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Bottom and Plankton Fauna of the Akan Lake Group of Hokkaido*

By

Masuzo UÉNO

(上 野 益 三)

(With Plate VII and 6 text-figures)

Introduction

The nine lakes and lakelets in which the present study was conducted are all situated around the foot of the Volcano Oakan-dake, which stands in the center of the Akan Caldera of Eastern Hokkaido. The work was done in the first half of September, 1935. If these lakes and lakelets be separated on a basis of depth, Akan-ko, Panke-ko and Penke-ko are in one category and the other six in another. The largest lake, Akan-ko, is of the greatest interest from the ecological point of view not only in the bottom fauna but also in the plankton production. Panke-ko is the second largest, but is the deepest in the Akan lake group. Penke-ko is much smaller than the preceding two lakes although it is deeper than Akan-ko. These three lakes lie within a drainage basin extending from Penke-ko through Panke-ko and into Akan-ko, which is the most advanced eutrophic condition among them. The remaining small lakes or lakelets vary greatly from one another in morphometric, physical-chemical and biological conditions. A full account of these lakes will be published by Mr. S. YOSHIMURA shortly.

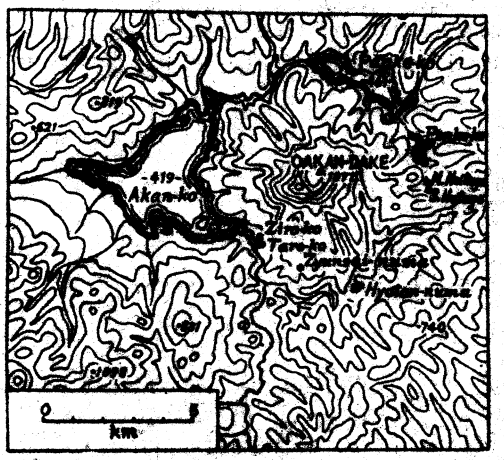

Fig. 1. Sketch map of Akan district.

I wish to express my appreciation to the trustees of the Hattori Hokokai Fund, under

* Contribution from the Otsu Hydrobiological Station, Kyoto Imperial University.

The present paper form the first part of my reports of the limnological studies on certain lakes in Hokkaido.

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whose grant this study was carried out. My thanks are also due to Prof. YAICHIRO OKADA of the Tokyo Higher Normal School and to Mr. S. YOSHIMURA of the Tokyo Bunrika University for their co-operation, and to Messrs. Y. KUSUKI and K. HIRASAKI for their assistance in the field. For valuable aid in many ways I am indebted to Professors T. INUKAI and T. UCHIDA of the Hokkaido Imperial University.

I. Bottom Fauna

A. Composition and Depth Distribution

a. Large and deep lakes

1. *Akan-ko* (*Lake Akan*)

This lake has an area of 11.86 square kilometer and a maximum depth of 36.6 m. Except for its steep, rocky eastern shore, the slope of the floor is gradual, the aquatic plants (chiefly *Vallisneria* and *Potamogeton*) extending down to a depth of about 5 m. The littoral zone seems to extend from the shoreline to a depth of about 8 m, the sub-littoral from 8 to 15 m, while the profundal consisting of soft black mud includes all the bottom from 15 to 36 m. One of the most striking features of the littoral zone is the presence of *Aegagropila sauteri* on the shallow sandy bottom in some of the wetsern and northern parts.

The bottom organisms were taken up with a small EKMAN-BIRGE dredge which collects a sample of 225 cm^2 surface area. Eight courses were taken by boat straight across different parts of the lake (Fig. 2). At 38 different stations on these courses samples were secured.

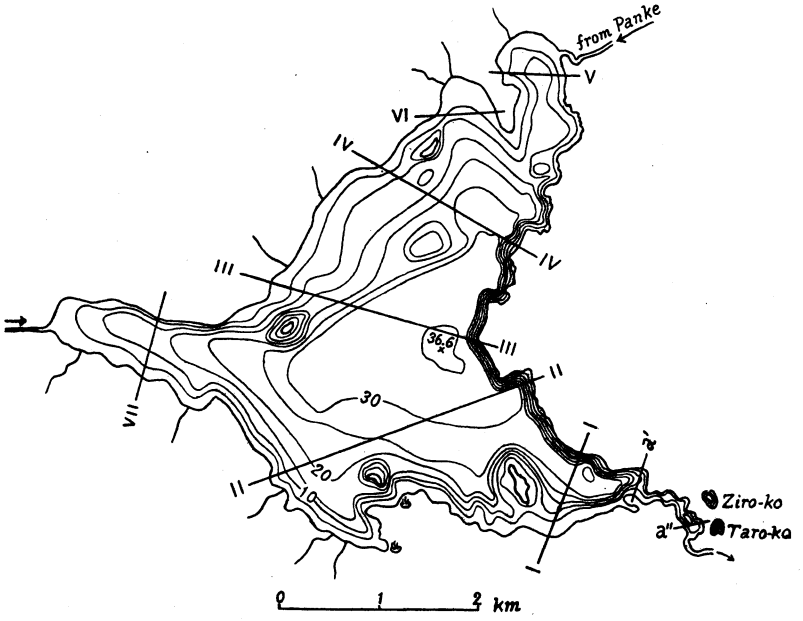

Fig. 2. Bathymetric map of Akan-ko, showing the courses of boat.

The results obtained are summarized in Table I.

Table I. Depth distribution of bottom fauna of Lake Akan (Number per m^2)

Depth in meters	Number of samples	*Chaoborus*	Orthocladiariae	*Ch. plumosus*	*Procladius*	*Sergentia*	*Endochironomus*	*Sialis*	*Ephemera*	*Baëtis*	*Ephemerella*	*Cambaroides*	*Pisidium*	*Viviparus*	*Lymnaea*	*Valvata*	*Planorbis*	Oligochaeta miscel.	Total number per m^2
0–1	1	—	1056	—	—	—	—	—	—	—	44	—	—	—	—	—	—	44	1144
1–2	4	44	264	176	—	440	—	—	88	132	—	—	—	176	176	—	264	352	2112
2–4	5	—	308	—	572	396	—	44	44	—	—	—	—	220	—	88	—	264	1936
4–6	4	—	—	308	—	176	—	44	—	—	—	88	—	—	—	88	88	—	792
6–8	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
8–10	3	—	—	440	—	—	—	—	—	—	—	—	—	—	—	—	—	—	440
10–15	6	132	44	572	—	220	220	—	—	—	—	—	—	—	—	88	—	352	1628
15–20	1	—	220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	44	264
20–25	4	88	132	—	—	—	—	—	—	—	—	—	—	—	—	—	—	44	264
25–30	2	—	176	—	44	44	—	—	—	—	—	—	—	—	—	—	—	88	352
30–34	7	—	264	44	528	1628	—	—	—	—	—	—	572	—	—	—	—	572	3608

The bottom fauna of Akan-ko is composed of five major groups:

(i) Chironomid larvae.—At least five species of the Chironomidae make up more than 69% of the total bottom population by numbers, *Sergentia* larva being the most abundant (35% of the total chironomid fauna). With regard to the depth distribution of the chironomids as a whole, three distinct maxima in numbers are observed, the first in the upper littoral, the second in the lower sublittoral shallower than 15 m and the remaining one in the profundal deeper than 30 m. A great numerical abundacne occurring in the shallow littoral region is chiefly due to the predominance of the Orthocladiariae in the *Aegagropila*-association.

(ii) Chaoborus.—MIYADI (1932) who first studied the bottom fauna of this lake called attention to the predominance of *Chaoborus,* but in my study its larva and pupa make up a very small proportion of the total bottom population, being only 0.7% by numbers. It is not yet clear whether it emigrated out during the mid-summer or a pronounced succession has occurred since MIYADI's exploration.

(iii) Oligochæta.—The oligochæte fauna is composed of at least five species belonging to the genera,[1] *Nais, Stylaria, Limnodrilus, Tubifex* and *Lumbriculus,* forming about 15% of the total number of bottom population.

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1) Determined by Mr. HIDEJI YAMAGUCHI of the Hokkaido Imperial University.

They are distributed almost uniformly, except for the two slight masses occurring in both the littoral and sublittoral zones.

(iv) Mollusca.[2]—The molluscs consist of five species of gastropods and two species of pelecypods, namely, *Lymnaea* (*Radix*) *aulicularia* var., *Viviparus malleatus, Planorbis* (*Gyraulus*) *japonicus, Valvata piscinalis japonica, V. p. simusyuensis, V. cristata hokkaidoensis, V. pulchella saghalinensis, Pisidium* (*Eupisidium*) *cinereum* and *P.* (*E.*) *subtruncatum.* All of the gastropods are confined to the bottom of the upper 10 m, its maximum numbers being found in the water shallower than 2 m, while the bivalves occur only in the deeper bottom. The molluscs as a whole occupy only 10.3% of the total bottom population. Among them *Planorbis* is the most abundant (28.8% of the total molluscan fauna) and *Pisidium* the most scarce (13.9%).

The so-called "shell-zone" is not distinct, the living molluscs and empty shells being found in the following numbers:

Table II. Depth distribution of Mollusca in Lake Akan (Number per m^2)

Depth in meters	*Viviparus*		*Lymnaea*		*Valvata*		*Planorbis*		Total number per m^2		Weight g per m^2
0.5	0	0	0	0	0	0	0	0	0	0	0
1.5	88	(110)	88	(110)	0	(88)	264	(88)	440	(396)	2.9
2.0	88	0	0	(132)	0	0	0	(264)	88	(396)	—
2.5	44	0	0	(176)	0	0	0	(88)	44	(264)	—
3.0	44	0	0	(66)	88	0	0	0	176	(66)	4.2
4.5	0	(66)	0	(44)	88	0	66	0	154	(110)	3.9
5.0	0	(88)	0	0	0	0	0	(44)	0	(132)	—
6.5	0	0	0	(44)	0	(44)	0	0	0	(88)	—
10.0	0	0	0	0	0	(44)	0	0	0	(44)	6.2
10.5	0	0	0	0	88	0	0	0	88	0	—

Bracketted figures denote the empty shells.

The shells of both *Planorbis* and *Lymnaea* form the first abundance in the upper littoral zone shallower than 3 m, and the larger shells of *Viviparus* seem to make the second mass in the zone between 4.5–6.5 m.

(v) Insect larvæ other than chironomids and *Chaoborus.*—*Sialis*-larva and the burrowing nymph of the mayfly genus *Ephemera* occur most abundantly in the zone shallower than 5 m. All of these insect larvæ, including a crayfish *Combaroides japonicus,* form only 5% of the total number of the bottom population.

* * *

[2] *Valvata* and *Pisidium* were determined by Mr. SYUITI MORI of the Kyoto Imperial University. (cf. also MIYADI 1935).

Generally speaking, the bottom population below 10 m is composed of chironomids, *Chaoborus*, oligochætes and *Pisidium*, the gastropod molluscs and insect larvæ other than the above being practically absent. It has been well known that the bottom fauna is not uniformly distributed over the bottom from the shore to the deepest water. This is also true of Lake Akan. The present study, however, seems to show much more uniform distribution of the bottom population than MIYADI found in June (cf. MIYADI 1932), when different species were distributed very differently according to depth. In September there are seen three maxima or "concentration zones" (EGGLETON 1931, 1935) of the bottom population, viz. the first in the shallow littoral, the second in the lower sublittoral and the other in the middle profundal, and the population declines sharply above and below these zones. Iu the last zone the bottom population is very much more abundant than it is above that region.

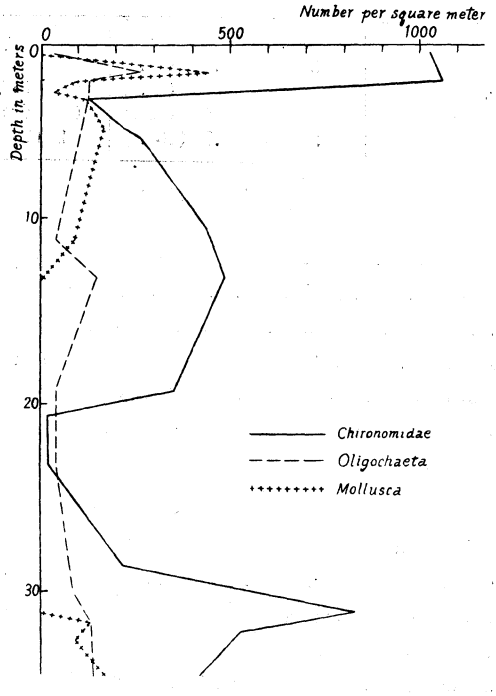

Fig. 3. Depth distribution of bottom fauna of Akan-ko in September, 1935.

Quantity of the bottom population. The quantitative results obtained in various ecological zones are summarized in Table III.

Table III. Quantity of bottom population of Lake Akan

A. Average number per m^2

Zone	Number of samples	Chironomid larvæ	*Chaoborus* larva and pupa	Oligochæta	Molluska	Others
		%	%	%	%	%
Littoral	15	249 (37.4)	3 (12.0)	44 (32.1)	70 (57.8)	32 (100)
Sublittoral	9	181 (27.2)	15 (62.0)	39 (28.5)	10 (8.3)	0
Profundal	14	236 (35.4)	6 (26.0)	54 (39.4)	41 (40.8)	0
Total	38	666 (100.0)	24 (100.0)	137 (100.0)	121 (100.0)	32 (100)

B. Average wet-weight g per m²

		%	%	%	* %	%
Littoral	15	0.57 (32.6)	— —	0.04 (36.4)	4.38 (84.5)	0.32 (100)
Sublittoral	9	0.73 (41.7)	0.005 (45.5)	0.02 (13.2)	0.69 (13.2)	—
Profundal	14	0.45 (25.7)	0.006 (54.5)	0.06 (50.4)	0.12 (2.2)	—
Total	38	1.75 (100.0)	0.011 (150.0)	0.12 (100.0)	5.19 (100.0)	0.32 (100)

* *Viviparus*-shell deducted.

The maximum population is found in the sublittoral, and the littoral population is a little larger than that of the profundal. The wet-weight of the bottom organisms is also the largest in the littoral, but that of the profundal is less than half of that of the sublittoral. RAWSON (1930) obtained corresponding results in Lake Simcoe in Canada, though he found the maxima in numbers and dry weight of the population in the lower profundal.

2. *Panke-ko* (*Lake Panke*)

Panke-ko is the deepest in the Akan lakes having a maximum depth of 49.9 m. Its area is 2.75 square kilometer. Owing to the steep rocky floor the mud deposit seems to be restricted to a small area deeper than 30 m. Even at a depth of 34 m the bottom mud contains fine sand and organic débris. This seems to make a rather large area of the bottom from 5 to 30 m uninhabitable by organisms. Accordingly, the bottom fauna as a whole is rather poor in both species and numbers, though this observation is drawn from fewer samplings than were taken at Akan-ko. The principal component is *Sergentia*-larva which makes up 72% of the total bottom population and attains its maximum number of 1940 per square meter at a depth of 43 m.

Table IV. Depth distribution of bottom fauna of Panke-ko (Number per m²)

Depth in meters	Number of samples	Orthocladiariæ	*Sergentia*	Oligochæta	*Sialis*	*Ephemera*	Trichoptera	Zygoptera	Total number	Total wet-weight g/m²
0–5	2	44	176	220	44	44	44	44	616	13.4
5–10	1	—	—	—	—	—	—	—	0	0
10–20	1	—	—	—	—	—	—	—	0	0
20–30	2	—	—	—	—	—	—	—	0	0
30–40	3	—	661	44	—	—	—	—	705	1.3
40–45	4	—	2992	—	—	—	—	—	2992	12.7

3. *Penke-ko (Lake Penke)*

The mud deposit in this lake seems to be much more restricted to a small deep area than in Panke-ko. In 12 samplings *Sergentia* and Tanypodinæ were taken up only from the bottom deeper than 30 m; the former numbered only 132 individuals per square meter at a depth of 38 m (maximum depth 39.4 m; cf. TAKAYASU and KONDO 1936 a).

b. Small and shallow lakes

4. *Taro-ko and Ziro-ko*

These two small lakes are situated close together but are greatly different in the components of their bottom faunæ. The species are richer in Taro-ko than in Ziro-ko. In the former *Chironomus plumosus* and *Sergentia* are widely distributed over the bottom, forming 73% of the total bottom population; *Valvata* occupies 15% and the remaining is represented by 6% each of oligochætes and *Sialis*-larva.

Table V. Depth distribution of bottom fauna of Taro-ko
(Number per m^2)

Depth in meters	*Ch. plumosus*	*Sergentia*	*Valvata*	Oligochæta	*Sialis*	Total number
2	704	132	176	—	—	1012
3.5	—	—	—	—	44	44
4	264	176	—	44	—	484
4.5	572	88	—	44	—	704
7	88	132	44	—	44	308
8	352	176	—	44	—	572

Over almost the whole bottom of Ziro-ko (maximum depth 3 m) is a dirty yellow diatom-gyttja. The bottom fauna is very monotonous, consisting of only *Sergentia*, which numbers 352–1276 per square meter.

5. *Hyotan-numa*

This shallow lake is bounded by an overgrowth of cyperaceous and umbelliferaceous plants. The bottom deposits are blackish brown mud consisting of a very large amount of decaying vegetable matter. The bottom fauna of the main basin is represented by the molluscs which make up 55% of the total bottom population. The principal component of the chironomid fauna is *Sergentia*, forming only 18.2% of the total population. In the auxiliary basin neither molluscs nor chironomids are found, fauna being represented by larva of *Sialis* and the nymph of the mayfly genus *Ephemera* as seen in Table VI.

Table VI. Depth distribution of bottom fauna of Hyotan-numa (Number per m^2)

Depth in meters		*Sergentia*	*Pisidium*	*Planorbis*		*Lymnaea*		Oligochæta	*Sialis*	*Ephemera*	Total number	
											Main basin	Auxiliary basin
main	1.5	—	—	—	(88)	44	(44)	132	—	—	176 (132)	—
	2	—	308	748	—	—	(132)	—	—	—	1056 (132)	—
	3	88	44	—	(44)	—	—	—	44	—	132 (44)	44
	4	—	132	—	—	—	—	—	—	—	132 —	—
	4.5	—	44	—	(132)	—	—	44	—	—	88 (132)	—
aux.	1.4	—	—	—	—	—	(88)	88	88	308	88 (88)	396
	3.7	—	—	—	—	—	—	44	—	—	44 —	—

B. General Discussion

The bottom faunæ of the three large and deep lakes are generally similar, but Akan-ko supports a much more varied and richer fauna, especially molluscs, than the other two lakes. However, the bottom population greatly vary quantitatively. It is the largest in Panke-ko in both numbers and weight; Akan-ko ranks second in numbers but is in weight inferior to Taro-ko, as data in Table VII will show.

Table VII. Average number (N) and weight (wet, W) of bottom fauna of the Akan Lake Group, calculated for 1 m^2

Group of Animals	Akan-ko		Panke-ko		Taro-ko		Ziro-ko		Hyotan-numa	
	N	W(*g*)	N	W(*g*)	N	W(*g*)	N	W(*g*)	N	W(*g*)
Chironomidæ....	666	1.75	775	2.90	537	3.03	616	4.25	88	—
Molluscs	121	5.19*	0	—	110	5.34	0	—	264	0.92
Oligochæta	137	0.12	132	0.44	44	—	0	—	88	1.26
Insect larvæ other than Chironomidæ..	32	0.32	176	12.54	44	2.86	0	—	44	—
Total	956	7.38	1083	25.88	735	11.23	616	4.25	484	2.18

* *Viviparus*-shell deducted.

In this table neither Penke-ko nor Zyunsai-numa are included, the former having an extremely poor population and the latter being entirely azoic over the bottom.

As discussed by EGGLETON (1935), it seems certain that the depth distribution of bottom population is not controlled by any one factor but may be determined by the combined effect of various physical and chemical as well as biological

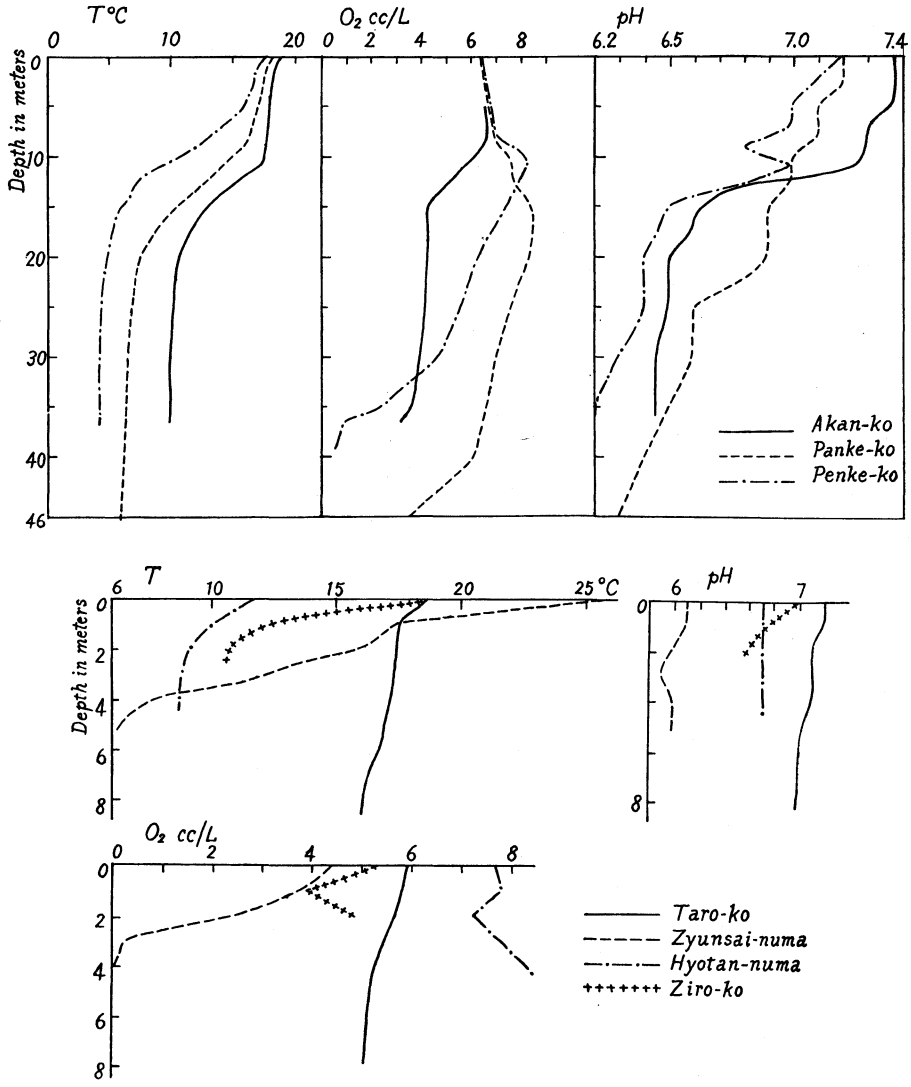

Fig. 4. Stratifications of temperature, pH and dissolved oxygen in the Akan lakes.

factors. It seems, however, that in certain instances any one of these factors may give the most powerful effect in causing migration of an organism. In Zyunsai-numa, for instance, all the *Chaoborus* larvæ migrated up as plankters from the bottom to the upper layer, apparently because of the great deficiency of dissolved oxygen in the deeper water. The accompanying figures will show the thermal and chemical stratifications in these lakes (Fig. 4).

It is a noticeable fact that one of the important factors found to be influencing the luxurience and the depth distribution of the bottom fauna in these larger lakes is the difference of the slope of the lake-floor. However, in the small and shallow lakes the nature of the bottom deposits is much more effective in the life of the bottom organisms. The abundant deposit of humic and decaying vegetable matter may cause a great diminution of dissolved oxygen (Zyunsai-numa) or may affect the food supply of the organisms (Hyotan-numa). The rather pure diatom-gyttja deposited in Ziro-ko appears also to limit the kinds of bottom animals inhabiting it. The writer is of the opinion that it is difficult to find any one of the general environmental factors controlling the distribution of the bottom fauna in the lakes studied.

It is worthy of notice that the occurrence of *Pisidium* and the anærobic larva of *Chaoborus* in association on the deeper bottom of Akan-ko, which has a good amount of dissolved oxygen in the deep water even in late summer (cf. also MIYADI 1932, p. 231). In both Panke-ko and Penke-ko, however, *Chaoborus* was found only as a plankter but not taken at all from the bottom mud. Since in these three lakes no more oxygen deficiency in deep water can be expected to occur after my observations, the occurrence of *Chaoborus* in these lakes especially in Akan-ko is to be regarded as quite an exceptional case.

II. Plankton

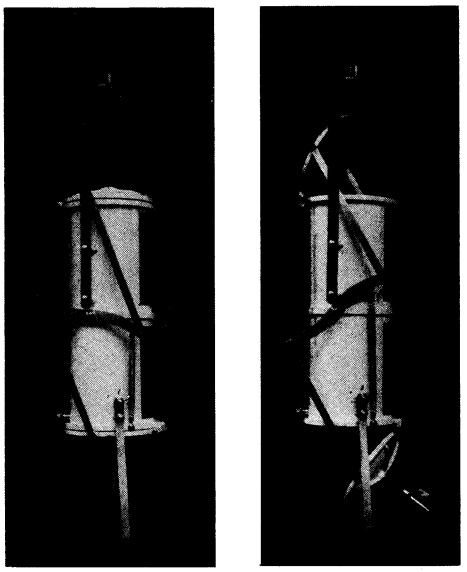

Fig. 5. An improved plankton-catcher of MÜNSTER STRØM's type.

The net-plankton was obtained by two kinds of nets, one being a small qualitative net of APSTEIN's type of 20 cm diameter for surface catches, and the other a small closing-net of JUDAY's type of 15 cm diameter of the upper cone for vertical hauls. To get the vertical series of plankton-samples from different depths, an improved plankton-catcher of MÜNSTER STRØM's type was used (Fig. 5). It has a volume of 10 liters (cf. MÜNSTER STRØM 1926). The rough volume of a plankton catch was determined by allowing the sample to settle in a graduated glass cylinder over a period of 24 hours, and then dried at a temperature of 50°C for hours to achieve a constant weight.

A. Composition of the Zooplankton

The percentage composition of the zooplankton is shown in Table VIII, from which will be seen the characteristics of the plankton-population of that season.

Table VIII. Percentage composition of the zooplankton of the Akan Lake Group (September, 1935)

	Akan-ko	Panke-ko	Penke-ko	N. Hutago-numa	S. Hutago-numa	Hyotan-numa	Zyunsai-numa	Taro-ko	Jiro-ko
Rotatoria	1	**49**	**54**	10	11	33	**95**	33	18
Cladocera	41	40	34	32	**67**	**35**	2	33	5
Copepoda	**58**	11	12	**58**	22	32	3	**34**	**77**

Table IX. Distribution of the zooplankters in the Akan Lake Group

Zooplankter \ Lake	Akan-ko	Panke-ko	Penke-ko	S. Hutago-numa	N. Hutago-numa	Zyunsai-numa	Hyotan-numa	Hyotan, auxiliary basin	Toro-ko	Ziro-ko	
Protozoa											
1. *Trintinnopsis lacustris* ENTZ	+	·	·	·	·	·	·	·	·	·	1
Rotatoria											
2. *Polyarthra trigla* (EHRENBERG)	+	+	·	·	·	·	·	·	·	+	3
3. *Keratella quadrata* (O. F. MÜLLER) ..	+	·	·	·	·	·	·	·	+	+	3
4. *Keratella cochlearis* (GOSSE)	·	·	·	+	+	+	+	·	·	+	5
5. *Notholca longispina* (KELLICOT)	·	+	+	·	·	·	+	·	·	·	3
6. *Asplanchna herricki* DE GUERNE	+	+	·	·	·	·	+	·	·	·	3
7. *Conochilus unicornis* ROUSSELET	+	+	+	·	·	+	+	·	·	·	5
8. *Filinia longiseta* (EHRENBERG)	·	+	+	·	·	·	·	·	·	·	2
Cladocera											
9. *Daphnia longispina* (O. F. MÜLLER) .	+	+	+	+	+	+	+	·	+	·	8
10. *Daphnia cristata longiremis* (G. O. SARS)	+	+	+	·	·	·	·	·	·	·	3
11. *Scapholeberis mucronata* (MÜLLER) ..	·	·	·	·	+	·	·	·	·	·	1
12. *Bosmina coregoni* BAIRD	+	+	+	·	·	·	·	·	·	+	4
13. *Alona guttata* (G. O. SARS)	+	+	·	·	·	·	·	·	·	·	2
14. *Leydigia acanthocercoides* (FISCHER) .	+	·	·	·	·	·	·	·	·	·	1
15. *Chydorous spiæricus* (O. F. MÜLLER) ..	·	·	·	·	·	·	+	·	·	·	1
16. *Polyphemus pediculus* (LINNÉ)	·	+	+	·	·	·	·	·	·	·	2
Copepoda											
17. *Acanthodiaptomus pacificus yamanacensis* (BREHM)	+	+	+	+	+	+	+	·	·	·	7
18. *Mesocyclops hyalinus* (REHBERG)	+	+	+	·	·	·	·	·	·	+	4
19. *Mesocyclops oithonoides* (G. O. SARS)	·	·	·	·	+	·	·	·	·	·	1
20. Copepodid (Cyclopoida)	+	+	+	·	·	·	+	·	·	·	4
Insecta											
21. *Chaoborus*-larva	·	+	+	+	·	+	·	·	·	·	4
22. *Ceratium hirundinella* O. F. MÜLLER .	+	·	·	·	+	·	·	·	+	+	4
Total.....	14	14	11	4	6	5	8	0	3	6	

The predominance of rotifers is found in three lakes, namely, Panke-ko, Penke-ko and Zyunsai-numa. The plankton of both S. Hutago-numa and Hyotan-numa are composed chiefly of the Cladocera, especially of *Daphnia*, while in the remaining four lakes the copepods predominate.

Among the rotifers, *Conochilus unicornis* and *Keratella cochlearis* occur most widely, *Filinia longiseta* being found in only two lakes. *Acanthodiaptomus pacificus yamanacensis* is distributed in almost all lakes, appearing most abundantly in Panke-ko. Of the Cladocera, *Daphnia longispina* is present in all of the lakes except Ziro-ko. In some of the lakes it is the most important component of the zooplankton.

The populations of *Daphnia longispina* living in these lakes seem to belong to four different races. The races inhabiting S. Hutago-numa, Zyunsai-numa and Hyotan-numa have large and heavy bodies which are characteristic of the littoral forms of the species; the race of the former two lakes differs from that of the last by having a broad head and posteriorly elongated rostrum. On the contrary, the races occurring in Akan-ko, Panke-ko and Penke-ko have short heads and hyaline shells. Among them the race found in Panke-ko is of a peculiar large size. They should be considered the so-called "*primitiva*-type" of *longispina hyalina*, as already pointed out (UÉNO 1934). It is of the great interest that the size and shape of these different races of *Daphnia longispina* seem to be quite well adapted to the sizes and depths of the lake-basins as well as to the clearness and nutritive conditions of the water.

It is noted that the larva of *Chaoborus* was obtained by a plankton-net in several lakes (see Table IX), in the bottom samples of which none of this larva was present. Since the bottom organisms in Zyunsai-numa were entirely absent owing to the entire lack of bottom oxygen, the presence of *Chaoborus* in an upper layer recalls the composition of the bottom fauna in this lake in an earlier season in which rich bottom oxygen might have been present.

B. Stratification of the Zooplankters

Two vertical series of the net-plankton were obtained by a plankton-catcher already mentioned. The weight of the instrument (cir. 12 kg) it was necessary to limit the collections to Akan-ko, which is the only lake equipped with large motor-boat. All of the zooplankters in each sample were counted. The results are shown in Tables X and XI.

It is evident from these tables and the accompanying figures that the zooplankters are all confined to the upper layer shallower than 10 m. Among them *Conochilus unicornis* was found only in the upper 5 m; *Bosmina coregoni* and *Mesocyclops hyalinus* extend somewhat down to the lower limit of the

Table X. Vertical distribution of the zooplankters in Lake Akan

Station A; 5 IX 1935, 16h; number per 10 L.

Depth in meters	0	1	3	5	8	10	12	15	17	20	25	30	Total
Tintinnopsis lacustris	0	0	5	1	0	0	0	1	0	1	0	2	10
Polyarthra trigla	1	5	3	0	1	2	0	1	0	0	0	2	15
Keratella quadrata	0	3	2	0	2	1	0	1	1	0	2	1	13
Asplanchna herricki	0	3	3	5	1	2	2	3	1	0	0	0	20
Conochilus unicornis	19	240	224	7	5	2	1	1	0	0	0	0	499
Daphnia longispina hyalina	21	73	363	238	204	56	20	3	1	4	4	22	1009
D. cristata longiremis	0	0	0	0	0	0	22	26	13	20	9	20	110
Bosmina coregoni	17	134	174	101	122	60	7	4	3	5	8	11	651
Leydigia acanthocercoides	0	0	0	0	0	0	0	0	0	0	1	0	1
Mesocyclops hyalinus	190	320	566	324	236	148	31	25	10	16	23	34	923
Nauplii and copepodids of Copopeda	27	68	103	74	14	7	4	0	0	4	1	14	316
Ceratium hirundinella	901	619	1113	119	1504	122	54	77	71	23	71	0	—
Volvox	0	0	0	10	25	4	1	0	0	0	1	1	—
													4567

Table XI. Vertical distribution of the zooplankters in Lake Akan

Station B; 6 IX 1935, 14h 30m; number per 10 L.

Depth in meters	0	1	5	10	15*	20	25	30	Total
Tintinnopsis lacustris	0	0	0	0	—	0	0	1	1
Polyarthra trigla	4	12	3	2	—	2	1	3	27
Keratella cochlearis	0	0	1	3	—	0	0	0	4
Asplanchna herricki	0	0	4	3	—	0	2	0	9
Conochilus unicornis	1	25	19	0	—	0	2	0	47
Daphnia longispina hyalina	20	124	77	63	—	3	30	5	332
D. cristata longiremis	0	0	1	3	—	37	82	17	140
Bosmina coregoni	2	11	52	53	—	6	19	1	144
Leydigia acanthocercoides	0	0	0	0	—	0	1	1	2
Acanthodiaptomus pacificus yamanaceisis	0	2	0	0	—	0	0	0	2
Mesocyclops hyalinus	20	123	321	160	—	15	50	52	741
Nauplii and copepodids of Copepoda	3	13	48	11	—	5	7	20	107
Volvox	0	0	16	23	—	1	0	0	—
									1546

* Vial destroyed.

epilimnion, but in the hypolimnion only a very few of them were secured. *Daphnia longispina*, which is always found living in the hypolimnion in some lakes in middle Japan during summer months (KIKUCHI 1930), occurs also in the water above the metalimnion. It seems probable that such a phenomenon

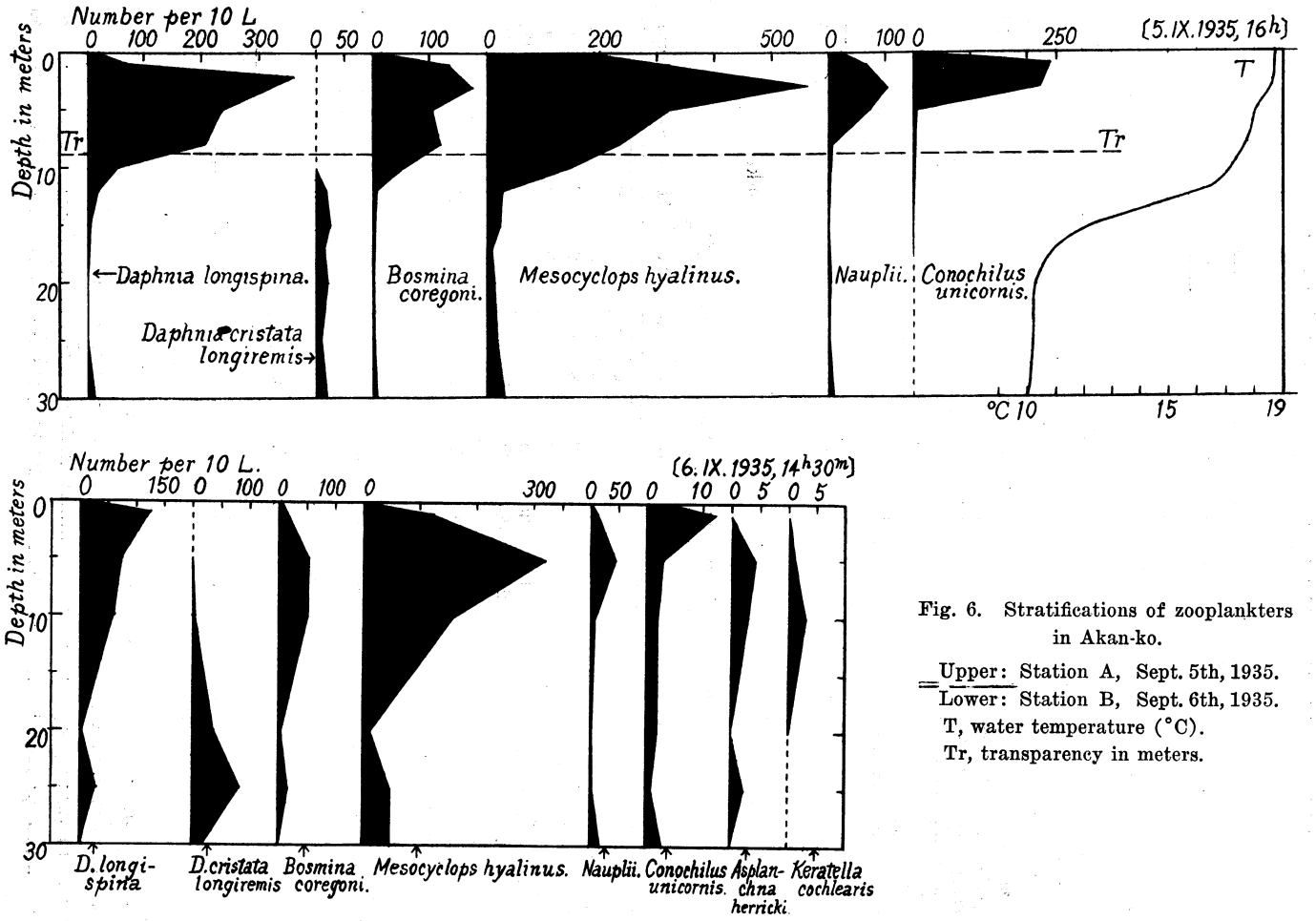

Fig. 6. Stratifications of zooplankters in Akan-ko.

Upper: Station A, Sept. 5th, 1935.
Lower: Station B, Sept. 6th, 1935.
T, water temperature (°C).
Tr, transparency in meters.

is chiefly due to the water-temperature of this lake which is so cold for these organisms as to cause them to migrate down to the hypolimnion.

On the other hand, there were found two species of the zooplankters occurring only in the hypolimnion. They are *Daphnia cristata longiremis* and *Leydigia acanthocercoides*, both of which are for the first time recorded in Japan. The former is a well-known cold-water animal which is distributed in the circumboreal regions, and the latter was found only in the layer just above the lake-bottom.

Phytoplankton. The phytoplankton occurs most abundantly in Akan-ko, where *Ceratium hirundinella* predominates in the upper 5 m, forming a water-bloom together with the diatom *Asterionella formosa* and blue-green alga *Anabæna*. In both Panke-ko and Penke-ko the phytoplankton was hardly seen, while in Zyunsai-numa a rich production of *Peridinium* and *Dinobryon divergens* was found.

C. Productivity

a. Quantity

The rough volume and dry weight of the plankton which were secured from the samples obtained by the vertical hauls are shown in Table XII.

Table XII. Quantity of plankton of the Akan Lake Group

Lake	Depth of hauls (m)	Rough volume cc/m³	Dry weight mg/L
Penke-ko	46–0	33.13	0.233
Akan-ko	33–0	21.00	0.341
Zyunsai-numa...	5–0	19.44	—
Panke-ko	30–0	15.74	0.140
Hyotan-numa...	4.5–0	12.35	—

Panke-ko seems to yield the most profuse quantity of plankton per unit volume of water. This is chiefly due to the abundance of *Daphnia* which makes the total plankton catch voluminous. The same is also true of the plankton of Zyunsai-numa. However, the largest dry weight was secured in Akan-ko which is followed by Panke-ko; that of Penke-ko is much less than the preceding two lakes.

The amount of the plankton of the seven lakes studied may be rated in about the following order:

Panke > Akan > Zyunsai > Penke > Hyotan > Taro > Ziro.

b. Plankton Nitrogen

The total organic nitrogen content of the plankton was determined by digestion with sulphuric acid and perhydrol followed by the micro-Kjeldahl

procedure after PARNAS and WAGNER (PREGEL 1930) on the dried materials mentioned already (cf. also COOPER 1934). The results are given in Table XIII.

Table XIII. Plankton-nitrogen of three lakes.

Lake	Depth of hauls m	Samples dry weight (mg)	Total organic nitrogen (mg)	Total organic nitrogen (%)	Crude protein* (%)
Akan-ko	33–0	40.6	1.97	4.9	30.3
„	Surface**	40.9	3.08	7.5	47.1
Panke-ko	46–0	38.7	2.31	6.0	37.4
Penke-ko	30–0	15.1	0.91	0.6	37.6

* N × 6.25.

** Sample obtained from the surface where water-bloom appeared.

The quantity of crude protein in Panke-ko and in Penke-ko was nearly the same, but that of a surface sample from Akan-ko was larger than that of Panke-ko. The average quantity of the crude protein in the water of Lake Mendota is 44.5% (BIRGE and JUDAY 1934), and this value stands between the quantities obtained from Panke-ko and the surface of Akan-ko. According to BIRGE (BIRGE and JUDAY 1934), the crude protein is present 56.6% in the mixed Entomostraca, 51.2% in blue-green algæ and 44% in diatoms. It seems natural that 47% of the crude protein is present in the surface plankton of Akan-ko which consists of a rather large amount of mixed species of the Entomostraca, dinoflagellates, blue-green algæ and diatoms.

BIRGE and JUDAY (1926) called the nitrogen from the residues of the lake-water "dissolved", and noticed that the nitrogen of this form is from three to six times as great as that of the plankton, i.e. "plankton nitrogen". The dissolved nitrogen of the lakes studied was estimated by Mr. YOSHIMURA colorimetrically but not from the residues. According to his findings, its quantity is the largest in Akan-ko (aver. 0.332 mg/L) and that is followed by Penke-ko (aver. 0.16 mg/L). Panke-ko contained the smallest amount (aver. 0.077 mg/L).

III. Remarks on the Lake Type

It is of great interest that in the Akan lake group different types of water and of biocoenosis are seen. With regard to the plankton no marked differences are discernible, water-bloom appearing only in Akan-ko. The bottom fauna shows, however, some marked differences among the lakes. Panke-ko, Penke-ko and Ziro-ko belong to the *Sergentia* type, while Akan-ko and Taro-ko are *Sergentia* and mesotrophic *Plumosus* type (*sesu* MIYADI 1933). Akan-ko is

characterized by the occurrence of both *Chaoborus* and *Pisidium* in the deeper bottom; in this lake and in Taro-ko the presence of *Valvata* is also noticed. Akan-ko belongs to an exceptional lake type, not referable to VALLE's mesotrophic *Pisidium-Corethra* or *Pisidium-Sergentia* types (VALLE 1927, p. 155).

LUNDBECK (1926) and DECKSBACH (1929) have shown that the succession of lake types from oligotrophic to eutrophic is well represented by chironomid species inhabiting them. According to this, Panke-ko, Penke-ko and Ziro-ko are in the oligotrophic or less advanced mesotrophic conditions, and Akan-ko and Taro-ko seem to belong to the somewhat advanced mesotrophic, of which the former is partly eutrophic and thus produces water-bloom. The chemical nature of the waters and the plankton-production coincide rather well with the above types.

Summary

1. The bottom and pelagic fauna of nine lakes and lakelets in the Akan district of Hokkaido were studied in the first half of September, 1935.

2. The largest lake, Akan-ko, is the richest in the species of the bottom animals, but ranks the second in the abundance of the bottom population. The most important component of the bottom faunæ of the lakes studied is the larva of the chironomid genus *Sergentia*.

3. The bottom faunæ of the large and deep lakes are markedly similar, particularly in deep water. They are somewhat different in each of the small and shallow lakes. None of the bottom fauna was found in a small lake, in the deep water of which the dissolved oxygen was entirely absent.

4. The depth distribution of the bottom population seems to be influenced not only by the complex effect of the physical and chemical factors but also by the condition of the mud deposits, which are largely affected by the slope of the lake-floor.

5. The net-plankton is composed chiefly of rotifers and cladocerans, among which *Conochilus, Keratella* and *Daphnia* are the important components of that season.

6. The data obtained in Akan-ko demonstrate the striking fact that all of the zooplankters occur chiefly in the epilimnion, below which they are found in very small numbers. This is the most important difference in the vertical distribution of the zooplankters between the lakes of Hokkaido and those of Middle Japan.

7. The rough volume of the plankton is the largest in the lake which produces luxuriant crustacean plankton especially large *Daphnia*. The largest dry weight is, however, obtained in the lake having various kinds of plankton

organisms especially of rich production of the algal plankton.

8. The plankton nitrogen was estimated by the mikro-Kjeldahl procedure for the first time in the Japanese lakes. The largest amount of crude protein of 47% was obtained in Akan-ko where an enormous water-bloom was present.

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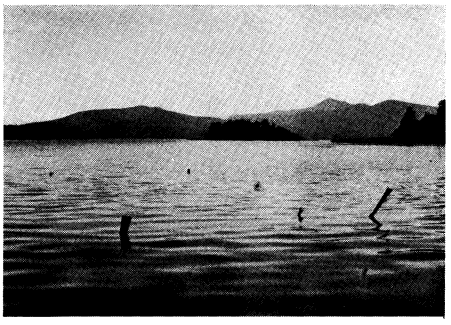

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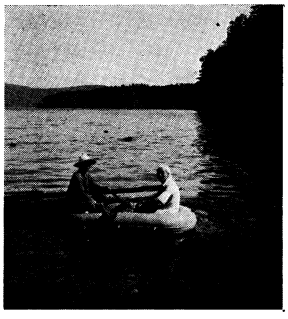

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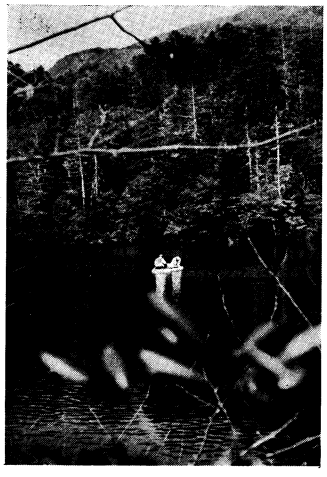

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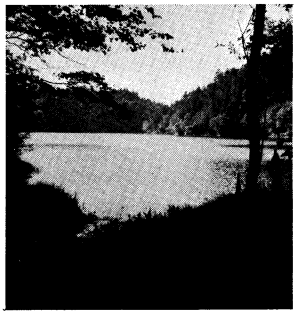

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Explanation of Plate VII

Fig. 1. Akan-ko. View from Senhoku-toge looking SE. The mountain at the left of the lake is Volcano Oakan-dake. (UÉNO photo).

Fig. 2. View over part of Akan-ko, from the north shore looking south. (UÉNO photo).

Fig. 3. Panke-ko, from the western end of the lake looking east. (Photo Prof. Yaichiro OKADA).

Fig. 4. Penke-ko. (Photo Prof. OKADA).

Fig. 5. Ziro-ko. (UÉNO photo).

Fig. 6. Taro-ko. (UÉNO photo).

Fig. 7. Hyotan-numa. From the north shore looking SW: cyperaceous plants cover the littoral region. (UÉNO photo).

Über einige ostasiatish-oceanische Chilognathen

gesammelt von Herrn Y. TAKAKUWA in Tokyo

(150. Diplopoden-Aufsatz)

Von

Dr. K. W. Verhoeff, Pasing bei München

dazu 21 Abbildungen

Spiroboloidea

Seit vielen Jahren sind die *Spiroboloidea* die fast einzige grössere *Diplopoden*-Gruppe gewesen, mit welcher ich mich nicht näher beschäftigt habe. Seit mich aber in den letzten Jahren auch diese Kinder der Tropen auf verschiedenen Wegen erreicht haben und ich mich sowohl in die Objecte selbst, also auch in die Literatur über dieselben versenkte, erhielt ich bald den Eindruck, dass die Lage der Wissenschaft auf diesem Gebiet keine besonders erfreuliche ist. Von den alten Beschreibungen, in welchen von Gonopoden überhaupt gar keine Rede ist, will ich schweigen, denn sie sind wertlos, mit Ausnahme solcher Formen, welche durch irgend ein anderes Merkmal ganz auffallend ausgezeichnet sind.

Was aber die neueren Bearbeitungen mit Berücksichtigung der Gonopoden betrifft, so hapert es auch bei ihnen meist ganz bedenklich und zwar besonders bei den *Trigoniulidea,* bei welchen die hinteren Gonopoden basal durch ein queres *Gerüst* sternocoxaler Natur mit einander verbunden sind. Die Beschaffenheit dieses Gerüstes ist nämlich systematisch und vergleichendmorphologisch sehr wichtig und da es, wie ein Blick auf Abb. 11 bezeugt, auch von verwickeltem Bau ist, so müssen notwendig klaffende Lücken in unserem Wissen entstehen, wenn dieses Gerüst entweder gar nicht oder nur ganz ungenügend beschrieben und abgebildet wird und das gilt leider für die meisten Beschreibungen. Die meisten Autoren haben geglaubt, es sei ausreichend, wenn die die Umrisse der auffallendsten Bestandteile der Gonopoden angäben, aber um den Zusammenhang und die Beziehungen der Teile haben sie sich nicht gekümmert, Das ist aber sowohl bei den vorderen als auch den hinteren Gonopoden von Uebel, worauf ich übrigens auch schon 1924 (bei meinem ersten Studium der *Spiroboloidea,* in Dr. *Mjöberg's* australischen Diplopoden, 97, und 98, Aufsatz)

Trans. Sapporo Nat. Hist. Soc., Vol. XIV, Pt. 4, 1936.

hingewiesen habe, Arkiv för Zoologi, Stockholm 1924, Bd. 16, N. 5, VI. Kapitel S. 93–117.

Wer die zahlreichen Abbildungen in der Literatur betrachtet und mit meinen Abb. 1–11 vergleicht, wird unschwer verstehen, was ich meine, aber ich möchte auch noch bemerken, dass meine eigenen Abbildungen in dem eben citirten Aufsatz von 1924 ohne meine Schuld durch *zu starke Verkleinerung* etwas an Deutlichkeit verloren haben. Es ist nicht möglich, auf alle die vielen Mängel in den Abbildungen der Autoren hinzuweisen, nur ein Beispiel will ich auführen, um meine Meinung zu verdeutlichen. So hat *J. Carl* in seiner „Diplopoden-Fauna von Celebes" Revue Suisse de Zoologi, 1912, vol. 20, N. 4 auf S. 161 einen *Trigoniulus squamosus* CARL[1] beschrieben und die vorderen Gonopoden durch eine Abbildung auf S. 163 (aus 3 Linien bestehend) und Abb. 30 auf Taf. 6 erläutert. Man erfährt aber aus denselben weder über die Verbindung und Lagebeziehung der vorderen Gonopoden zu ihrem Sternit etwas, noch über Muskeln oder Sehnen dieser Gebilde. Was aber die durch Abb. 31 erläuterten hinteren Gonopoden betrifft, so fehlt vollständig das Gerüst und der Spermagang ist in seiner ganzen Länge und bis zum Zapfen einheitlich dargestellt, obwohl das in natura nicht vorkommt.

Da die neue Form, mit welcher ich mich noch folgend zu beschäftigen habe, mit *Trigoniulus* nahe verwandt ist, verweise ich auf *C. Attems* mühevoll und verdienstliche Arbeit über die *indo-australischen Myriapoden,* Archiv f. Naturgesch. 1914, Berlin, 4. H., in welcher er unsere Kenntnisse von den zahlreichen *Trigoniulus*-Arten unstreitig gefördert hat durch Aufstellung eines Schlüssels derjenigen, welche noch seiner Ansicht hinsichtlich der Gonopoden „genügend gekannt sind." Dass letzteres allerdings selbst für die „Auserwählten" des Schlüssels nicht genügend zutrifft, beweist *Attems* selbst durch die Tatsache, dass der erste Gegensatz seines Schlüssels sich nicht auf die Gonopoden bezieht, sondern auf Hüftfortsätze am 3.–5. Beinpaar des ♂.

Unter den in *Attems* Schlüssel aufgenommenen Arten befindet sich auch *T. lumbricinus* Gerstäcker, als dessen Synonyme er auführt *goesi* Porat 1876 und *goesi* Sanssure und Zehntner in Grandidiers Madagaskar-Werk S. 130. Letztere führen unter weiteren Synonymen auch an den *„Spirobolus" rugosus* aus *Voges* „Beiträgen zur Kenntnis der Juliden" in Zeitsch. f. wiss. Zool. Bd. 31, 1878. Letzteres ist wichtig, weil *Voges* in seiner Abb. 36 und 36a die Gonopoden ziemlich deutlich abgebildet hat, jene dagegen nicht. Uns interessirt aber diese Darstellung von *Voges* schon deshalb, weil sie eine beträchtliche Aehnlichkeit aufweist mit dem hier beschriebenen *Marshallbolus takakuwai.*

[1] Der Name *„squamosus"* = beschuppt ist falsch, weil Schuppen = squamae gar nicht vorkommen und auch am Innenast der binteren Gonopoden nach Carl „viele feine Spitzchen" stehen, entsprechend seiner eigenen Abb. 34 !

Attems erklärt übrigens a.a.O. auf S. 343 für *lumbricinus*: „Ein Ubiquist der Tropen in der indo-australischen, neotropischen, aethiopischen und madagassischen Region."—

Diese Erklärung macht mir einen ausserordentlich *fragwürdigen* Eindruck, umso mehr, als man sich sagen (muss, wer hat die vergleichenden Untersuchungen angestellt, (vor allem der Gonopoden!) die das Recht geben eine solche Behauptung aufzustellen!? Ein höchster Zweifel ist aber um so mehr am Platze, wenn man den meist so kümmerlichen Zustand der Literatur hinsichtlich der Gonopoden berücksichtigt, von welchem ich oben schon sprach.

Voges Abb. 36a für die hinteren Gonopoden seines *rugosus* ist, besonders wenn man die geringe Grösse dieser Figur berücksichtigt, den meinigen von *M. takakuwai* so ähnlich, dass ich meinen Objecten am liebsten den Namen von *Voges* gegeben hätte, wenn nicht doch auch Unterschiede dagegen sprächen. Jedenfalls sind beide Formen ganz unzweifelhaft sehr nahe verwandt, wie aus allen Teilen der Gonopoden ersichtlich wird, aber das Solänomerit (*sl* Abb. 13) ist von verschiedener Gestalt, der Körper des *rugosus* ist bedeutend grösser, (60–70 mm.) das Präanalsegment besitzt eine kurze „Spina" und die Skulptur der Diplosomite stimmt nicht überein. Der *rugosus* Voges stammt von Rangoon.

In seinen genannten *Trigoniulus*-Schlüssel führt *Attems* den *lumbricinus* Gerst, (*rugosus* Voges) unter 11b an, d. h. bei den Formen, deren 3.–7. Beinpaar das ♂ keine Hüftfortsätze besitzen und ferner unter *16a* bei denjenigen, deren hintere Gonopoden, „vom Innenarm gegen den Hauptarm einen Seitenast entspringen" lassen, das ist der in Abb. 7 anbei mit *sl* bezeichnete Ast. Wenn er aber von *lumbricinus* weiter sagt: „Innenarm des hinteren Genopoden dicht beschuppt," so muss ich dazu bemerken, dass der Ausdruck „beschuppt" eine falsche Vorstellung erweckt, denn an diesen *Innenästen* der hinteren Gonopoden kommen vorwiegend *Wärzchen* oder Höckerchen in grosser Menge dicht gedrängt vor, aber keine Schüppchen, nur an Rande teilweise auch haarartige Gebilde. (Abb. 10)

Wenn man die Gonopoden der besser bekannten Arten von *Trigoniulus* vergleichend untersucht, kommt man zur Uberzeugung, dass diese artenreiche Gattung in mehrere aufgelässt werden muss, ein Unternehmen, welches durch genauere Untersuchung der Gonopoden gefördert werden wird. Mir steht nicht genug Material zur Verfügung, um eine solche Aufteilung vollständig durchzuführen, aber wenigstens einen Anfang dazu will ich durch den folgenden Schlüssel machen, wobei leider die sternocoxalen Brücken wegen unserer ungenügenden Kenntnisse nicht berücksichtigt werden konnen.

Trigoniulus und nähere Verwandte:

a) Telopodite der hinteren Gonopoden an der convexen Seite mit einer

Einschnürung hinter der Mitte, dieser gegenüber an der konkaven Seite eine kissenartige Auftreibung, *ohne* dass ein deutlicher Innenast aus gebildet ist, Coxite der vorderen Gonopoden am Ende in einen fingerartigen Fortsatz ausgezogen.

1. **Spirostrophus** BRÖL, VERH

(*digitulus* BRÖL.)

b) Telopodite an der convexen Seite *ohne* Einschnürung, ein deutlicher Innenast ist meistens ausgeprägt .....*c, d,*

c) Der ganz mit Wärzchen dicht bekleidete Innenast der hinteren Gonopoden ist nicht nur in zwei zweige gegabelt, sondern ist auch zugleich grösser wie der Endast und *überragt* diesen noch, welcher fingerartig schmal. Coxite der vorderen Gonopoden ohne fingerartigen Endfortsatz.

2. **Sumatrobolus** m.

(für *squamifer* ATT. 1930)

d) Der Innenast ist kleiner als der Endast und bleibt mehr oder minder weit hinter ihm *zurück,* bisweilen ist er überhaupt undeutlich ausgeprägt, ...*e, f,*

e) Der Innenast befindet sich ungefähr in der Mitte der hinteren Gonopoden (*po* Abb. 7) und besitzt terminal an seiner Basis *zwei Nebenäste,* von welchen der kleinere dicht an den Stamm des Telopodit angedrückt, (*sl* und *nb*). Coxite der vorderen Gonopoden ohne fingerartigen Endfortsatz. (Abb. 1 und 2) Drüsenporen sehr klein.

3. **Marshallbolus** n. g.

(*rugosus* VOGES und *takakuwai* n. sp.)

f) Der Innenast befindet sich entschieden hinter der Mitte der hinteren Gonopoden, dem Endast genähert und besitzt terminal keinen Nebenast, Drüsenporen deutlich ausgeprägt.

4. **Trigoniulus** s. str.

(*naresi* POC. *ralumensis* ATT. *tachypus* POC. *squamosus* CARL, *insculptus* VERH. u. a.)

Gonopoden der Trigoniuliden und Marshallbolus n. g.

In *Kukenthal's* Handbuch der Zoologie 4. Bd. 1926 hat *C. Attems* auf S. 196 die *Trigoniulidae* und *Spiromimidae* wie folgt charakterisirt:

a) „Das Coxit der hinteren Gonopoden besteht aus zwei im rechten Winkel zu einander stehenden, stärkeren Stäben und dazwischen gespannten Membranen.

Die Tracheentaschen sind gelenkig abgesetzt. Das Telopodit ist deutlich vom Coxit getrennt. Eine deutliche Gliederung des Telopodits ist selten sichtbar. Der Innenarm ist als Tibialfortsatz aufzufassen, (? V.) die Partie distal von ihm als Tarsus. Zwei Blasen im hinteren Gonopod und ein fingerförmiger *Zapfen* meist vorhanden. Coxit und Telopodit der vorderen Gonopoden kurz und breitblattig, selten einzelne Teile länger und schlanker ausgezogen,"..... ..... **Trigoniulidae**

b) „Coxit der hinteren Gonopoden ganz chitinisirt, eng mit dem Telopodit verbunden. Der ganze Gonopod bildet ein breites, in der Mitte stark eingeschnürtes C. In der Basis nur eine Blase am Beginn der Samenrinne, kein fingerförmiger Zapfen. Alle Teile der vorderen Gonopoden lang und schlank ausgezogen." ..... **Spiromimidae**

(Eine 3. Familie, *Pochybolidae* ist fragwürdiger Natur, da ihre Characteristik, abgesehen von den „mehr breiten und kurzen vorderen Gonopoden" mit der *Spiromimidae* übereinstimmt.)

In einem andern Aufsatze „über einige *Myriapoden* und *Isopoden* aus Dekan" (noch nicht gedruckt) habe ich mich mit diesen von *Attems* gegebenen Characteristiken der beiden Familien beschäftigt und sie durch neue ersetzt, aus welchen ich jetzt nur soviel herausgreifen will, dass bei den

a) *Trigoniulidae* an den hinteren Gonopoden die Basalspangen (*b, c* Abb. 11) und mit ihnen der Ansatz der Stützen (*fu*) sowie der Embolus (*z*) von eigentlichen hinteren Gonopod ganz *getrennt* sind durch Zwischenhäuter während bei den

b) *Spiromimidae* die Basalspangen und zugleich der Ansatz der Stützen, sowie der Embolus mit der Basis des hinteren Gonopod *verwachsen* sind.

Attems eröffnet die citirten Diagnosen der beiden Familien mit den Coxit der hinteren Gonopoden, was wir uns aber unter diesen Coxiten vorstellen sollen, ist durchaus nicht genügend geklärt und ein Blick auf die beigegebenen Abbildungen 1–13 von den complicirten Organen der Gattung *Marshallbolus* lässt jeden Beobachter sich leicht überzeugen, dass diese Frage nach den

Höften oder Coxiten

keineswegs leicht zu beantworten ist, um so mehr als auch das Sternit der hinteren Gonopoden in Betracht kommt. Attems sagt zwar a.a.O. auf S. 195 von den *Trigoniulidea* im Allgemeinen; „Die hinteren Gonopoden sind durch das *Sternit* und Membranen mit einander verbunden", aber diese Erklärung steht vollkommem in Widerspruch mit seiner citirten Charakteristik der *Trigoniulidae.*

In diesem Dilemma muss ich auf einen wichtigen und führenden Zusammenhang hinweisen, nämlich die von mir schon in meinem *Diplopoden*-Werk

(Bronn's Klassen und Ordnungen des Tierreichs) bewiesene *gesetzmässige Lage der Stigmen und damit zugleich Tracheentaschen im Bereich der Sternite.*

Die den Tracheentaschen homologen *Stützen* der Gonopoden (*fu* Abb. 11) besetzen zwar keine Stigmen mehr, aber die Stellen, an welchen sie gelenkig mit den sternocoxalen Spangen verbunden sind, (*x*) entsprechen der Lage der Stigmen. Somit müssen die medianwärts von den Gelenkstellen *x* gelegenen Gerüstteile (*a* und *b*) als *sternale* Gebilde betrachtet werden, während wir die nach aussen ziehende Spange (*c*) sowie die Blasen (*bl*) in welche die Coxaldrüsen münden und die sie stützenden Emboli (*z*) um so mehr als *coxale* Teile erklären können, als sie bei den *Spiromimiden* tatsächlich mit den hinteren Gonopoden fest verwachsen sind. Für die ganze in Abb. 11 dargestellbe *Brücke* zwischen den hinteren Gonopoden ist demnach die Bezeichnung einer *sternocoxalen* durchaus berechtigt.

Bei den *Trigoniuliden* sind die hinteren Gonopoden so verwickelt gebaut, dass wir über sie noch lange nicht genügend aufgeklärt sind. Nach Anschauung von *Attems* und *Carl* werden die hinteren Gonopoden von einem Spermagang der Länge nach durchzogen, während eine Coxaldrüse in die Blasen der sternocoxalen Brücke jederseits einmündet. In meinem genannten Dekan-Aufsatz habe ich gezeigt, dass bei den *Spiromimiden* die Coxaldrüsen in den hinteren Gonopoden selbst liegen, während es mir scheint, als wenn bei *Marshallbolus* zweierlei Drüsen vorhanden wären, deren eine in den Blasen mündet, (Abb. 11) während die Mündung der andern noch fraglich ist.

Was den Zerfall der hinteren Gonopoden in Abschnitte betrifft, so habe ich schon an anderer Stelle gezeigt, dass wir *Praefemorofemur* und *Tibiotarsus* unterscheiden können und im Basalgebiet sich häufig ein auffallender *Bogen* bemerklich macht, den ich als *Coxitbogen* betrachte. (*cbo* Abb. 7)

Den meisten Formen kommt ein *Innenast* zu, der gewöhnlich nicht nur eine besonders Struktur aufweist (*po*) sondern auch und zwar ganz bezonders dadurch ausgezeichnet ist, dass in ihm der Spermagang mündet. Liegt diese Mündung in einem schlanken Fortsatz, dann kann man, wie es bei *Marshallbolus* der Fall ist, von einem *Solänomerit* sprechen, (analog den *Polydesmoideen.*)

Der Umstand dass der *Innenast,* mit Ausnahme zweier für *Marshallbolus* sehr bezeichnender Nebenäste (*sl* und *nb*) sehr dicht mit sehr feinen Wärzchen besetzt ist (Abb. 10) und ausserdem löffelartig ausgehöhlt, spricht dafür, dass sich an ihm zeitweise Sperma und Drüsensekret ansammelt.

Eine eigene Bewandtnis hat es aber ferner mit einer *physiologischen Beziehung zwischen Innenast und Endarm.* Von den bei den terminalen Nebenästen des Innenarmes ist nur einer im Profil deutlich sichtbar (*sl*) und ihm nenne ich Solänomerit, da er offenbar das Endstück des Spermaganges enthält. Der andere Nebenast dagegen (*nb*) ragt im Profil nur mit seiner Basis

vor, neben der man ein ovales Fenster bemerkt. (*fe* Abb. 7) Eine klare Vorstellung von diesem versteckten Nebenast gab mir est ein macerirtse Präparat, (Abb. 12) aus welchen sich ergiebt, dass er stachelartig dünn ausläuft. Im natürlichen Zustande legt er sich dicht an den Hauptarm in eine Rinne.

Das S-förmig gewundene Solänomerit berührt mit seinen knopfartigen Ende fast das hakige Ende eines anderen Fortsatzes, (*h*) welcher unter dem Endteil des Hauptarmes zurückgebogen ist. Dieser Endteil (*e*) endigt mit zwei kleinen Vorsprüngen und innen vor denselben zeigt sich die Mündung einer *Rinne* (*rn*) welche ich zwar nicht ganz vollständig verfolgen konnte, die aber die ganze Endhälfte der hinteren Gonopoden im Bogen zu durchsteichen scheint, also vom Endteil (*e*) bis in die Gegend an der Basis des Innenastes. (*x*) In dieser Rinne beobachtete ich auch dünkle Sekretmasse (*y* Abb. 7) und Fetzen derselben in der Nachbarschaft des zurückgebogenen Astes. (*h*) Wenn ich nun darauf aufmerksam mache, dass die hinteren Gonopoden *im Ruhezustande sich grösstenteils im Innern der Coxite der vorderen Gonopoden befinden,* (Abb. 1) die zu diesem Zwecke stark und fast wie eine dreiseitige Pyramide aufgereichen sind, dann begreift man leicht, dass die Endhälften der hinteren Gonopoden so zu sagen *unter zwei Kapuzen sitzen.*

Der Zustand der Endhälften der hinteren Gonopoden ist aber nach meiner Ueberzeugung eine *Anpassung an diese Beziehungen zwischen vor deren und hinteren Gonopoden.* Im Wesentlichen beruhen aber die besprochenen Merkmale in der Endhälfte der hinteren Gonopoden darauf, dass durch dieselben eine reichlichere Aufnahme und Verteilung und damit auch Mischung von Sperma und Drüsensekret ermöglicht wird.

Jetzt noch einige Bemerkungen über die *vorderen* Gonopoden, deren Bau keineswegs so einfach ist, wie einige Autoren anzunehmen scheinen. Die Notwendigkeit ihres gedrungenen Baues ergiebt sich schon aus dem eben Gesagten. Eine Merkwürdigkeit ist das Vorhandensein einer aus Abb. 1 und 2 ersichtlichen Muskellinie (*ml*), welche darauf beruht, dass Coxalmuskeln von entgegengesetzter Richtung auf längerer Strecke in einer Linie zusammenstossen, ein Zeichen sowohl von der Stärke der Muskeln als auch von dem Umstande, dass der verfügbare Raum für ihre Ausbreitung aufs Aeusserste ausgenutzt worden ist.

Die vorderen Gonopoden lassen sich nicht verstehen ohne eine Klarstellung ihrer Beziehungen zur Stütze und zum Sternit, was ich durch Abb. 6 erläutert habe. Der dicke, gewundene Arm (*ar*) welcher in Abb. 6 dunkel gehalten ist, stellt einen *Sternitbogen* vor und zwar hat man sich ihn an das in Abb. 3 dargestellte Sternit an gesetzt vorzustellen. Mit seinem breiten äusseren Ende ist dieser Sternitbogen angewachsen an eine dreieckige *Stütze* oder *Tracheentasche* und so bildet das ganze Sternit mit seinen beiden Bögen eine *breite Brücke*

zwischen beiden Stützen. Diese Stützen aber sind durch Gelenke verbunden einerseits (*g*) mit einer *Telopoditfessel* (*ps*), deren basalen Abgang vom Telopodit man aus Abb. 4 ersieht, anderseits mit der Basalecke der Coxite. (g^1 Abb. 6)

Simit stehen alle diese Teile in einem bestimmten, festen, gerüstartigen Zusammenhang, ohne welchen die starken Muskeln die massigen vorderen Gonopoden nicht bewegen könnten. In Abb. 1 und 2 sieht man die vorderen Gonopoden in natürlichen Zustande von beiden Seiten, in Abb. 4 und 5 in macerirtem und isolirt, in Abb. 5 das Coxit gleichzeitig auseinander gerollt. Eine grosse gewundene Sehne (*s*) ist in Abb. 1 und 2 besonders auffallend, sie vereinigt die meisten Coxalmuskeln und setzt sich (wie man aus dem Fortsatz *s* der Abb. 4 ersieht,) innen vor der Mitte des Telopodit an dieses an. Zwei andere Muskeln kommen in Abb. 4 durch die Sehnenbüschel s^1 und s^2 zum Ausdruck.

Das Telopodit welches tief in das Coxit eingesenkt ist, bleibt zwar ungegliedert, aber es besitzt innen eine tiefe *Einbuchtung* (*in*) welche ich als *Rest einer Zweiteilung* um so mehr auffasse, als aussen gerade der Einbuchtung gegenüber ein Muskel ansetzt. Vorn unfassen die Coxite die Telopodite vollständig (Abb. 2) hinten dagegen, wo sich die hinteren Gonopoden einschieben, nur halb. Dass die Coxite aber auch in der Längsrichtung in die Telopodite eingreifen, ersieht man aus der breiten Längsrinne (*ca* Abb. 4) in den letzteren, welche beiderseits von Kanten (*c* und *l*) begleitet wird.

Marshallbolus takakuwai n. sp.

♂ 45–51 mm. lg. mit 49 oder 51 Rumpfringen. (1) Rumpfringe mit *drei Farbenringen,* Prozonite graugelblich, Metezonite gelbrot und dazwischen noch ein mehr oder minder brauner Bogen. Beine gelb. Hier und da besonders im hintersten Rumpfviertel auch schwarze Drüsenflecke.

Ocellen 34 von unten nach oben 4, 6, 6, 6, 6, 4, 2.

Labrum tief eingebuchtet, mit Medianfurche, dahinter 2+2 Gruben, die ausseren nicht immer deutlich, Scheitelfurche recht fein, Antennen mit vier Riechkegeln.

Im Gegensatz zu den andern mir bekannten *Trigoniuliden* sind die *Poren der Wehrdrüsen so auffallend klein,* dass man sie besonders suchen muss. Die Nähte sind nur in den Unterflanken gut ausgeprägt, nach oben verschwinden sie. Metazonite nur unterhalb der Poren längs gefurcht. Diese Furchen streichen im untersten Gebiet *schräg* von hinten oben nach vorn unten, während an den Prozoniten im Gegenteil die viel feineren Streifen von hinten unten nach vorn oben ziehen. Die Lage der Poren wird an besten angedeutet durch eine *Längsfurche* auf den Metazoniten, welche kräftiger ist als die gewöhnlichen.

An den Prozoniten verschwinden nach oben allmählig die Schrägstreifen und oberhalb der Poren herrschen Grübchen und Runzeln im hintersten Viertel. *Diese Grübchen sind zum Teil dem kleinen Porus so ähnlich,* dass er auch hier durch undeutlich gemacht wird. Oberhalb der Poren sind die Metazonite vorn wegen der fehlen den Naht ebenfalls mit Grübchen und Runzeln besetzt, grössenteils aber sind sie punktirt oder kurz gestrichelt.

Praeanalsegment ohne Fortsatz, hinten oben abgerundet-stumpfwinkelig. Analklappen mit wulstigen Rand und Bogenrinne vor demselben.

An der abgerundet-dreieckigen Collum-Seitenlappen eine Furche neben dem Vorderrand, dieser nur mit schwacher Andeutung einer seitlichen Einbuchtung.

Hüften am 3.–5. Beinpaar des ♂ *ohne* eigentliche Fortsätze, aber am Ende doch etwas vorgewölbt. Die Gonopoden sind im vorigen bereits genügend besprochen worden.

Vorkommen: Diese Art verdanke ich Herrn Y. TAKAKUWA, dem sie auch gewidmet ist, von den Marshall-Inseln.

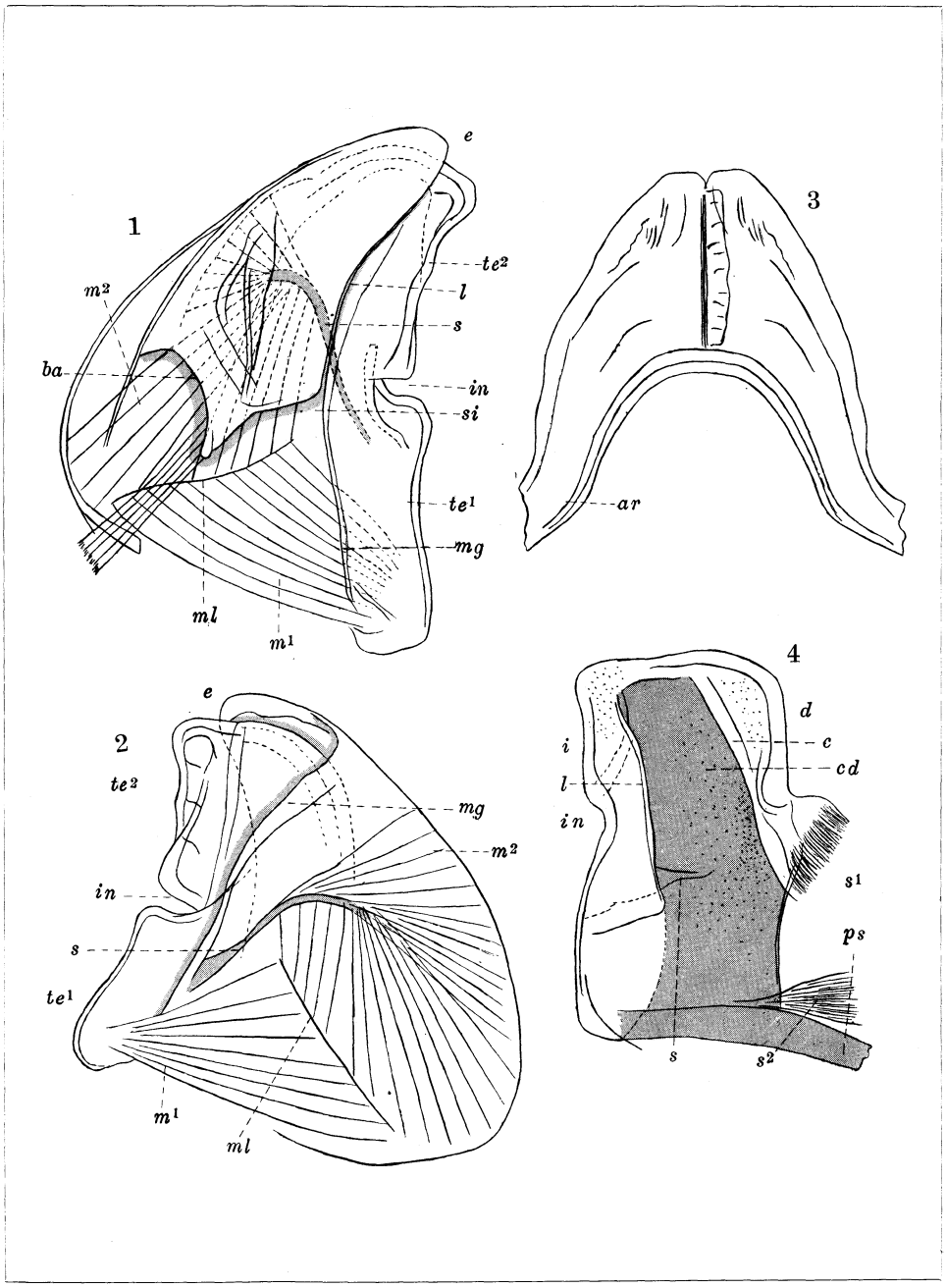
Ammerkung: Von den Marshall-Inseln ist bisher, ausser einem höchst fragwürdigen *„Spirostreptus"(?)chamissoi* KRSCH., nur der *Trigoniulus narosi* POC. bekannt, also eine von vorliegender Form sehr abweichende. (Man vergleiche in *Attems* indo-australischen Myriapoden, Archiv f. Naturg. Berlin 1914 auf Taf. V, Abb. 68–71)

Erklärung der Abbildungen

Abb. 1–13. *Marshallbolus* n. g. *takakuwai* n. sp.

1. Vordere Gonopoden von innen und hinten gesehen, *ba* Basis, *e* Ende des Coxit, te^1 Grundteil, te^2 Endteil des Telopodit, *s* grosser Sehne des Coxitmuskeln (m^2) m^1 Muskellinie, *ml* basaler Coxitmuskel, *si* innere Bucht zwischen Coxit und Telopodit, *l* Coxitrand, welcher das Telopodit umfasst, in Bucht zwischen den beiden Abschnitten des Telopodit, × 56.[1)]
2. Vordere Gonopoden von aussen und vorn gesehen, Bezeichung wie vorher, *mg* äusserer das Telopodit umfassen der Coxitrand, × 56.
3. Sternit der vorderen Gonopoden, *ar* Bogen welche *es* mit der Stütze verbinden, × 56.
4. Telopodit der vorderen Gonopoden isoliert, innen-*d* Aussenrand, *cd* Höhlung in welche das Coxit eingreift, *l* innerer, *c* äusserer, kantenartiger Rand der Höhlung, *s*, s^1, s^2 Sehnen der in Abb. 1 und 2 gezeichneten Coxitmuskeln, × 56.
5. Coxit der vorderen Gonopoden auseinander gerollt, *su* Höhlung, in welcher das Telopodit ruht, *k* Leiste (welche *l* der Abb. 1 entspricht) × 56.

[1)] Zwischen *ba* und dem Telopoditrand *mg* liegt eine weite Bucht, in welcher sich, ebenso wie in der Höhlung der Coxite der vorderen Gonopoden die hinteren Gonopoden in Ruhelage befinden.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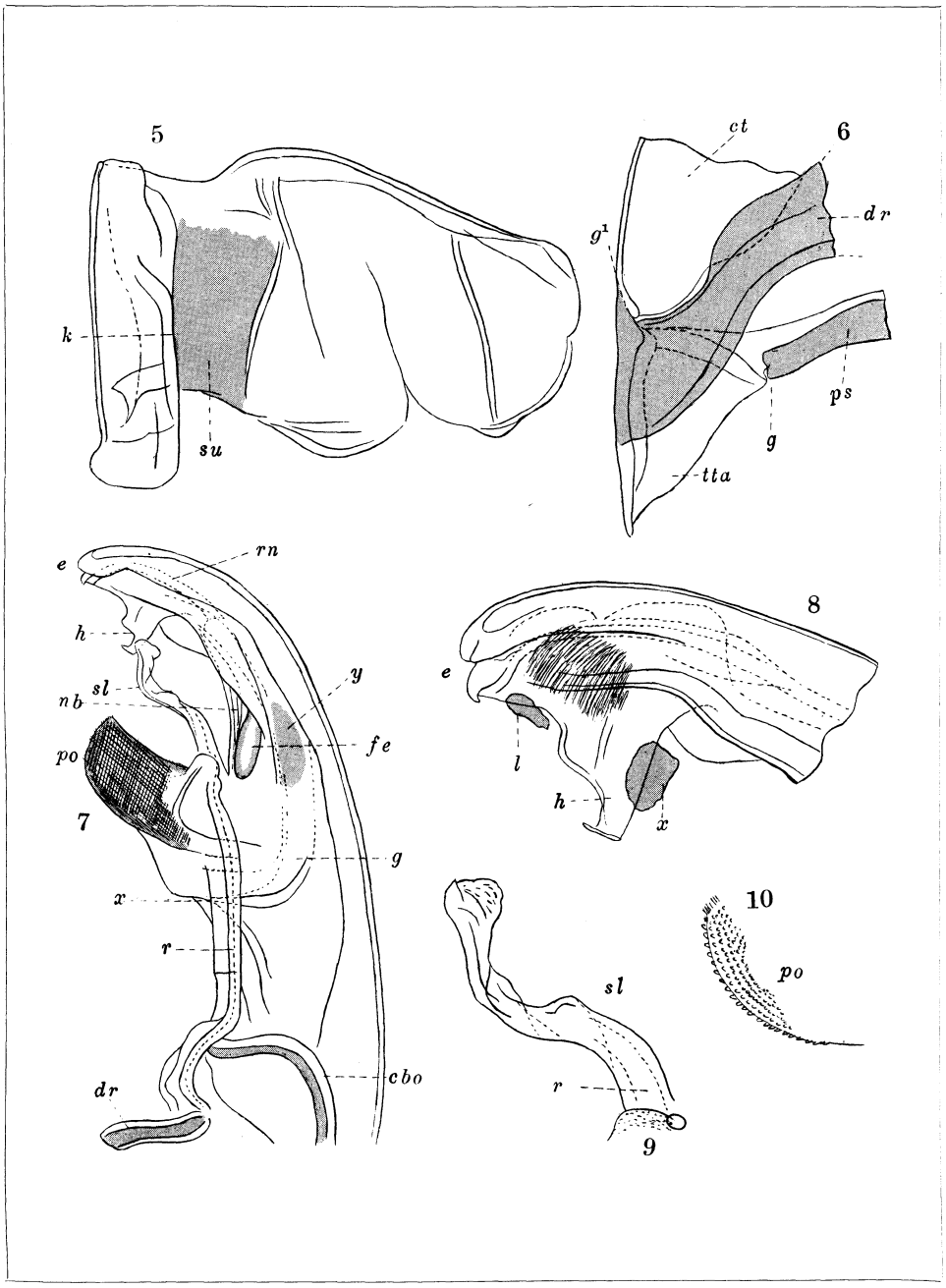
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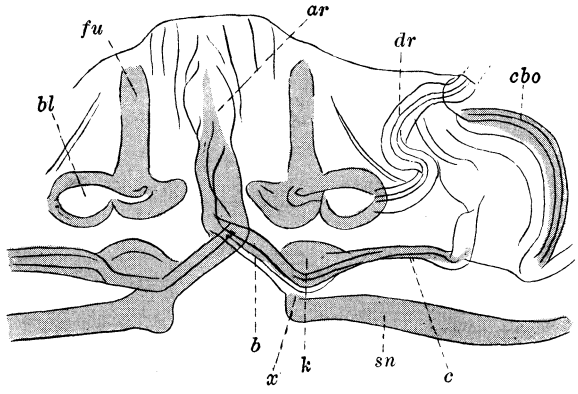

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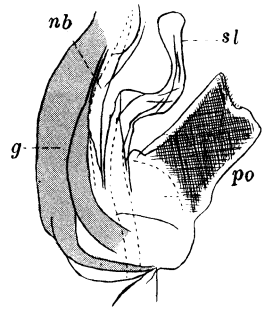

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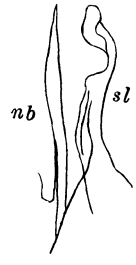

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6. Verbindungsgebiet von Coxit (*ct*), Stütze (Tracheentasche) *tta* Sternitbogen (*ar*) und Telopoditfessel (*ps*), *g* Gelenk zwischen letzterer und der Stütze, g^1 Gelenk zwischen Stütze und Coxit, ×56.
7. Hinterer Gonopod, Ansicht von vorn, *s* Spermagang, *dr* Drüsengang, *cbo* Coxitbogen, *po* Innenast, *fe* Fenster, *sl* Solänomerit, *e* Ende, *h* Nebenast des Endarmes, ×56.
8. Endarm der hinteren Gonopoden, an seinem Nebenast (*h*) sitzen zwei Sekretklümpchen, (*x*) ×125.
9. Solänimerit der hinteren Gonopoden, ×125.
10. Stück vom Innenast der hinteren Gonopoden, (*po*) ×220.
11. Sternocoxales Feld zwischen den hinteren Gonopoden, *cbo* Coxitbogen, *fu* Stützen, *dr* Drüsengang, *bl* Blasen, *z* deren Stützzapfen (Embolus) *b*, *c* sternocoxale Brücken, oder Basalspangen, *ar* deren sternale mittlere Verbindung, ×56.
(Abb. 1, 2, 3, 7–10 und 13 sind nach natürlichen, 4–6; 11 und 12 nach macerirten Objecten gezeichnet.)
12. Solänomerit und seinen Nebenast (*nb*) isolirt, ×56.
13. Innenast eines hinteren Gonopoden-Telopodit und seine Nachbarschaft, *po* Innenast, *sl* Solänomerit, *nb* sein Nebenast, ×56.

Über die japanischen *Cryptops*-Arten

Von

Yoshioki TAKAKUWA

(高 桑 良 興)

Mit 5 Abbildungen

Verf. hat früher eine *Cryptops*-art, die von ihm im Kyusyu gefunden worden war, als 1 n. sp. (Trans. Sapporo Nat. His. Soc. vol. XIII, pt. 4, 1934) beschrieben. Damals besass Verf. jedoch nur wenige, mehr oder weniger defekte. Aber im letzten Jahre (1935) konnte Verf. auf einer Reise in die Mandschurei und Korea mehrere Exemplare derselben Art sammeln und genau untersuchen, weshalb jetzt die frühere Beschreibung hier korrigiert werden soll. Ich habe vor kurzem auf der kleinen Felseninsel Enosima, die von Tokyo nur 40 km. entfernt und ein Vergnügungsort an der Seeküste ist und auf der Ôsima-Insel wieder viele Exemplare dieser Gattung gefunden. Diese sind als eine neue sp. anzusehen.

Ferner habe ich jüngst auch 2 Arten dieser Gattung in Formosa gefunden, aber die eine Art ist leider etwas defekt und lässt keine genaue untersuchung zu, doch glaube ich, dass die andere Art auch als eine n. sp. anzusehen ist. Und diese sollen in folgenden beschrieben werden.

1. *Cryptops japonicus* TAKAKUWA.

Farbe gelb. Kopf und Hinterende etwas rotgelb. Länge 20 mm. Rumpf reichlich und kurz behaart. Kopf rundlich, oft mit median unvollständigen kurzen Furchen. Antennen 17 gliedrig.

Am Rand des Clypeus vor dem Labrum liegt eine Querreihe von etwa 6 stärkeren Borsten, davon in der Medianen findet Borsten von wechselnder Zahl und Anordnung. Vorn zwischen den Antennen sich ein dreieckiger Vorsprung mit einem starkem Dorn. Labrum einzähnig.

Vorderrand der Kieferfusshüften ein wenig hervoragend, fast gerade, jederseits mit 4–5 Borsten, die am Rande selbst stehen versehen.

1. und 2. Tergit oft mit undeutlicher Längsfurche, sie überlagern fast stets den Hinterrand des Kopfschildes. Die Paramedianfurchen meist vom 3. Tergit an vollständig. Bogenförmig verlaufende Furchen am 3.–20. Sternit, bis zum 20.

mit Furchenkreuz. 21. Sternit nach hinten zu ein wenig verjüngt, Hinterrand konvex oder fast gerade.

Coxopleuren am Hinterrand mit einigen dornartigen Borsten, auch im Porenfeld finden sich einige. Das Porenfeld bleibt vom Hinterrand weit entfernt, mit etwa 30 Poren, das letzte Drittel porenfrei.

1.–19. Beinpaar mit feinen langen Borsten besetzt. Präfemur, Femur und Tibia des 20. Beinpaars sind oft besonders durch ventrale Behaarung ausgezeichnet. Präfemur und Femur der Endbeine ventral mit kurzen kräftigen Dörnchen, dorsal mit langen feinen Borsten versehen, ohne kahle Längsarea, alle Glieder ohne Endzähne. Femur hat ventral meist 1, oft 2 Sägezähnchen. Tibia mit 5–8, 1. Tarsus mit 3–4 in einer Reihe stehenden Sägezähnchen.

Fundort: Kyusyu(Kokura), Mandschurei(Hôten, Tôkôsi), Korea(Ansyu).

Ammerkung: Sie unterscheidet hauptsächlich sich von einer ähnlichen Art *C. doriae* dadurch, dass sie an allen Gliedern der Endbeine keine Endzähne aufweist. Zwar ist sie auch *C. tahitianus* sehr ähnlich, aber sie unterscheidet sich von dieser dadurch, dass sie 17 und nicht wie *C. t.* 15 Antennenglieder besitzt, und ferner dadurch, dass ihre Femur der Endbeine ventral meist 1–2 Sägezähne haben, die bei *C. t.* dagegen völlig fehlen. Überdies ist auch die Zahl der Sägezähnchen an der Tibia und dem ersten Taraus der Endbeine bei den beiden arten verschieden.

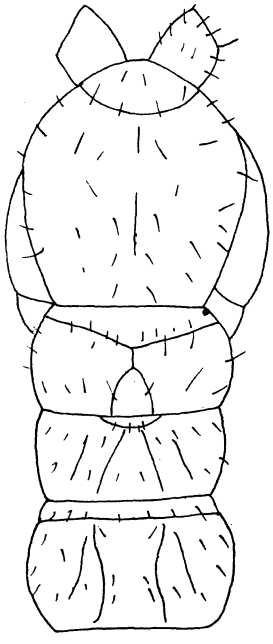


Fig. 1.
C. striatus, Vorderende des Körpers. × 50.

2. ***C. striatus*** n. sp.

Blassgelb. Kopf und Hinterende rotgelb. Länge 17 mm.

Kopf das ersten Tergit überlagert, nicht gefurcht, meist aber mit sehr undeutlicher medianer Längafurche. Ganzer Rumpf mässig beborstet. Antennen 17 gliedrig. Clypeus ungefähr wie bei *C. japonicus*.

Vorderrand der Kieferrfusshüften fast gerade, jederseits mit 1 oder 2 Borsten besetzt.

1. Tergit mit nach hinten vorgezogener Ringfurche und median liegender Grube, aus der 2 divergierende Längsfurchen nach hinten verlaufen.

2.–19. Tergit mit vollständigen Paramedianfur-

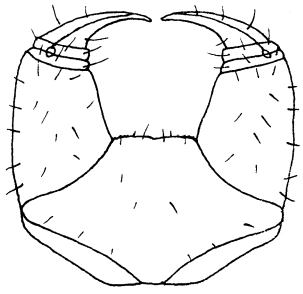


Fig. 2.
C. straitus, Kieferfuss. × 50

chen, und bogig angeordneten Lateralfurchen. Paramedianfurchen des 2. Tergits nach vorn zu konvergierend, vom 3. Tergit an parallel, vom etwa 6. Tergit mit undeutlichem Mediankiel.

2.–19. oder 20. Sternit mit Furchenkreuz. 21. Sternit nach hinten zu verjüngt, Hinterrand gerade.

Coxopleuren mit etwa 30 Poren. Das Porenfeld erreicht fast den Hinterrand der Coxopleuren, der dazwischen liegende Teil ist fast unbeborstet, mit einigen langen Stacheln am Hinterrand Präfemur und Femur der Endbeine ventral dicht und gleichmässig mit dornartigen Borsten besetzt, dorsal fein behaart, Tibia ohne lateralen Endzahn. Femur ohne Sägezähnchen, Tibia mit etwa 5, 1. Tarsus mit etwa 4 Sägezähnchen.

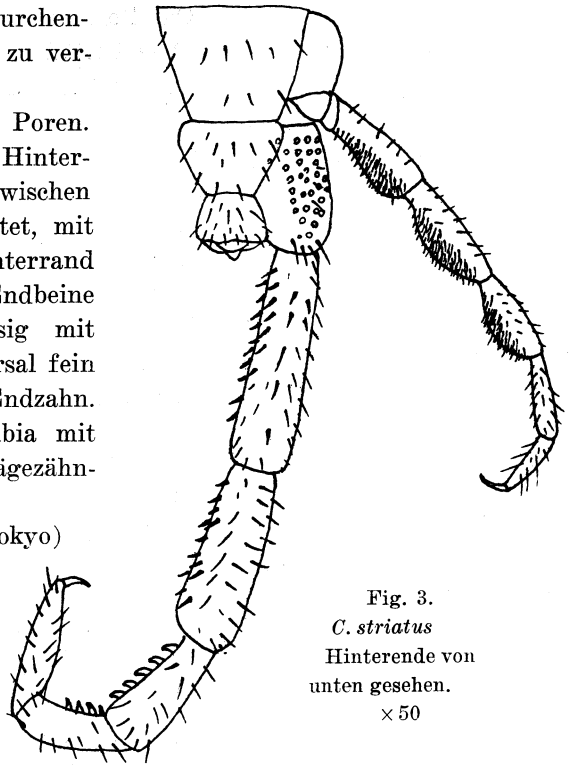


Fig. 3.
C. striatus
Hinterende von unten gesehen.
×50

Fundort: Enosima (bei Tokyo)

Ammerkung: *C. micrus* ist dieser Art sehr ähnlich, aber jene unterscheidet sich von dieser in den folgenden Punkten: Kopf mit 2 Längsfurchen, Vorderrand des Kieferfuss zweilappig, Coxopleuren mit nur etwa 4 Poren, Tibia mit 4, 1. Tarsus mit 2 Sägezähnchen.

3. ***Cryptops nigropictus*** n. sp.

Körperlänge (ohne Analbeine) 17 mm. Nach längerem Liegen in Alkohol gelblich. Vom 3. Tergit an zeigen sie alle links und rechts in fast symmetrischer Anordnung grosse und kleine schwarze Flecken, die sich auch auf Bauch und Hüfte fortsetzen.

Antennen 17 gliedrig, die ersten 4 Glieder mit wenigen langen starken Borsten versehen, die folgenden dagen dicht und fein behaart.

Kopfschild fast so breit wie lang, mit sehr kurzer undeutlicher Furche, hinten überlägert vom 1. Tergit.

1. Tergit mit sehr schwach ausgebildeter medianer Furche. 2. Tergit mit vorn verkurzter Längsfurche, Paramedian- und lateralfurchen vom 3. Tergit an.

Sternite bis zum 19. mit Furchenkreuz, der Querast kurzer und schwächer

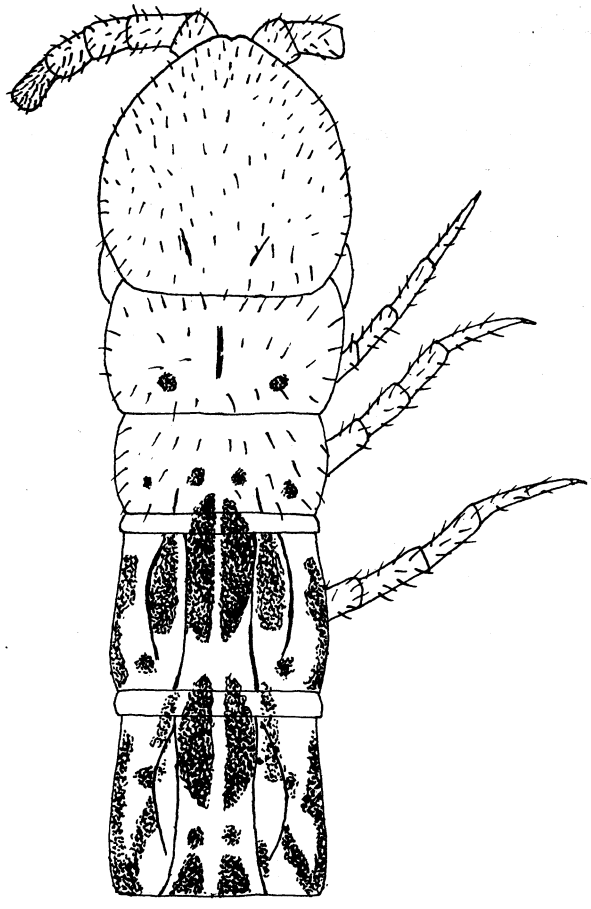


Fig. 4.
C. nigropictus,
Vorderende des Körpers. × 50

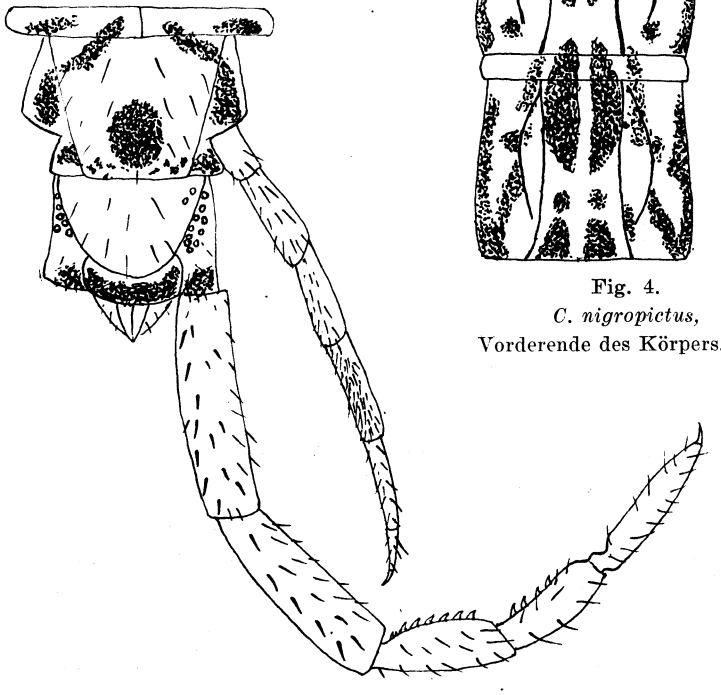


Fig. 5.
C. nigropictus, Hinterende von unten gesehen. × 50

sichtbar ist, das 20. Sternit ist sehr schwach ausgeprägt.

Vorderrand der Kieferfusshüften leicht gerundet, am Rande mit einigen Borsten besetzt.

Der ganz Körper kurz und reichlich beborstet.

Tarsen des 1.–19. Beinpaares undeutlich, beim 20. und 21. deutlich zweigliedrig. Vorletztes Beinpaar nicht verdickt, Unterseite des 1. und 2., besonders des 3. Gliedes reichlich beborstet.

Endbeinpräfemur und Femur dorsal mit vielen Borsten versehen, auf der Ventralseite wenige dicke Dornen aufweisend. Alle Glieder ohne Endzähne, Femur ohne Sägezähnchen, Tibia mit etwa 6 und Tarsus mit 4 Sägezähnchen besetzt. Endglied unten messerartig scharf.

Endsternit trapezförmig, nach hinten schmäler werdend. Coxopleuren hinten ziemlich abgestutzt, ihre Porenfelder beschränken sich auf die dem Sternit zugewandten Seiten, mit je etwa 13 Poren, die schon in einiger Entfernung vom Hinterrand aufhören. Stigmen länglich oval.

Fundort: Formosa (Syaka, Syôka).

Anmerkung: Unter den Gattung *Cryptops* gehörigen Arten, sind, nach „Geophilomorph" von Attems, die Arten, die die Eigentümlichkeiten haben, dass „1. Tergit ohne Ringfurche, Tergit mit 2 vollständigen Paramedianfurchen, Tibia und 1. Tarsus der Endbeine mit Sägezähne, die der Endbeintibia einreihig, und es reichliches grünes bis schwarzes Pigment vorhanden ist", folgende 3: 1. *C.* (*c.*) *australis* NEWP. 2. *C.* (*c.*) *ninuiensis* CHAMB. 3. *C.* (*c.*) *pictus* RIB. Aber dass Femur der Endbeine bei diesen 3 Arten 1–2, während bei dieser neuen Art keinen Sägezahn trägt, und dass der Kopf bei *C. pictus* mit 2 vollständigen Längsfurchen, während bei dieser neuen mit sehr undeutlicher kurzen Furche versehen ist, und noch dazu *C. australis* und *C. ninuiensis* ungegliederte Tarsen tragen, unterscheiden verständlich diese neue Species von oben genannten 3 *Cryptops*-arten.

摘　　要

日本產メナシムカデ屬（Cryptops）につきては，予が昭和九年本誌 Vol. XIII, pt. 4（歐文）及動物學雜誌第551號（和文）に於て，1新種ニホンメナシムカデを記述した他には，未だ一つも記述されたものがない．このニホンメナシムカデは先年九州旅行の時，少數の多少不完全な標本を得て，記述したものであるが，昨昭和十年鮮滿を旅し，多くの同種標本を得たので，玆に前の記述を補正し得たことを喜ぶ．然るに近頃江ノ島及臺灣に於て又各1新種を得，都合本屬の3種が我國に產する事を知つたのである．今の處我國では步肢21對を有し眼を缺くものがあつたら，先づ本屬と考へてよからう．本屬の種は死後多く最終肢を痙攣的に屈曲し（第3圖）且つそれが甚容易に脫落する性質を有するので，大抵それと見當がつき易いが又直に不完全標本となるの恐れがある．以上3種の詳しい記載は歐文に讓り，次に簡單なる檢索表を揭げる．

△ 體に多くの黒い汚斑を有する .....
C. nigropictus n. sp. (クロメナシムカデ) 新稱, 臺灣 (彰化, 沙鹿) 產

△ 體に上の如き黒斑がない .....

× 第1背板に横の細溝線がある .....
C. striatus n. sp. (スヂメナシムカデ) 新稱, 江ノ島產

× 第1背板に上の如き線がない .....
C. japonicus TAKAKUWA (ニホンメナシムカデ) 九州, 朝鮮, 滿洲產

備考 クロメナシムカデは臺南糖業試驗場技師柳原政之氏の寄贈にかゝる只2個の標本に依つて記述したもので, 玆に同氏に對し深く御好意を謝し, 併せて尙多數の同標本を入手せんことを希望するものである.

Some New Monothalamous Foraminifera from Northern Japanese Waters

By

Yoshine HADA

(羽田良禾)

With 5 text-figures

In the present paper five new species belonging to the genus Lagena are reported from shallow waters off the Pacific coast of Hokkaido and the Kurile Islands. The materials upon which these studies have been based were collected at the following four localities.

	Station	Depth
1.	Off Akkeshi Bay, East Hokkaido	55 m
2.	Off Hamanaka Bay, East Hokkaido	42 m
3.	Lake Hijirippu, brackish lake situated between Akkeshi and Hamanaka Bays	3 m
4.	Suribachi, Paramusiru Island	15 m

Some authors have hitherto divided the monothalamous hyaline forms into two genera by the character of the aperture concerning ecto- and endosolenian tubes; viz., the group having an ectosolenian aperture has been placed in the genus *Lagena* and the other with an entosolenian one in the genus *Entosolenia* EHRENBERG or *Oolina* D'ORBIGNY. But in this investigation there having been found the new species, *Lagena intermedia*, which carries not only an outer tube but also an inner one, the writer considers that it is probably natural to include them all in a single genus *Lagena* of which the diagnosis is as follows.

Genus ***Lagena*** WALKER & JACOB, 1798.

Test free, generally flask-shaped or ovoid, sometimes compressed, consisting of a single chamber with an outer or inner tube, or both; wall calcareous, hyaline, finely perforate; surface smooth or variously ornamented; aperture ecto- or entosolenian, radiate, circular, oval, fissurine, or slit-like.

Lagena compressa HADA sp. nov.

Figure 1

Test short, 0.73–0.80 of the breadth in length, laterally ovate in side view,

Trans. Sapporo Nat. Hist. Soc., Vol. XIV, Pt. 4, 1936.

slightly elevated at the anterior end, fairly compressed, its thickness 0.45–0.58 of the breadth; central region of side faces nearly flattened; periphery rounded, with a clear edge at the upper part; surface smooth; aperture terminal, fissurine, provided with a curved entosolenian tube.

Length, 180–216μ; breadth, 245–272μ; thickness, 110–155μ.

Localities:—Paramushir Island and off Hamanaka Bay.

This broad new species differs from *Lagena stewartii* WRIGHT in being low and in having flat side faces and an elongate curved inner tube.

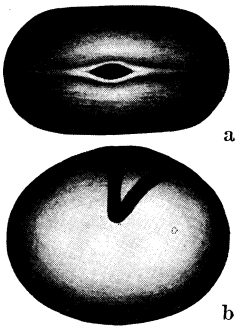


Fig. 1.
Lagena compressa HADA sp. nov. × 110.
a. apertural view.
b. side view.

Lagena curta HADA sp. nov.

Figure 2

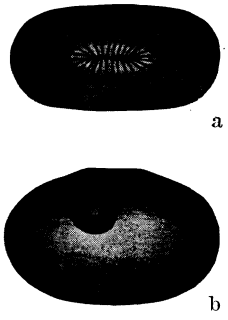


Fig. 2.
Lagena curta HADA sp. nov. × 110.
a. apertural view.
b. side view.

Test very low, widened, 0.66 of the breadth in length, compressed, 0.5 of the breadth in thickness, with somewhat flat side faces; apertural end more or less high; peripheral margin rounded, posterior end also broadly rounded; surface smooth; aperture consisting of a comparatively large radiate area and a slit-like opening connecting with an entosolenian tube.

Length, 168μ; breadth, 256μ; thickness, 128μ.

Locality:—Off Akkeshi Bay.

This short species differs from *Lagena apiculata* (REUSS) in being shortened and in lack of apical spines and from *L. compressa* HADA sp. nov. in the presence of a radiate aperture.

Lagena bispina HADA sp. nov.

Figure 3

Test oval, its length 1.5 of the breadth, compressed, thickest at the posterior 0.33 of the test, its greatest thickness 0.4 of the length; side faces convex; marginal edge surrounded with two clear bands, the upper stretched down to the anterior 0.4 of the test, thicker than the lower, widest at the apertural end, then gradually narrowing towards its lateral terminals, at last becoming two minute spines obliquely

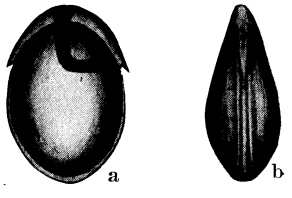


Fig. 3.
Lagena bispina HADA sp. nov. × 145.
a. Side view.
b. Peripheral view.

apart from the test, the lower keeled throughout; wall translucent; aperture fissurine with a curved entosolenian tube.

Length, 165μ; breadth, 112μ; thickness, 67μ.

Locality:—Off Akkenshi Bay.

This small new species differs from *Lagena lucida* (WILLIAMSON) in possessing lateral spines and from *L. uncinata* HERON-ALLEN & EARLAND in the structure of spines and an inner tube.

Fig. 4.
Lagena intermedia HADA sp. nov.
×155.

Lagena intermedia HADA sp. nov.

Figure 4

Test oblong, 0.3 of the length in breadth, somewhat compressed, provided with a tube consisting of a short neck of 0.2 of its total length with a radiate lip and of an inner tube of 0.17 of the length of the test; both ends rounded; wall thin, translucent.

Length, 272μ; breadth, 80μ.

Locality:—Off Hamanaka Bay.

This new species differs from all species of the genus *Lagena* in having an ectosolenian tube and also an entosolenian one.

Lagena cucurbita HADA sp. nov.

Figure 5

Test gourd-shaped with a subterminal short neck, 0.5 of the length in breadth, slightly constricted a little below the the middle, almost circular in crass section; both ends semispherical; surface smooth; aperture opening at the end of the conical ectosolenian tube of 0.1 of the length of the test in length; brackish.

Length, 450μ; breadth, 220μ.

Locality:—Lake Hijirippu.

This brackish species differs from most species of *Lagena* in its gourd-shaped form and in the subterminal position of a neck.

Fig. 5.
Lagena cucurbita HADA sp. nov.
×80.

摘　　要

北日本近海産の新單室有孔蟲類

東北海道の太平洋岸及び北千島に於て採集せる有孔蟲類の研究資料中より檢出せる石灰質よりな

る單室有孔蟲 *Lagena* 屬に屬する次の5新種を報告する. 其のうち最後の種は汽水產である.

種　名	採集地
Lagena compressa HADA sp. nov.	幌莚島, 霧多布沖
L. curta HADA sp. nov.	厚　岸　沖
L. bispina HADA sp. nov.	厚　岸　沖
L. intermedia HADA sp. nov.	霧多布沖
L. cucurbita HADA sp. nov.	火散布沼

從來, 研究者によつては entosolenian tube を有する種は *Entosolenia* 又は *Oolina* 屬に入れ *Lagena* 屬より分離してゐたが, 今回の研究で ectosolenian tube が發達せるに拘らず殼室中で伸びて entosolenian tube となれる兩屬の特性を共有せる新種 *Lagena intermedia* を發見した. 故に *Entosolenia* 又は *Oolina* 屬は獨立せる屬とは認め得ない. 從つて石灰質よりなる單室有孔蟲類は凡て *Lagena* 屬一屬に總括さるべきものと考へる.

Description of a New Genus and Species of *Cottidae* from the Western Coast of Hokkaido

By

Shoichi NOJIMA

(能 島 正 一)

With 1 text-figure

Japonopsychrolutes NOJIMA, gen. nov.

Body tadpole-shaped, tapering from anterior portion of the dorsal to tail, covered with thin, loose, movable skin, no scales, prickles nor bony plates; the head large, depressed, no spines, with small mucous pores, small tentacles; mouth large, oblique; the jaws about equal, with bands of teeth; vomer with teeth, palatines with none; fleshy flaps on lower side of the mandible; gills 4; no slit behind the last arch; gill membranes united, narrowly joined to the isthmus; pseudobranchia very small; branchiostegals 7; lateral pores present.

Two dorsal fins continuous, embedded in the loose skin, the soft dorsal longer than twice the length of spinous part, rays higher than spines; spines very slender, flexible; pectoral large, long; ventral I, 3; caudal rounded.

The present genus is very closely allied to *Psychrolutes* GÜNTHER. But it is distinct having teeth on the vomer and fleshy flaps on the mandible. In addition the lateral pores are present and the soft dorsal longer than twice the length of spinous part.

Type—*Japonopsychrolutes dentatus* NOJIMA.

Nom. Jap. *Yagishirikajika-zoku.* (n. n.).

Japonopsychrolutes dentatus NOJIMA, sp. nov.

Measurements in hundredths of length without caudal fin (254 mm.); depth of body 20.0; width of body 17.7; length of head 33.4; width of head 30.3; depth of caudal peduncle 7.8; interorbital width 7.4; diameter of eye 5.9; diameter of orbit 7.9; length of snout 6.2; length of maxillary 18.5; width at angles of mouth 21.0; distance from tip of lower jaw to anus 54.0.

Dorsal IX, 23; anal 18; caudal 18; pectoral 23; ventral I, 3; lateral pores 18.

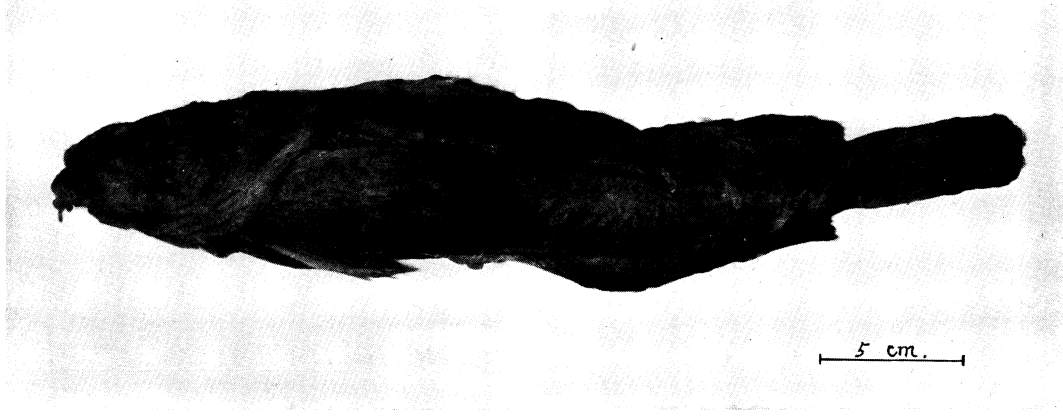
Body slightly compressed, tapering from anterior portion of the dorsal to

Trans. Sapporo Nat. Hist. Soc., Vol. XIV, Pt. 4, 1936.

the tail, covered with very loose and movable skin, small tentacles scattered along the anterior half of the lateral line. Head large, depressed, flattish above, no spines; the skin of head with small pores; mouth large, oblique; snout shorter than the orbit; eye-ball sunken; maxillary reaches a point vertically below the posterior margin of the eye; small conical teeth on both jaws and the vomer; interorbital space broad, flat; nostrils two pairs, slender, thin tubes, having length $\frac{1}{2}$ diameter of pupil; upper margins of maxillaries, orbital rim, preopercular portions and gill-covers with small tentacles; fleshy flaps on the lower margin of mandible 3 pairs, the middle pair the largest; flaps at the ends of both side of maxillaries 1 pair; a large glandular pore at the base of each flap on the side toward symphysis of mandible. Gill arches 4, no gill-slit behind the last gill-arch; gill membranes united, narrowly joined to the isthmus, gill opening extending to slightly below base of pectoral; pseudobranchia present, very small; branchiostegals 7; lateral line obsolete, with 18 pores.

Dorsal fin without a notch between the spinous and rayed portion, both portions embedded in the loose skin, the soft dorsal longer than twice the length of spinous part, ray higher than spine; spines very slender, flexible; anal embedded in loose skin also; posterior end of dorsal and anal free from caudal; caudal rounded; pectoral large and long, with 23 rays, the lower 5 swollen, the longest ray reaching to origin of anal; ventral reaching to middle of body, not vent.

Color; in formalin, body and head whitish gray, with large clouded slightly dark blotches on back and sides; lower part of head, abdomen, breast and chest white; edge of caudal black; anal with black blotches; ventral white; peritoneum white.



Japonospychrolutes dentatus sp. nov. From the type.

A specimen of this species was collected off Yagishiri Island, Hokkaido in the Japan Sea.

Nom. Jap. *Yagishirikagika*. (n. n.)

摘　　要

カジカ科ノ一新屬一新種

本種は北海道西岸燒尻島近海にて採集せられたるものなり．ウラナイカジカ屬 *Psychrolutes* GÜNTHER に似てゐるが下記の諸點が主に異なる．鋤骨に齒，下顎に三對の稍大なる房狀の肉質突起物が存する．尙側線は明瞭ではないが側線孔十八ヶを數ふることが出來る，脊鰭の棘條部の基底の長さが軟條部の長さの二分の一より短い．よつてこの種を新屬新種とした．

The Spiders Collected by the Late Mr. Sadae TAKAHASHI, with Descriptions of Two New Species[1)]

By

Saburo SAITO

(齋 藤 三 郎)

With two text-figures

The *Araneina* in the collection of the late Mr. Sadae TAKAHASHI was examined by the writer at the kind requist of Dr. Yaichiro OKADA, Dr. Taku KOMAI and the younger brother of the deceased, Mr. Shin TAKAHASHI. The specimens are about thirty in number and identified as the following eight known and two new species.

1. ***Heteropoda venatoria*** (LINNAEUS) No. 602, 609

One male and two females. Male and one female collected from the South Sea Islands on December, 1936 represented by the cast-off skin of the part of cephalothorax. Another female without label shows the following dimentions (cm) :—total length, 2.50; length of abdomen, 1.35; leg I, 4.70; leg II, 5.15; leg III, 4.20; leg IV, 4.85.

2. ***Thomisus onustoides*** Bös. et STRAND No. 610

A single female specimen collected on December 31, 1930 at the residential land in front of the primary school of Kwarenko(花蓮港), Formosa. The measurements(cm) are as follows:—total length, 0.85; length of abdomen, 0.45; leg I, 1.20; leg II, 1.20; leg III, 0.75; leg IV, 0.85.

3. ***Plexippus Paykulli*** (AUDOUIN) No. 608

Only one female specimen collected on August 22–25. The locality missed. This cosmotropical species common to the Old and New Worlds. The measurements(cm) are as follows:—total length, 0.90; length of abdomen, 0.60; leg I, 0.90; leg II, 0.85; leg III, 1.00; leg IV, 1.05.

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1) A part of the Memorial Edition for the late Mr. Sadae TAKAHASHI.

Trans. Sapporo Nat. Hist. Soc., Vol. XIV, Pt. 4, 1936.

4. ***Nephila maculata*** (FABRICIUS) No. 598, 599

Four adult females collected at Formosa. According to the note of the collector this spider lives specially at the damp region in the mountain.

No.	Sex	Locality	Date	Measurements (cm)					
				Total length	Length of abdomen	Leg I	Leg II	Leg III	Leg IV
598	♀	Formosa	August, 1934	4.30	3.05	9.35	7.95	5.10	8.45
598	„	„	„	4.20	3.05	8.90	7.30	4.75	7.45
599	„	On the way to Botansha (ボタン社) from Shijuke (四重溪)	March 3, 1930	3.85	2.75	9.00	7.38	4.75	7.75
599	„	„	„	4.58	3.10	9.67	7.60	5.05	8.20

5. ***Argiope amoena*** L. KOCH No. 607

An adult female specimen without locality collected on July, 1929. The measurements (cm) are as follows:—total length, 1.45; length of abdomen, 0.95; leg I, 3.30; leg II, 3.20; leg III, 2.05; leg IV, 3.15.

6. ***Araneus sia*** STRAND No. 608

A single subadult male specimen judging from the black characteristic markings of the abdomen. Without locality. Collected on August 22–25. The measurements (cm) are as follows:—total length, 0.85; length of abdomen, 0.50; leg I, 1.10; leg II, 1.10; leg III, 0.70; leg IV, 1.05.

7. ***Araneus ventricosus*** L. KOCH No. 605

One subadult female collected on July, 1932 at Taihoku. The measurements (cm) are as follows:—total length, 2.60; length of abdomen, 1.65; leg I, 3.80; leg II, 3.65; leg III, 2.65; leg IV, 3.65.

8. ***Atypus Karschi*** DÖNITZ No. 611

A single female collected on August, 1930 at Kwarenko. The measurements (cm) are as follows.—total length, 1.20; length of abdomen, 0.55; leg I, 1.00; leg II, 0.80; leg III, 0.75; leg IV, 1.00.

9. ***Lycosa Takahashii*** sp. nov. No. 604

Jap. name. *Sunawara-Dokugumo.*

(Fig. A)

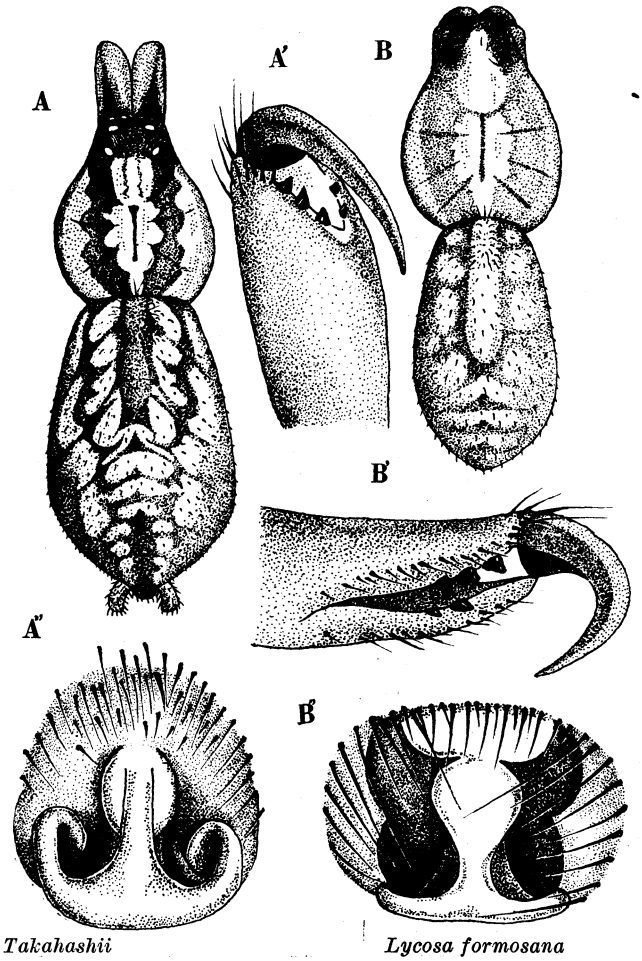
Two females collected on August 21, 1930 at the sea-shore of Kwarenko.

Cephalothorax convex; caput high, lowers posteriorly. Cervical groove indefinite and median groove obvious. Anterior row of eyes almost straight and somewhat shorter than median row. Posterior median eyes largest, anterior lateral eyes smallest and posterior lateral eyes larger than anterior median eyes. Eye-ratio 5:4:3:1. Four anterior eyes nearly equidistant, separated from each other by the diameter of its lateral eye. Distance of two posterior median eyes somewhat larger than the diameter. Posterior lateral eyes separated from each other by five times, from median eyes by two times their diameters. Clypeus nearly equal to the diameter of anterior median eye. Chelicerae with black long hairs, comparatively slender and furnished with three teeth at lower margin. Labium as long as wide, pointed bluntly in front and rounded behind. Maxillae wider in front than at base in ratio 3:2; both outer and anterior margins diverging slightly and both inner margins converging strongly. Sternum egg-shaped, convex, with convex anterior margin and posterior blunt end; the widest part between the second legs equalls to two-thirds of length, sparsely clothed with long black hairs. Each leg furnished with three pairs of spine at the under side of femur and tibia respectively.

Colour in alcohol: Cephalothorax dull yellow, with black caput and sepial marginal, median lines and submarginal band. Chelicerae brown, furnished with black teeth and fangs. Labium and maxilla dull yellow, discoloured to light yellow at anterior parts. Sternum darker than the maxilla. Legs blight yellow, annulated with sepial bands as follows: trochanter with 1, femur with 2, patella with 1, tibia with 2, metatarsus with 3. Abdomen beneath bright yellow, and above yellow ornamented with light black markings (Fig. A). The measurements(cm) are as follows:—

Sex	Total length	Length of abdomen	Leg I	Leg II	Leg III	Leg IV
♀	1.15	0.65	1.70	1.70	1.70	2.05
♀ (immature)	0.90	0.55	1.15	1.15	1.15	1.45

Remarks: This species is closely allied to *Lycosa dilatata* O. P. CAMBRIDGE, but it is easily distinguished by the following distinct charatceristics:—the stem of the central process of epigynum is short and the cross-piece is large (Fig. A″). The venter is pale yellow and there is no any markings, while *L. dilatata*, according to the original descriptions, has a narrow central-dusky band running from the epigynum to the spinnerets, and the central process of epigynum is much longer than the breadth of the crosspiece.



Lycosa Takahashii

A : Female removed the legs and palpi.
A′ : Right chelicera from beneath.
A″ : Epigynum.

Lycosa formosana

B : Female removed the legs and palpi.
B′ : Right chelicera from beneath.
B″ : Epigynum.

[Original]

10. ***Lycosa formosana*** sp. nov. No. 600

Jap. name. *Akane-Dokugumo.*

(Fig. B)

Three females collected on November 4, 1930 at Kwarenko. Cephalothorax circular with high caput: cervical groove very faint, three pairs of radial, and a median grooves obviously distinguishable. Eight eyes in three rows black; posterior median eyes most largest, auterior lateral eyes smallest, and posterior lateral ones larger than anterior median ones: their ratio in diameter, 2:3:6:8;

four anterior eyes equidistant, separating from each other by the radius of its lateral eye; quadrangle of four posterior eyes trapezoid, height and anterior margin of which equal to three times and posterior margin to four times the diameter of posterior median eye. Clypeus narrow, nearly equal with radius of anterior lateral eye. Chelicerae strong, furnishing with long brown hairs and armed with three teeth at lower margin. Labium triangular with obtuse vertex and rounded base and furnished with black long hairs at vertex. Maxillae hairly, the length attaining three times height of labium; outer margins of both maxillae nearly parallel, inner margin converging and anterior margins diverging. Sternum convex, nearly circular and furnished thinly with short brown hairs. Each leg armed with spines as follows:—underside of tibia and metatarsus with 3 pairs respectively, and above 4 at femur, 3 at patella, 4 at tibia, 3 pairs at metatarsus. Abdomen oblong oval and nearly equal with the cephalothorax in length.

Colour in alcohol: Cephalothorax bright yellowish brown with deep brown median groove and pale black slender marginal and broad submarginal bands. Chelicera, labium, maxilla and sternum yellow, but sternum somewhat darker than others, and fangs deep brown. Legs beneath light yellow, above dull yellow, annulated indistinctly with pale black colour. Abdomen beneath light yellow, above dull yellow with a heart marking and pale black transverse lines (Fig. B). The measurements (cm) are as follows:—

Sex	Total length	Length of abdomen	Leg I	Leg II	Leg III	Leg IV
♀	1.00	0.48	1.65	1.65	1.60	2.30
„	0.93	0.50	1.60	1.60	1.60	2.05
„	0.90	0.50	1.65	1.65	1.60	2.13

Remarks: This species is very allied to *Lycosa constricta* O. P. CAMBRIDGE, but differs in the body-colour and the form of epigynum. *L. constricta* has a distinct marking on abdomen, namely according to the original paper "abdomen usually olive-brown, with a darker shoulder-spot and a dark, anterior, central, lanceolate, dorsal bar, followed by a series of indistinct yellow chevrons, the anterior ones disconnected in the middle". Epigynum is broader than long in both species, but in the present species not so large in proportion as in *L. constricta* (Fig. B″).

摘　　要

二新種を含む故高橋定衞氏採集蜘蛛

故高橋定衞氏が主として臺灣で採集された蜘蛛約 30 個體の査定結果を岡田彌一郎博士，駒井卓博士並に故人令弟高橋憲，三氏の計畫なる故人紀念出版の一部として茲に記す．査定種は次の 8 既知種及び 2 新種である．

1. *Atypus Karschi* DÖNITZ
2. *Heteropoda venatoria* (LINNAEUS)
3. *Thomisus onustoides* BÖS. et STRAND
4. *Plexippus Paykulli* (AUDOUIN)
5. *Nephila maculata* (FABRICIUS)
6. *Argiope amoena* L. KOCH
7. *Araneus sia* STRAND
8. *Araneus ventricosus* L. KOCH
9. *Lycosa Takahashii* sp. nov.　スナハラドクグモ（新稱）
10. *Lycosa formosana* sp. nov.　アカネドクグモ（新稱）

Contributions to the Flora of Northern Japan VIII

By

Kingo MIYABE and Misao TATEWAKI
(宮部金吾・舘脇操)

125. *Cyrtomium Fortunei* J. SMITH, Ferns Brit. & For. (1866), 286; HOOK. & BAK. Syn. Fil. (1867), 257; TAGAWA, in Acta Phytotax. et Geobot. III. (1934), 61, *pl. II. fig. 5–9.*

Aspidium falcatum Sw. var. *Fortunei* MAKINO, in Bot. Mag. (Tokyo), X. (1896), (212).

Polystichum falcatum DIELS, var. *Fortunei* MATSUM. Ind. Pl. Jap. I. (1904), 342.

Polystichum Fortunei NAKAI, in Bot. Mag. (Tokyo), XXXIX. (1925), 116; MAKINO & NEMOTO, Fl. Jap. ed. 2, (1931), 100.

NOM. JAP. *Yabusotetsu.*

HAB. *Yezo.* Isl. Okushiri (KINGO TOGASHI, VI. 7, 1935).

DISTR. Yezo, Honshu, Shikoku, Kyushu, Korea and SE. China.

Remarks. New to the flora of Hokkaido and Saghalien.

126. Salix Kimurana MIYABE ET TATEWAKI, sp. nov.

Salix berberifolia PALL. var. *Kimurana* MIYABE ET TATEWAKI, in Trans. Sapporo Nat. Hist. Soc. XIV. (1935), 84.

NOM. JAP. *Karafuto-megiyanagi.*

After the careful studies of this interesting willow, DR. A. KIMURA came to the conclusion that it is better to be treated as a distinct species, to which opinion the writers agree. From *Salix berberifolia* PALL., the present species is readily distinguished by the absence of stomata on the upper surface of leaves and by the growth of hairs near the apex of both dorsal and ventral sides of the carpel, and also by the elongated catkin.

127. Salix yezoensis KIMURA: KIMURA, in MIYABE & KUDO, Fl. Hok. & Saghal. IV. (1934), 430.

NOM. JAP. *Yezo-no-kinuyanagi.*

[Trans. Sapporo Nat. Hist. Soc., Vol. XIV, Pt. 4, 1936]

HAB. *S. Kuriles.* Isl. Kunashiri: at the foot of Mt. Tomari (M. TATEWAKI, VIII. 20, 1936).

Remarks. New to the flora of the Kuriles.

128. Alnus japonica SIEB. ET ZUCC. var. **arguta** CALL.: MIYABE & KUDO, in Journ. Fac. Agr. Hokkaido Imp. Univ. XXVI. (1934), 468.

NOM. JAP. *Yezo-hannoki, Yachihannoki.*

HAB. *S. Kuriles.* Isl. Kunashiri: Zenbekotan (M. TATEWAKI, VIII. 22, 1936).

Remarks. New to the flora of the Kuriles.

129. Betula avatschensis (*avaczensis*) KOMAR. in FEDDE Repert. Sp. Nov. XIII. (1914), 166, et Fl. Pen. Kamtschat. II. (1929) 43; SCHNEID. in SARG. Pl. Wils. II. (1916), 488.

Betula platyphylla × *Betula Ermani* Hult. Fl. Kamtchat. II. (1928), 33.

Betula Ermani × *Betula japonica* KUZENEVA, in KOMAR. Fl. URSS. V. (1936), 279.

Betula Tauschii KOIDZ. var. *avatschensis* MIYABE ET KUDO, Fl. Hok. & Saghal. IV. (1934), 465.

NOM. JAP. *Okuyezo-shirakamba.*

HAB. *S. Saghalien.* Distr. Shikka: Handasawa (S. SUGAWARA & U. KIMOTO, VII. 11, 1936).

Yezo. Prov. Shiribeshi: Hariusu (M. HARA, IX. 8, 1936).

Remarks. New to the flora of Hokkaido and S. Saghalien.

130. Aquilegia japonica NAKAI ET HARA, in Bot. Mag. (Tokyo), XLIX. (1935), 7.

form. **Konoi** MIYABE ET TATEWAKI, form. nov.

A typo differt petalis ecalcaribus.

NOM. JAP. *Rishiri-odamaki* (n. n.).

HAB. *Yezo.* Prov. Kitami: Mt. Rishiri (R. KÔNO, VIII. 1934).

131. Miyakea integrifolia MIYABE ET TATEWAKI, in Trans. Sapporo Nat. Hist. Soc. XIV. (1935), 3, *f. 1.*

Scapus fructifer sub involucrum molliter-villosus 5–10 cm longus 2–4 mm latus. Pedunculi fructiferi molliter-villosi valde elongati 10–15 cm longi. Receptaculum fructiferum hemisphaericum ca. 5 mm longum 3 mm latum. Achaenia lineari-fusiformia ca. 5 mm longa densissime villosa. Styli fructiferi plumosi ca. 3.5 cm longi infra medium purpurei.

NOM. JAP. *Hitotsuba-okinagusa.*

HAB. *S. Saghalien.* Distr. Shikka: the upper Ennai (M. TATEWAKI & Y. TAKAHASHI, VI. 17, 1936–type fr. in Herb. Fac. Agr. Hokkaido Imp. Univ.); Naruko (M. TATEWAKI & Y. TAKAHASHI, VI. 26, 1936); the upper Naruko (B. YOSHIMURA, VIII. 1936); Mt. Kawashima (M. KAWASHIMA, VII. 16, 1935; S. SUGAWARA, VIII. 3, 1935; M. TATEWAKI & Y. TAKAHASHI, VI. 21, 23 & 29, 1936); Mt. Shiroji (S. SUGAWARA, VIII. 7, 1935).

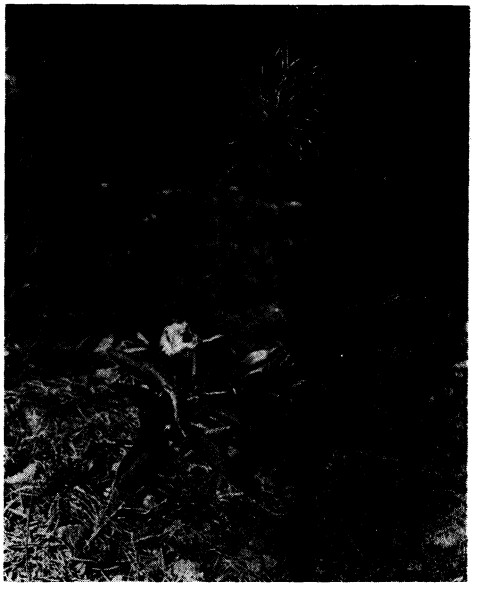


Fig. 12. *Miyakea integrifolia.* Mt. Kakashima, S. Saghalien. (VI. 21, 1936)

Remarks. As one of the generic characters, we should like to add the striking character of the peduncle. After defloration, the peduncle rapidly elongates in length generally 2 to 3 times the length of the scape. The plant is distributed in the north-eastern part of Southern Saghalien situated between the River Poronai and Ochotsk Sea. It is not a rare plant in this district. It is not surprising to know that the plant would turn up some day in the Ajan and Ochotsk districts.

Clavis Specierum Papaverum Boreali-Japoniae.

1 { Petala alba vel alborosea. 2
  { Petala flava. 3

2 { Herba humilis 4–10 cm alta. Petala 4–10 mm longa. Capsula 6–10 mm longa. ..... *Papaver alboroseum*
  { Herba 10–25 cm alta. Petala 10–15 mm longa. Capsula 10–15 mm longa. ..... *Papaver alboroseum,* var. *elongatum*

3 { Capsula oblongo-ovata clavato-obovata vel obovata. ..... *Papaver ochotense*
  { Capsula late ovoidea vel globosa. 4

4 { Folia bipinnatilobata vel pinnatisecta, lobis oblongo-ovatis oblongis vel anguste oblongis, ad apicem late cuneatis interdum mucronulatis vel obtusis. Flores 1–2.5 cm in diametro in sicco. Capsula ovoidea vel late ovoidea 7–10 mm longa 5–8 mm lata. 5
  { Folia plerumque pinnatipartita, lobis latioribus apice rotundatis vel rotundato-obtusis corniculatis. Flores (2.5)–3–5 cm in diametro in sicco.

Capsula globosa vel late ovoidea 1–1.5 cm lata et longa..... ..... *Papaver Miyabeanum*

5 Folia plerumque bipinnatilobata, lobis oblongis vel oblongo-ovatis ad apicem late cuneatis interdum mucronulatis. ..... *Papaver Fauriei*

Folia pinnatisecta, lobis anguste oblongis vel oblanceolatis obtusis, inferioribus saepe tripartitis. ..... *Papaver Stubendorfii*

132. Papaver alboroseum HULT. Fl. Kamtchat. II. (1928), 141, *fig. 12, b–c, Pl. III. fig. C*; KOMAR. Fl. Pen. Kamtschat. II. (1929), 159; TATEWAKI, Vas. Pl. N. Kuriles, (1934), 271.

Papaver nudicaule L. var. *Fauriei* KUDO, Fl. Isl. Paramushir, (1922), 109, (non FEDDE).

Papaver nudicaule L. var. *kurilense* TATEWAKI, form. *pilosum* TATEWAKI, Pl. Isl. Alaid, (1927), 16.

NOM. JAP. *Hosoba-no-araitohinageshi.*

HAB. *N. Kuriles.* Isl. Alaid: Gotôsan (H. ITO & G. KOMORI, 1926); Kitaura (M. TATEWAKI, 1930). Isl. Paramushir: Kakumabetsu (M. AIZAWA, VI. 22, 1900); Suribachiwan (Capt. OBAMA, 1932); Nishikawa (J. OHWI & R. YOSHII, 1934).

var. **elongatum** HULT. l. c. *fig. 12, a, Pl. III. fig. a–b*; KOMAR. l. c.

Papaver nudicaule L. var. *kurilense* TATEWAKI, Pl. Isl. Alaid, (1927), 16, p. p.

NOM. JAP. *Araito-hinageshi.*

HAB. *N. Kuriles.* Isl. Alaid: Karasawa, Minamiura (H. ITO & G. KOMORI, 1926), Minamiura (J. OHWI & R. YOSHII, 1934).

DISTR. *sp.* N. Kuriles and Kamtchatka.

133. Papaver Fauriei FEDDE, in sched. Herb. Reg. Berol., et in Repert. VII. (1909), 257, (pro syn.).

Papaver nudicaule L. subsp. *xanthopetalum* FEDDE, var. *Fauriei* FEDDE, Repert. VII. (1909), 257, et in ENGL. Pfl.-reich. IV.–104. (1909), 380.

Papaver alpinum L. var. *microcarpum* KAWAKAMI, in Bot. Mag. (Tokyo), XIV. (1900), (111), (non LEDEB.).

Papaver nudicaule MAKINO, in Bot. Mag. (Tokyo), XVII. (1903), 163, et XIX. (1905), 111, p. p.; MATSUM. Ind. Pl. Jap. II.–2. (1912), 146, p. p. (non L.).

NOM. JAP. *Rishiri-hinageshi.*

HAB. *Yezo.* Prov. Kitami: Mt. Rishiri (W. HIROSE, 1896; T. KAWAKAMI, 1899; M. MIURA, 1907; M. TATEWAKI, 1920; S. KOMIYA, 1934; K. SHIRAHAMA, 1934; G. HADA, 1934; B. YOSHIMURA, 1935).

DISTR. Endemic.

134. Papaver Miyabeanum TATEWAKI, in sched. Herb. Fac. Agr. Hokkaido Imp. Univ.; MIYABE & TATEWAKI, in Trans. Sapporo Nat. Hist. Soc. XIV. (1935), 5, (pro syn.).

Papaver nudicaule MATSUM. Ind. Pl. Jap. II.–2. (1912), 146, p. p. (non L.).

Papaver nudicaule L. subsp. *xanthopetalum* FEDDE, var. *shimshirense* MIYABE ET TATEWAKI, in Trans. Sapporo Nat. Hist. Soc. XIV. (1935), 5.

Papaver nudicaule L. subsp. *xanthopetalum* FEDDE, var. *Fauriei* TATEWAKI, Phytogeogr. M. Kuril. (1933), 198, 227, 296, (non FEDDE).

Fig. 13. *Papaver Miyabeanum.* Isl. Shimushir, Middle Kuriles. (VIII, 11. 1928).

NOM. JAP. *Chishima-hinageshi.*

HAB. *Middle Kuriles.* Isl. Urup, Isl. Shimushir and Isl. Matsuwa.

DISTR. Endemic.

135. Papaver ochotense A. TOLM. in Journ. Soc. Bot. Russ. XVI. (1931), 82, *fig. 3, 4.*

NOM. JAP. *Shikka-hinageshi,* (n. n.).

HAB. *S. Saghalien.* Distr. Shikka: Mt. Kawashima (M. KAWASHIMA, 1935; S. SUGAWARA, 1935; M. TATEWAKI & Y. TAKAHASHI, 1936); Mt. Shiroji (S. SUGAWARA, 1935); Alpine Meadow in the upper Chirikoro (M. KAWASHIMA, 1935); Mt. Chônosuke (B. YOSHIMURA, 1936).

DISTR. S. Saghalien, in the North Eastern Portion of the SCHMIDT LINE and Ochotsk Region.

136. Papaver Stubendorfii A. TOLM. in Journ. Soc. Bot. Russ. XVI. (1931), 80, *fig. 2, 4.*

Papaver nudicaule L. subsp. *xanthopetalum* FEDDE, var. *typicum* MIYABE ET TATEWAKI, in Trans. Sapporo Nat. Hist. Soc. XIV. (1935), 5, (non FEDDE).

NOM. JAP. *Karafuto-hinageshi.*

HAB. *S. Saghalien.* Distr. Motodomari: the upper Kashipo (S. SUGAWARA, VI. 20, 1933).

DISTR. Saghalien and Eastern Siberia.

Remarks. New to the flora of Saghalien.

137. Arabis borealis ANDRZ. in LEDEB. Fl. Alt. III. (1831), 25, in nota; FISCH. ET MEY. Ind. Quint. Sem. Hort. Petrop. (1839), 33; TRAUTV. ET MEY. Fl. Ochot. (1856), 14; BUSCH, in Fl. Sib. Or. Extr. IV. (1926), 440, cum fig. (*A. borealis* DC.).

Arabis Gerardi BESS. var. *borealis* REGEL, Pl. Radd. (1861), 162.

Arabis hirsuta SCOP. var. *borealis* FEDTSCH. Fl. Command. (1906), n. 20.

NOM. JAP. *Chirie-hatazao.* (n. n.).

HAB. *S. Saghalien.* Distr. Shikka: Kumakoshi-tôge, the upper Ennai (M. TATEWAKI & Y. TAKAHASHI, VI. 16, 1936).

DISTR. Saghalien, Kamtchatka, Islands in Bering Sea, Ochotsk, Amur and Siberia.

Remarks. New to the flora of Japan.

138. Cardamine chiriensis MIYABE ET TATEWAKI, sp. nov.

Perennis glaberrima. Rhizoma breve multi-internodosum, flavescens, reliquis petiolorum albis obtectum, radicibus simplicibus filiformibus. Caules (7)–10–15–(18) cm alti adscendentes simplices. Folia simplicia integra crassa glauca, apice obtuso-apiculata, margine revoluta crassiora saepe purpurascentia, nervis subtus saepe prominente elevato-reticulatis; radicalia plerumque 1, oblanceolata longe petiolata; caulina (2)–3–4–(5); inferiora oblanceolata vel obovato-oblanceolata petiolata cum petiolis 2–5 cm longa 3–6 mm lata; superiora sursum gradatim minora breviter petiolata vel subsessilia saepe basi attenuata. Racemus 3–7–(9) florus. Sepala oblongo-ovata anguste albo- vel purpureo-marginata ca. 3 mm longa 1–1.5 mm lata. Petala alba unguiculata obovato-oblonga 7 mm longa 2.5–3 mm lata. Stamina longiora ca. 3 mm longa, breviora 2 mm longa. Glandulae nectariferae medianae majusculae breviter spatulatae integerrimae; laterales annulares stamina breviora circumcingentes. Pedicelli erecto-patuli 5–10–(15) mm longi. Siliquae erectae vel erecto-patentes 20–25 mm longae, in stylum usque ad 2–5 mm longum attenuatae.

NOM. JAP. *Narukosô.* (n. n.).

HAB. *S. Saghalien.* Distr. Shikka, Chirie-gun: Mt. Kawashima (M. KAWASHIMA, VII. 16, 1935; S. SUGAWARA, VIII. 3, 1935; M. TATEWAKI & Y. TAKAHASHI, VI. 21, 1936–type fl. in Herb. Fac. Agr. Hokkaido Imp. Univ., VI. 23 & 29, 1936); Mt. Naruko, the upper Naruko (M. KAWASHIMA, VII. 12, 1935; B. YOSHIMURA, VIII. 14, 1936–type fr. in Herb. Fac. Agr. Hokkaido Imp. Univ.); Naruko (M. TATEWAKI & Y. TAKAHASHI, VI. 26, 1936); Mt. Asase (S. SUGAWARA, VIII. 9, 1935).

Fig. 14. *Cardamine chiriensis*

Remarks. The present species is very closely related to *Cardamine Victoris* N. Busch (Fl. Sib. et Or.-As. VI. 706, cum fig.), to which fact Mr. HIROSHI HARA has most kindly called our attention, by sending us a photographic reproduction of the description and figures of the plant from Penshingskaja Territory.

Our plant may probably better be treated as a variety of *Cardamine Victoris,* but as there are so many points of clear distinction between them, we have treated the Saghalien plant tentatively as a new species.

The plant in question differs form *Cardamine Victoris* by the character of the rhizome which is somewhat thickened and composed of several closely set

nodes, from which single wiry roots and the remnants of the white base of petioles are produced, and also by the leaf which is conspicuously wider, being 3–6 mm long and oblanceolate in shape, and is coriaceous and prominently reticulated on the undersurface.

139. Draba ussuriensis POHLE, in Bull. Jard. Imp. Bot. de Pierre le Grand XIV. (1914), 470; BUSCH, in Fl. Sib. Or. Extr. III. (1919), 372, cum fig.; SCHULZ, in ENGL. Pfl.-reich. IV.–105. (1927), 189; HARA, in Journ. Jap. Bot. IX. (1933), 513.

form. **plena** MIYABE ET TATEWAKI, form. nov.

Flores pleni.

NOM. JAP. *Yayezaki-okuyezo-nazuna.* (n. n.).

HAB. *S. Saghalien.* Distr. Shikka: Mt. Kawashima (M. TATEWAKI & Y. TAKAHASHI, VI. 23, 1936).

140. Thlaspi japonicum BOISS. in Herb. Boiss. VII. (1899), 797; TAKEDA & TANABE, Photo-Atlas Alp. Pl. Jap. II.–9. (1932), 114, *pl. 390.*

var. **sagittatum** MIYABE ET TATEWAKI, var. nov.

Folia caulina ovato- vel oblongo-sagittata, auriculis acuminatis vel acutis. Cetera ut in typo.

NOM. JAP. *Tengu-gunbai.* (n. n.).

HAB. *Yezo.* Prov. Ishikari: Mt. Tengu near Jôzankei (H. OHTANI, VI. 15, 1930–type in Herb. Fac. Agr. Hokkaido Imp. Univ.).

141. Sedum Middendorffianum Maxim. Prim. Fl. Amur. (1859), 116, et in Mél. Biol. XI. (1883), 760; MAST. in Gard. Chron. (1878), II. 267; KUDO, Rep. Veg. N. Saghal. (1924), 152; KOMAR. & KLOB.-ALIS. Key Pl. Far East. Reg. I. (1931), 601; H. FRODERSTR. in Acta Hort. Goth. Tom. X. (1935), app. 202; Nemoto, Fl. Jap. Suppl. (1936), 279.

Sedum hybridum TRAUTV. ET MEY. Fl. Ochot. (1856), n. 137, (non L.).

NOM. JAP. *Yanagiba-kirinso, Hina-kirinsô.*

HAB. *S. Saghalien.* Distr. Shikka: Along the R. Naruko (M. TATEWAKI & Y. TAKAHASHI, VI. 27, 1936); Mt. Chônosuke, the upper Naruko (B. YOSHIMURA, VIII. 10, 1936).

DISTR. Saghalien, Corea, Amur and Ochotsk.

Remarks. New to the flora of S. Saghalien.

142. Potentilla uniflora LEDEB. in Mém. Acad. Imp. Sc. St. Pétersb. V. (1812), 543; DC. Prodr. II. (1825), 572; RYDBG. in N. Am. Fl. XXII.–4. (1908), 332; HULT. Fl. Kamtchat. III. (1929), 68, *fig. 8, e–f.*

Potentilla macrantha LEDEB. var. *uniflora* G. DON, Gen. Hist. (1832), 550.

Potentilla villosa PALL. var. *uniflora* LEDEB. Fl. Ross. II. (1844), 58.

Potentilla nivea L. var. *uniflora* RYDBG. in Bull. TORREY Bot. Club, XXIII. (1896), 303.

NOM. JAP. *Karafuto-urajirokinbai.* (n. n.).

HAB. *S. Saghalien.* Distr. Toyohara: The upper Hareki near Konuma (U. KIMOTO, VI. 28, 1936).

DISTR. Saghalien, N. Kuriles, (var. *ampla* HULT.) Kamtchatka, Chukuch Penins., Dahuria and N. America.

Remarks. New to the flora of Saghalien.

143. Oxytropis campestris DC. Astr. (1802), 59, fol. 74, et Prodr. II. (1825), 278; LEDEB. Fl. Ross. I. (1842), 591; RGL. ET TIL. Fl. Ajan. (1859), 76; FR. SCHM. Fl. Sachal. (1866), 123; ASCHERS. U. GRAEBN. Syn. VI.–2. (1909), 820; MIYABE & MIYAKE, Fl. Saghal. (1915), 107, p. p.; KUDO, Rep. Veg. N. Saghal. (1924), 171, p. p.; KOMAR. & KLOB.-ALIS. Key Pl. Far East. Reg. USSR. I. (1932), 672.

Astragalus campestris L. Sp. Pl. ed. 1, (1753), 761.

Phaca campestris WAHLB. Veg. Helv. (1813), 130.

NOM. JAP. *Takane-ohgi.*

HAB. *S. Saghalien.* Distr. Toyohara: The upper Hareki (H. NISHIYAMA, VII. 17, 1936–fl.).

144. Geranium erianthum DC. Prodr. I. (1824), 641; NAKAI, in Bot. Mag. (Tokyo), XXIII. (1909), 101, et ibid. XXVI. (1912), 257; KNUTH, in ENGL. Pfl.-fam. IV.–129. (1912), 122.

var. **angustifolium** MIYABE ET TATEWAKI, var. nov.

A typo differt, lobis foliorum lanceolato-rhomboideis vel lanceolatis, segmentis foliorum anguste inciso-laciniatis.

NOM. JAP. *Hosoba-no-chishimafûro.* (n. n.).

HAB. *S. Saghalien.* Distr. Shikka: The upper Ennai (M. KAWASHIMA, VII. 28, 1935).

145. Geranium yesoense FR. ET SAV. Enum. Pl. Jap. II. (1879), 305, (*yedoense*); NAKAI, in Bot. Mag. (Tokyo), XXIII. (1909), 103, et ibid. XXVI. (1912), 265; KNUTH, in ENGL. Pfl.-reich. IV.–129. (1912), 181.

var. **genuina** TATEWAKI, nom. nov.

NOM. JAP. *Yezo-fûro.*

form. **lobato-dentatum** (TAKEDA), Tatewaki, com. nov.

Geranium yezoense FRANCH. ET SAV. var. *lobato-dentatum* TAKEDA, in Bot.

Mag. (Tokyo), XXIV. (1910), 257.

NOM. JAP. *Fugire-yezofûro.*

HAB. *Yezo.*

form. **albiflorum** TATEWAKI, form. nov.

Flores albi.

NOM. JAP. *Shirobana-yezofûro.* (n. n.).

HAB. *S. Kuriles.* Isl. Kunashiri: Tôfutsu (M. TATEWAKI, VIII. 20, 1936).

var. **pseudo-palustre** NAKAI, in Bot. Mag. (Tokyo), XXIII. (1909), 103, (var. *pseudo-pratense*), et ibid. XXVI. (1912), 264.

Geranium Miyabei NAKAI, in ibid. XXVI. (1912), 264.

form. **leucanthum** TATEWAKI, form. nov.

Flores albi.

NOM. JAP. *Shirobana-hamafûro.* (n. n.).

HAB. *S. Kuriles.* Isl. Kunashiri: Tomari (M. TATEWAKI, VIII. 21, 1936).

146. Ilex Fauriei MAKINO, in Journ. Jap. Bot. V. (1928), 14; MAKINO & NEMOTO, Fl. Jap. ed. 2, (1931), 670; MURAMATSU, Fl. Pref. Akita, (1932), 64; YÛKI, Fl. Yamagata Pref. (1934), 53; MURAI, Fl. Miyagi Pref. (1935), 73, et Fl. Central Iwate, (1935), 60.

Ilex rugosa FR. SCHM. var. *Fauriei* LOESN. Monogr. Aquif. (1901), 421.

var. **rugosa** TATEWAKI, var. nov.

Folia supra rugosa.

NOM. JAP. *Ohtsurutsuge.*

HAB. *Yezo.* Isl. Okushiri: R. Aonae (B. SONOKI, VIII. 20, 1934); Katsuma (M. TATEWAKI, V. 24, 1935; KINGO TOGASHI, VI. 7, 10 & 13, 1935); Horonai (M. TATEWAKI, V. 22, 1935); Tsurikake (K. TOGASHI, VII. 31, 1935).

form. **ovata** TATEWAKI, form. nov.

Folia ovata vel oblongo-ovata 4–6 cm longa 2.5–3 cm longa supra rugosa.

NOM. JAP. *Maruba-no-ohtsurutsuge.* (n. n.).

HAB. *Yezo.* Isl. Okushiri: Katsuma (K. TOGASHI, VI. 13, 1935).

var. **laevis** TATEWAKI, var. nov.

Folia supra laevia.

NOM. JAP. *Okushiri-otsurutsuge.* (n. n.).

HAB. *Yezo.* Isl. Okushiri: R. Horonai (B. YOSHIMURA, VII. 17, 1935).

DISTR. Honshu and SW. Yezo.

Remarks. New to the flora of Hokkaido and Saghalien.

147. Hovenia dulcis THUNB. Fl. Jap. (1784), 101; DC. Prod. II. (1825),

40; SIEB. ET ZUCC. Fl. Jap. I. (1835), 135, *t. 73, 74*; MIQ. Prol. Fl. Jap. (1866–7), 220; MAXIM. Rham. Or. Asia. (1866), 20; FR. ET SAV. Enum. Pl. Jap. I. (1875), 82; HEMSL. in Journ. Linn. Soc. XXIII. (1886), 131, excl. syn.; SCHNEID. Ill. Handb. Laubholzk. II. (1909), 291, *fig. 200, 201, a*, et in SARG. Pl. Wils. II. (1916), 252; GIRON, in Bot. Ital. n. ser. XVII. (1910), 425; MATSUM. Ind. Pl. Jap. II.–2. (1912), 338; SHIRASAWA, Icon. For. Tr. Jap. II. (1912), 144, *pl. 47*; NAKAI, Rep. Veg. Isl. Ooryongto, (1919), 338; MORI, Enum. Pl. Corea, (1922), 244; REHD. Man. Cult. Tr. & Shr. (1927), 596; LEE, For. Bot. China, (1935), 806.

var. **glabra** MAKINO, in Bot. Mag. (Tokyo), XXVIII. (1914), 155; NAKAI, Fl. Sylv. Korea. IX. (1920), 17; MAKINO & NEMOTO, Fl. Jap. ed. 2, (1931), 708.

NOM. JAP. *Kemponashi.*

HAB. *Yezo.* Isl. Okushiri: Monai (KINGO TOGASHI, IX. 22, 1935).

DISTR. Yezo, Honshu, Shikoku, Kiusiu, Corea and China.

Remarks. New to the flora of Hokkaido and Saghalien.

148. Cornus controversa HEMSL.: MIYABE & KUDO, Icon. Ess. For. Tr. Hokkaido, III. (1931), 41, *tab. 81.*

NOM. JAP. *Mizuki.*

HAB. *S. Kuriles.* Isl. Kunashiri: Tomari (M. TATEWAKI, VIII. 21, 1936).

Remarks. New to the flora of the Kuriles.

149. Armeria vulgaris WILLD. var. **arctica** KOMAR.: MIYABE & TATEWAKI, in Trans. Sapporo Nat. Hist. Soc. XIV. (1935), 78.

form. **albiflora** TATEWAKI, form. nov.

Flores albi.

NOM. JAP. *Shirobana-karafutohamakanzashi.* (n. n.).

HAB. *S. Saghalien*: Distr. Shikka: Mt. Kawashima (M. TATEWAKI & Y. TAKAHASHI, VI. 29, 1936).

150. Aster (Alpigenia) **Tsuneoi** MIYABE ET TATEWAK., Atlas Alp Pl. Hokkaido Sansokai, VIII. (1936), no. 4.

Erigeron Tsuneoi TATEWAKI, in Hokkaido Ringyôkaihô, XXX.–11. (1935), 593, cum fig.

Erigeron glabratus HOPPE ET HORNSCH. var. *angustifolium* TATEWAKI, in Res. Bull. Exp. For. Fac. Agr. Hokkaido Imp. Univ. V. (1928), (83).

Erigeron glabratus NAKAI, Rep. Veg. Mt. Apoi, (1930), 72, (non HOPPE ET HORNSCH.).

Rhizoma lignescens crassum 4–5 mm in diametro, petiolis emarcidis anni praeteriti vestitum, fibras graciles permultes emittens. Caulis caespitosus

floriferi simplex erectus semper monocephalus foliatus superne densiuscule basin versus sparse hirsutus 5–13 cm altus. Folia radicalia rosulata sub anthesin viva exteriora minora, interiora majora lineari-spatulata 3–4 cm longa 2–4 mm lata, apice rotundata mucronulata, basi gradatim angustata subalato-petiolata, margine integra utrinque ciliato-villosa aut saepe glabrata, textura subcrassa, uninerviata; folia caulina sursum gradatim minora lineari-spatulata vel lineari-oblonga, apice mucronulato-acuta vel obtusa, basi angustata sessilia. Folia caulis sterilis rosulata 1–4 cm longa spatulata distincte petiolata glabrescentia. Capitula erecta ca. 2–3 cm lata. Involucrum hemisphaericum 7 mm longum 1–1.5 cm latum in sicco. Squamae biseriatim dispositae herbaceae omnes subaequilongae uninerviatae vel trinerviatae lineares vix 1 mm latae apice acutae aut breviter acuminatae purpurascentes margine crebro ciliolatae dorso sparse ciliato-villosae. Flores radii uniseriati ca. 1 cm longi, pars ligulae 8 mm longa 1 mm lata apice rotundata vel obtusa trinerviata, pars tubi 2 mm longa extus hirsuta. Flores disci tubulosi albi ca. 5 mm longi. Achenium 2 mm longum cylindricum hirsutum 10-nerviatum. Pappi setae subaequales apice attenuatae sordide flavo-albescentes 2–2.5 mm longae scabrae.

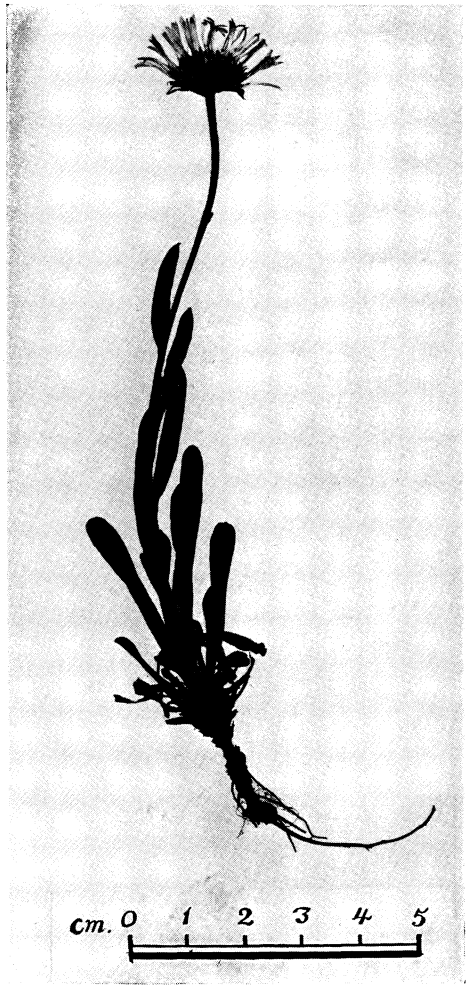


Fig. 15. *Aster Tsuneoi.*

NOM. JAP. *Apoi-azumagiku.*

HAB. *Yezo.* Prov. Hidaka: Mt. Apoi (M. TATEWAKI, V. 22, 1927–type in Herb. Fac. Agr. Hokkaido Imp. Univ., V. 29, 1936).

DISTR. Endemic.

Remarks. The present species is closely related to *Aster consanguineus* LEDEB., from which it is easily distinguished by the narrower and thicker leaves, the white flower and also by the yellowish white colour of shorter pappus.

151. Saussurea Kitamurana MIYABE ET TATEWAKI, sp. nov.

Rhizoma breve angustum, collo basibus foliorum vetustorum persistentibus squamato. Caulis humilis simplex erectus foliatus monocephalus 8–16 cm altus plus minusve villosus glabrescens. Folia crassa remote mucronulato-denticulata, denticulis patentibus, supra viridia sublanata crispulato-pilosa, subtus pallida dense subniveo-arachnoidea; radicalia inferioraque sub anthesin viva petiolata ovata, ovato-lanceolata vel oblongo-ovata apice acuta basi truncata subcordata vel cuneata cum petiolis 4–7 cm (petiolis 1.5–3 cm longis) longa 1.5–2.8 cm lata. Folia caulina superiora sursum gradatim minora angustioraque oblonga oblongo-lanceolata vel ovato-oblonga subintegra basi attenuata breviter petiolata vel subsessilia. Involucrum late campanulatum ca. 15 mm longum 15–20 mm latum in sicco, basi plerumque rotundatum, interdum foliis bracteolibus lineari-lanceolatis involucro brevioribus vel longioribus 1–2 instructum. Squamae sub 4 seriatim dispositae brunneo-puberulae, apice inappendiculatae arachnoideo-villosae, marginae integrae atro-purpurascentes; exteriores ovatae apice acutae vel obtusae; interiores oblongo-lanceolatae. Receptaculum setosum, setis albis usque ad 6 mm longis. Corolla subaequaliter profunde 5-fida ca. 6 mm longa, pars angusta tubi 7 mm longa. Pappus biserialis, setis exterioribus deciduis brevioribus, interioribus longioribus 1 cm longis brunneis plumosis. Achenia brunnea 4–4.5 mm longa cylindrica striata glabra apice truncata basi contracta.

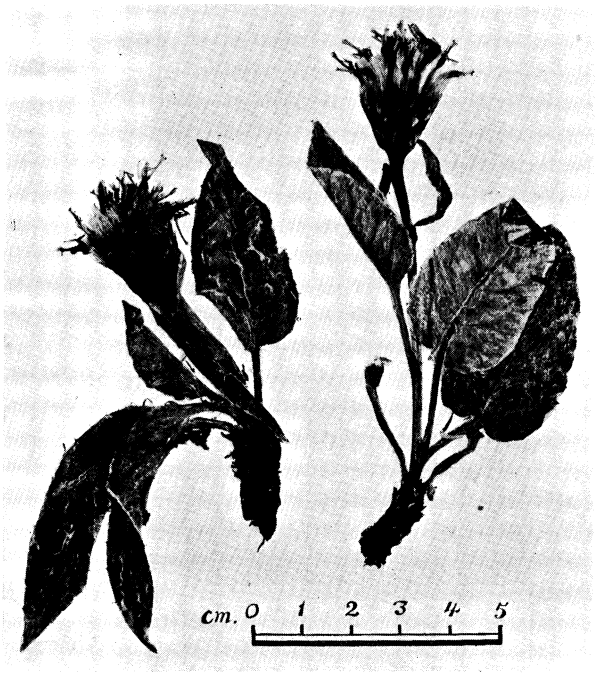


Fig. 16. *Saussurea Kitamurana.*

NOM. JAP. *Naruko-tôhiren.* (n. n.).

HAB. *S. Saghalien.* Distr. Shikka: Mt. Naruko, the upper Naruko (B. YOSHIMURA, VIII. 14, 1936).

Remarks. This interesting and distinct alpine *Saussurea* is named in honour of MR. SHIRÔ KITAMURA, the specialist in *Compositae* of Japan.

152. Erythronium japonicum MAKINO: MIYABE & KUDO, Fl. Hokkaido & Saghal. III. (1932), 326.

NOM. JAP. *Katakuri.*

HAB. *S. Kuriles.* Isl. Kunashiri: Sakumanbetsu (MORI, V. 1935).

Remarks. New to the flora of the Kuriles.

Errata.

Swertia crysantha HONDA ET TATEWAKI, in Trans. Sapporo Nat. Hist. Soc. XIV. (1936), 192=**Swertia chrysantha** HONDA ET TATEWAKI.

本學名の誤記は舘脇のミスタイプライトせし原稿に起因せるものにして，此處にそれを明にし學名を訂正す.

摘　　要

北日本植物誌料　七·八

101. チヤセンシダ 北海道の新產地（石狩及北見）.

102. アヲチヤセンシダ 樺太の新產地（小沼）と北海道に新追加（石狩）.

103. オロチヨンミミナグサ（新稱）*Cerastium arvense* に近き新種にして樺太淺瀨川上流にて菅原繁藏氏採集す.

104. カラフトミヤマビランヂ 果實の性質に依り，Silene より Melandryum に變更して新結合す.

105. シロバナカラフトブシ（新稱）カラフトブシに似て，花は白色，子房に疎毛を有す. 樺太產の新變種にて木本氏幹氏採集す.

106. ウスバカラマツ 學名の變更.

107. カラフトコマクサ（新稱）日本に新報知の植物. 樺太敷香支廳鳴子川上流長之助山にて川島將義氏採集す.

108. カラフトミヤマハタザホ（新稱）日本に新報知の植物. 樺太敷香支廳淺瀨山に菅原繁藏氏採集す.

109. シロバナハマエンダウ

110. カラフトオヤマノエンダウ（新稱）エゾオヤマノエンダウに似たるも，全株大きく，白毛更に密にして花瓣蓴裂片を異にする新種. 樺太敷香支廳川島山の產なり.

111. エゾノアフヒスミレ と **シロバナテシホスミレ**（新稱）.

112. オホイハカガミ 北海道植物誌に新追加. 渡島の產.

113. トチナイサウ 樺太植物に新追加. 川島將義氏鳴子川上流に採集す.

114. タニガハコザクラ（新稱）上野谷川岳に產するエゾコザクラの新變種.

115. シロバナヱゾミソガハサウ（新稱）利尻島の產.

116. ミヅカクシ 北海道植物に新追加. 石狩の產.

117. サハギキヤウ 北千島植物に新追加. 幌筵島產.

118. クツチヤロトダシバ (新稱) シロケトダシバに似たるも小穗は灰白色を呈し有毛而して疎花を有する變種. 屈斜路地帶に產す.

119. チシマイトスゲ 樺太植物に新追加. 菅原繁藏氏淺瀨山に採集す.

120. ウラゲキヌガササウ (新稱) 葉の裏面有毛の變種. 飯豐山にて松浦一氏採集す.

121. シラオヒエンレイサウ (新稱) ミヤマエンレイサウとオホバナエンレイサウの中間型を呈する新種. エンレイサウ屬の細胞學的研究に專心する羽賀氏が膽振白老に採集せるものにして學名は氏の名を記念す.

122. クロミノオホバナエンレイソウ 白老に產す.

123. エゾノミヤマエンレイソウ (新稱) 子房の先端黑紫色を呈する新變種にして屈斜路湖畔に產す.

124. オクシリエビネ (新稱) 從來ナツエビネとして認められしものなるが富樫錦吾氏の採集せる花の標本に依りて新種となせり.

125. ヤブソテツ 北海道植物に新追加. 奥尻島の產.

126. カラフトメギヤナギ 變種を種類とす.

127. エゾノキヌヤナギ 千島植物に新追加. 國後島の產.

128. エゾハンノキ 千島植物に新追加. 國後島の產.

129. オクエゾシラカンバ 邦領樺太及び北海道新產の追加.

130. リシリヲダマキ (新稱) 花瓣に距なき新品種. 河野齡藏氏これを利尻岳に採集す.

131. ヒトツバオキナグサ 樺太に於ける產地の追加と果實の記載.

132-136. 北日本產ケシ屬を分類せるに, アライトヒナゲシ, リシリヒナゲシ, チシマヒナゲシ, シスカヒナゲシ (新稱), カラフトヒナゲシは皆別種にしてその分布區域も限定せられしものの如し. アライトヒナゲシは北千島に, リシリヒナゲシは利尻岳に, チシマヒナゲシ (第十三圖參照) は中部千島に, カラフトヒナゲシは南樺太中部山岳に, シスカヒナゲシはシユミツド線以東の山岳地帶に分布す. リシリヒナゲシとチシマヒナゲシは本邦の特產なり.

137. チリエハタガホ (新稱) 本邦に新報知の植物. 南樺太國境に近き遠內川にて採集す.

138. ナルコサウ (新稱) 第十四圖に示すが如き新種にして, 樺太敷香支廳鳴子川流域山岳地帶を中心に分布するものの如し.

139. ヤヘザキオクエゾナヅナ (新稱) 樺太敷香支廳川島山の產.

140, テンググンバイ (新稱) ヒメグンバイに似たる變種にして葉型卵狀箭形又は長楕圓狀箭形を呈し, 耳垂は銳尖形又銳形. 故大谷度直氏石狩國天狗岳に採集す.

141. ヤナギバキリンサウ 邦領樺太植物に新追加. 敷香支廳鳴子川流域にて採集す.

142. カラフトウラジロキンバイ (新稱) 日本植物の新追加. 樺太小沼附近に木本幹氏採集す.

143. タカネワウギ 從來報知せられしものは再檢討を要す. 有花の標本を西山博氏南樺太小沼附近にて採集す.

144. ホソバチシマフウロ (新稱) 葉の細裂せる狹葉變種. 川島將義氏南樺太遠內川の上流にて採集す.

145. フギレエゾフウロ; シロバナエゾフウロ (新稱); **シロバナハマフウロ** (新稱).

146. オホツルツゲ; マルバオホツルツゲ (新稱); **オクシリオホツルツゲ** (新稱) 從來北海道に

報知せられしオホツルツゲは皆オホツルツゲにあらず. 今般の報知を以て北海道植物に入る. 奥尻島の産にして葉型卵形乃至長楕圓狀卵形のものにマルバオホツルツゲ, 葉の表面の平滑なるをオクシリオホツルツゲとす.

147. ケンボボナシ 北海道植物に新追加. 奥尻島に富樫錦吾氏採集す.

148. ミヅキ 千島植物に新追加. 國後島の産.

149. シロバナカラフトハマカンザシ（新稱）樺太敷香支廳川島山の産.

150. アポイアヅマギク 1935年北海道林業會報に Erigeron 所屬として發表し, 1936年北海道山草會山草寫眞集にて Aster 屬に編入せしも, ここに再錄す.

151. ナルコタウヒレン（新稱）一莖一花, 苞は四列の寫眞の如き珍草である. 樺太敷香廳鳴子川の産で, 本邦菊科植物專攻家北村四郎氏を記念して命名す.

152. カタクリ 千島植物に新追加. 國後島の産.

Contributions to the Knowledge of the Systematics of Morus in Japan III

MORUS IN CULTIVATION (I)

By

Teikichi HOTTA*

(堀 田 禎 吉)

With one plate and two text-figures

The number of cultivated races of mulberry trees in Japan are generally reported to amount to over one thousand and six hundred. Among them, however, some are found to be synonymous. According to the writer's investigations, they are to be limited to not more than one thousand and four hundred. The writer has been engaged since 1929 in collecting the specimens of the cultivated mulberry trees in every district of Japan. From time to time the writer has travelled through most parts of these districts to make observation on the field conditions of the cultivated mulberry. As to some particualr cultivated races of mulberry trees the writer has procured them from their habitats by request, and has made comparative studies on them by cultivating them in the nursery in the Botanical Garden of the Faculty of Agriculture of the Hokkaido Imperial University. The number of cultivated races of mulberry trees, that the writer has hitherto collected, have reached to over 1,300, and the specimens collected more than 10,000. Some scientific reports have already been made on cultivated mulberry trees in Japan, among which T. NAKAI,[1),6)] G. KOIDZUMI,[2),3),4)]

* Deep acknowledgement is due to Prof. Emer. K. MIYABE and Prof. S. ITO who have given to the written constant guidance, and to Prof. Y. TOCHINAI and Dr. M. TATEWAKI who have rendered kind suggestions and advice, and also to the Sericultural and Agricultural Colleges and Experiment Stations, all over the country for the specimens which they so kindly supplied.

1) NAKAI, T.:—Jour. Coll. Sci., Imp. Univ. Tokyo, XXXI, p. 193 (1911).

2) KOIDZUMI, G.:—Synopsis Specierum Generis Mori in Bull. Imp. Sericult. Exp. Stat., III, 1, p. 32, 51 et 53 (1917).

3) KOIDZUMI, G.:—Cultivated mulberry trees on type of *Morus bombycis* KOIDZ. (*Yamaguwagata-no-saibaihin*), in Bull. Imp. Sericult. Exp. Stat., VI, 3, p. 86–127 (1921).

4) KOIDZUMI, G.:—Synopsis Specierum Generis Mori in Bull. Imp. Sericult. Exp. Stat., II, 1, p. 10, 25 et 28 (1923).

6) NAKAI, T.:—*Moraceae* in Flora Sylvatica Koreana, XIX, p. 94–95 (1932).

Y. YENDO,[5] and likewise by T. HOTTA.[7),8)] They have mostly dealt with varieties and forms of *Morus alba* LINN., *Morus bombycis* KOIDZ., *Morus latifolia* POIRET and *Morus atropurpurea* ROXB.

Key to the species, variaties and forms of Morus found in cultivation

1. Style long, divided into two parts of stigma at its apex. ..... Sect. I. **Dolichostylae** KOIDZ.
   Morus bombycis KOIDZ. ... 2
   Style none or very sohrt with sessile or subsessile stigma divided into two parts. ..... Sect. II. **Macromorus** KOIDZ. 7
2. Leaf with dense hairs on both surfaces or only on the under surface. .. 3
   Both surfaces with a few short hairs. 5
3. Under surface with conspicuous hairs. 4
   Both surfaces with conspicuous hairs, the leaf deeply cordate. ..... var. *Yamabe* HOTTA
4. Apex of the leaf usually acute, acuminate or short acuminate, the leaf usually not lobate or 2–4 lobate. ..... var. *pubescens* HOTTA
   Apex of the leaf subtricuspidate, the leaf variously lobate. ..... var. *vestita* KOIDZ.
5. Both surfaces of the leaf rather scabrous, and the leaf usually lobate or not lobate. ..... var. *typica* HOTTA 6
   Both surfaces of the leaf rather smooth, and the leaf variously incised or lacerate. ..... var. *Tachibanawase* HOTTA
6. Most of the leaves conduplicate, sessile or subsessile. ..... f. *conduplicata* HOTTA
   Leaf even and flat, petiole 3–10 cm. in length. ..... f. *normalis* HOTTA
7. Upper surface of the leaf is even and lustrous or not lustrous. Cystolith of mesophyll is obtuse or rarely acute at the apex. ..... *M. alba* LINN. 8
   Upper surface of the leaf is rugose and has a strong lustre. Cystolith of mesophyll is papillate and obtuse, and deeply placed in tissue. ..... *M. latifolia* POIRET 11
8. Margin of the leaf dentate-serrate, apex obtuse or rather acuminate or shortly acute, base usually cordate. ..... var. *typica* HOTTA 9

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5) YENDO, Y.:—Traité sur la Cult. du Mûr. au Jap., p. 15, 17 et 20 (1930).

7) HOTTA, T.:—Contributions of the knowledge of the systematics of *Morus* in Japan, I, in Trans. Sapporo Nat. Hist. Soc., XIV, 3, p. 195–205 (1936).

8) HOTTA, T.:—Contributions of the knowledge of the systematics of *Morus* in Japan, II, in Bull. Soies Kinugasa 366, p. 9–26 (1937).

Margin of the leaf dentate, dentate-sinuate or dentate-serrate, apex long acuminate, base truncate. .....var. *Kasasagi* HOTTA

9. Leaf is single and plain. 10
Leaf usually duplicated, a small extra lobe produced on the under surface of the leaf. .....f. *duplicata* HOTTA

10. Young leaf is deep greenish-yellow, adult leaf light yellowish-green, ovate or ovato-lanceolate. .....f. *flavoviridia* HOTTA
Young and adult leaves greenish-blue, ovate or ovato-elliptical. ....f. *normalis* HOTTA

11. Shoot and branch usually erect or more or less crooked. 12
Shoot and branch spirated. .....var. spirata HOTTA

12. Apex of the leaf acute or obtuse. 13
Apex of the leaf truncate, emarginate or rarely obtuse, base rather truncate or shallow-cordate. .....var. *Ohzu* HOTTA

13. Leaf cochleato-convex, upper surface of the leaf dark green colour. ....var. *planifolia* (SERING.) HOTTA
Upper surface of the leaf convex, and strong green colour or green colour. .....var. *typica* HOTTA

Sect. I. **Dolichostylae** KOIDZUMI

Imp. Sericult. Exp. Stat., II, 1, p. 3 (1923).

(1) ***Morus bombycis*** KOIDZUMI

Morus bombycis KOIDZUMI, Bot. Mag. (Tokyo), XXIX, p. 313 (1915).

Nom. Jap. *Yamaguwa: Aizujushima,* Aizutakasuke, Akaaburagi, Akagi (Akaichi, Dateakagi, Date-guwa, Datetsuruta, Hidakuwa, Murasaki-guwa, Oshu, Oshuakagi, Oshukaneko, Shirakumo, Yonezawaakagi),** Akayawase, Akazuru, Amagiyaso, Arakawa, Aritawase, A, Asahiwase, Awometakahashi, Awojiku, Ayado, Azumasaki, Azumashidare, Benten, Benikuki-guwa, Botanmaruba, Budo, Chikubayaso, Daichirimen, Daiho, Daisuisha, Dateakagi, Date-guwa, Dewayaso, Eijiwase, Fuguwa, Fuki-guwa, Fushi-guwa, Fushimagariichibei, Goromaru, Gorozi, Goroziwase, Gunmaakagi (Zinza), Gunmabanto, Gunmafushimagari, Hanzawa-guwa, Henshunyamaguwa No. 1–3, Hichiei-guwa, Hikage-guwa, Hirayamawase, Hirozuru, Hoki-guwa, Horai, Innoyohai, Isebudo, Iwama-guwa, Izeki, Jubei-guwa, Juniseiki, Juyemon, Kazayemon, Kahachi, Kamikura, Kaneko, Kaniwase, Kenmochi, Kenmochiwase, Kikuba, Kinka, Kiuhei, Koki-guwa, Kokuni-*

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* The Japanese names written in Italic are of the cultivated races.

** The Japanese names written in the parenthesis are synonym or vernacular names of the cultivated races.

guwa, Komaki (*Aokikobore, Aoziku, Furisode, Matsumoto-guwa, Naka-guwa, Nezumigaeshi, Nobuo, Onnaichibei, Oha, Shinshufurisode, Shinshu-guwa, Shinshuoha, Shinshushiroshita, Shiratama, Shiroshita, Sodefuri, Tanbataro, Yawata-guwa*), *Koshiro, Koshu-guwa, Kozakura, Kozayemon* (*Ashihawa, Shinanome, Shinshuwase*), *Kunimori, Kurojumonzi, Kuroki, Kurokikobore* (*Kurokobore*), *Kurofushimagari, Kutoichi, Kuwao-guwa* (*Tosayama, Tosayama-guwa*).

Hab. Japonia: in hortis culta.

var. ***Yamabe*** HOTTA, var. nov.

Folium cordatum, utrinque pubescens, margine fere crenato-dentata.

Nom. Jap. *Yamabe-guwa.*

Hab. Japonia: in hortis culta.

Remarks. Leaf is deeply cordate, both surfaces of the leaf have white hairs, margin is crenate-dentate.

var. ***pubescens*** HOTTA, Trans. Sapporo Nat. Hist. Soc., XIV, 3, p. 201 (1936).

Syn. *Morus japonica* AUDIB, var. *pubescens* YENDO, Traité sur la Cult. du Mûr. au Jap. p. 17 (1930). nom. seminud.

Remulus tenuis, fere declinatus. Folium subtus insigniter pubescens.

Nom. Jap. *Keyama-guwa: Kurokosaka, Yokoyamawase.*

Hab. Japonia: in hortis culta, sed in Hokkaido saepius inculta.

Remarks. *Henshun-yamaguwa No. 1* seems to be closely related to this variety.

var. ***vestita*** KOIDZUMI, Bull. Imp. Sericult. Exp. Stat., II, 1, p. 13 (1923).

Syn. *Morus bombycis* KOIDZUMI, var. *tomentosa* KOIDZUMI, Bull. Imp. Sericult. Exp. Stat., VI, 3, p. 103 (1921). nom. seminud.

Morus japonica AUDIB, var. *pubescens* YENDO, Traité sur la cult. du Mûr. au Jap. p. 17 (1930) nom. seminud., pro parte.

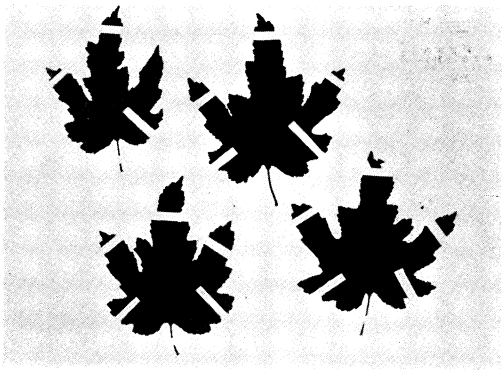


Fig. 1. *M. bombysis* KOIDZ., var. *vestita* KOIDZ.

Morus bombycis KOIDZUMI, var. *pubescens* HOTTA, Trans. Sapporo Nat. Hist. Soc., XIV, 3, p. 201 (1936) pro parte.

Folium varie lobatum subtus tomentosum, apice lobi fere subito cuspidato. Apex folii fere subtricuspidatus.

Nom. Jap. *Kirebakeyama-guwa* (nov.): *Chairowase-guwa, Kamekuwa, Satomi, Shiraume-guwa, Suyematsu-dosanshu* in Hokkaido, *Tsurukuwa, Uguisuwase.*

Hab. Japan: in hortis culta.

Remarks. *Hidawase* is closely related to this variety and may better be treated as a less tomentose form of the variety.

var. ***Tachibanawase*** HOTTA, var. nov.

Folium varie incisum vel lacerum, utrinque fere laeve, apice caudato subtricuspidato.

Nom. Jap. *Tachibanawase.*

Hab. Japonia: in hortis culta.

Remarks. Leaf is variously incised or lacerate, both surfaces are rather smooth, apex caudate and subtricuspidate. According to K. TAKEDA of Chitose village, Higashimurayama district, Prov. Uzen, this variety perhaps originated from the cultivated variety "Akagi", in about 1907 in the Toyota village of this district.

form. ***conduplicata*** HOTTA, f. nov.

Folium parvum 6–7 cm. longum 7–9 cm. latum, plerumque cordatum vel fere rotundatum, supra conduplicatum, scabrum; petiolo nullo vel valde breve.

Nom. Jap. *Chizimi-guwa* (*Kinchaku-guwa*).

Hab. Japonia: in hortis culta.

Remarks. Leaf is small, 6–7 cm. in length 7–9 cm. in breadth, usually cordate or more or less depressed rotundate, surface scabrous and most of the leaves conduplicated. Leaf is sessile or subsessile.

Sect. II. **Macromorus** KOIDZUMI

Imp. Sericult. Exp. Stat., II, 1, p. 4 (1923).

(2) ***Morus alba*** LINN.

Morus alba LINN., Sp. Pl. ed. 1, p. 986 (1753) ed II, 1, p. 1398 (1763); Syst. Veget., p. 710 (1759)—HOUTTYN in LINN. Pfl. Syst., III, p. 284 (1777)—WILLDNENOW, Sp. Pl., IV, p. 368 (1805)—DIETRICH, Lexic. Gart. Bot., p. 260 (1806)—ROXBURG, Fl. Ind. ed. 2. III, p. 594 (1832)—SERINGE, Desc. et cult. Mûr., p. 10 tab. 1–17 (1855)—BUREAU in DC. Prodromus, XVII, p. 238 (1873)—HOOKER, fil. Fl. Brit. Ind., V, p. 492 (1888)—FORBES & HEMSLEY, Jour. LINN. Soci., XXVI, p. 455 (1889–1902)—E. H. WILSON, Pl. Wil., III, p. 294 et 302 (1907–1910)—NAKAI, Jour. Coll. Sci., Imp. Univ. Tokyo, XXXI, p. 193 (1911)—KOIDZUMI, Imp. Sericult. Exp. Stat., III, 1, p. 52 (1917) et II, 1, p. 28 (1923)—REHDER, Jour. Arn. Arb., IIX, p. 102 (1927)—YENDO et HIGUCHI, Traité sur la cult. du Mûr. au Jap., p. 17 (1930)—MAKINO & NEMOTO, Fl. Jap., p. 218 (1931)—TERAZAKI, Icon. Pl. Jap., p. 479 (1933).

Syn. *Morus indica* LINN., pro parte. Sp. Pl. ed. 2, p. 1398 (1763)—BURMAN in RUMPHIUS Hab. Amboin, p. 8, tab. 5 (1755) et in SERINGE. Desc. Cult. Mûr.,

atl. 13, tab. 21, fig. 1 (1855).

Morus tatarica LINN., Sp. Pl. ed. 1, p. 986 (1753) ; Syst. Vegt., p. 710(1759) ed. 2, p. 1399 (1763)—HOUTTYN in Linn., Pfl. Syst., II, p. 290 (1777)—PALLAS, Fl. Ross., 1. 2, p. 9, tab. 2 (1784)—WILLDNENOW, Sp. Pl., IV, p. 369 (1805)—DIETRICH, Lexic. Gart. Bat. Nachtr., V, p. 153 (1819).

Morus alba var. *vulgalis* BUREAU in DC. Prodromus, XVII, p. 238 (1873)—C. K. SCHNEIDER, Illust. Handb. Laubholzk., Bd., I, s. 237 (1904)—ASCHERS. et GRAEBN. Syn. Mitteleurp. Fl., Bd., IV, s. 579 (1911).

Morus italica POIRET, in LAMARK Encycl. Bot., IV, p. 377 (1797)—PERS. Syn. Pl., II, p. 557 (1807)—DIETRICH, Lex. Gart. Bot. Nachtr., V, p. 153 (1819).

Morus byzantina SIEBOLD, Herb. Fl. Gret., (1820) ex Steud. Nom. ed, 2, II, p. 162 (1840).

Morus macrophylla MORETTI, Del. Sem. Hort. Ticin (1829).

Morus Tok-wa SIEBOLD, ex PETZOLD et KIRCHNER, Musc., p. 547, pro syn. (1864).

Morus alba HEMSLEY, Jour. LINN. Soc., XXVI, p. 455, pro parte (1894)—PRITZEL in ENGLER, Bot. Jahrb., XXIX, s. 297, pro parte (1900)—KOMAROV, Fl. Mansch., II, p. 91, pro parte (1903)—C. K. SCHNEIDER in SARGENT Pl. wilsonianae, III, 2, p. 294, (1916), pro parte.

Morus heterophylla LOUDON, Arb. et Frut., II, p. 1361, sec. Ind. Kew (1838).

Morus tortuosa AUDIB, ex MORRETTI, Gional. Inst. Lomb. Sc., I, p. 182, sec. Ind. Kew (1841).

Morus nervosa DELILE ex SPACH ibid. II, p. 33 (1835).

Morus alba var. *tatarica* M. a BIEB. Fl. Taurio-caucasica, II, p. 398 (1808)—YENDO et HIGUCHI, Traité sur la Cult. du Mûr. au Jap., p. 32 (1930).

Morus patavina HORT, SPACH, Hist. Natur. Végét. Phanéro., Paris, XI, p. 43 (1834–48).

Morus lucida HORT, Arb. et Furt., III, p. 1350 (1836).

Morus tortuosa MORETTI, Gional. Inst. Lomb. Sc. lett., I, p. 181 (1841).

Nom. Jap. *Karayama-guwa*,[1] Shiromi-guwa,[2] Maguwa.[3]

Distr. China, Manchuria et Korea.

Remarks. According to Prof. Y. YENDO[4] the species is of Chinese origin. It is told that, in as early as 2697 B.C., *Sirintsu*, Empress of *Hoandi*, used its leaves raising silkworms. It was imported from China to Japan in *Hakuho* era of Emperor *Temmu* (about 677 A.D.) by a priest, *Joe-Osho*, who transplanted

1) KOIDZUMI, G.: Synopsis Specierum Generis Mori, Imp. Sericult. Exp. Stat., II, 1, p. 30 (1923).

2) C. a LINNEAUS: *Morus* in Species Plantarum ed. 1, p. 986 (1753).

3) MAKINO, T. & NEMOTO, K.: Flora of Japan, p. 218 (1931).

4) YENDO, Y.:—Agriculture and Horticulture, IIX, 9, p. 2099 (1933).

it in the grounds of Kuwami Temple at Azuchi village, Gamo district, Prov. Omi.

var. ***Kasasagi*** HOTTA, var. nov.

Folium ovato-oblongum, plerumque 2 lobatum vel non lobatum, margine dentata, dentato-sinuosa vel fere dentato-serrata, apice longiacuminato, basi truncata vel rotundata vel rarissime aperte cordator, petiolo circ. 4 cm. longo.

Nom. Jap. *Kasasagi-guwa.*

Hab. Japonia: in hortis culta.

Remarks. Leaf is ovate-oblong, usually 2 lobate or not lobate, margin dentata, dentato-sinuate or more or less dentato-serrate, apex long acuminate, base truncate or rotundate rarely shallow cordate, and petiole 4 cm. in length.

var. ***duplicata*** HOTTA, var. nov.

Folium plerumque duplicatum, supra magnum subtus parvum vel vestigium folii parvi conspicuum; apice acuto vel acuminato rarius longiattenuato.

Nom. Jap. *Ryomen-guwa* (*Kinchaku-guwa*).

Hab. Japonia: in hortis culta.

Remarks. Leaf is usually duplicate, a small extra lobe is produced on the under surface of the leaf, sometimes the lobe is degenerated and only its vestiges are to be seen. Apex is acute or acuminate rarely long attenuate.

This variety was originated in the Date district, Prov. Iwashiro. C. IKEDA in Awano village of this district is said to have propagated by grafting the mutant on an old tree of *Ichibei.*

form. ***flavoviridia*** HOTTA, f. nov.

Folium juvenale valde flavoviride, adultum leviter flavoviride, ovatum vel lanceolato-oblongum.

Nom. Jap. *Kibajumonji.*

Hab. Japonia: in hortis culta.

Remarks. Young leaf is deep greenish-yellow, adult leaf light yellowish-green, ovate or ovate-lanceolate. Groove of the petiole has rather dense white hairs.

(3) ***Morus latifolia*** POIRET

Morus latifolia POIRET in LAMARCK, Encycl. Bot., IV, p. 381 (1976).

Nom. Jap. *Roso.*

Distr. China.

Remarks. This species was imported in 1874 by the Production Bureau of the Department of Home Affairs from *Hanzou,* Prov. *Tsujian,* China.

var. ***spirata*** HOTTA, var. nov.

Ramulus spiratus. Folium fere obliquo-ellipticum vel ovatum, margine plerumque dentato-serrata vel argutiserrata.

Nom. Jap. *Fuseryu, Taihei-guwa.*

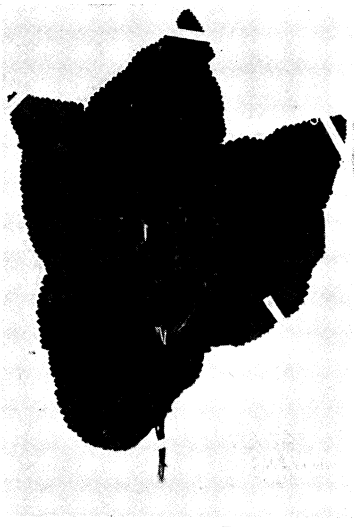


Fig. 2. *M. latifolia* PAIRET, var. *Ohzu* HOTTA.

Hab. Japonia: in hortis culta.

Remarks. Shoots and branches are spirated. Leaf is rather oblique-elliptical or ovate, margin is usually dentato-serrate, acuto-serrate or rarely crenate-dentate.

var. ***Ohzu*** HOTTA, var. nov.

Folium subtus fere pubescens, apice truncato vel emarginato rare obtuso, basi fere truncata vel aperte cordata.

Nom. Jap. *Ozu-guwa.*

Hab. Japonia: in hortis culta.

Remarks. Upper surface of the leaf has rather dense white hairs, apex is truncate, emarginate or rarely obtuse, base is rather truncate or shallow-cordate.

var. ***planifolia*** (SERING.) HOTTA, comb. nov.

Syn. *Morus multicaulis* PERROTET, var. *planifolia* SERINGE, Descr. Cult. Mûr. p. 219 (1855); Gelso delle Filipp. TAMARO Gelsicoltula, p. 219 (1905)—KOIDZUMI, Bull. Imp. Sericult. Exp. Stat., II, 1, p. 28 (1923).

Folium valde cochleato-convexum, juvencum tantum bullatum, adultum planum, supra nitidum atro-viride, plerumque ovato-ellipticum vel ellipticum (ex opere KOIDZUMI).

Nom. Jap. *Hiraba-roso.*

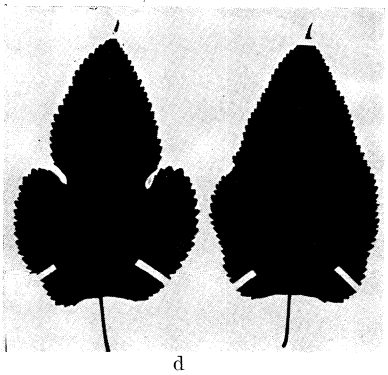
Hab. in hortis culta.

Botanical Institute, Faculty of Agriculture,
Hokkaido Imperial University, Sapporo, Japan.

Explanation of Plate

Plate XI.

a. *M. bombycis* KOIDZ., var. *Yamabe* HOTTA.
b. *M. bombycis* KOIDZ., var. *Tachibanawase* HOTTA.
c. *M. bombycis* KOIDZ., f. *conduplicata* HOTTA.
d. *M. alba* LINN., var. *Kasasagi* HOTTA.
e. *A. alba* LINN., f. *duplicata* HOTTA.
f. *M. latifolia* POIRET, var. *spirata* HOTTA.



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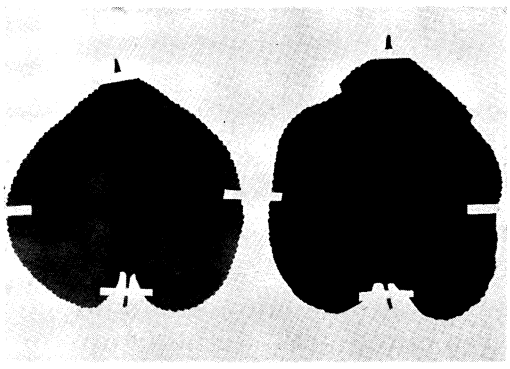
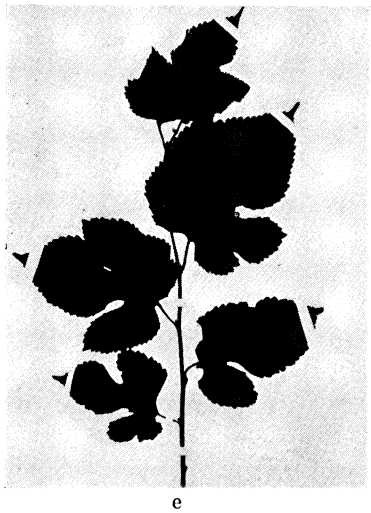
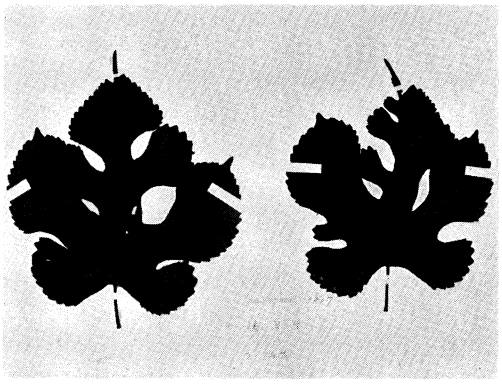


a



e



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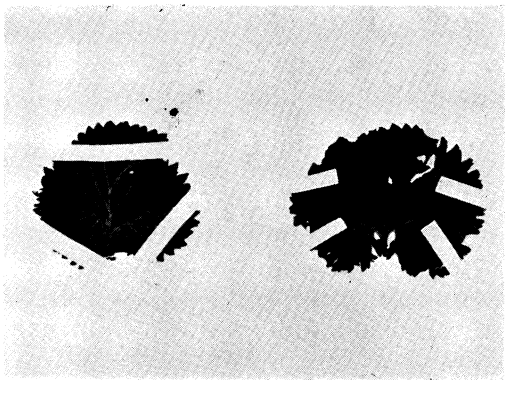

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摘　　要

邦産桑屬ノ分類學的知見（三）

Morus bombycis KOIDZUMI, var. *Yamabe*, 及 var. *Tachibanawase* の二新變種竝ニ f. *conduplicata* の一新品種を創定し又 var. *pubescens* 及 var. *vestita* に新しく數種の栽培種を加へ尙 *Morus alba* LINN. var. *Kasasagi* の一新變種 f. *duplicata*, f. *flavoviridia* の二品種を創定し又 *Morus latifolia* POIRET に var. *spirata*, var. *Ohzu*, var. *planifolia* の三新變種を創定した. 卽栽培種に六新變種, 三新品種竝に新しく栽培種を加へた 二變種を合し八變種三品種を記載した。

尙 *Morus bombycis* KOIDZUMI に包含すべき栽培種七十九種を確認した。

更に *Morus alba* LINN., *Morus latifolia* POIRET を初め各變種及品種に屬する栽培種の起源も可及的報告した。

New Species of Parasitic Fungi—I

By

Kogo TOGASHI

(富樫浩吾)

1. ***Irene alpina*** TOGASHI et MENTZER sp. nov.

Fig. 1–2

Coloniis minutis, epiphyllis, raro hypophyllis et petiolicolis, sparsis, usque 4 mm. diam., saepe confluentibus, nigricantibus, leniter velutinis; mycelium ex hyphis densiasime intertextis valde ramosis septatis (articulis 30–45μ longis) obscure brunneis 5–8μ crassis compositum; hyphopodia capitata modice numerosa, valde irregularia, cruciato-lobata, angulato-lobata vel sublobata, cellula superiore

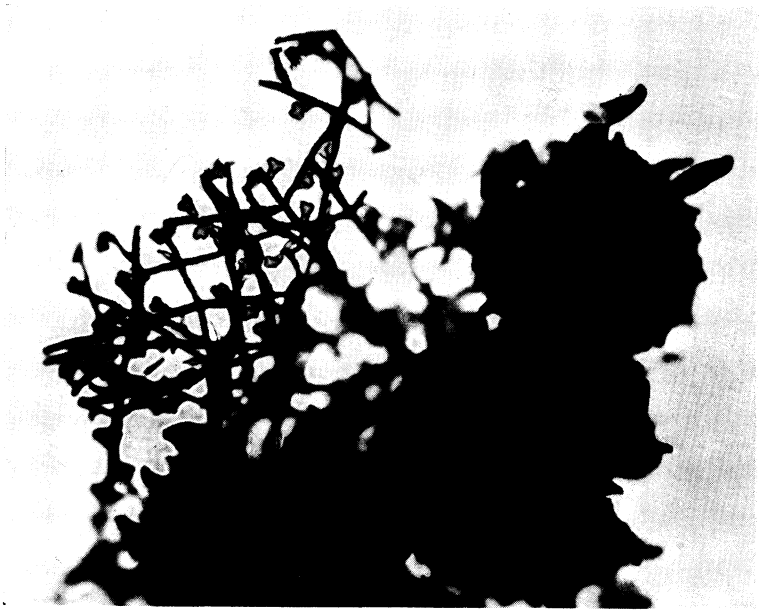

Fig. 1. *Irene alpina* TOGASHI et MENTZER
Perithecia and mycelia, showing appendages and hyphopodia (Enlarged).
(Photo Dr. W. N. TAKAHASHI).

Trans. Sapporo Nat. Hist. Soc., Vol. XIV, Pt. 4, 1936.

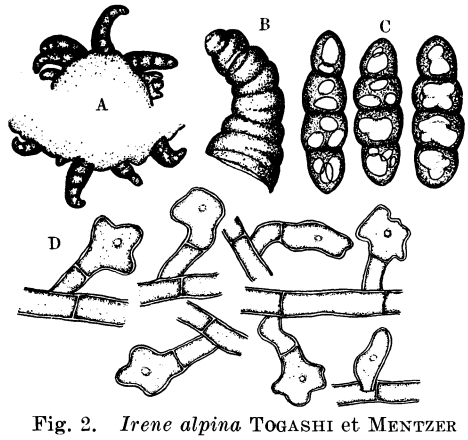

Fig. 2. *Irene alpina* TOGASHI et MENTZER
a. Appendages on the perithecia (×100).
b. An appendage (×400).
c. Ascospores (×400).
d. Different forms of hyphopodia (×400).

2. *Claviceps yanagawaensis*

TOGASHI sp. nov.

Fig. 3–4

Sclerotiis depresso-cylindraceis, utrimque attenuatis, acuminatis vel rotundatis, curvatis, primum pallide flavido-viridis et granuloso-asperulis, maturis nigrescentibus, rubescenti-violaceis vel atro-violaceis, levibus, intus albidis, 1.5–15 mm. longis, 0.55–1.3 mm. latis, plerumque 3.5–7.5×0.75–1.0 mm.; stromatibus solitariis, binatis vel ternatis, usque hexatis, carnosis; capitulo subgloboso, inferne applanato subtus excavato, ab ostiolis prominulis obscurioribus punctulatis, primum pallide rufo-brunneis, dein atro-purpureis vel brunneo-nigricantibus, 0.3–1.0 mm. altis, 0.4–1.5 mm. latis, longissime stipitatis; stipite cylindrico, gracili flexuoso, concolo, 0.7–6.2 mm. maxima inferiore brevi stipitiformi, obscure brunnea, tota 22–35μ longa, superne 15–25μ lata, basi 6–8μ lata, alternantia; setae nullae; perithecia in centro plagularum pauca conferta, globosa, atra, 160–270μ diam., appendicibus numerosis, vermiformibus, sursum curvatis, obscure brunneis, 40–80μ longis, usque 110μ, ad basim 20–36μ latis; asceis jam resorptis; sporidiis ellipsoideo-cylindraceis, utrimque rotundatis, fuligineis, 3-septatis, ad septa contrictis, 27–48×11–16μ.

Hab. in foliis visis *Coptidis trifoliatae* SALISB. in Japonia (Mounte Iwate, Pref. Iwate: Aug. 5, 1935, N. HIRATSUKA & K. TOGASHI–typus).

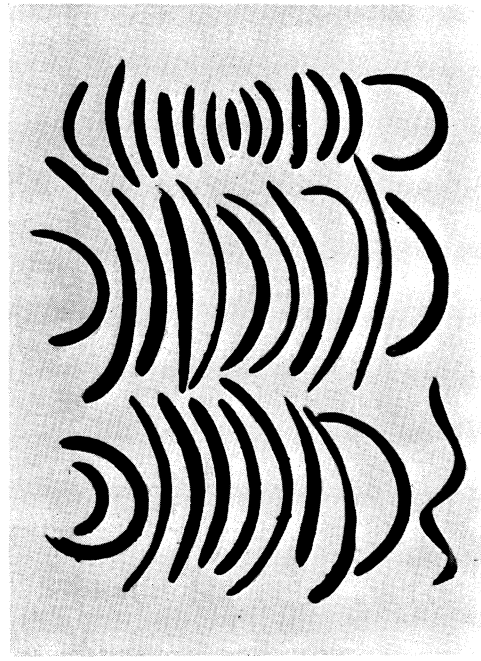

Fig. 3. Sclerotia of *Claviceps yanagawaensis* TOGASHI (Somewhat enlarged).

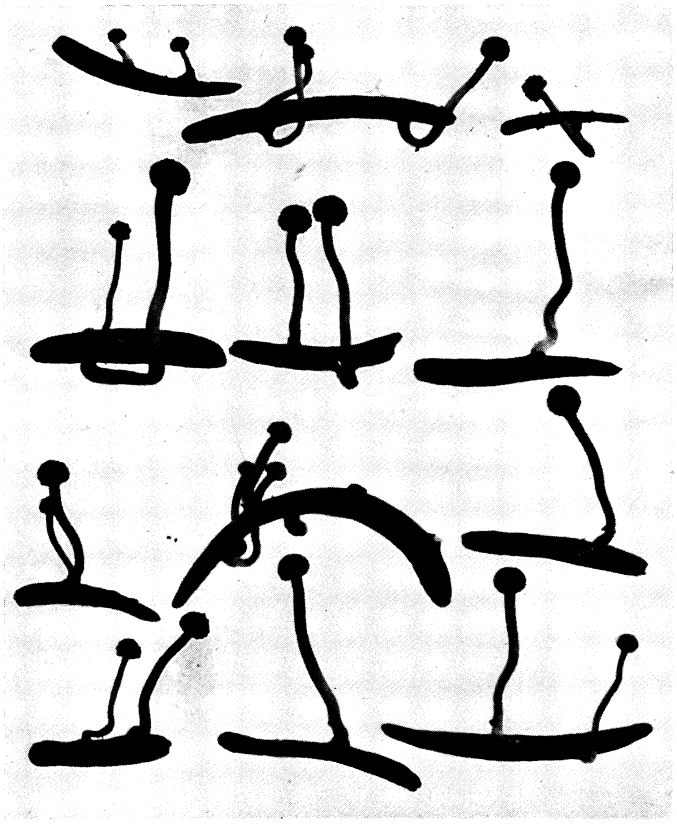

Fig. 4. Germinating sclerotia of *Claviceps yanagawaensis* TOGASHI (Somewhat enlarged).

longo, 0.4–1.5 mm. lato; peritheciis numerosis, immersis, dens stipatis, elongato-obovatis, ostiolis papillae-formibus, 180–320×70–190μ; ascis cylindraceis, linearibus, gracillimis, apice attenuatis, subhemisphaerico-incrassatis, 2.5–4.5μ crassis, ad basin attenuatis, curvatis, hyalinis, 8-sporis, 85–165×4.0–8.0μ; sporidiis filiformibus, parallele dispositis, curvatis vel rectis, continuis vel uni-septatis, hyalinis, pluriguttulatis, 75–135×1.0–2.25μ.

Hab. in caryopsidis vivis *Zoysiae japonicae* STEUD. in Japonia. (Yanagawa-mura Pref. Iwate: Oct. 2, 3, 16, Nov. 4, 1934, K. TOGASHI; Maio 12, Junio 11, Julio 17, Aug. 16, Sept. 27, Oct. 12, 19, 1935, K. TOGASHI).

The sclerotia of this new fungus are depressed and light yellowish green when they are young. By these macroscopical characteristics it may be easily distinguished from the other graminicolous species of *Claviceps*.

3. ***Mycosphaerella yanagawaensis*** TOGASHI sp. nov.

Fig. 5

Peritheciis epiphyllis vel stipiticolis, sparsis vel subgregariis, parenchymati innatis, minutis, sphaeroidies, vix prominulis, ostiolis minutis hiantibus (latit. circiter 10–15μ), fuligineis, circa ostiolum nigricantibus, 70–150μ diam., plerumque 90–120μ; ascis paucis, fasciculatis, cylindraceo-subclavatis, brevissime pedicellatis, in pedicellum brevem attenuatis, leniter curvulis vel rectis, aparaphysatis, octosporis, 48–86×16–23μ, plerumque 50–65×18–20μ; sporidiis subdistichis, fusiformibus, leniter curvulis vel subrectis, uniseptatis, ad septum vix constrictis, hyalinis, 18–27×7–12μ, plerumque 20–24×8–10μ.

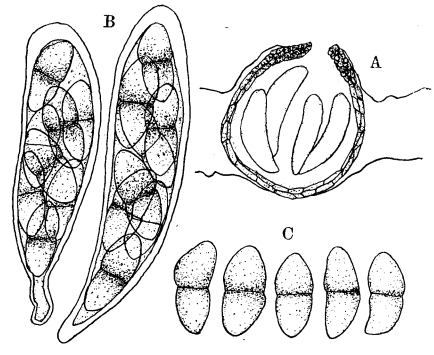

Fig. 5. *Mycosphaerella yanagawaensis* TOGASHI
a. Perithecium (×275).
b. Asci (×600).
c. Ascospores (×600).

Hab. in foliis et stipitiis vivis *Pteridii aquilini* KUHN. var. *japonici* NAKAI in Japonia. (Yanagawa-mura, Pref. Iwate: Aug. 6, 1934–typus K. TOGASHI; Julio 17, 1935, K. TOGASHI).

Nine species and one variety of *Mycosphaerella* and *Sphaerella* are described as occurring on *Pteridium aquilinum*. Among them *S. prominula* SPEG. seems to be closely related to the fungus under consideration, but both the asci and ascospores of the former are much narrower than those of the latter. *M. Pteridis* (DESM.) VESTERGR. and *S. Tyrolensis* AUERSW. also have the elongated asci and ascospores.

4. ***Phyllosticta Lespedezae*** TOGASHI sp. nov.

Maculis amphigenis, irregularibus, angulatis, nervis limitatis, dispersis vel gregariis, supra atro-brunneis, infra dilutioribus, 2–5 mm. latis, interdum confluentibus, demum partes amplas foliorum occupantibus; pycnidiis plerumque hypophyllis, saepe amphigenis, numerosissimis laxe gregariis, subepidermicis, globosis, 35–75μ in diam., plerumque 40–50μ, contextu atro-brunneis, membranaceo-parenchymaticis; conidiis minutis, bacillaribus, rectis, utrimque rotundatis, hyalinis, continuis, 3–6×0.8–1.2μ.

Hab. in foliis vivis *Lespedezae bicoloris* TURCZ. var. *japonicae* NAKANI in Japonica (Yanagawa-mura, Pref. Iwate: Oct. 1,–typus, Oct. 2, 1934, K. TOGASHI).

5. ***Phyllosticta Yanagawana*** TOGASHI sp. nov.

Maculis amphigenis, sparsis, circularibus vel subcircularibus, medio albo-

griseis, arescentibus, rubro-brunneo-marginatis, plerumque 5–15 mm. latis, saepe confluentibus, tunc magnitudine formaque irregularibus, demum tota lamina foliorum destruitur; pycnidiis amphigenis, sparsis, fere superficialibus, brunneo-atris, globoso-depressis vel globosis, 100–220μ, plerumque 140–170μ diam., contextu tenui, parenchymatico, flavo-brunneis, ostiolo minuto pertusis, 15–20μ latis, sporulis numerosis, oblongis vel cylindraceis, rectis, utrimque rotundatis, continuis, hyalinis, 3.5–7.5×1.8–3.0μ, plerumque 5.0–7.0×2.0–2.5μ, rarius usque ad 11μ longis.

Hab. in foliis vivis *Hostae Sieboldianae* ENGL. in Japonia (Yanagawa-mura, Pref. Iwate: Aug. 5, 1934; Julio 16–typus, 17, Aug. 16, 1935, K. TOGASHI).

The present fungus differs from *Phyllosticta Funkiae* FERRARIS in its larger pycnidia and smaller spores.

6. ***Septoria Cardiocrini*** TOGASHI sp. nov.

Maculis in foliis amphigenis, supra brunneolis vel atro-brunneis, infra brunneis vel ochraceo-brunneis, rotundatis, oblongis vel irregularibus, indeterminatis vel fusco-marginatis, 10–25 mm. latis, subinde confluentibus, tunc majorem folii partem denique occupantibus; pycnidiis epiphyllis, numerosis, densiuscule sparsis, diu epidermide tectis, denique erumpentibus, globosis vel subglobosis, atro-brunneis, 60–130μ, rarius usque ad 150μ diametris, contextu minute parenchymatico, ostiolis latis 20–40μ diametris; sporulis filiformibus, cylindraceis vel elongato-subclavatis, utrimque acutiusculis, curvulis vel varie flexuosis, raro rectis, 1–6 plerumque 3–5 septatis, hyalinis, raro guttulatis, 24–54×1.0–2.0μ, plerumque 36–42μ longis.

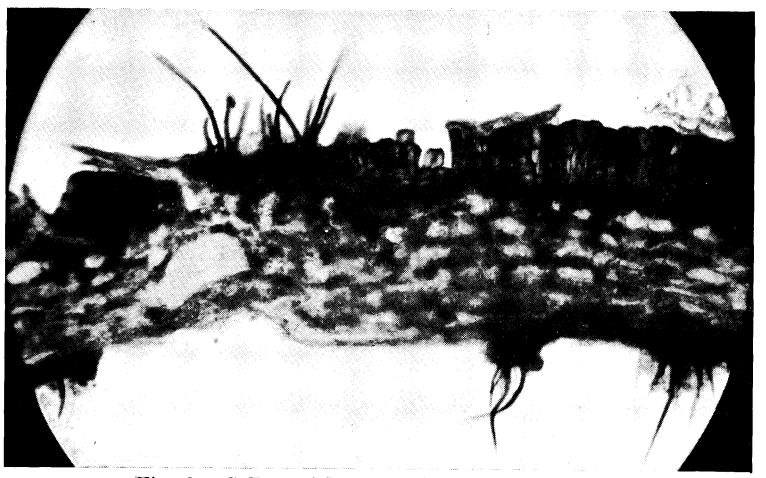

Fig. 6. *Colletotrichum pucciniophilum* TOGASHI on the teleuto-sori of *Puccinia Funkiae* DIET. (Enlarged).

Hab. in foliis vivis *Cardiocrini cordati* MAK. in Japonia (Yanagawa-mura, Pref. Iwate: Aug. 5, 1934, K. TOGASHI; Junio 11, 12–typus, 13, 1935, K. TOGASHI).

7. ***Colletotrichum pucciniophilum*** TOGASHI sp. nov.

Fig. 6–7

Acervulis sub soris *Puccinia Funkiae* DIET., amphigenis, praecipue epiphyllis, sparsis, atris, 60–130μ latis; setulis copiosis, simplicibus rigidis, subrectis, quandoque subflexuosis, atro-brunneis, basi subinflatulis, sursum tenuatis, dilutioribus, non vel 1–4 septatis, 30–190×3–8μ, plerumque 50–80×4–7μ; conidiis falcatis, utrimque acutis, hyalinis, continuis, 12–24×2.5–4.5μ, plerumque 17–20×2.5–3.5μ.

Hab. in foliis vivis *Hostae Sieboldianae* ENGL., socio *Pucciniae Funkiae* DIET. in Japonia (Yanagawa-mura, Pref. Iwate: Aug. 5, 1934–typus, K. TOGASHI).

Recently Tehon (Mycologia **25**, 4, p. 254, 1933) in Illinois described a species of *Colletotrichum, C. aeciicolum,* found on the aecidia of *Puccinia Asterum* KERN. This seems to be the only record that *Colletotrichum* or *Gloeosporium* occurs intimately on rust sori. The fungus in question, however, is distinctly different from *C. aeciicolum* in its morphological characters.

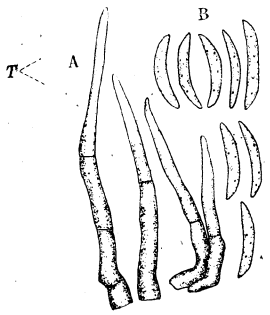

Fig. 7. *Colletotrichum pucciniophilum* TOGASHI
a. Setae (×600).
b. Conidia (×600).

The writer wishes to express here his sincere thanks to Dr. LEE BONAR and Miss. VERA P. MENTZER, Botany Department of the University of California, for their kind advice and for the allowance of free use of the herbarium materials and literature.

October 12, 1936
Harbarium of the University of California, Berkeley

The *Penicillium* from Wuchang, Central China*

By

SHIH YOU-KUANG

(施 有 光)

Laboratory of Applied Mycology, College of Agriculture,
Hokkaido Imperial University, Sapporo, Japan

This paper reports thirty nine species and strains of *Penicillium* collected from Wuchang, Central China. Of thesè, three species and one variety are presumed to be new to science. The culture medium used was CZAPEK's solution agar unless otherwise stated. This work was started under Professor H. H. CHUNG of the Botanical Department of National Wu-Han University, China, and accomplished under Professor J. HANZAWA of the Laboratory of Applied Mycology, Hokkaido Imperial University, Japan. To them the writer wishes to express his hearty gratitude for their kind suggestions and valuable criticisms throughout the work. He is also greatly indebted to Dr. CHARLES THOM of the U. S. Department of Agriculture, Washington D. C. for his great kindness in identifying most of the species.

Enumeration of the Species

1. ***P. sinicum*** SHIH sp. nov. Coloniis albis, dein valde obscure viridibus et demum fuscis, floccosis, dispergentibus, minute guttulosis, rugosis, margine angusta; reverso incolorato, dein profunde violaceo et demum fulvo-fusco; in agaro Koji hyphis abundantibus, sterilibus, at parcis conidiis; conidiophoris 40–260×3–3.5μ, singulatim orientibus aut raro ex repentibus hyphis ramificantibus, plerumque ramosis, septatis, in maturitate leviter asperibus; penicillus 15–35μ longus, monoverticillatus, interdum biverticillatus, catenis conidiorum columnas compactas formantibus, usque ad 160μ longas; pseudobasidiis crebris, leviter viridibus, 7–10×1.8–2.5μ; conidiis leviter viridibus, levibus, globosis, 2.5–3.6μ diam.

Remarks: According to CHARLES THOM's classification, this species will be a member of the *Monoverticillata-Ramigena* section but it has simpler branching

* Supported by a research grant from the China Foundation for the Promotion of Education and Culture.

system. In some respects it is related to ***P. Sartoryi*** THOM from which it is characterized by its branching system, i. e. without secondary branches, conidiophores rough and without vesicular apex, and reverse of colonies colored violet.

Hab. On Chinese ink.

2. ***P.*** (***Citromyces***) ***bruntzii*** SARTORY. Compt. rend. soc. biol. Paris 76: pp. 605–606, (1914).

Remarks: This species contains two strains; see the following key.

Hab. Strain I from air culture; strain II on salted pork.

3. ***P. wuchangense*** SHIH sp. nov. Coloniis per omne incrementum albis aut interdum in partibus minutis leviter lividis, vero in agaro Koji leviter aeruginoso-viridibus, dein obscure glaucis, floccosis, non guttulosis, tarde at late vigentibus, rugosis, gelatina liquescente; reverso incolorato, dein leviter luteo; conidiophoris 20–520×2–2.5μ, ex repentibus hyphis orientibus, raro ramosis, aseptatis, levibus, penicillum in termino portantibus; penicillus monoverticillatus, conidiorum catenas declinantes portans; pseudobasidiis in apicem acutum terminantibus, laxis, 2–4 pseudobasidiis verticillum formantibus, 5–7× 1.5–2μ; conidiis levibus, achrois, globosis, 2.5–3.5μ diam.

Remarks: The present species is related to ***P. restrictum*** GILMAN and ABBOTT but it differs from the latter in its white colonies and smooth conidia.

Hab. On a cake.

4. ***P. chermesinum*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 284–285; Col. Pl. X, Cart. 114; Pl. XVI, fig. 95, (1923).

Hab. On waste paper.

5. ***P. fellutanum*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 262–264; Col. Pl. XIII, Cart. 177; Pl. XXIII, fig. 133, (1923); MARIE, B. M., Mycologia XXIV, 4, pp. 298–401, (1932); MACY, H. & STEELE, G. H., Journ. Dairy Sci. XVII, 5, pp. 397–407, (1934).

Hab. On dead leaves.

6. ***P. frequentans*** WESTLING. Arkiv. för Botanik 11, pp. 58, 133–134, figs. 39, 78, (1911); WAKSMAN, S. A., Soil Sci. II, 2, pp. 103–148, (1916); in BIOURGE Monogr. La Cellule 33: fasc. 1, pp. 292–293; Col. Pl. X, Cart. 127; Pl. XVII, fig. 99, (1923).

Hab. On leather.

7. ***P. implicatum*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 278–280; Col. Pl. IX, Cart. 76; Pl. XIV, fig. 82, (1923).

Hab. From air.

8. ***P. aurantio-violaceum*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 282–284; Col. X, Cart. 33; Pl. XVI, fig. 94, (1923).

Hab. On feather.

9. ***P. aurantio-brunneum*** DIERCKX. Soc. Scientif. Bruxelles 25: p. 86, (1901); BIOURGE, La Cellule 33: fasc. 1, pp. 309–311; Col. Pl. IX, Cart. 145; Pl. XV, fig. 85, (1923).

Hab. On leather shoes.

10. ***P. sublateritium*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 315–317; Col. Pl. X, Cart. 57; Pl. XVI, fig. 92, (1923).

Hab. On leather.

11. ***P. flavi-dorsum*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 290–291; Col. Pl. VIII, Cart. 87; Pl. XIII, fig. 73, (1923).

Hab. From air.

12. ***P. oxalicum*** CURRIE and THOM. Journ. Biol. Chem. XXII, 2, p. 289, fig. 1, (1915); WAKSMAN, S. A., Soil Sci. II, 2, pp. 103–148, (1916); DALVI, P. D., Journ. Indian Inst. Sci. XIII, A, 15, pp. 173–192, (1930); HARISON, J. W., Iowa State Coll. Journ. of Sci. IX, 1, pp. 37–60, 1 fig., 14 graphs, (1934); COEHLER, B., Abs. in Phytopath., XXV, 1, p. 24, (1935).

Hab. On bamboo shoot.

13. ***P. steckii*** ZALESKI. In Bul. Acad. Polonaise Sci.: Math. et Nat. Ser. B, pp. 469–471, taf. 50; ZALESKI No. 1631b (1927).

Hab. On leather.

14. ***P. citrinum*** THOM. Emended from U. S. Dept. Agric. Bur. Anim. Ind. Bul. 118, pp. 61–63, fig. 22, (1910); LECLERG, E. L., Mycologia, 22, (4): pp. 186–210, (1930), and Phytopath. XXI, 11, pp. 1073–1081, (1931); PASSMORE, S. R., Bull. Imper. Inst. XXX, 3, pp. 296–205, (1932).

Hab. On a fungus belonging to the *Basidiomycetes*.

15. ***P. chlorophaeum*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 271–273; Col. Pl. VIII, Cart. 39; Pl. XIII, fig. 78, (1923).

Remarks: This species contains two strains; see the following key.

Hab. Strain I on rice; strain II on pear.

16. ***P. notatum*** WESTLING. Arhiv för Botanik 11: 55, pp. 95–97; figs. 17, 59, (1911); WAKSMAN, S. A., Soil Sci. II, 2, pp. 103–148, (1916); BIOURGE Monogr. La Cellule 33: fasc. 1, pp. 179–181; Col. Pl. IV, Cart. 19; Pl. VIII, fig. 37, (1923); CIFERRI, R., Journ. Dept. Agric. Puero Rico, XV, 3, pp. 223–286, 1 Pl., 1 diag., (1931); KOEHLER, B., DUNGAN, G. H., & BURLISON, W. L., Journ. Amer. Soc. Agron., XXVI, 4, pp. 262–274, 3 graphs, (1934).

Remarks: This species contains two strains; see the following key.

Hab. Strain I on bread; strain II on rubber.

17. ***P. puberulum*** BAINIER. Bul. Soc. Mycol. France 23: pp. 16–17; Pl. IV, figs. 6–12, (1907); MORGAN, G. E. V., Journ. Dairy Res. IV, 2, pp. 226–237, 2 figs., (1933); GEORGE, D. PUEHLE, Phytopath. XXI, 10, p. 1139, (1931).

Hab. From air.

18. ***P. roqueforti*** THOM. U. S. Dept. Agr. Bur. Anim. Ind. Bull. 82, pp. 35–36, fig. 2, (1906); Also idem Bull. 118, p. 34, fig. 4, (1910); BUCHANAN, R. E., Mycologia 2, pp. 99–108, (1910); WAKSMAN, S. A., Soil Sci. II, 2, pp. 103–148, (1916); VERNON, T. R., New Zealand Journ. of Sci. & Techn., XV, 4, pp. 237–247, 5 figs. (1934); HANZAWA, J. and YOSHIMURA, S., Journ. of Sapporo Soc. of Agric. & Fores. Year XXVII, No. 125, pp. 1–18, 1 Pl., (1935).

Probable synonyms: ***P. aromaticum*** SOPP, ***P. vesiculosum*** BAINIER, ***P. glaucum*** in the French cheese literature (see DUCLAUX, pp. 694, MAZÉ, ROGER).

Hab. On dead twig.

19. ***P. corymbiferum*** WESTLING. Arkiv. för Botanik 11, pp. 56, 92–95, figs. 16, 58, (1911); VAN BEIJMA, THOE KINGMA F. H., "Willie Commelin Schoten", Baaru, XII, pp. 28–30, (1928); WEBER, A., Reprinted from Aarbog. for Gartneri (1931), 19 pp. 7 figs. (1932); CHARMRWAY, A. K., Trans. Brit. Mycol. Soc. XVIII, 3, pp. 249–252, 1 graph, (1933).

Hab. On paste.

20. ***P. divergens*** BAINIER and SARTORY. Bul. Soc. Mycol. France 28, pp. 270–276, Pl. XIII, figs. 3–6, (1912).

Hab. From air.

21. ***P. viridicatum*** WESTLING. Arkiv. för Botanik 11: 53, pp. 88–90, figs. 14, 56, (1911); DALE, E., Annal. Mycol. Vol. 12, pp. 33–62, (1914); WAKSMAN, S. A., Soil Sic. II, 2, pp. 130–148, (1916); LECLERG, E. L., Mycologia XXII, 4, pp. 186–210, (1930); DALE, E., Phytopath., XXI, 10, pp. 1142, (1931).

Hab. On orange.

22. ***P. johannioli*** ZAL. In Bul. Acad. Polonaise Sci.: Math. et Nat. Ser. B, pp. 453–454, taf. 40; ZALESKI No. 402, (1927); KENNELLEY, VIOTET, C. E., & GRIMES, M., Scient. Proc. Roy. Dublin Soc. N. S. XIX, 40–47, pp. 549–569, 2 Pl., (1930).

Hab. On paste.

23. ***P. martensii*** BIOURGE. Monogr. La Cellule 33: fasc. 1, pp. 152–154; Col. Pl. II, Cart. 118, Pl. III, fig. 14, (1923); GEORGE, D. DUEHLE., Phytopath., XXI, 10, pp. 1142, (1931).

Hab. From air.

24. ***P. crustosum*** THOM. The *Penicillia*, p. 399, (1930).

Hab. On rice.

25. ***P. elongatum*** DIERCKX. Soc. Scient. Bruxelles, 25: 87, (1901); Synonym: (?) ***P. leucopus*** (PERS.), BIOURGE fide BIOURGE.

Hab. On dog dung.

26. ***P. italicum*** WEHMER. In Hedwigia 33: pp. 211–214, (1894); see also Beitr. z. Kennt. Einh., Pilze II, 1, pp. 68–72, Taf. I, figs. 1–3, Taf. II, figs. 1–10, Jena, (1895); WEIDEMANN, C., Centralbl. f. Bakt. XIX, pp. 755 u. 769, fig. a, (1907); WAKSMAN, S. A., Soil Sci. II, 2, pp. 103–148, (1916); SCHWARTZ, W., Centralbl. f. Bakt. LXX, p. 463, (1927); KLOTZ, L. J., Abs. in Phytopath., XIX, pp. 1144, (1929); BARKER, J., Dept. Sci. & Indus. Res., Food Invest. Board, Special Rept. 38, VI, p. 62, 9 Pl., 5 graphs, (1930); HAHNE, B., S. Africa Dept. of Agric. Bull. 98, p. 20, (1931); GIOELLI, F., Riv. Pat. Veg. XXII, 7–8, pp. 195–200, 3 figs. (1932); SAVASTANO, G., Boll. R. Staz. Pat. Veg., N. S. XII, 3, pp. 306–340, 7 Pl., 2 graphs, (1932); FRIEND, W. H., & BACH, W. J., Texas Agric. Exper. Stat. Bull. 446, P. 40, 4 figs., (1932); MÜLLER, A. S., Pytopath., XXIII, 9, pp. 734–737, (1933); BARGER, W. R., California Citrograph, XVIII, 9, pp. 240–256, 3 graphs, (1933); CIFERRI, R., & BALDACCI, E., Atti Inst. Bot. R. Univ. di Parvia, Ser. IV, 4, pp. 204–280, 27 figs., (1933); HAUSSMANN, G., Ann. Sper. Agric. XV, pp. 104–116, 5 Pl., (1934).

Hab. On orange.

27. ***P. patulum*** BAINIER. Bull. Soc. Mycol. France, 22 (fasc. 3): p. 208, Pl. XI, figs. 14–17; also ibid. 23; Pl. V, figs. 10–16, (1907).

Hab. On soy bean milk.

28. ***P. ventruosum*** WESTLING. Arktiv. för Botanik 11, pp. 57, 112–114, figs. 26, 67, (1911).

Hab. On bread.

29. ***P. purpurogenum*** STOLL. Beitr. a. Morph. u. Biol. Char. Penicill. Wurzburg, p. 32, t. I, fig. 6, t. III, fig. 2, (1904); THOM, C., U. S. Dept. Agric. Bur. Anim. Ind. Bul. 118, p. 36, fig. 5, (1910); and Mycologia VII, 3, pp. 134–142, (1915); LECLERG, E. L., Mycologia XXII, 4, pp. 186–210, (1930); DURRELL, L. W., Bull. Torrey Bot. Club, LVII, 4, pp. 233–237, (1930).

Hab. On decaying wood.

30. ***P. crateriforme*** GILMAN and ABBOTT. Iowa State Coll. Journ. Sci. 1: No. 3, p. 293, fig. 28, (1927).

Remarks: This species comprises two strains; see the following key.

Hab. Strain I on paraffin; strain II on fruit of Litchi.

31. ***P. luteum*** ZUKAL. Sitzber. K. Akad. Wiss. (Vienna) Math. Naturw. Kl. 98: p. 521, (1888); WEHMER, C., Ber. Deut. Bot. Gesellsch. 2: pp. 499–516, Taf. 25, (1893); THOM, C., U. S. Dept. Agric. Bur. Anim. Ind. Bul. 118: p. 39, (1910); BIOURGE Monogr. pp. 231–235; DERX, H. G., Bul. Soc. Mycol. France 41: pp. 375–381, (1925).

Remarks: This species comprises three strains; see the following key.

Hab. Strain I on walnut; strain II on rice; strain III from air culture.

32. ***P. rugulosum*** var. ***levis*** SHIH var. nov. Precipue conidiis levibus a typo differens.

Remarks: The present variety has the morphology of ***P. rugulosum*** THOM but with smooth conidia.

Hab. On a woody wall of an old house.

33. ***P. Hanzawanum*** SHIH sp. nov. Coloniis primum albis et sine fructibus in triduum, dein profundè aeruginoso-viridibus, tum valde canis olivaceis, et demum obscure canis olivaceis, floccosis, conidiis parcis, margine sterili angusta, hyphis aeriis sterilibus, tarde vigentibus, rugosis, non guttulosis; reverso primum incolorato, dein leviter fusco, agaro achroo; gelatina leviter liquescente; coloniis in agaro Koji obscure viridibus, abundanter magnas guttas oleaceas et glutinosas exsudantibus; conidiophoris 40–200×3–3.5μ, ex repentibus orientibus, interdum ramosis, septatis, parce verrucosis, penicillum in termino portantibus; penicillus aequaliter biverticillatus, 25–38μ longus; basidiis compactis, 2–5 verticillum formantibus, 8–15×3μ; pseudobasidiis crebris, 9–15×2–2.5μ; conidiis in catenis parallelis stantibus, leviter flavo-viridibus, ellipticis, levibus, 3.2–5×2.5–3.8μ.

Remarks: Dr. CHARLES THOM identified this species as an undescribed

species of the *Biverticillate* series. It is related to ***P. tardum*** THOM from which it is characterized by its larger conidia and far shorter conidiophores, especially its floccose colonies and oil-like drops in Koji agar.

Hab. From air culture.

Key to the Species of *Pencillium* in Wuchang, Central China

I. Penicillus typically monoverticillate, consisting of one series of sterigmata either borne upon simple conidiophore or its branches ..... ***Monoverticillate division.***

A. Colonies floccose, with more or less extensive development of aerial mycelium as simple hyphae, not ropy or fascicled ..... ***Stricta floccosa.***

B. Conidial areas some shades of green or blue green during the growing period; conidia globose or subglobose, less than 4.5μ in diameter.

C. Conidiophores rough when mature, with more or less dichotomous branches; reverse violet to brownish; conidia 1.8 to 3μ in diameter.. ..... ***P. sinicum*** SHIH sp. nov.

CC. Conidiophores smooth, not branching; reverse rose; conidia 3 to 3.5μ in diameter ..... ***P. (Citromyces) bruntzii*** SARTORY.

a. Colonies with a thin layer of aerial hyphae in Koji agar .... *Strain I.*

aa. Colonies without aerial hyphae in Koji agar ..... *Strain II.*

BB. Conidial areas white throughout development or occasionally partly bluish but blue green in Koji agar; conidiophores 20 to 520μ long; conidia globose or rarely elliptical, 2.5 to 3.5μ in long axis..... ..... ***P. wuchangense*** SHIH sp. nov.

AA. Colonies not floccose.

D. Colonies with part of the aerial hyphae as ropes or funiculose masses or networks of trailing or ascending hyphae .... ***Stricta Funiculosa.***

E. Ropiness or funiculose condition well marked as the colonies are examined under the microscope; colonies closely felt, greenish white; reverse sordid orange, red to almost blackish; conidia elliptical, 2.5 to 4 by 2 to 2.5μ ..... ***P. chermesinum*** BIOURGE.

EE. Ropiness reduced to trailing and more or less fascicled hyphae in colonies velvety or nearly so in appearance; colonies bluish to yellowish green to drab; reverse yellowish, greenish, to deep blackish green; conidia globose or oval, 2.5 to 3.5μ in long axis .... ***P. fellutanum*** BIOURGE.

DD. Colonies velvety in appearance.

F. Colonies with trailing hyphae and more or less ropy as seen under

the microscope; conidiophores arising from creeping hyphae, with apex swollen to about twice the diameter of the stalk .... ***P. frequentans*** WESTLING.

FF. Colonies velvety; conidiophores arising from submerged mycelium.

G. Conidia elliptical.

H. Colonies dull bluish green, overgrowth of long hyphae; agar brown red; conidia 2 to 3.5 by 1.8 to 2.8μ .... ***P. implicatum*** BIOURGE.

HH. Colonies deep bluish glaucous to wood brown, with or without small tuft of aerial hyphae; reverse and agar ochraceous-salmon to brown; conidia 2.5 to 4.2 by 4 to 6μ .... ***P. aurantio-violaceum*** BIOURGE.

GG. Conidia globose or subglobose.

I. Conidia smooth.

J. Colonies 100 to 200μ deep, blue green to olive green; reverse orange brown; conidia globose, 3 to 4μ in diameter .... ***P. aurantio-brunneum*** DIERCKX.

JJ. Colonies about 300μ deep, gray green; reverse yellowish brown to brick red; conidia ovoid or subglobose, 2.8 to 3.2μ in long axis ..... ***P. sublateritium*** BIUORGE.

II. Conidia faintly echinulate, 3 to 3.5μ in diameter; colonies blue green to gray green; reverse yellow to reddish brown .... ***P. flavi-dorsum*** BIOURGE.

II. Penicillus consisting of two or more series of sterigmata and metulae, with the branching system typically lopsided or asymmetrical .... ***Asymmetrica division.***

A. Colonies velvety, at times showing a basal network of aerial hyphae, but maintaining the general velvety appearance ..... ***Velutina section.***

B. Conidia more than 4.5μ in long axis; colonies dark green; conidia in deep mass breaking off easily, elliptical and large, 3.5 to 6.8 by 2.3 to 3μ ..... ***P. oxalicum*** THOM and CURRIE.

BB. Conidia less than 4.5μ in long axis.

C. Penicilli with metulae divaricate, producing verticils of conidia approximating separate monoverticillate penicilli.

D. Colonies broadly but indistinctly zonate, thinner toward margin, grayish blue green; reverse yellow; conidia 2 to 2.5μ in diameter ..... ***P. steckii*** ZALESKI.

DD. Colonies narrowly growing, thin, not zonate, dull blue green; reverse yellow to dark red; conidia 2.4 to 3.5μ in diameter..... ..... ***P. citrinum*** THOM.

CC. Penicilli more compact in the characteristic form of a brush or broom.

E. Conidiophores mostly ascending rather than erect; penicilli characterized by terminal verticils of metulae more or less closely aggregated and each subtended by one or more distant secondary penicilli often monoverticillate ..... ***Radiata***.

F. Colonies thick, up to 600μ; reverse yellow to brown; conidia subglobose, 3.6 to 4.2 by 3 to 4μ ..... ***P. chlorophaeum*** BIOURGE.

a. Colonies slowly becoming grayish green, with large yellow drops ..... *Strain I.*

aa. Colonies quickly becoming gray, drops colorless .. *Strain II.*

FF. Colonies thinly and closely textured, about 200μ deep; reverse deep yellow; conidia globose, 2.6 to 3.2μ in diameter..... ***P. notatum*** WESTLING.

a. Colonies grayish green in age; aerial hyphae abundant in Koji agar ..... *Strain I.*

aa. Colonies showing blackish in age; aerial hyphae very scanty in Koji agar ..... *Strain II.*

EE. Conidiophores more erect; penicilli more completely aggregated into a morphological unit.

G. Colonies narrowly growing; reverse and agar deep red; conidiophores 100 to 200μ long; conidia 4 to 4.2μ in diameter.. ..... ***P. puberulum*** BAINIER.

GG. Colonies spreading broadly; reverse and agar yellow to greenish; conidiophores about 100μ long; conidia 4 to 5μ in diameter ..... ***P. roqueforti*** THOM.

AA. Colonies with part or all of the conidiophores combined into fascicles or coremia which are erect or ascending ..... ***Fasciculata section***.

II. Colonies with most or all of the conidiophores in fascicles or in definite coremia.—Fascicles small and with simple conidiophores among them ..... ***Subsection coremiella***.

I. Colonies blue green to olive gray; reverse deep orange to brown; conidia globose or subglobose, 3 to 4μ in long axis. ..... ***P. corymbiferum*** WESTLING.

II. Colonies bluish green to blackish; reverse red; conidia oval or subglobose, 3 to 4.5μ in long axis ..... ***P. divergens*** BAINIER.

III. Colonies with simple conidiophores and fascicles closely mixed, but with simple conidiophores predominating.

J. Colonies in bright green or yellowish green shades (***Subsection***

viridicatum); reverse yellowish to brownish; conidia globose or subglobose, 3 to 4.5μ in long axis ..... ***P. viridicatum*** WESTLING.

JJ. Colonies in blue green, dull to dark gray green or glaucous shades.

K. Colonies in blue green shades ..... ***Subsection aeruginosa.***

L. Colonies with narrow crowded zones; reverse quickly colored brown red; conidia oval or globose, 3 to 4.5μ in long axis.... ..... ***P. johannioli*** ZALESKI.

LL. Colonies with broad zones; reverse yellow to maroon; conidia mostly elliptical, 3.5 to 4 by 2.4 to 3μ .... ***P. martensii*** BIOURGE.

KK. Colonies in dull to dark gray green or glaucous shades .... ***Subsection glauca.***

M. Zonation indistinct or reduced to ridges in the conidial mass; fascicles seen only at margin; conidial chains forming continuous crusts over the surface of mycelium .... ***P. crustosum*** THOM.

MM. Zonation usually evident and broad, especially in outer areas of colonies.

N. Conidia 2.8 to 3.5μ in long axis.

O. Sclerotia and perithecia not described; colonies green to brown; conidia mostly oval .... ***P. elongatum*** DIERCKX.

OO. Sclerotia and perithecia described but not often uncountered; colonies bluish green to gray; conidia cylindrical to elliptical ..... ***P. italicum*** WEHMER.

NN. Conidia 4 to 4.5μ in long axis.

P. Colonies with narrow white margin; growth restricted; reverse red to red brown ..... ***P. patulum*** BAINIER.

PP. Colonies with broad white margin; growth spreading; reverse uncolored to clear brown .... ***P. ventruosum*** WESTLING.

III. Penicillus typically consisting of one symmetrical verticil of metulae, bearing symmetrical verticils of sterigmata lanceolate or acuminate at apex ..... ***Biverticillata-Symmetrica division.***

A. Colonies showing green conidial areas on a mycelium usually showing yellow shades, sometimes red in age.—Ropiness reduced to inconspicuous amounts or absent.—Colonies more or less bordered, mixed with or overgrowth by yellow to orange hyphae; reverse yellow, orange or red.

B. Reverse quickly and intensely red.

C. Colonies tending toward floccose, with thick overgrowth of cottony

sterile hyphae; conidiophores up to 300μ long; reverse quickly becoming deep red ..... ***P. purpurogenum*** STOLL.

cc. Colonies velvety in appearance, aerial hyphae scanty and closely mixed; conidiophores up to 150μ long; reverse orange to pinkish red ..... ***P. crateriforme*** GILMAN and ABBOTT

a. Colonies with reddish mycelium in Koji agar ..... *Strain I.*

aa. Colonies without reddish mycelium in Koji agar ..... *Strain II.*

BB. Reverse predominantly yellow to orange rather than intense red.

D. Conidial areas dark gray green to olive green; reverse colorless to yellow; conidia globose or oval, 2 to 3μ in long axis ..... ***P. luteum*** ZUKAL.

a. Colonies partly colored sulphur yellow during the growing period in Koji agar ..... *Strain I.*

aa. Colonies without sulphur yellow during the growing period in Koji agar.

b. Colonies in Koji gelatine grayish green in age, with abundant cottony aerial hyphae ..... *Strain II.*

bb. Colonies in Koji gelatine gray blackish in age, aerial hyphae very scanty ..... *Strain III.*

DD. Conidial areas yellowish green to dark green; reverse yellow orange in spots; conidia smooth, mostly elliptical, 3.4 to 4 by 2.5 to 3μ .. .. ***P. rugulosum*** var. ***levis*** SHIH var. nov.

AA. Colonies lacking the yellow to red mycelium, with shades of gray green to blackish, floccose; conidiophores with walls sparingly tuberculate, 40 to 160μ long; conidia elliptical, 3.2 to 5.2 by 2.5 to 3.8μ ....***P. Hanzawanum*** SHIH sp. nov.

摘　　要

中華民國武昌產 *Penicillium* に就て

本報告は中華民國武昌產 *Penicillium* の 39 菌種を記載せるものにして其中に三新種並に一新變種を包含す. 卽ち *P. wuchangense, P. sinicum, P. Hanzawanum, P. rugulosum* var. *levis* なり.

Explanation of Plate

Fig. 1. *P. wuchangense* SHIH. A, Conidiophore under low power, bearing divergent chains of conidia; B, short branching conidiophores; C, D, E, and F, part of conidiophores with different arrangement of sterigmata; G, conidia.

Fig. 2. *P. Hanzawanum* SHIH. A, Branching conidiophores under low power, bearing parallel chains of conidia; B and C, part of the branching conidiophores magnified; D, a simple conidiophore with penicillus consisting of three superposed series of verticils; E, elliptical conidia, three of which are with connectives.

Fig. 3. *P. sinicum* SHIH. A, Conidiophore under low power, with short branches and bearing chains of conidia in columns; B, part of a conidiophore in young stage; C, D, and E, conidiophores with different forms of branching; F, and G, conidiophores bearing verticils of metulae, suggesting the *Biverticillata-Symmetrica* form; H, conidia.

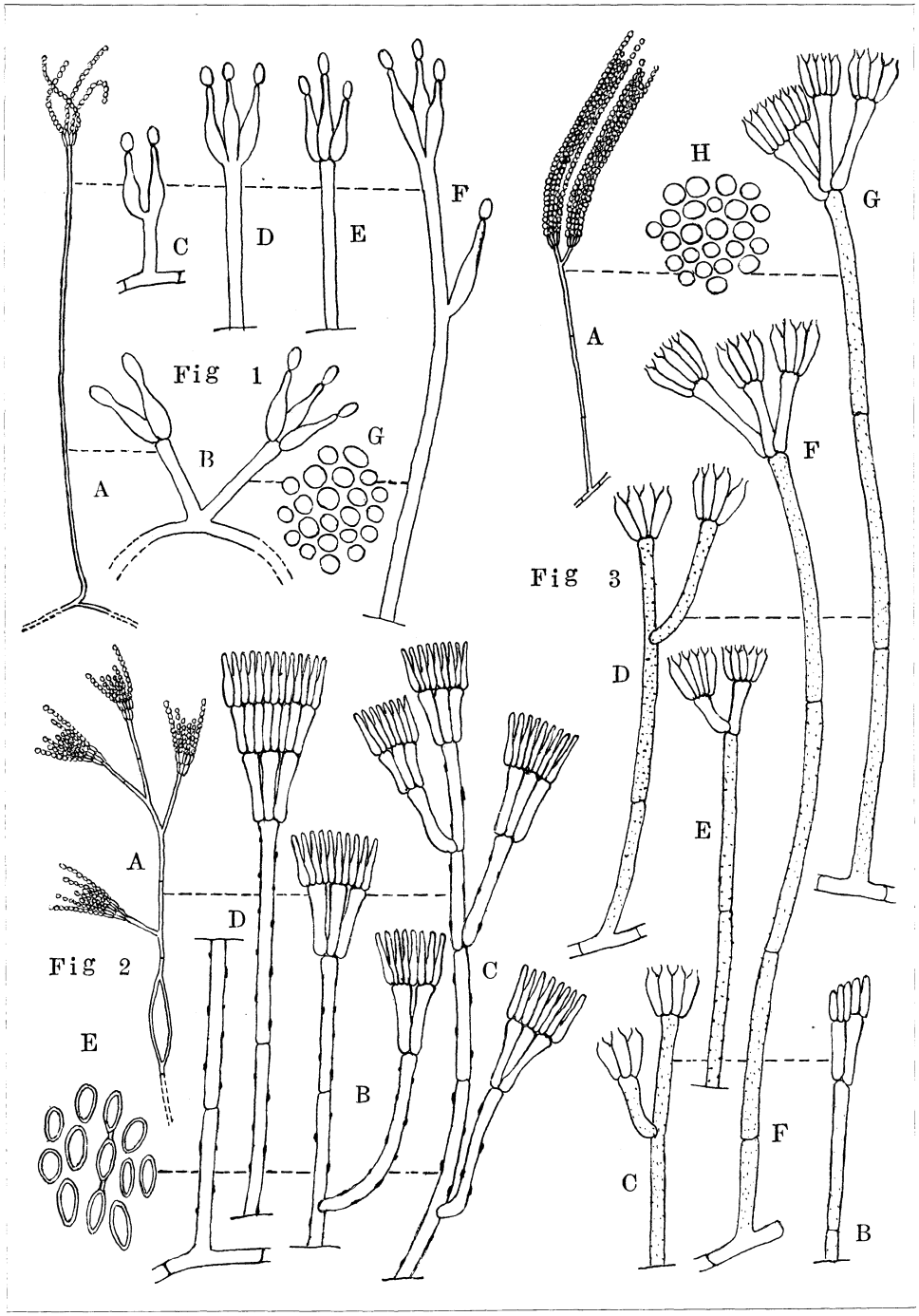

Fig 1

Fig 2

Fig 3

New or Noteworthy Fungi Parasitic on Agricultural Plants in Southern Saghalien

By

Tetsuji Ishiyama

(石 山 哲 爾)

In recent years the fungi parasitic on wild plants in Southern Saghalien have been studied by Prof. S. Itô[51][16], Mr. N. Hiratsuka[10][11][12][13], Messrs. K. Kawai & H. Ohtani[17] and others, but no attempt has heretofore been made to describe the fungi parasitic on agricultural plants.

The writer has recently published a list of fungi parasitic on agricultural plants in Southern Saghalien.[14]

In the present paper the writer intends to describe some new or noteworthy species of fungi collected in that district, as a supplimentary note of the above mentioned list.

The writer wishes to express here his sincere thanks to Prof. S. Itô for his kind direction and to Prof. Y. Tochinai and Assist. Prof. T. Fukushi for their valuable suggestions and kind advices. And he is also indebted to Messrs. U. Kimoto and N. Shirasaka, phytopathologists of the Dept. of Agr., Sagalien Central Experiment Station.

1. ***Ascochyta italica*** (Traversa) n. comb.

Syn. *Ascochyta Fagopyri* Bresadola f. *italica* Traversa, Ann. Myc. I, p. 312, 1903; T. Ishiyama, Jour. Sapporo Soc. Agr. & For. XXVIII, No. 131, p. 9, 1936.

Hab. on leaves of *Fagopyrum esculentum* L. (*Soba*).

Prov. Toyohara: Konuma.

Distrib. Japan (Southern Saghalien), Europe.

Remarks. Since the present fungus is clearly distinguished from *Ascochyta Fagopyri* by the smaller and not constricted spores, the writer proposes to deal with the fungus as an independent species. The present fungus is new to our country. Its general characters are as follows:—

Lesions epiphyllous, circular, 0.3–1.0 cm. in diam., brown colored, grayish yellow at the centre, provided with concentric zonations; on the under surface of leaves, they are grayish green in color and without zonations; the affected

tissues are very brittle.

Pycnidia epiphyllous, subepidermal, subglobose or depressed-globose, blackish brown, pseudoparenchymatous, 80–160μ, mostly 144μ in diam., provided with a circular ostiole. Pycnospores oblong or cylindrical, straight or slightly curved, rounded at the ends, hyaline, 1-septate, rarely 2-septate (about 5%), not constricted at the septum, guttulate, usually contain 4 oil-drops, 10–15×2.5–5.0μ, usually 12.5×3.5–4.0μ, average 13.05×3.81μ.

2. ***Ascochyta Lycopersici*** BRUN, Champ. Saint, p. 430, 1887; SACC. Syll. Fung. X, p. 304, 1892; T. ISHIYAMA, Jour. Sapporo Soc. Agr. & For. XXVIII, no. 131, p. 9, 1936.

Syn. *Ascochyta socia* PASSER.: SACC. Syll. Fung. X, p. 304, 1892.

Hab. on leaves *Lycopersicum esculentum* MILL. (*Tomato*).

Prov. Toyohara: Konuma.

Distrib. Japan (Southern Saghalien), Europe, N. America.

Remarks. KLEBAHAN[18] stated that this species is an imperfect stage of *Dydimella Lycoperisici* KLEBAHN. As his view is still in question, the writer has used the name, *Ascochyta Lycopersici* in this paper. As far as the writer is aware, this fungus has not been reported from our country up to the present time. The general characters are as follows:—

Lesions circular or elliptical, brown to blackish brown, grayish at the centre, provided with concentric zonations, 1–5 mm. in diam., on the under surface of leaves, pale in color, sometimes confluent in larger and irregular shape. The affected leaves die prematurely. Pycnidia scattered on the upper side of the lesion, subepidermal, globose or subglobose, light brown in color, pseudoparenchymatous, 96–192μ in diam., provided with a circular or ovoidal ostiole. Pycnospores oblong, cylindrical or ovoidal, rounded at the ends, curved or straight, hyaline, 1-septate, rarely 2-septate, not constricted at the septum, guttulate, 6.4–13.6×2.4–3.6μ, mostly 9.6–12.0×3.2μ, average 10.854×3.246μ.

3. ***Ascochyta menthicola*** sp. nov. (Pl. XII, Fig. 5, a, b.)

Syn. *Ascochyta* sp., T. ISHIYAMA, Jour. Sapporo Soc. Agr. & For. XXVIII, no. 131, p. 10, 1936.

Maculis irregularibus, indistincte-marginatis, brunneis, deinde medio cinerescentiter mutantibus; pycnidiis epiphyllis, sparsis, immersis, globosis vel subglobosis, 64–112μ latis, contextu parenchymatico, brunneo, ostiolo routundato; sporulis oblongis, cylindraceis, vel ovoideis, utrinque rotundatis, rectis vel curvulis, l-septatis, non constrictis, biguttulatis, hyalinis, 6.5–12.8×2.4–4.4μ, plerumque 8.0–9.6×3.2–4.0μ.

Hab. on leaves of *Mentha arvensis* L. var. *vulgaris* BENTH. (*Hakka*).

Prov. Toyohara: Konuma.

Distrib. Japan (Southern Saghalien, Hokkaido).

Remarks. The present fungus is frequently accompanied with *Phyllosticta Menthae* BRESADOLA which will be mentioned later on, and the damage caused by the fungus appears to be as severe as that caused by the latter.

4. ***Ascochyta Ribis*** MASSA, Ann. Myc. X, p. 290, 1912; T. ISHIYAMA, Jour. Sapporo Soc. Agr. & For. XXVIII, no. 131, p. 10, 1936.

Hab. on leaves of *Ribes grossularia* L. (*Gooseberry*).

Prov. Ohdomari: Horonaiho.

Distrib. Japan (Southern Saghalien), Europe.

Remarks. The present fungus closely resembles *Ascochyta Ribis* MASSA, except for a slight difference in the size of spores. The spores of this fungus are mostly 8.0–9.6×2.8–3.2μ, while those of the latter are 6×3μ. But such a difference is not considered to be a sufficient basis to divide these fungi into different species.

This species is a new addition to the mycological flora of Japan, and *Ribes grossularia* is a new host to this fungus. The general characters of the fungus are as follows:—

Lesions circular, 1.3 mm. in diam., grayish white, surrounded by a reddish brown border. Pycnidia scattered sparsely on the lesions as blackish dots, globose or subglobose, buried, yellowish brown, membranaceous, 112–208μ in diam., with a circular ostile. Pycnospores oblong or cylindrical, straight or curved, rounded at the ends, hyaline, 1-septate, not constricted at the septum, 2-guttulate in each cell, 6.4–11.2×2.4–3.6μ, mostly 8.0–9.6×2.8–3.2μ, average 8.47 ×3.052μ.

5. ***Ascochyta sojaecola*** ABRAMOFF, Dis. & Pests of Soy beans in Far East, 1931 (Abst. in Rev. Appl. Myc., XI, p. 88, 1932).

Hab. on leaves of *Glycine soja* BENTH. (*Daizu*).

Prov. Toyohara: Konuma.

Distrib. Japan (Southern Saghalien) & Amur.

Remarks. Up to the present time, as far as the writer is aware, two species of Ascochyta parasitic on *Glycine soja* have been recorded, namely one is *A. Sojae* reported from Manchuria by M. MIURA[19] in 1928, and the other is *A. sojaecola* described from Amur by I. N. ABRAMOFF[1] in 1931. The present fungus differs from *A. Sojae*, because the spores of the fungus in question are cylindrical, rounded at the ends and 6.4–12.8×2.8–4.4μ in size, while those of the latter are fusiform, bluntly pointed at the ends and 12–18×4.0–4.5μ in size. The present fungus closely resembles *A. sojaecola*, because the spores of the latter

species are cylindrical and 8–11×3–5μ in size, and the writer considers that his fungus is identical with *A. sojaecola,* which seems to be closely related to *Ascochyta Phaseolorum* SACC.

This fungus is a new addition to the mycological flora of Japan. Its general characters are as follows:—

Lesions circular or elliptical, brown colored, later become grayish at the centre, surrounded by a reddish brown border, and provided with dark brown concentric zonations. Pycnidia scattered solitary as brown dots on the upper side of the lesions, globose or depressed-globose, dark brown in color, pseudo-parenchymatous, 80–160μ, mostly 96–112μ in diam., provided with a circular ostiole. Pycnospores cylindrical, oblong or ovoidal, straight or slightly curved, hyaline, homogenous or slightly guttulate, 1-septate, rarely 2 or 3-septate (ca. 1%), not or slightly constricted at the septum, 6.4–12.8×2.4–4.4μ, mostly 8.0–9.6 ×3.2μ, average 9.9×3.4μ in size.

6. ***Phyllosticta Menthae*** BRESADOLA, Ann. Myc. XIII, p. 104, 1915; T. ISHIYAMA, Jour. Sapporo Soc. Agr. & For., XXVIII, no. 131, p. 11, 1936.

Hab. on leaves of *Mentha arvensis* L. var. *vulgaris* BENTH. (*Hakka*).

Prov. Toyohara: Konuma.

Distrib. Japan (Southern Saghalien), Europe.

Remarks. *Phyllosticta Mentahae* was first described by BRESADOLA from Sachsen[3] and it is different from *Ph. calamintha* ELL. et EV. and *Ph. decidua* ELL. et KELL., which are also parasitic on *Mentha arvensis,* having longer spores (the spores of the former species are 6–7×2–2.5μ, and those of the latter fungi are 3.5–4.5×2–2.5 and 3–7×1.5–3μ, mostly 3–4×1.5μ).

The fungus under consideration closely resembles BRESADOLA's fungus except for some slight differences, as shown in the following table.

	Lesions	Pycnidia	Pycnospores
Phyll. Menthae[3]	dark colored, circular or oblong	lens-shaped, yellow, 180–190μ	cylindrica-oblong, 2-guttulate, 6–7 ×2–2.5μ
The present fungus	dark brown, later grayish white, circular	globose, brown, 96–144×112–160μ	oblong or ovoid, 2-guttulate, 4–9.6 ×2–3.2μ (aver. 7.1×2.5μ)

Since the differences between these fungi are slight, the writer inclines to believe that the fungus is identical with *Phyll. Menthae* BRESADOLA.

The disease caused by this fungus is very important from the economic point, because it appears from the later part of Ausust to the middle of Sept-

ember and sometimes destroys all the leaves of its host plant before harvest.

This fungus is a new addition to the mycological flora of Japan. Its general characters are as follows:—

Lesions at first circular and brown, but later grayish white, sometimes confluent in larger and irregular shape and dark grayish brown in color, at last enlarged to cover the whole surface of the leaf. Pycnidia amphigenous, scattered, globose or subglobose, subepidermal, 96–144×112–160μ, average 116.8 ×131.6μ, pseudoparenchymatous, dark brown in color, provided with a more or less papillated and circular ostiole. Pycnospores oblong or ovoidal, rounded at the ends, straight or curved, hyaline, not septate, very rarely 1-septate, 2- guttulate, 4.0–9.6×2.0–3.6μ, usually 4.8–8.0×2.0–2.8μ, average 7.1×2.5μ in size.

7. ***Septoria Citrulli*** ELLIS et EVERHART, Jour. Myc. IV, p. 102, 1888; T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, no. 131, p. 11, 1936.

Hab. On leaves of *Cucumis sativus* L. (*Kiuri*).

Prov. Ohdomari: Ohdomari.

Distrib. Japan (Southern Saghalien), Europe, N. America.

Remarks. The present fungus closely resembles *Septoria Citrulli* which was described by J. B. ELLIS & B. J. EVERHART[5] in 1888 as a parasite of a water melon. The morphological characteristics of these two fungi are compared in the following table.

	Lesions	Pycnidis	Pycnospores
Sept. Citrulli (5)	circular, white, 1 mm. in diam.	solitary produced	cylindrical or cylindrical-clavate, guttulate, 10–25 × 1.5–2μ.
The present fungus	circular or ovoid, white to yellow, 1–2 mm. in diam.	sparsely scattered	cylindrical or cylindrical-clavate, guttulate, 3-septate, 11.2–20.8 × 1.6–2.8μ.

The writer considers that the present fungus is identical with *Sept. Citrulli*. The species has never been reported from Japan up to the present time. The general characters of this fungus are as follows:—

Lesions circular or ovoid, white to yellowish in color, 1–2 mm. in diam., sometimes confluent. Pycnidia very sparsely scattered on the lesions, globose or subglobose, subepidermal, 80–144μ in diam., provided with a circular ostiole. Pycnospores cylindrical or cylindrical-clavate, sometimes tapered toward one of the ends, hyaline, rounded at the ends, mostly curved 0–3-septate, usually 3, guttulate, 11.2–20.8×1.6–8.8μ, average 15.376×2.44μ.

8. ***Septoria daucina*** BRUNAUD, Glan, myc. sér. 2, Herbor, p. 8, 1892; SACC. Syll. Fung. XI, p. 541, 1895; T. ISHIYAMA, Jour. Sapp. Soc. Agr. and For.

XXVIII, no. 131, p. 11, 1936.

Hab. on leaves of *Daucus carota* L. (*Ninjin*).

Prov. Ohdomari: Obara.

Distrib. Japan (Southern Saghalien) & Europe.

Remarks. This species is a new addition to the mycological flora of Japan, and its general characters are as follows:—

Lesions circular or elliptical, 0.5–2 mm. in diam., grayish yellow at the centre and blackish brown at the margin. Pycnidia very sparsely scattered on both sides of leaves, buried in the tissues, globose to subglobose, blackish brown, 64–80μ in diam., provided with a circular ostiole. Pycnospores filamentous, hyaline, curved, more or less guttulate, not septate, 24–48$\times$0.8–1.2μ, usually 32–25.2$\times$1.2μ.

9. ***Septoria lappicola*** sp. nov.

Syn. *Septoria* sp., T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, no. 131, p. 12, 1936.

Maculis rotundatis vel irregularibus, rufescentibus, saepe indisinctezonatis; pycnidiis epiphyllis, immersis, globosis vel subglobosis, 80–112μ diam., contextu parenchymatico, olivaceo-brunneo, ostiolo rotundato; sporulis cylindraceis, curvulis vel rectis, utrinque rotundatis, 1–8-septatis, plerumque 3-septatis, non constrictis, hyalinis, homogenis, 8.0–22.4$\times$1.6–3.2μ, plerumque 12.8–20.8$\times$2–4μ.

Hab. on leaves of *Arctium Lappa* L. (*Gobô*).

Prov. Ohdomari: Obara.

Distrib. Endemic!

Remarks. This fungus is distinguished from *Sept. Lapparum* SACC. by the characteristics of spores as well as by the lesion on the leaf, i.e. the spores of this fungus are 12.8–20.8$\times$2.4μ in size and 3-septate, and the lesion is reddish brown with black concentric zonations, while the spores of the latter are 25 $\times$1–1.25μ and not septate, and the lesion is sooty to white in color.

10. ***Stagonospora Betae*** sp. nov. (Pl. XII, Fig. 4, a, b.)

Syn. *Stagonospora* sp., T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, no. 131, p. 12, 1936.

Maculis epiphyllis, rotundatis, brunneis, deinde medio cinerescentibus, zona fusco brunnea circumdatis, saepe confluentibus; pycnidiis epiphyllis, sparsis, immersis, globosis vel subglobosis, 112–160μ diam., contextu parenchymatico, atro brunneio, ostiolo rotundato; sporulis cylindraceis vel cylindraceo-clavatis, utrinque obtusiusculis vel sursum obtustius-culisque deorsum routundatis, utrinque obtusiusculis vel sursum obtustius-culisque deorsum rotundatis, curvulis vel sigmoideis, pallide olivaceis, pluriguttulatis, 3–8-septatis, plerumque 7-

septatis, non constrictis, 32.5–60.0×4.0–5.5μ plerumque 45–55×5μ.

Hab. on leaves of *Beta vulgaris* L. (*Tensai*).

Prov. Toyohara: Konuma.

Distrib. Endemic!

Remarks. The present fungus differs from *Stagonospora Spinaciae* ELL. et Ev. and *Stag. Chenopodii* PECK., having slender and pale olive colored spores.

11. ***Stagonospora graminicola*** sp. nov. (Pl. XII, Fig. 3, a, b.)

Syn. *Stagonospora* sp., T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, no. 131, p. 12, 1936.

Maculis indistinctis; pycnidiis plus minusve seriatim dispositis, epiphyllis, globose-depressis, 48–144μ plerumque 96–112μ diam., contextu parenchymatico, fusco-brunneio, ostolo rotundato; sporulis cylindraceis, utrinque rotundatis, curvulis vel subsigmoideis, in massa pallide olivaceis, separatim subhyalinis, multiguttunlatis, 5–12-septatis, plerumque 7–9-septatis, non constrictis, 22.5–55.0×3.0–5.5μ, plerumque 32.5–45.5×4–5μ.

Hab. on leaves of *Triticum vulgare* L. (*Komugi*).

Prov. Toyohara: Konuma; Prov. Maoka: Uendomari, Futamata.

on leaves of *Echinochloa crus-galli* BEAUV. var. *edulis* HONDA (*Hie*).

Prov. Ohdomari: Ohdomari.

Distrib. Endemic!

12. ***Stagonospora islandica*** ROSTR. Islands Svampe in Bot. Tidsskrift, XXV, p. 320, 1903; SACC. Syll. Fung. XVIII, p. 361, 1906; T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, no. 131, p. 12, 1936.

Hab. on leaves of *Triricum vulgare* L. (*Komugi*).

Prov. Toyohara: Konuma.

on leaves of *Secale sereale* L. (*Raimugi*).

Prov. Toyohara: Konuma.

Distrib. Japan (Southern Saghalien), Europe.

Remarks. The present fungus is very similar to *Stagonospora islandica* which was reported by E. ROSTRUP[23] from Iceland in 1903, as a parasite on the sheath of grasses, although the present fungus has somewhat longer spores than those of his fungus. This species is a new addition to the Japanese mycological flora and its general characters are as follows:—

Lesions indistinct. Pycnidia scattered on the leaves, subepidermal, depressed-globose, 96–192μ in diam., pseudoparenchymatous, brown colored, provided with a circular ostiole. Pycnospores cylindrical or cylindrical fusoid, rounded at the ends, sometimes tapered toward the ends, subhyaline (light sooty olive color in mass), straight, curved or subsigmoid, 1–9-septate, mostly 5–7-

septate, very rarely 1–3 or 8–9-septate, 17.5–35.0×3.5–5.5μ, mostly 22.5–30.0×4–5μ, average 24.8×4.08μ on wheat, 26.425×4.594μ on rye, guttulate, containing 1–2 oil drops in each cell.

13. ***Colletotrichum cereale*** SELBY et MANNS, Proc. Indiana Acad. Sci. 1908, p. 111; SACC. Syll. Fung. XXII, p. 1208, 1913; T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, no. 131, p. 13, 1936.

Hab. on leaves of *Avena sativa* L. (*Yenbaku*).

Prov. Ohdomari: Ohdomari, Obara; Prov. Toyohara: Konuma.

Distrib. Japan (Southern Saghalien), N. America.

Remarks: This speceis is a new addition to the fungus flora of Japan and its general characters are as follows:—

Lesions indistinct. Acervuli widely scattered on the upper surface of leaves as blackish dots, roundish, brown, 65–140μ in diam. Satae dark brown in color, lighter colored at the apex, nearly straight, tapered toward the apex, non- or 1–3-septate, 75–112×4–5μ. Conidia fusiform, curved, obtuse at the ends, hyaline, guttulate, 17.5–25.0×3.5–5μ. Conidiophores cylindrical, hyaline, very short.

14. ***Heterosporium Allii-Cepae*** RANOJEVIĆ Ann. Myc. VIII, p. 399, 1910; SACC. Syll. Fung. XXII, p. 1388, 1913; T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For., XXVIII, no. 131, p. 15, 1936.

Syn. *Heterosporium Allii* (non ELL. et MART.) HARA, The diseases of vegetables and flowers, and their prevention, 1920 & Pathol. Agric. Plant. ed. 2, p. 765, 1930.

Hab. on leaves of *Allium fistulosum* L. (*Negi*).

Prov. Ohdomari: Taran'nai, Horonaiho; Prov. Toyohara: Konuma, Ochiai; Prov. Maoka: Futamata, Mizuho, Uendomari.

on leaves of *Allium odorum* L. (*Nira*).

Prov. Ohdomari: Hirano.

Distrib. Japan (Southern Saghalien, Hokkaido, Honshiu), Europe.

Remarks: The present fungus seems to be identical with the fungus described by K. HARA as *Heterosporium Allii* ELL. et MAR., but it is readily distinguished from ELLIS & MARTIN's fungus by its very large spores. On the other hand it agrees in every respect with *Heterosporium Allii-cepae* described by RANOJEVIĆ[22] in 1910. The general characters of this fungus are as follows:—

Lesions linear or elliptical, at first yellowish in color, but later sooty colored when the conidia are produced, somewhat bluish in color at the margin, frequently confluent covering the entire surface of leaves. Affected leaves sometimes wither and prematurely die. Condiophores emerge through stomata in tufts, simple, very long, 112.5–210.0×10–12.5μ, 1–6-septate, nodulose, dark brown,

lighter colored at the apex, swollen at the base. Conidia cylindrical or clavate, brown in color, rounded at the ends, verrucose, 1–3-septate, usually 3-septate, rarely not or 4-septate, semewhat narrow at the centre, not or slightly constricted at the septa, 42.5–120×10–17.5μ, usually 62.5–87.5×12.5–15.0μ.

15. ***Tyrospora Cannabis*** sp. nov. (Pl. XII, Fig. 1, a, b.)

Syn. *Macrosporium* sp., T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, 131, p. 16, 1936.

Maculis epiphyllis, orbicularibus vel irregularibus, 1–5 mm diam., indistincte-marginatis, ochraceo-griseis; hyphis singulis vel laxe fasciculatis, simplicibus vel raro ramulosis, erectis, flexuosis, deorsum pallido sursum fusco brunneis, 2–7-septatis, 30–87.5×5.0–7.5μ; conidiis solitario acrogenis, oblongis vel ovoideis, utrinque rotundatis, brunneis, callosis, 3–7-septate-muriformis, constrictis, 30–55×22.5–32.5μ, plerumque 35–40×25–30μ.

Hab. on leaves of *Cannabis sativa* L. (*Asa*).

Prov. Maoka: Uendomari.

Distrib. Endemic!

16. ***Macrosporium papaveris*** BRESADOLA, Ann. Myc. XIII, p. 106, 1915; T. ISHIYAMA, Jour. Sapp. Soc. Agr. & For. XXVIII, no. 131, p. 16, 1936. (Pl. XII, Fig. 2).

Syn. *Macrosporium somniferi* GARBOWSKI, Bull. Soc. Myc. Fr. XXXIII, p. 91, fig. 4, 1917.

Hab. on leaves of *Papaver somniferum* L. (*Keshi*).

Prov. Ohdomari: Minagishi.

Distrib. Japan (Southern Saghalien), Europe.

Remarks. There are 4 species of Macrosporium or Alternaria parasitic on *Papaver somniferum*, namely, *Macrosporium Papaveris* BRES.[3], *Macrosporium somniferi* GARBOWSKI[8], *Macrosporium Papaveris* (non BRES.) *Parisi*[20], and *Alternaria Brassicae* var. *somniferi* HART. et BR. The former two species are readily distinguished from the latter two by the spores without pedicel. The present fungus closely resembles *Macrosporium somniferi* in the general feature of the lesion, but resembles *Macrosporium Papaveris* in the characters of the spores. However, there is no difference in taxonomic essentials among these three fungi as shown in the following table.

After comparing the present fungus with the Exsiccati of *Macrosp. somniferi* GARB. (SYDOW, Mycotheca Germanica, Fasc. XXXVI, no. 1785), the writer came to the conclusion that these two fungi are identical. Accordingly it is proposed here to treat *Macrosp. sommiferi* as a synonym of *Macrosp. Papaveris* BRESAD. by reason of priority.

	Conidiophores	Conidia
Macrosp. Papaveris (3)	fasciculate, olive colored, septate, 90–120 × 6μ	subclavate or subfusoid, transversally 3–6, longitudinally 1–2 septate, strongly constricted at the septa, 50–72 × 18–30μ.
Macrosp. somniferi (8)	single, olive colored, septate, 120 × 5–6μ	at first ovoid, later clavate, muriform, 55–100 × 25–35μ.
The present fungus	loosely fascicular or single, olive colored, septate, 20–70 × 5–9μ	oblongal clavate or ovoid, transeverselly 3–7, longitudinally 1–4-septate, constricted at the septa 45.0–72.5 × 15–22.5μ.

The shape of the conidia of this fungus, being obclavate and obviously obtuse at the apex, indicates that it belongs to the genus Alternaria, so-called "Alternaria sonchi-group", according to Elliott,(6) but the writer has still used the name *Macrosporium Papaveris* in this paper, because he could not observe the mode of conidia-formation.

This fungus is a new addition to the fungus flora of Japan with general characters as follows:—

Lesions circular or elliptical, 2–5 mm. in diam., brown, provided with concentric zonations. On the under side, they are grayish brown in color. Conidiophores fascicular or single, simple, straight or curved, olive brown in color, 20–70×5–9μ, average 56.5×6.35μ, 3–7-septate, mostly 3-septate. Conidia produced from the apex of conidiophores, oblong-clavate or ovoid, rounded at the base, more or less obtuse at the apex, olive brown in color, transeversely 3–7- and longitudinally 1–4-septate, constricted at the septa, 45.0–72.5×15.0–22.5μ, average 55.5×19.5μ.

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Explanation of Plate

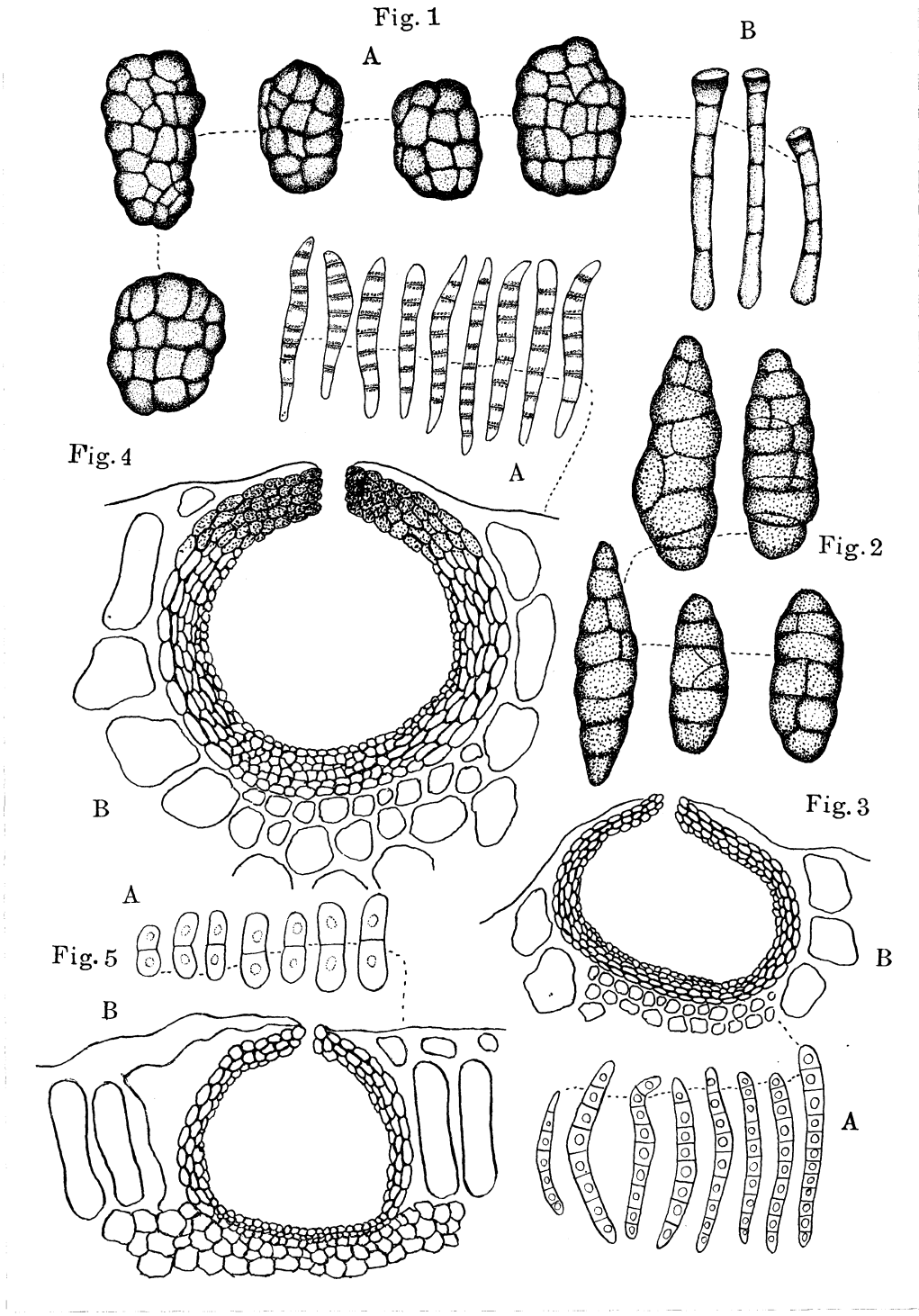
Fig. 1. *Tyrospora Cannabis* sp. nov. on leaves of *Cannabis sativa.*
a. Conidia (×400)
b. Conidiophores (×400)

Fig. 2. *Macrosporium Papaveris* BRESADOLA on leaves of *Papaver somniferum.*
Conidia (×400)

Fig. 3. *Stagonospora graminicola* sp. nov. on leaves of *Triticum vulgare.*
a. Pycnospores (×400)
b. Pycnidia (×240)

Fig. 4. *Stagonospora Betae* sp. nov. on leaves of *Beta vulgaris.*
a. Pycnospores (×400)
b. Pycnidia (×240)

Fig. 5. *Ascochyta Menthicola* sp. nov. on leaves of *Mentha arvensis.*
a. Pycnospores (×1000)
b. Pycnidia (×300)



T. Ishiyama del.

本 會 記 事

昭 和 十 年 度

六月十五日本會々報第十四卷一號發行サル.

昭和十年六月十七日九年度總會ヲ兼ネ第221回例會ヲ農學部新館五階中講堂ニ於テ開催，例會ニ於テ下記講演アリタリ.

一，蕃茄ノもざいく病ニ就テ　農學士 村山大記君

一，敵蟲輸入ニ關スル一考察　農學士 渡邊千尙君

總會ニ於テハ各幹事ノ事務報告ニ次デ役員ノ改選ヲ行ヒ舊幹事重任ニ決定セリ.

十一月三十日札幌遺傳談話會ト合同ニテ第222例回（講演）會ヲ新館四階大講堂ニ於テ開催シ，下記講演アリタリ.

一，人類ノ性染色體ニ就テ　農學博士 小熊 梓君

幻燈ト圖表ニヨリ性染色體研究ノ歷史及現況ヲ興味深ク講演セラレ聽衆約200名，盛會ナリキ.

十二月三十日本會々報第十四卷二號發行サル.

昭和十一年三月本會幹事長伊藤誠哉氏ヨリ基金ノ一部トシテ金貳百圓ヲ寄贈サル.

昭 和 十 一 年 度

五月三十日十年度總會ヲ兼ネ第223回例會ヲ五階中講堂ニ於テ開催，下記講演アリ.

一，りんごノもにりあ病ニ就テ　農學博士 島 善鄰君

りんごノ花腐レ實腐レハ林檎病害中重要ナルモノニシテ共ニ同一菌 Monilia ニヨリテ開花中ソノ花柱ヨリ侵入病害ヲ惹起セシムル事ノ實驗的證明ニ就キ顯微鏡寫眞，幻燈等ニヨリソノ該博ナル知識ヲ吐露セラレタリ.

總會ニ於テハ各幹事ノ事務報告ニ次ギ新タニ庶務幹事一名增加ニ決定シタリ，尙ホ役員改選ノ結果舊幹事重任トナレリ，又今回轉任セラレタル島田會計幹事ノ後任トシテ田川隆君，新任庶務幹事トシテ坂本正幸君ノ推薦ヲ見タリ.

六月三十日本會々報第十四卷三號發行サル.

十月 天皇陛下ノ本學ヘ行幸遊バサルヽニ方リ本會々報第一卷一號ヨリ第十四卷第三號迄ヲ獻上シタリ.

十月二十日本會事務所ヲ農學部新館ニ移轉シタリ.

十一月三十日札幌遺傳談話會ト合同ニテ第224回例會講演會ヲ四階大講堂ニ於テ開催，次ノ講演アリ.

一，アイヌ民族ノ衞生學的調査　醫學博士 井上善十郎氏

アイヌ民族ノ衞生狀態ニ關シ多年調査研究ノ結果ヲ詳細ナル統計ニ基ヅキ論ゼラレタリ，就中疾患ニ關シ結核性並ニ黴毒性疾患ガ大半ヲ占ムル點ニツキ聽衆ノ注意ヲ喚起セラ

レ，又特ニ兒童ノ衞生狀態ニ詳說セラルヽ處アリ，同民族ノ將來ニ就テハソノ人口構成ヨリ噴火灣沿岸，日高，十勝地方ノ如キ比較的溫暖ナル地方ニ居住スルモノハムシロ增加ノ傾向ヲ示シ，決シテ滅亡ノ過程ニアルモノニ非ラズトノ興味アル結論ヲ下サレタリ，聽衆約 150 名盛會ナリキ.

會員移動

入會

昭和十年度.	大坪長三氏	兵庫縣姬路市高尾町 672ノ1
	川口榮作氏	北大農學部養蠶學教室
	田中林藏氏	釧路國虹別，孵化場
	布能庄太郎氏	山梨縣甲府市袋町 62
	能島正一氏	北大農學部動物學教室
	田川隆氏	〃 植物學教室
十一年度.	福井重紀氏	〃 動物學教室
	小村達夫氏	〃 〃
	太田嘉四夫氏	〃 〃
	平井信二氏	北海道林業試驗場
	今野徹男氏	北大農學部植物學教室
	細川定治氏	〃

退會

十年度.	村野時哉氏
十一年度.	大立目謙一郎氏
	飯柴永吉氏
	影山純介氏

本會正會々員佐々木欣哉君ハ昭和十年三月四日，星野三郎君ハ同十月十六日，大谷廣直君ハ同十二月十三日，齋藤和彥君ハ同十二月十七日，南鷹次郎君ハ昭和十一年八月九日逝去サル．茲ニ謹ミテ哀悼ノ意ヲ表ス

昭和十一年十二月

札幌博物學會

札幌博物學會報

第十四卷

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注　意

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6. 論文には歐文及び和文の題目を記せられ度し
7. 著者の姓名は歐文，和文共に全體を記入せられ度し
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12. 原稿には左記の記號によりて活字型を定められ度し

キ　ヤ　ツ　プ	(CAP)	≡≡≡
スモールキヤツプ	(SMALL CAP)	≡≡≡
イ　タ　リ　ツ　ク	(*Italic*)	———
ヘビータイプ	(**Heavy type**)	～～～
ヘビーイタリツク	(***Heavy Italic***)	≈≈≈
ゲ　ス　ペ　ル　ト	(Gesperrt)	- - - - -

人名はスモールキヤツプ，學名はイタリツク.

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編輯兼發行者　犬飼哲夫

東京市神田區美土代町十六番地
印刷者　島連太郎

東京市神田區美土代町十六番地
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