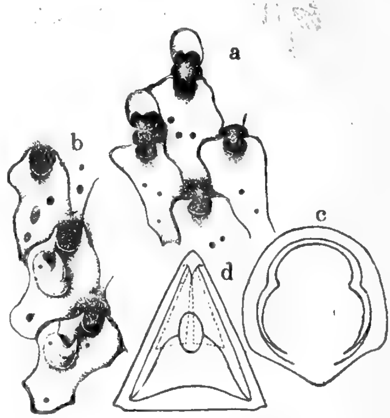

Fig. 2. *Retepora watanabei*, n. sp.

a. A few zooecia, two of which are seen provided with ooecia. × 30.
b. Zooecia with frontal avicularia. × 30.
c. Operculum. × 200.
d. Mandible of frontal avicularium with two retractor muscles. × 200.

front of the middle. Avicularia (*d*) conspicuously large, present on most zooecia nearly in the centre; their mandible triangular, slightly curved, hooked at end, with oblong lucida in the centre and with the attachment for the two tendons of occlusor muscles rather high up near the distal end. Mature ooecium (*a*) moderately small, subspherical, smooth-surfaced, with a small peak in the middle of lower margin; immature ooecium with much larger opening and without peak in the lower margin. Dorsal surface nodulous, perforated only in the parts close around fenestrae, with irregularly developed vibices. In some of the areas surrounded by the vibices there is an occurrence of the same kind of avicularia as that of the ventral surface.

This new species is represented in the collection by a dried specimen from Ôsaka and numerous colonies in alcohol from Tomo Gulf in Prov. Bungo. The Ôsaka specimen is a large convoluted and non-pedunculate zoarium 7 cm. broad and 3.5 cm. high. The Tomo specimens are much smaller and pedunculated.

The species greatly resembles *Retepora pacifica* Robertson in many respects, but differs from it in the total absence of oral spines and in the dorsal avicularia being immersed.

4. *Retepora monilifera umbonata* MacGillivray.

R. monilifera var. *umbonata* MacGillivray 1865, p. 8.—McCoy 1885, p. 23; pl. 37, figs. 1–3.—Waters 1889, p. 20.

R. hirsuta Busk 1884, p. 119; pl. 26, fig. 4.

Numerous small colonies and fragments in the collection may be identified with the above form. The localities are: off Niijima (depth unknown); Yodomi (54–62 fms.); Onigasé (117–156 fms.). In the specimens from these localities, the oral spines are limited in occurrence to marginal zooecia of the distal parts of stock.

5. *Retepora tessellata* Hincks.

Retepora tessellata. Hincks 1878, p. 35; pl. 19, figs. 9–12.—Busk 1884, p. 112.—McCoy 1885, p. 29; pl. 99, figs. 4–8.

Of this species there are in the collection a few well preserved colonies and numerous fragments from Yodomi and a depth of 62–78 fms., as well as from Onigasé and a depth of 117–156 fms. In the habitus of zoarium and in the shape of fenestrae, the specimens differ somewhat from those previously described by authors from other localities. The zoarium is of a simply lamellar or foliaceous shape, not convoluted as in the Australian specimens described by MacGillivray. Some Onigasé specimens possess strongly developed rooting-processes arising from the dorsal surface of the proximal parts of zoarium. The fenestrae in all the Sagami Sea specimens examined are 2.6×1.0—2.8×1.8 mm. large. They are distinctly wider than the trabeculae are broad (0.4–0.7 mm.). In comparison with previously described specimens of the species, those now before me seem to have much larger fenestrae and stronger trabeculae.

6. ***Retepora punctiligera*** Ortmann.

Retepora punctiligera Ortmann 1890, p. 35, pl. 2, fig. 24.

This species is represented in the collection by numerous fragments from Onigasé (160–200 fms.) and a small complete zoarium from Yodomi (60–80 fms.). The majority of Onigasé specimens have oblong and narrow fenestrae usually measuring about 2.4–4.0 mm. long and 1.0–1.8 mm. wide, with trabeculae of 0.5–0.6 mm. breadth; whereas the specimen from Yodomi has nearly circular fenestrae of 0.6–1.9 mm. length and 0.5–0.9 mm. width, and trabeculae of 0.4–0.6 mm. width.

In spite of these differences between specimens from the two localities, there exists a perfect agreement in all the important characfters of zooecia. In fact, the size and shape of fenestrae seem to be of not much specific importance. Labial fissure or pore is distinctly present, especially so in the Yodomi specimen. Small oral glands of a subglobular shape always occur near, and dorsal to, the distal end of the tentacle sheath.

The compensation sac is large and distinct, with moderately thick wall; it is of an oval outline, narrowed neck-like close to the opening.

7. ***Retepora tumescens*** Ortmann.

Retepora tumescens Ortmann 1890, p. 34, pl. II, fig. 20.

Numerous large specimens in the collection may be referred to the above species. The localities are: Mochiyama (depth unknown); Onigasé (117–312 fms.); Okinosé (depth unknown). The Mochiyama specimens have large frontal avicularium prominently raised and provided with subtriangular mandible, exactly as in the type specimens described by Ortmann from Sagami Sea, while in the Onigasé specimens the same are raised to a less degree and have somewhat smaller and more narrowly triangular mandible.

8. ***Retepora phœnicea*** Busk.

Retepora phœnicea Busk 1854, p. 94, pl. cxxi, figs. 1–2.—Hincks 1877, p. 362. —Busk 1884, p. 124, textfig. 34.—McCoy 1885, p. 27, pl. xcviii, figs. 1–5; pl. xciv, fig. 13.—Waters 1887, p. 197, pl. vi, figs. 15 and 20.

The present species is represented in the collection by two small but complete colonies. Both are from Yodomi and a depth of 80–100 fms. The species closely resembles *Retepora sanguinea* Ortmann in many respects, but differs from it in the shape and situation of frontal avicularia.

9. ***Retepora axillaris*** Ortmann.

Pl. VIII., fig. 4; textfig. 3.

Retepora axillaris Ortmann 1890, p. 36, pl. ii, fig. 25.

Several large colonies in the collection may de identified with this species. The localities are: Yodomi (63–312 fms.); Homba (234 fms.); Onigasé (117–156 fms.); a coral reef in the Loochoos (Okinawa group).

The colour of the Sagami Sea specimens is always a dark purple in the living state; it changes into a lighter purple when dried, and fades away more or less in the spirit.

The Okinawa specimen is peculiar in that it is of a violet colour and is in shape infundibuliform, passing below into a short peduncle, and in the zooecial aperture being provided with a thin and entire (not dentate) peristome.

The Sagami Sea specimen, on which Ortmann based the species, was without ooecia. In all the specimens now before me the ooecia are present in abundance. The ooecial aperture in ventral view is commonly of the configuration shown in (textfig. 3 *h*), there existing on the lower ooecial margin a pair of well developed peaks which divide the upper parts of the aperture into three broad recesses, a median and two lateral. Not infrequently one meets with interesting variations in the development and arrangement of the ooecial aperture. The median recess may de entirely cut off from the main aperture, apparently

Fig. 3.

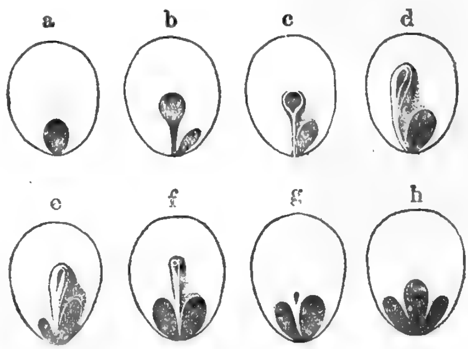

Fig. 3. The ovicell of *Retepora axillaris* Ortmann showing the various state of its aperture.

by fusion of the two peaks into one, and may then appear as a small and isolated perforation of a slit-like, obovate or circular form (*c-g*). The longitudinal line of fusion of the peaks may or may not be indicated by a ridge-like thickening of the test, which thickening is continuous with the thickened lip of the isolated perforation. At other times, the median recess presents a spatulate form, connected with the remaining portion of the aperture by a narrow stalk-like part (*f*). Conjointly with the above variation, the lateral recesses may be developed assymmetrically in regard to their relative size in a pair (*e*) or in that they occur unilaterally in a single number (*b-e*). The simplest cases sometimes observed of ooecial apertures were those in which these, in ventral view, were of a simple oval shape (*a*), without the development of the peaks nor of lateral recesses.

10. *Retepora dendroides* (Ortmann).

Retepora dendroides Ortmann 1890, p. 36, pl. II, figs. 27 a and 27 b.

A large colony of this species obtained at a spot off Odawara (120 fms.) is in the collection.

Of the ventral avicularia, there are two kinds: the large with triangular pointed mandible and the small with semicircular mandible, the margin of which is recurved and serrated at edge. An avicularium belonging to either of the two kinds may be situated just below zooecial aperture, and a second avicularium of the other kind close to the lower zooecial end; or it may sometimes be that both the avicularia are of the larger kind. Marginal zooecia are mostly provided with vicarious avicularium which has large triangular mandible pointed and curved at end. The avicularian gland is always better developed in avicularia of the smaller size than in those of a large size. In certain zooecium one or two masses of spermatozoa occur on each side of the polypide. The spermatozoa, distinctly visible through decalcified zooecial wall, are relatively large and rod-like and stain deeply with borax carmine.

11. *Retepora minor* (Ortmann).

Retepora minor Ortmann 1890, p. 37, pl. II., fig. 28.

Two small colonies of this species exist in the collection, both obtained at Yodomi and from a depth of 64–78 fms. In those specimens, most zooecia have one or two small roundish avicularia with minutely crenated semicircular mandible as described by Ortmann; more rarely they bear an elongate subelliptical avicularium of a larger size placed below the zooecial aperture, close to and on one side of the labial fissure, instead of the small avicularium mentioned before. Vicarious avicularia are larger than any frontal avicularia and are provided with an elongate subtriangular mandible pointed and curved at the extremity. All avicularia of the species have a small and inconspicuous avicularian gland of a globular shape and are furnished with two retractor muscles attached to the lower margin of mandible.

12. *Retepora kinoshitai*, n. sp.

Pl. VIII., fig. 7; textfig, 4.

Zoarium erect, sometimes slightly decumbent, spreading in a plane from a common peduncle which expands below into a non-celliferous base for attachment. Branches numerous, dichotomous, dorsoventrally flattened, broadest in basal parts, non-reticulating, conically rounded at the free end. Zooecia rhomboidal, alternately disposed; the ventral surface irregularly nodulous, sparsely perforated by pores. Zooecial aperture small, nearly semicircular, the curved lower margin with a distinct labial fissure. In the younger zooecia (textfig. 4 *a*.) and also in those situated on the lateral sides of branches, the marginal wall of the aperture forms, on each side and at the upper end of the cell margin, an angular process bearing a small spine at the apex. Operculum broadly semicircular, with moderately thick sclerite (*c*). Avicularia immersed, present in three kinds: small, medium sized, and large. The small avicularium (*e*) is the commonest,

Fig. 4.

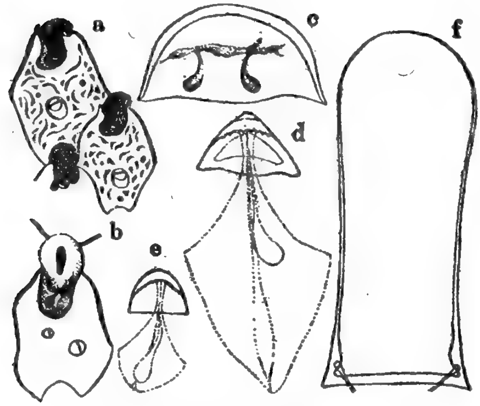

Fig. 4. *Retepora kinoshitai*, n. sp.

a. Ventral view of zooecia. ×30.
b. Zooecium with ooecium. ×30.
c. Operculum showing two opercular glands. ×200.
d. Frontal larger avicularian mandible with two retractor muscles and an avicularian gland. ×200.
e. Oral avicularian mandible with retractor muscles and an avicularian gland. ×200.

occurring on either side of the labial fissure and partly projecting into the apertural space; it has a semicircular mandible slightly curved, minutely denticulated at the distal margin and directed obliquely downwards. The medium-sized avicularium (*d*) is less common, being found mostly below, but sometimes on either side of, the zooecial aperture; it is spherical and is provided with a broad subtriangular mandible minutely denticulated on the distal margin and variously directed. The large avicularium (*f*) is the least common, being not present on many zooecia; it is nearly elliptical in outline, and is provided with a large shield-like mandible. This kind of avicularia occurs mostly just below zooecial aperture but sometimes in the centre of ventral zooecial surface. Ooecia (*b*) small, circular in outline, weakly inflated, with the lower margin prolonged below into a kind of lamina and extending a short way into the zooecial aperture, smooth on sucface, the ventral wall with a small narrow elliptical fissure in the centre. Dorsal surface of zoarium convex, divided into irregular areas by weak vibices; each of these areas bear several avicularia which may be distinguished into the same three kinds as those found on the ventral side. In the basal part of zoarium, the surface is almost smooth throughout, all traces of zooecium being nearly completely obliterated. On the distal margin of retracted tentacular sheath there open two small oral glands.

The collection includes several colonies of this new species, obtained at Onigasé (117–234 fms.), at a spot off Odawara, and in the Kagoshima Gulf (54 fms.). The Onigasé specimen, which I have made the type of the species, is 35 mm. high. All the other specimens are smaller. The Kagoshima specimen is peculiar in that the branches are somewhat truncate at the free end and the ventral zooecial surface is granulated and imperforate, instead of being smooth and perforated.

The species is one which should be assigned to *Reteporella*, were this to stand either as a distinct genus or a subgenus under *Retepora*.

Ortmann ranged this species under Busk's *Reteporella*. In agreement with Waters I greatly doubt the tenability of *Reteporella* as a genus distinct from *Retepora*. Sufficiently warranted as seems to me the amalgamation of the two, yet the former may possibly be held up as a subgenus under the latter. In addition to the non-reticulate character of zoarium in all the species which had been taken under *Reteporella*, there may exist some more common characters by which that group as a subgenus might be distinguished from *Retepora* s. str. At least in all the four species studied by me and with non-reticulate zoarium—viz., *Retepora* (*Reteporella*) *minor* (Ortm.), *R. kinoshitai* n. sp., and *R. crenulata* n. sp.—I find, as against *Retepora* s. str., *1*) the ovicells are immersed, not raised; *2*) their ventral wall is prolonged below into a sort of lamina extending a certain distance into the zooecial aperture; *3*) the aperture of ovicell is longitudinally fissure-ilike with non-denticulate margin; *4*) the avicularian gland is single globular, and usually larger in ventral, than in vicarious avicularia.

13. ***Retepora crenulata***, n. sp.

Pl. VIII., fig. 6; textfig. 5.

Zoarium erect, about 50 mm. high, consisting of dichotomously subdividing branches which expands fan-like or are somewhat contorted. The branches are somewhat flattened dorsoventrally, almost truncate at end, and nearly uniformly wide throughout. Zooecia (textfig. 5 *a–b*) mostly rhomboidal, not infrequently oval, arranged in alternating rows; surface distinctly nodulous except along lower margin of zooecial aperture which is smooth, frequently perforated by minute, irregularly scattered pores. In young zooecia (*h*) at the end of branches, the distal parts of zooecium are distinctly prolonged in a tubular manner. Zooecial aperture circular, with raised and serrated lower margin which shows a small labial fissure in the middle; the upper margin is entire in mature zooecium, while in young zooecia it is 4–5-toothed, the teeth being moderately prominent and frequently surmounted each with a short oral spine (*h*). Ventral avicularia are distinguishable into three forms, *a*, *b* and *c*, each with two retractor

Fig. 5.

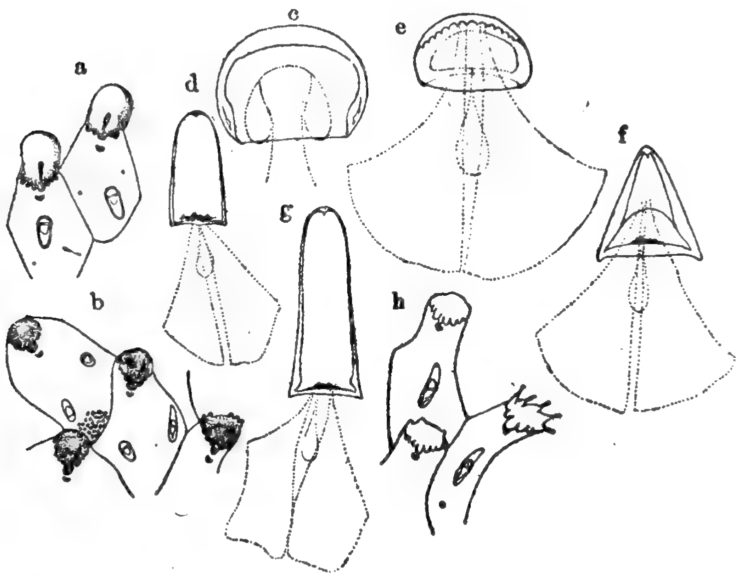

Fig. 5. *Retepora crenulata*, n. sp.

a. Two zooecia with ovicells. × 30.
b. A few zooecia with three kinds of frontal avicularia. × 30.
c. The operculum and two pear-shaped oral glands hanging down from the distal margin of tentacular sheath. × 100.
d. The shield-like mandible (*a*) of frontal avicularium with two retractor muscles and an avicularian gland. × 200.
e. The semicircular mandible (*b*) of frontal avicularium. × 300.
f. The triangular mandible (*c*) of frontal avicularium. × 200.
g. The elongate shield-like mandible of vicarious avicularium. × 200.
h. Young zooecia; one of them with oral spines on the toothed apertural margin. × 30.

muscles and a single avicularian gland. Form *a* (*d*) is of an oblong shape, with variously directed, elongate shield-like mandible which is pointed and slightly curved at apex; it is situated at varying positions in the middle or rather posterior parts of ventral zooecial surface. Form *b* (*e*) is of an oval shape, found in the same position as the above, with nearly semicircular mandible directed obliquely downwards and showing weakly reflexed and serrated distal margin. Form *c* (*f*) is of a nearly oblong outline, with triangular mandible hooked and weakly reflexed at apex; occurring in the posterior parts of zooecial surface, together with either of the two preceding forms. Vicarious avicularia (*g*) larger than any frontal avicularia, provided with large shield-like mandible pointed and slightly curved at apex. Dorsal surface convex, nodulous, divided by vibices into numerous regularly shaped areas, each of which exhibits two avicularia. One of these agrees in shape and size with the first kind, and the other with the second kind, of the ventral avicularia. Ooecia small, orbicular, weakly inflated, with a plain narrow fissure in the middle of its smooth surface; the lower margin is prolonged into a lamina and extends some way into the zooecial aperture.

This is another species of the *Reteporella* group. It is represented in the collection by a small and a moderately large colony, and by fragments. They were obtained at Onigasé (117–234 fms.), at Yodomi (64–78 fms.), and at a spot off Jôgashima (80 fms.). The species somewhat resembles *Reteporella minor* Ortmann, but differs from it in the absence of oral avicularia and in the presence of the large oblong ventral avicularia.

Adeonidae.

Adeonella Busk 1884.

1. ***Adeonella japonica*** Ortmann.

Pl. VIII., fig. 9; textfig. 6.

Adeonella japonica Ortmann 1890, p. 54, pl. IV, fig. 11.

The zooecial features vary considerably according to age of the animal. Young zooecia (textfig. 6 *b*.) are of an elongate oval form, with raised central parts surrounded by a weak elliptical ridge and outside of this by a series of marginal pores which grow smaller distally; whereas, the older zooecia (*c*) are irregularly hexagonal and somewhat depressed in the frontal parts, the marginal pores becoming very small or nearly filled in by growth of the shell. Blind zooecia frequently occur in the proximal parts of colony, and in those zooecia the median pore has entirely disappeared, there remaining only a few marginal pores. Frontal avicularia (*d*) with triangular mandible which is simply pointed at end without curving; they are about one half as large as the vicarious avicularia. The younger zooecia (*b*) have each

Fig. 6.

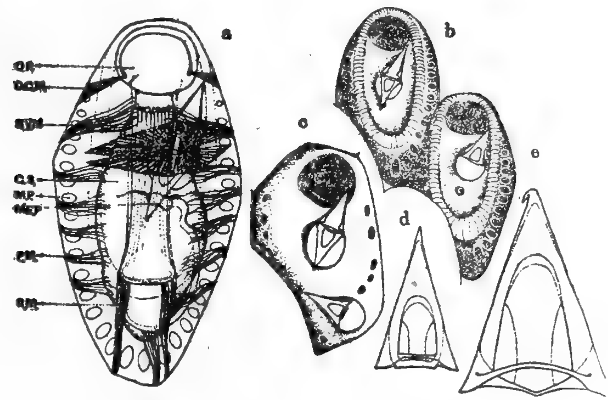

Fig. 6. *Adeonella japonica* Ortmann.

a. View of a young zooecium with zooid within. ×ca. 70.

c.s. compensation sac. *me.p.* median pore.
m.p. marginal pore. *op.* operculum.
oc m. occlusor muscle. *p.m.* partietal muscle.
p.v.m. parieto-vaginal muscle. *r.m.* retractor muscle.

b. Two young zooecia. ×30.
c. An older zooecium. ×30.
d. Mandible of frontal avicularium. ×150.
e. Mandible of vicarious avicularium. ×150.

a single frontal avicularium, while the older zooecia (*c*) have two of same, the one placed below zooecial aperture being always larger than the other. The median pore is circular in young zooecia, while in older zooecia it assumes a bisquit-like shape. The membranous wall of the unusually large compensation sac (fig. *a*, *c.e.*) passes continuously into the zooecial wall at the margin of median pore, besides of course at that of zooecial aperture. So that, the compensation sac opens to the exterior at two places as in *Microporella*. Operculum (fig. *a*, *op.*) nearly circular, with weak vertical flange and with submarginal sclerite; occlusor muscles (fig. *a*, *oc.m.*) inconspicuous, proceeding from the distal parts of the lateral wall of zooecium and attached to the vertical flange; divaricator muscle not found. The parieto-diaphragmatic muscle (fig. *a*, *p.v.m.*) is strongly developed, springing out from the lateral wall of zooecium and attaching itself to the distal wall of tentacular sheath. There are 17 tentacles.

A large number of the colonies of this species came under my observation. They were obtained from a considerable depth in the Sagami Sea: viz. Okinosé (195 fms.); off Matsuwa (78 fms.); off Jôgashima (depth unknown); Yodomi (54–100 fms.); Kona in Izu Province (400 fms.).

2. ***Adeonella hexangularis***, n. sp.

Pl. VIII., fig. 10; textfig. 7.

Description of the type:—Zoarium consisting of numerous compressed foliaceous branches, rising irregularly from an encrusting base. Branches irregularly divided into lobes of varying size. Young zooecia (textfig. 7 *a.*) are of a subhexagonal shape, with slightly convex ventral surface surrounded by a single row or double rows of marginal pores; their aperture is suborbicular with thin and slightly elevated peristome; median pore numbering from four to eight, always situated below frontal avicularium, minutely fimbriated inside. Old zooecia are of an irregularly hexagonal shape, slightly depressed in front, and exhibit some pores which have decreased both in size and number, due to the progress of growth of the wall. At bifurcating points as well as at indefinite places near lateral edges of most zoarial branches, there exist groups of three to seven zooecia which are distinctly larger than ordinary zooecia and are probably to be regarded as gonoecia (*a*).

Fig. 7.

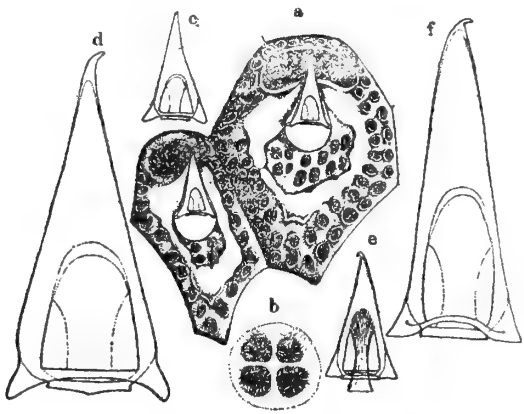

Fig. 7. *Adeonella hexangularis*, n. sp.

a. A gonoecium (right) and an ordinary zooecium (left). ×50.
b. Fimbriated median pores of a zooecium. ×150.
c. Mandible of frontal avicularium. ×150.
d. Mandible of vicarious avicularium. ×150.
e. Mandible of frontal avicularium (Kagoshima specimen). ×150.
f. Mandible of vicarious avicularium (Kagoshima specimen). ×150.

The zooecia in question have zooecial aperture distinctly transversely elongated and about twice as long as that of ordinary zooecia. Frontal avicularia (*c*) with triangular mandible which is simply pointed at end without curving; they are much smaller than vicarious avicularia. Vicarious avicularia (*d*) are provided with large triangular mandible, being pointed and slightly curved at apex.

The above type specimen was obtained from off the Misaki Marine Station. Depth unknown. A somewhat smaller specimen, which may be regarded to be specifically identical with the type, is to hand from Kagoshima Gulf. This differs not inconsiderably from the type in some respects of zoarial form and the shape of avicularian mandibles. It has narrower (about half as wide as in the type) and rather regularly dichotomously dividing branches. The mandibles are somewhat narrower and more strongly curved and pointed at apex.

This new species somewhat resembles *Adeonella japonica* Ortmann, but may be distingiushed from it by the longer and more narrowly triangular vicarious avicularia and by the more numerous presence of fimbriated median pores.

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Explanation of Plate VIII.

Fig. 1. *Retepora misakiensis*, n. sp. × 1.
Fig. 2. *Retepora pacifiea* var. *japonica*, n. var. × 1.
Fig. 3. do. × 1.
Fig. 4. *Retepora axillaris* Ortmann. × 1.
Fig. 5. *Retepora watanabei*, n. sp. × 1.
Fig. 6. *Reteporella crenulata*, n. sp. × 1.
Fig. 7. *Reteporella kinoshitai*, n. sp. × 1.
Fig. 8. *Reteporella dendroides* Ortmann. × 1.
Fig. 9. *Adeonella japonica* Ortmann. × 1.
Fig. 10. *Adeonella hexangularis*, n. sp. × 1.

On a Second Collection of Mallophaga from Formosan Birds.

By

Seinosuke Uchida, *Juigakushi.*

With 3 text figures.

The collection of Mallophaga, here noted on, consists of specimens which were taken from birds collected in Formosa partly by Dr. T. Shiraki and partly by Mr. Y. Kikuchi, during the early summer of 1917. The parasites were taken from the hosts in the fresh state.

A list of the hosts and of the parasites is as follows:

Host	Parasites
Herodias garzetta	*Myrsidea kikuchii* n. sp.
Milvus ater govinda	*Docophorus gonorhynchus* G.
	Nirmus fuscus G.
Calophasis mikado	*Nirmus ovatus* Uchida.
	Lipeurus variabilis N.
	Lipeurus intermedius var. *major* Uchida.
	Goniodes intermedius Neumann.
	Menopon productum P.
	Myrsidea mikadokiji (Uchida).
Arboricola crudigularis ..	*Lipeurus formosanus* Uchida.
	Lipeurus rubrifasciatus P.
	Goniocotes microcephalus Uchida.
	Menopon pallescens N.
Amaurornis phoenicura ..	*Rallicola bisetosa* (P).

Charadrius cantianus	*Docophorus semivittatus* G.
Glareola orientalis	*Nirmus furvus* N.
Sterna sinensis	*Docophorus albemarlensis* Kell. and Kuwana. *Lipeurus potens* Kell. and Kuwana. *Comatomenopon elongatum* n. g. n. sp.
Turtur chinensis	*Goniocotes kurodai* Uchida (juv.).
Hirundo daurica striolata.	*Docophorus excisus* G.
Lanius schach	*Docophorus communis* N.
Oriolus indicus	*Docophorus communis* N. *Nirmus mundus* N.
Corvus macrorhynchus levaillanti....	*Myrsidea shirakii* n. sp.
Urocissa caerulea	*Myrsidea urocissae* (Uchida).
Acridotheres cristatellus ..	*Docophorus leontodon* var. *affinis* P.
Zosterops simplex	*Docophorus communis* N.

Gen. **Docophorus** Nitzsch.

1. ***Docophorus nisi*** Denny.

Denny, Monogr. Anopl. Brit., p. 109, pl. iii, fig. 11; *Docophorus gonorhynchus* Giebel, Insecta Epizoa, p. 70; Piaget, Les Pediculines, p. 20, pl. i, fig. 3.

Three males and twelve females were collected from *Milvus ater govinda* shot at Nanpeishō, June 4.

2. ***Docophorus semivittatus*** Giebel?

Giebel, Insecta Epizoa, p. 102.

Two young specimens taken from *Charadrius cantianus* obtained at Suiteiryō, June 6.

3. ***Docophorus albemarlensis*** Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Wash. Acad. Sci., vol. IV, p. 465, pl. xxviii, fig. 5.

Two male and six female individuals collected from *Sterna sinensis* shot at Tōkō, June 3.

4. ***Docophorus excisus*** Giebel.

Giebel, Insecta Epizoa, p. 88, pl. ix, fig. 1, 2 and 3.

A single female specimen taken from *Hirundo daurica striolata*, June 5.

5. ***Docophorus communis*** Nitzsch.

Uchida Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 173.

Six female specimens collected from *Oriolus indicus*, *Lanius schach* and *Zosterops simplex*, all captured at Nanpeishō, June 4.

6. ***Docophorus leontodon*** var. ***affinis*** Piaget.

Five male and seven female individuals taken from three specimens of *Acridotheres cristatellus* shot at Nanpeishō (June 4), at Chōsū (June 7) and at Reikō (June 13).

Gen. **Nirmus** Nitzsch.

7. ***Nirmus fuscus*** Nitzsch.

Denny, Mongr. Anopl. Brit., p. 118, pl. ix, fig. 8; Giebel, Insecta Epizoa, p. 123, pl. viii, fig. 2; Piaget, Les Pediculines, p. 130, pl. x, fig. 9.

A single female specimen of this species obtained from *Milvus ater govinda* shot at Nanpeishō, June 4.

8. ***Nirmus ovatus*** Uchida.

Uchida, Journ. Coll. Agr. Imp. Univ. Tokyo, vol. III, p. 174, pl. x, fig. 3.

Twenty one males, twenty three females and eleven youngs collected from *Calophasis mikado* shot on Mt. Arisan, June 15. This species was described by me from two male specimens from the same host obtained at the same locality. The description of the female is as follows:

Very similar to male but differing from it in the following points. Body, but especially the abdomen, much larger. Antennæ shorter, but proportional lengths of segments about the same as in the male. Eighth abdominal segment longer and its posterior margin straight instead of concave. The last abdominal segment small, posteriorly slightly emarginated and with a very fine hair on each side.

Measurements of *Nirmus ovatus*.

	♀ mm.	♀ mm.	♀ mm.	♀ mm.	♀ mm.	♂ mm.	♂ mm.	♂ mm.	♂ mm.	♂ mm.
Length of body	1.91	1.92	1.92	1.85	1.92	1.52	1.50	1.56	1.53	1.53
Width of body	.67	.65	.67	.64	.67	.57	.55	.58	.56	.56
Length of head	.52	.51	.52	.51	.52	.50	.47	.48	.47	.47
Width of head	.49	.47	.49	.47	.47	.42	.43	.43	.43	.42
Length of thorax	.31	.32	.32	.29	.31	.25	.27	.27	.27	.27
Width of thorax	.40	.38	.39	.38	.38	.36	.35	.36	.35	.34
Antennæ	.25	.25	.25	.24	.24	—	.24	—	.24	.24

9. ***Nirmus furvus*** Nitzsch.

Two males and three females obtained from *Glareola orientalis* (June 5.).

10. ***Nirmus mundus*** Nitzsch.

Giebel, Insecta Epizoa, p. 135; Piaget, Les Pediculines, p. 161.

Three female and one young individuals were taken from *Oriolus indicus* shot at Nanpeishō, June 4.

Gen. **Rallicola** Johnston and Harrison.

11. ***Rallicola bisetosa*** (Piaget).

Piaget, Les Pediculines, p. 217, pl. xviii, fig. 4.

Two male and six young specimens collected on *Amaurornis phoenicura* taken at Nanpeishō, June 4.

Measurements of two adult specimens on hand:

	♂	♂
Length of body	1.43 mm.	1.33 mm.
Width of body	.42 „	.38 „
Length of head	.43 „	.43 „
Width of head	.34 „	.33 „
Length of thorax	.24 „	.24 „
Width of thorax	.29 „	.29 „

Gen. **Goniodes** Nitzsch.

12. ***Goniodes intermedius*** Neumann.

Neumann, Archives de Parasitologie, vol. xv, p. 627, figs 15—18; Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 179.

A single male specimen taken from *Calophasis mikado* shot on Mt. Arisan, June 15.

Gen. **Goniocotes** Burmeister.

13. ***Goniocotes microcephalus*** Uchida.

Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 177, pl. x, fig. 1.

This species was described from females taken from *Arboricola crudigularis* (Mt. Arisan). The present collection contains six specimens from the same host species shot on Mt. Suizan, June 20. Fortunately one of them is a male.

Description of the male: Smaller than the female; head slightly elongate; indistinct conical trabeculae present; antennae longer than in the female, though about the same in proportional lengths of segments; posterior margin of each eye with a long hair, which in the female is replaced by a short spine. Near the apex of triangular metathorax two weak hairs on each side. Abdomen remarkably shorter and broader than in the female; dorsal surface of same with a row of long hairs behind each spiracle on segments I—VI (instead of segments III—VI as in the female); segments I—IV each with a median row of four to six weak hairs; the last segment semi-circular, protruding and entire with four long and a few fine hairs on the posterior margin.

MEASUREMENTS.

	♀ mm.	♀ mm	♀ mm.	♀ mm.	♂ mm.
Length of body	1.28	1.25	1.25	1.23	.96
Width of body	.69	.65	.69	.65	.60
Length of head	.37	.36	.37	.36	.31
Width of head	.43	.42	.44	.40	.35
Length of thorax	.25	.24	.24	.25	.20
Width of thorax	.37	.37	.38	.36	.32
Antenna	.15	.14	.15	.14	.15

14. *Goniocotes kurodai* Uchida.

Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 175, pl. x, fig. 4.

A single young specimens from *Turtur chinensis* shot at Nanpei-shō, June 4.

Gen. **Lipeurus** Nitzsch.

15. *Lipeurus intermedius* var *major* Uchida.

Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 182.

Two males collected from *Calophasis mikado* obtained on Mt. Arisan, June 15.

16. *Lipeurus variabilis* Nitzsch.

Giebel, Insecta Epizoa, p. 219, pl. xvi, fig. 3; Uchida, Journ. Coll. Agric Imp. Univ. Tokyo, vol. III, p. 181.

Four female specimens obtained from *Calophasis mikado* shot on Mt. Arisan, June 15.

17. ***Lipeurus formosanus*** Uchida.

Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 179, text fig. 1.

A female and seven male specimens obtained from *Arboricola crudigularis* taken on Mt. Suizan, June 20.

The species was first described by me from a single female specimen taken from the same host species obtained on Mt. Arisan in 1916. The following is a description of the male: Much smaller than the female; head narrower, temples less expanded, trabeculae short, blunt, but more distinct than in the female. Antennae with first segment largest, being of about half the length of the remaining segments taken together; second segment narrower than the first and about two-thirds as long; third segment shorter than the second, with an angular projection (at distal end; fourth segment shortest, and fifth segment about equal to third. Abdomen much shorter and narrower than in the female; sides nearly parallel; the last abdominal segment large; posterior parts of lateral margin concave; the emarginated tip showing on each side an angulated projection bearing three fine hairs; a long and two short hairs on each lateral margin and another long hair on each side of dorsum; a capitate and somewhat chitinized process projecting from the end of the ventral surface of the last segment. Genitalia well chitinized, reaching from the posterior margin of sixth abdominal segment to the middle of the last segment; basal plate short, broad; parameres short, decurved.

MEASUREMENTS:

	♀ mm.	♂ mm.	♂ mm.	♂ mm.	♂ mm.	♂ mm.
Length of body	2.13	1.60	1.56	1.55	1.52	1.58
Width of body	.45	.30	.30	.30	.29	.30
Length of head	.52	.47	.46	.45	.46	.47
Width of head	.40	.33	.32	.32	.32	.32
Length of thorax	.38	.35	.34	.34	.34	.34
Width of thorax	.31	.28	.28	.28	.27	.28
Antenna	.27	.31	.30	.30	—	.30

18. *Lipeurus rubrifasciatus* Piaget.

Piaget, Les Pediculines, Supplément, p. 71, pl. vii, fig. 8; Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 181, pl. x, fig. 6.

Three male and six female specimens collected from *Arboricola crudigularis* taken on Mt. Suizan, June 20.

19. *Lipeurus potens* Kellogg and Kuwana.

Kellogg and Kuwana, Proc. Wash. Acad. Sci. IV, p. 477, pl. xxx, fig, 1.

A single female specimen from *sterna sinensis* shot at Tōkō, June 3.

Gen. **Menopon** Nitzsch.

20. *Menopon productum* Piaget.

Piaget, Les Pediculines, p. 461, pl. xxxvii, fig. 8; Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 183.

One female obtained from *Calophasis mikado* shot on Mt. Arisan June 15.

21. *Menopon pallescens* Nitzsch.

Giebel, Insecta Epizoa, p 293; Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 184.

A male and two female specimens collected from *Arboricola crudigularis* taken on Mt. Suizan, June 20.

Gen. **Myrsidea** Waterston.

22. *Myrsidea kikuchii* n. sp.

This new species is founded on a single female specimen which was obtained from *Herodias garzetta* shot at Nanheishō, April 3.

Description of the female:—Body short, broad, 1.72 mm. long and 0.63 mm. wide. Ground colour of body pale brownish with pitchy and smoky brown markings on head and thorax; with dark brown, continuous, transverse bands on abdomen.

Head large, comparatively long 0.33 mm. long, 0.56 mm. wide; front broad, rounded; frontal margin on each side with five fine hairs and four longer hairs, of which the hindmost one is remarkably elongated; a long and a short hair at the angle in front of each ocular emargination; a fine and a long hair on each side of the dorsum of front. Eye large, distinct, provided with a very short, weak hair; ocular fleck black, distinct; ocular fringe distinct, composed of numerous long and curved hairs; palpus projecting from the lateral border of head with nearly the whole length of its terminal segment; temples expanding, somewhat angulated in front and behind, each bearing five long pustulated hairs and a few short hairs and prickles; occipital margin straight, with two pustulated hairs in the median parts. Ground colour of head brownish; ocular blotches irregular, pitchy brown, outwardly fading into a smoky brown; a short and curved dark brown band on each side in front of mandibles; short smoky brown occipital bands connected posteriorly with similarly coloured broad bands running along the border of temples, occipital margin and posterior margin of temples narrowly, but conspicuously, bordered with pitchy brown. On the ventral aspect of head, in the space in front of mandibles, a hair and two bristles on each side; six fine hairs in the space between antennal grooves; on each side of the quadrate posterior ventral sclerite a row of three hairs, of which the hindmost one is the longest and strongest.

Prothorax 0.16 mm. long and 0.30 mm. wide; narrow, somewhat hexagonal in outline; lateral angles with two spines and a short hair; anterior lateral margin straight, bare; posterior lateral margin convex; posterior margin convex, with six hairs; colour of prothorax brownish with an indistinct W-shaped, smoky brown marking; distinct transverse and longitudinal chitin bars of a clear brownish colour. Mesothorax nearly as wide as prothorax, distinctly divided from metathorax by lateral emarginations and a sutural line, with short convex lateral, and truncate posterior, margin; two minute prickles on the posterior margin; lateral borders margined with brownish band. Metathorax 0.25 mm. long and 0.5 mm. wide; trapezoidal; the anterior margin straight, with two short hairs; lateral margins bare, nearly straight and diverging posteriorly; posterior lateral margin convex, with a short hair near each lateral angle. Ground colour of metathorax brownish, paler toward the centre, with a narrow dark brown band. Legs long and stout, somewhat paler than thorax, with dark brown dorsal markings, bearing a few scattered hairs and spines, and on the ventral surface of hind femora several rows of numerous short spines; onychium large, oblong.

Abdomen 0.97 mm. long and 0.63 mm. wide; elliptical, widest at the fifth segment; length of segments III—VII nearly equal, that of segments I, II and VIII slightly longer and subequal; posterior angles of segments projecting a little laterally, those of segments I—VIII bearing each a long hair and three or four spines; the last abdominal segment broad, with a fringe of hairs on the flatly rounded posterior margin; two long and a short hairs on each side of the fringe. Posterior margins of segments I and II slightly convex, that of segments III—VII nearly straight. Dorsal surface of segments I—VII with a row of about nine, short, submarginal hairs on each side along the posterior margin; dorsal submarginal hairs of the eighth segment fourteen in number, much longer than those of other segments. A group of five strong spines on each side of the posterior margin of the second abdominal sternite. Ground colour of abdomen pale brownish, with a dark brownish transverse band running right across each segment.

I have named this species for Mr. Y. Kikuchi of the Taihoku Museum.

23. *Myrsidea mikadokiji* (Uchida).

Menopon mikadokiji Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 183, pl. x, fig. 7.

A single young specimen of this species was taken from *Calophasis mikado* shot on Mt. Arisan, June 20.

24. *Myrsidea shirakii* n. sp.

Twelve male and fourteen female specimens collected from *Corvus macrorhynchus levaillanti* killed on Mt. Arisan, June 21.

This new species is characterized by the peculiarly formed tergite of the second abdominal segment. Ground colour of body pale buff, with smoky brown and pitchy markings on head and thorax, the abdomen with smoky brown, continuous, transverse bands.

Description of the female:—Head robust; front broadly rounded, with a very slight angulation on the meson; a long and several short marginal hairs on each side of front; two rather long marginal hairs on each lateral margin, and a long and a short pustulated hair at the angle in front of each ocular emargination. The eye is large, emarginate and with a distinct, quadrangular black fleck; ocular fringe distinct, composed of numerous stiff, curved hairs; palpus projecting with the whole length of its terminal segment; temples rounded, projecting, each bearing four long pustulated hairs and several short hairs and prickles; occipital margin concave, bearing two long hairs in the median parts. Colour of head yellowish buff, paler in the middle; the curved line bounding the antennal region pitchy inside and fading into dark brown outwards; a pitchy brown spot near the margin just in front of each palpus; temporal margin bordered with blackish brown; occipital margin edged with pitchy brown, narrower in the middle. On the ventral aspect of head, in the space in front of mandibles, a hair and a bristle on each side; six short hairs in two rows in the space between antennal grooves; on each side of the quadrate posterior ventral sclerite seven hairs, of which the hindmost is the longest and strongest.

Prothorax narrow, with produced lateral angles, each bearing two spines and a hair; anterior lateral and posterior lateral margins slightly concave, the former furnished with a short spine; posterior lateral angle obtuse, each bearing a long hair followed by four (rarely five) hairs along hind half of the posterior margin, which is obtusely angulated in the middle. Colour buffy whitish; transverse chitin bar pale but distinct; posterior margin bordered with dark blackish brown; similarly coloured curved line running subparallel with each lateral margin. Mesothorax dark blackish brown, nearly as wide as prothorax, distinctly divided from metathorax by lateral emarginations and a sutural line; lateral margin convex; posterior margin truncate with two short prickles. Metathorax short, trapezoidal; lateral margin bare, straight, diverging posteriorly; each posterior lateral angle with two hairs and four spines; posterior margin nearly straight, with a series of twelve (rarely fourteen) submarginal hairs. Ground colour of metathorax buffy whitish, with dark brownish, heavy, lateral bands, which are bend along the posterior margin. Legs long and stout, fore-femora greatly swollen; middle femora less so; hind-femora but little swollen, furnished with scattered hairs and spines, and on the ventral surface with several rows of short spines; onychium large, rounded; colour of legs slightly darker than thorax, with dark brown dorsal markings.

Abdomen broad, elliptical; widest at the fifth segment, though the tergite of that segment is narrower than that of either the fourth or the sixth segment; length of segments nearly equal, except the second segment which is the shortest; posterior angles projecting, furnished on segments I—VII each with a long hair and several spines; segment VIII with a short and two long hairs; the last segment broadly rounded, with a short and two long hairs on each side and a fringe of hairs along the posterior margin. Median parts of the posterior margin of the first segment triangularly produced posteriorly, reaching to the posterior, weakly convex margin of the second segment; posterior margin of all following segments nearly straight. Dorsal surface of the first segment with four hairs on each side of the posterior margin and with four more hairs on the margin of the produced median parts; dorsal surface of segments II—VI with four to six weak hairs on each side of posterior margin, and that of segments VII and VIII with two or three hairs. A group of four strong spines on each side of the posterior margin of the second abdominal sternite.

Ground colour of abdomen buffy whitish; transverse band of the first segment broad, brownish; that of the second segment dark brown and interrupted by the triangular projection of the preceding segment; segments III—VIII with a continuous, dark brown transverse band; sutures broad, buffy-whitish; the last segment uniformly coloured.

Description of the male:—Much resembles the female. Body smaller, metathorax slightly narrower than in the female; abdomen distinctly smaller and narrower; posterior margin of all abdominal segments nearly straight and bearing a row of twelve to sixteen hairs on segments I—VII and four hairs on segment VIII; the last segment narrower than in the female, with a few fine hairs instead of a continuous fringe of same. Genitalia long, distinct, well chitinized, reaching from posterior margin of the third segment to the posterior end of abdomen.

Measurements:

	♀	♀	♀	♀	♀	♂	♂	♂	♂	♂
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Length of body	2.16	1.90	1.92	1.93	1.93	1.53	1.70	1.68	1.72	1.72
Width of body	0.73	0.70	0.72	0.72	0.31	0.57	0.56	0.59	0.56	0.57
Length of head	0.37	0.36	0.37	0.37	0.36	0.33	0.34	0.34	0.34	0.35
Width of head	0.67	0.70	0.69	0.69	0.69	0.60	0.61	0.62	0.62	0.62
Length of prothorax	0.23	0.23	0.23	0.22	0.23	0.20	0.21	0.21	0.22	0.23
Width of prothorax	0.43	0.43	0.43	0.43	0.41	0.37	0.36	0.37	0.36	0.38
Length of metathorax	0.32	0.30	0.31	0.32	0.31	0.29	0.30	0.29	0.30	0.29
Width of metathorax	0.65	0.63	0.65	0.67	0.63	0.49	0.50	0.50	0.49	0.50

Named in honour of the collector, Dr. Tokuichi Shiraki of the Agricultural Experiment Station of Taihoku.

25. *Myrsidea urocissae* (Uchida).

Menopon urocissae Uchida, Journ. Coll. Agric. Imp. Univ. Tokyo, vol. III, p. 186, pl. x, fig. 5.

A female and three male individuals collected from *Urocissa cærulea* shot at Shishitō, May 27. The species has hitherto been known from females only.

Description of the male:--Smaller than the female, especially in the size of abdomen; posterior margin of all abdominal segments nearly straight, except the eighth in which it is slightly convex; the last abdominal segment somewhat narrower than in the female, and bearing eight fine hairs on the posterior margin instead of being continuously fringed by same. Genitalia somewhat broad, distinct, reaching from the anterior margin of the fourth segment to the middle of the last segment.

MEASUREMENTS:

	♂ mm.	♂ mm.	♀ mm.
Length of body	1.70	1.60	2.00
Width of body	0.70	0.69	0.87
Length of head	0.31	0.31	0.32
Width of head	0.59	0.59	0.65
Length of prothorax	0.21	0.20	0.25
Width of prothorax	0.36	0.37	0.41
Length of metathorax	0.27	0.27	0.27
Width of metathorax	0.50	0.50	0.63

Gen. **Comatomenopon** n. gen.

Menoponidae with elongate, whitish translucent body. Head long, rounded at anterior margin; temples prominent; lateral margin with a deep, distinct notch just in front of eye. No spines on ventral surface of head. Mesothorax small, scarcely separated from metathorax. A series of combs upon the ventral surface of posterior femora, and also on each side of certain abdominal sternites. Gastric teeth present at the distal end of crop. Male genitalia consisting of a very long and slender basal plate, continuous distally with a broad lamina, at the base of which elongate and inwardly curved parameres are set.

Genotype: *Comatomenopon elongatum* n. sp.

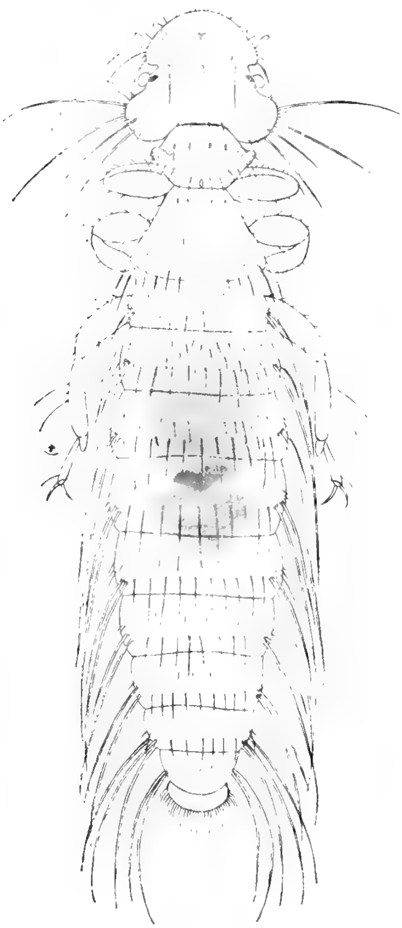

Fig. 1. *Comatomenopon elongatum.* n. sp, female. × 50.

26. *Comatomenopon elongatum* n. sp.

Fig. 1—3.

Two male and four female specimens obtained from *Sterna sinensis* shot at Tōkō, Nanheishō, April 3.

This new species may be recognized at a glance by the pale and unusually elongate body and by the presence of gastric teeth.

Description of the male:—Body very narrow, elongate, especially the abdomen which is gradually tapering towards the end; ground colour of body yellowish white, with some brownish markings on head.

Head elongate; front rounded, with several prickles and two marginal hairs on each side; a long and a short hair at each lateral angle, in front of a wide and distinct ocular emargination; two hairs and a spine on each side of the dorsum of front; eye prominent, slightly emarginate, with a distinct, quadrangular, black fleck; ocular fringe covered by the anterior margin of temple, comb-like, triangular in shape, composed of numerous short spines. Palpi long, projecting by the whole length of the terminal segment. Antennae (Fig. 2) prominent, projecting; the first segment short, with a few prickles; the second segment large, broadend toward the apical side, bearing three short hairs; the third segment the smallest, cup-shaped; the fourth the largest, somewhat globular, bearing numerous sensory hairs on tip. Temples expanded; margins somewhat angulated in front and behind, each bearing six hairs and a few prickles, both on margin and on dorsum; occipital margin slightly concave, with four hairs. Ground colour of head yellowish white, more deeply yellowish in front; ocular blotches and a spot near the margin in front of each palpus reddish brown; occipital margin narrowly edged with yellowish brown. On the ventral aspect of head, on each side of the median line, between mouth parts and the occipital margin are seven hairs which gradually become longer posteriorly.

Fig. 2. Antenna of Comatomenopon elongatum. ×230.

Prothorax small, with produced lateral angles, each bearing a hair and two spines; anterior lateral margins convex, each with two prickles; transverse chitin bar pale but distinct, with obliquely longitudinal bars at its ends; posterior lateral margins bare, slightly convex; posterior margin straight. On the dorsal surface of prothorax a row of eight hairs along the posterior margin. Metathorax triangular in outline, with very slight lateral emarginations and an indistinct sutural line between meso-and metathoracic segments; anterior lateral margins straight, diverging posteriorly, with numerous short hairs; posterior lateral angles obtuse, each with two long hairs in the near neighbourhood; posterior margin truncate with eight submarginal hairs. On the dorsal surface of metathorax numerous weak hairs arranged roughly in three rows. Ground colour of thorax translucent yellowish-white, without markings. Legs concolourous with thorax, long and slender, with numerous short hairs and spines; tarsus and claw very long; onychium oblong; hind pair of legs longer than the rest; on the ventral surface of hind femora three rows of dark-coloured combs, each composed of twelve to eighteen spines.

Abdomen remarkably long and narrow; widening gradually towards the third segment which is about equal to the fourth segment, then narrowing rapidly to the ninth segment; length of segments nearly equal; lateral margins of segments slightly convex; median parts of segments I—VIII with several short and one to three long hairs which become gradually longer in the posterior segments; the last segment rounded, with slight lateral emarginations, bearing two long hairs on each side. Posterior margins of segments I—VIII truncate, each bearing a submarginal row of a dozen hairs, of which the lateral ones are distinctly longer than the others. Numerous short and weak hairs on the dorsal surface of segments, those on segments I and II arranged roughly in two rows and those of segments III—VIII in one row; two pairs of short hairs on the dorsal surface of the last segment. Ventral surface of each abdominal segment with two or three irregular rows of weak hairs of various lengths; a pair of characteristic dark-coloured comb-like spines on each side of the ventral surface of the third segment; six long submarginal hairs along the posterior margin of the last segment. Colour of abdomen nearly translucent without any markings. Genitalia elongate, well chitinized, reaching from the posterior margin of the fourth segment to the end of the last segment; basal plate exceedingly long and slender; continuous distally with a broad lamina, at the base of which the elongate, inwardly curved parameres are set.

Description of the female (*Fig. 2.*) :—Similar to the male; body somewhat broader, especially in abdomen; posterior margin of metathorax convex instead of being straight; dorsal hairs of abdominal segments IV—VIII sparsely present; a fringe of fine hairs on the posterior margin of the ventral surface of the last segment, instead of the six long hairs of the male.

In both sexes, a dense row of dark coloured teeth (Fig. 3) situated at the distal end of the crop, is visible through the integment of the third or fourth abdominal segment. This is the second case known of the presence of gastric teeth in the Mallophaga, the first case having been reported by *Mr. Cummings from *Trimenopon echinodermata* taken from *Cavia aperea*.

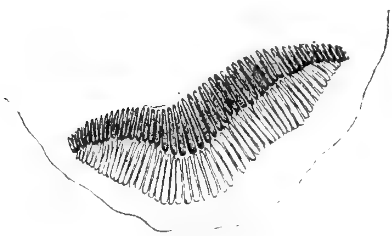

Fig. 3. Gastric teeth of Comatomenopon elongatum x 230.

MEASUREMENTS:

	♀	♀	♀	♂	♂
	mm.	mm.	mm.	mm.	mm.
Length of body	2.23	2.13	2.18	2.15	2.14
Width of body	0.43	0.45	0.45	0.38	0.38
Length of head	0.38	0.37	0.37	0.35	0.35
Width of head	0.43	0.41	0.43	0.42	0.42
Length of prothorax	0.19	0.18	0.18	0.19	0.19
Width of prothorax	0.29	0.28	0.29	0.28	0.28
Length of metathorax	0.24	0.24	0.24	0.24	0.24
Width of metathorax	0.36	0.35	0.37	0.34	0.33

* B. F. Cummings, Bul. Entom. Res. vol. IV, p. 40, 1913.

NOTICE.

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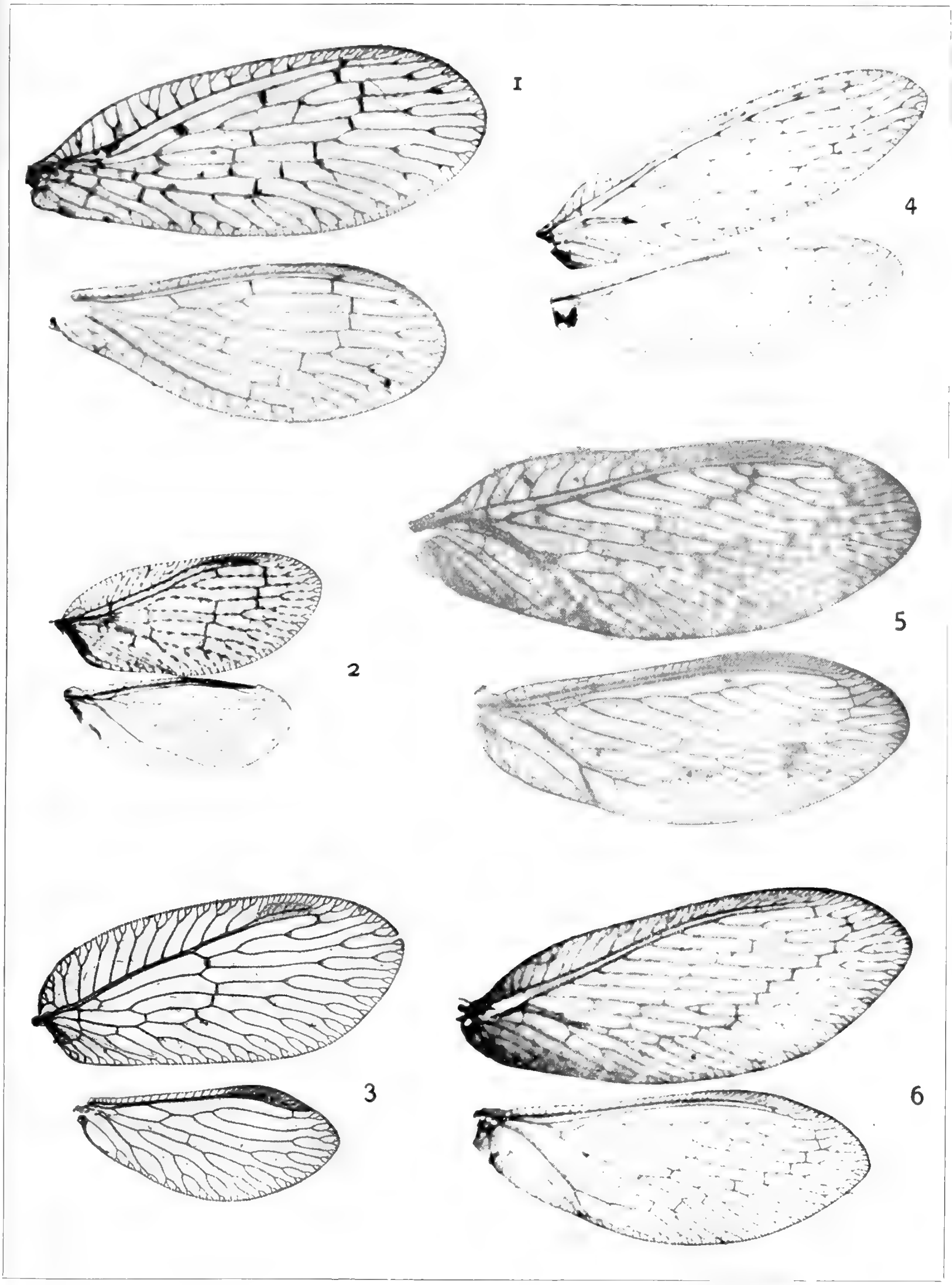

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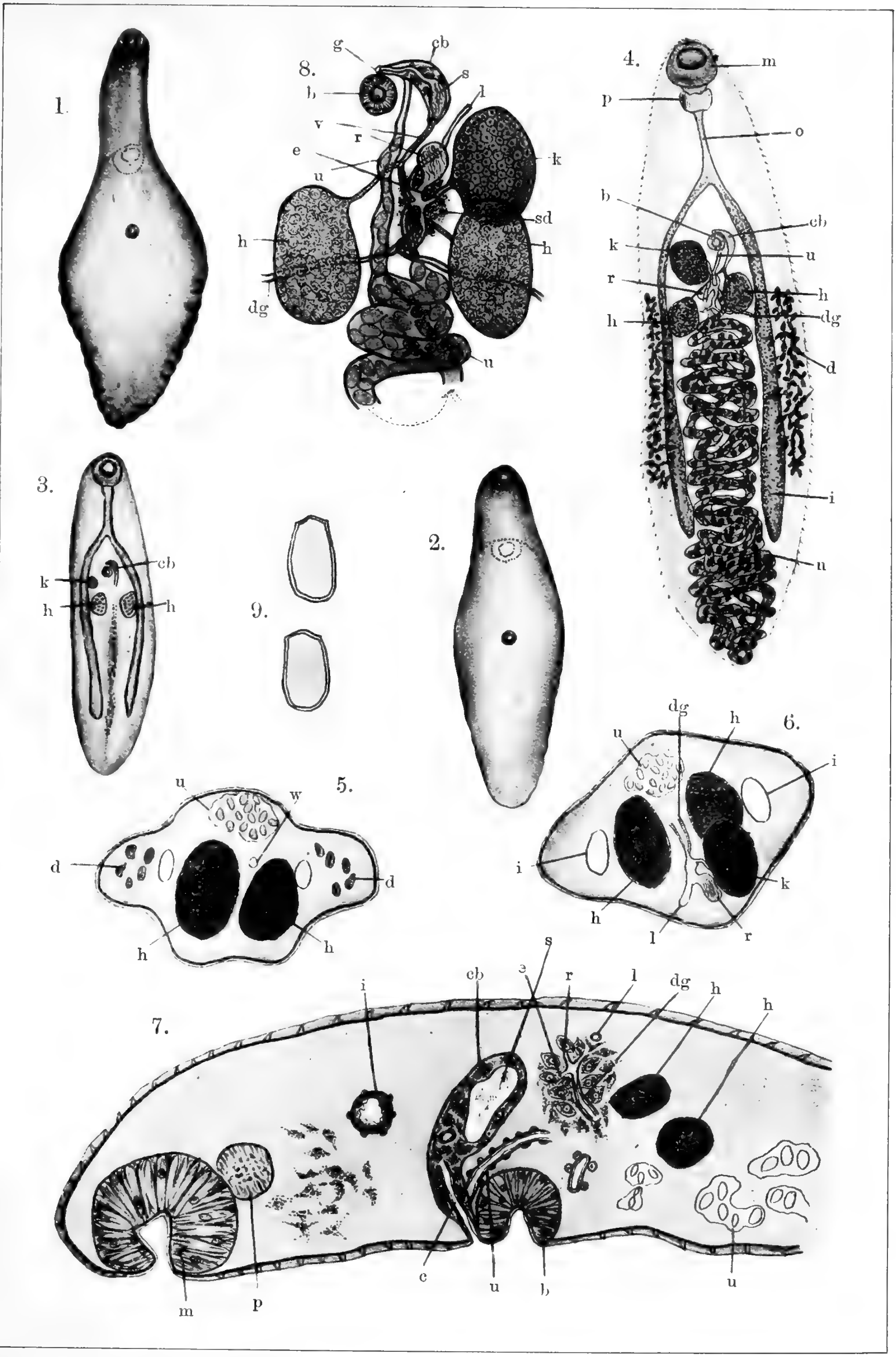

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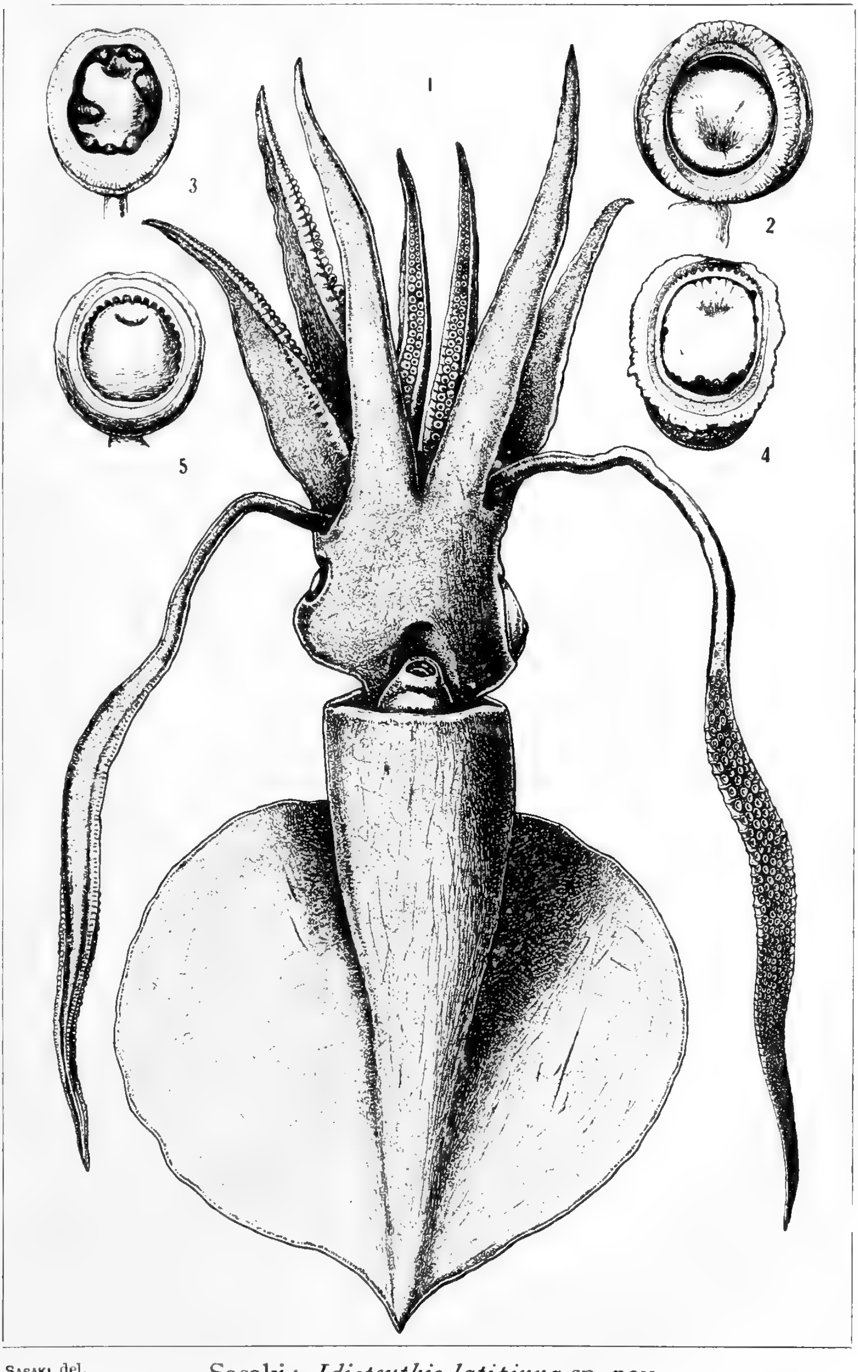

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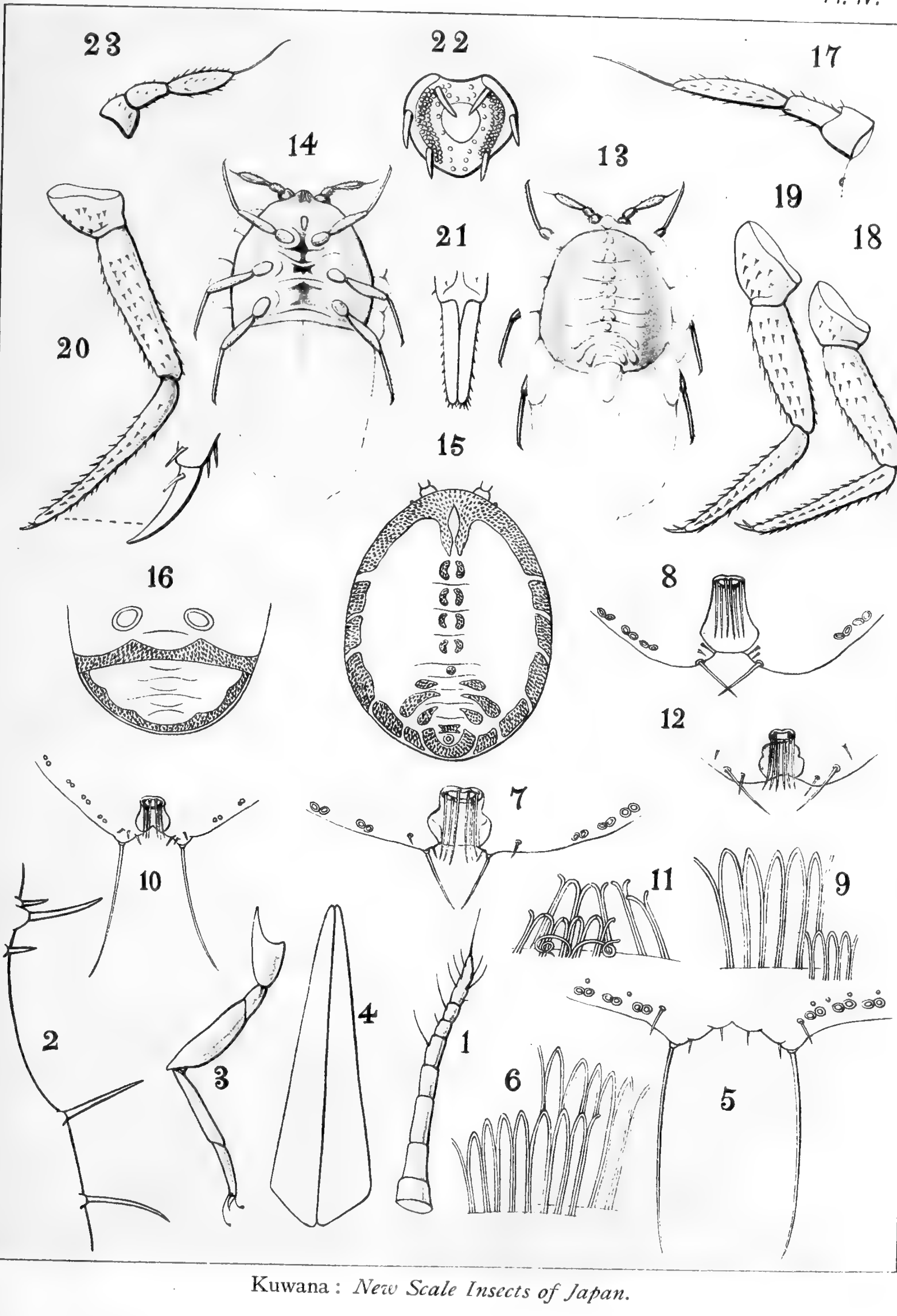

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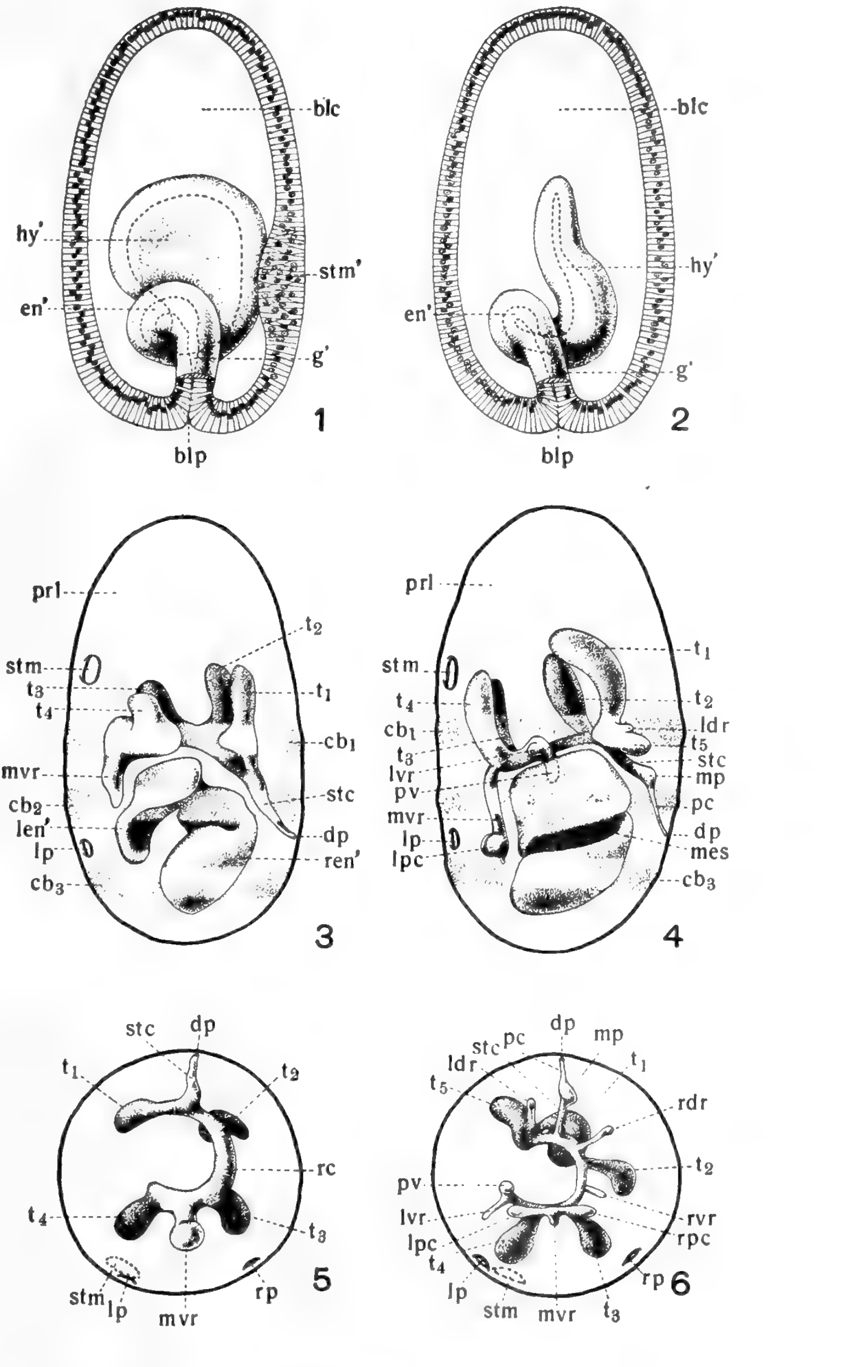

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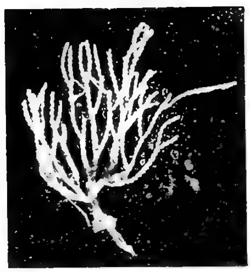

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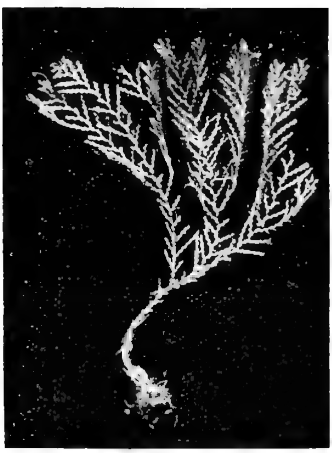

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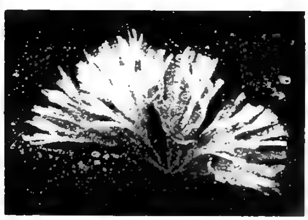

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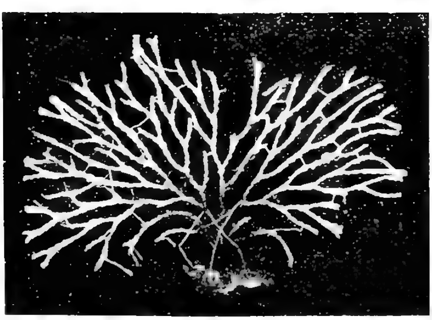

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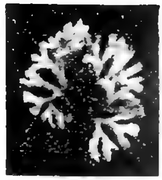

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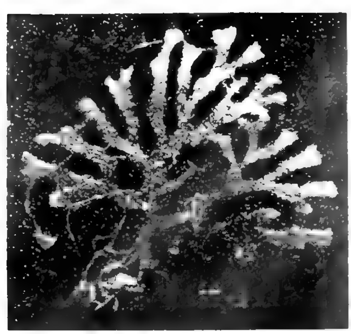

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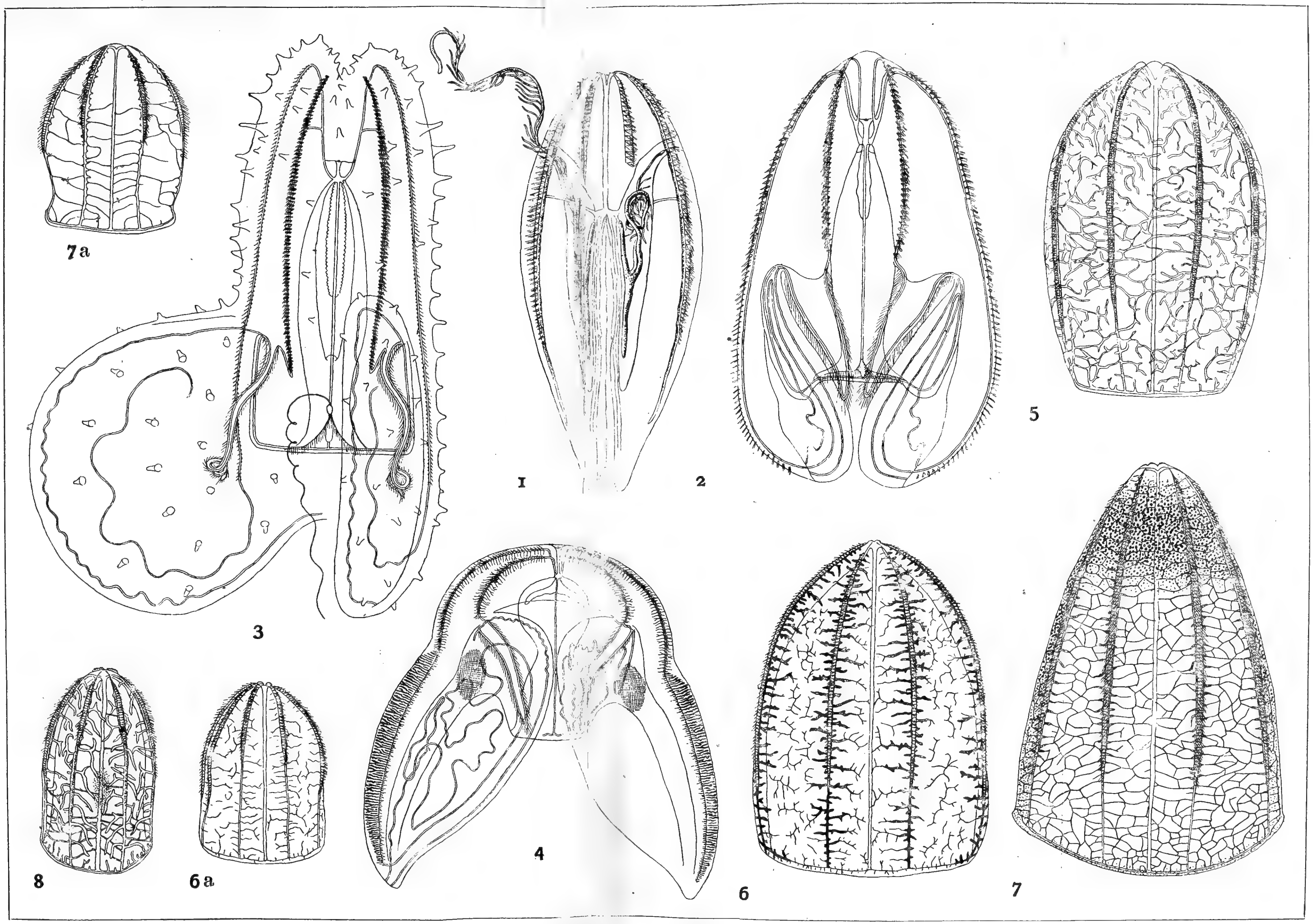

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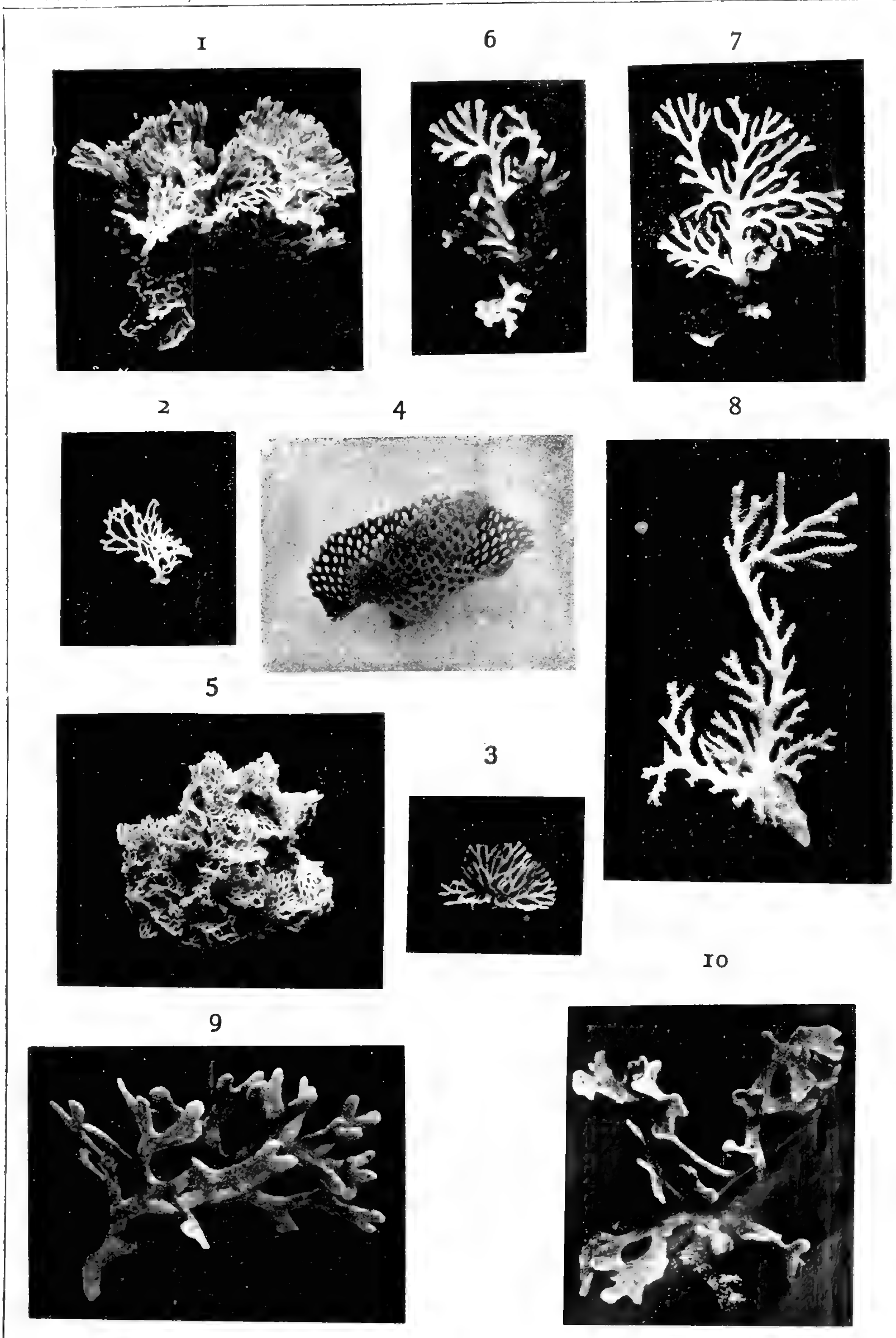

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