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A NEW SALIX FROM FUKIEN (SALICACEAE)

By Franklin P. Metcalf
Curator of Herbarium, Lingnan Natural History Survey and Museum.

SEPARATE FROM
LINGNAN SCIENCE JOURNAL
Vol. 15, No. 1, January, 1936
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LINGNAN SCIENCE JOURNAL

(CONTINUATION OF LINGNAAM AGRICULTURAL REVIEW)

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*Names arranged alphabetically.

A NEW SALIX FROM FUKIEN (SALICACEAE)

By Franklin P. Metcalf
Curator of Herbarium, Lingnan Natural History Survey and Museum.[1]

Salix changchowensis sp. nov.

Leaves scattered, strigilose or short pilose on upper surface, older leaves somewhat reticulate; lower surface with white bloom and abundant strigilose hairs, elliptical, 2 to 3 cm. long and 8-12 mm. wide, margin serrate; petioles and young branchlets densely pilose, male catkins 3-5 cm. long, mostly on short branches, rachis pilose, bracts subnaked above, white-pilose beneath. Stamens 4-7, glabrous. See plates 4 & 5.

Frutex, 2-3 m. Planta mascula. Folia supra sparse strigilosa vel pilosa, subtus glauca et dense strigilosa, elliptica, 2-3 cm. longa et 8-12 mm. lata, margine serrata; petiolis ramulisque dense pilosis. Amenta mascula 3-5 cm. longa, cylindrica; rachi pilosa, squamae ovatae, supra subglabrae, subtus albo-pilosae. Stamina 4-7, glabra.

Related to *Salix cantoniensis* Hance but distinguished by the longer catkins (3-5 cm. long), the shorter leaves (2-3 cm. long) with acute apices; the upper surfaces also are rather dull. *Salix cantoniensis* Hance has shorter catkins (1.5-2 cm.), longer leaves (4-7.5 cm.) with acuminate apices and the upper surface somewhat lucid.

Fukien: Changchow; White Cloud Hill, shrub, 2 m. *Chung 1181*, March 27, 1923 (A,K,AA 2 sheets)[2] and Changchow, Yuan shan, shrub 2-3 m. *Chung 1207*, March 28, 1934 (A,K,AA),[2] syntypes.

These two numbers were seen in Amoy in 1928 and noted tentatively as a new species. They were seen again and carefully studied at the Arnold Arboretum, Harvard University, in 1930-1931. A description was prepared, but the status of *Salix cantoniensis* Hance, to which *S. changchowensis* is related, was not clear in my mind, even though its isotype (*Hance 13757*) was seen at the Gray Herbarium, Harvard University, about the same time. When at Kew in 1931 I studied in considerable detail two sheets of the type (*Hance 13757*) of *Salix cantoniensis* Hance, and came to the conclusion that *S. cantoniensis* Hance is a good species and that the species here described is different and readily distinguished from it. Handel-Mazzetti in Sym. Sin. 7:62 (1929) listed *S. cantoniensis*

[1] Contribution from the Lingnan Natural History Survey and Museum, Lingnan University, Canton, China.

[2] A=Amoy University. K=Kew, AA=Arnold Arboretum.

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Hance with some doubt which he indicated by a question mark. Incidently he lists *CCC 2101* (*Levine*) from Edinburgh as belonging to this species. This is the first pistillate specimen on record and represents, therefore, the type of the pistillate plant, Hance having described only staminate material. A duplicate sheet of *CCC 2101* (*Levine*) is at Lingnan University with which I have also been able to compare *Chung 1181* & *1027* kindly loaned by Prof. C. K. Tseng, of Amoy University.

I have been unable to locate additional material of *S. cantoniensis* Hance. The type of the staminate plant was described from Canton; the type of the pistillate plant, *CCC 2101* (*Levine*) was collected from the Agricultural Experimental Station, Canton, in April 1918. *CCC 13329* (McClure), collected in 1925, may be this species. No additional specimens are available either here or in the herbarium of the Botanical Institute.

All material recently collected represents the common much cultivated *Salix babylonica* Linnaeus. This occurs in two forms, both are fairly common, one Sui lau (垂柳), with long pendulous branchlets and leaves, the other, Tsing Ming Lau (清明柳), with more erect branchlets and branches and usually with larger leaves. Both of these as well as *S. cantoniensis* Hance are used for ancestral worship at the Tsing-ming Festival in the spring. Branches of these species are displayed over the front door of the house or placed on the roofs of the small sampans or river boats.

The drawing was made by dose Gomez.

柳之一新種

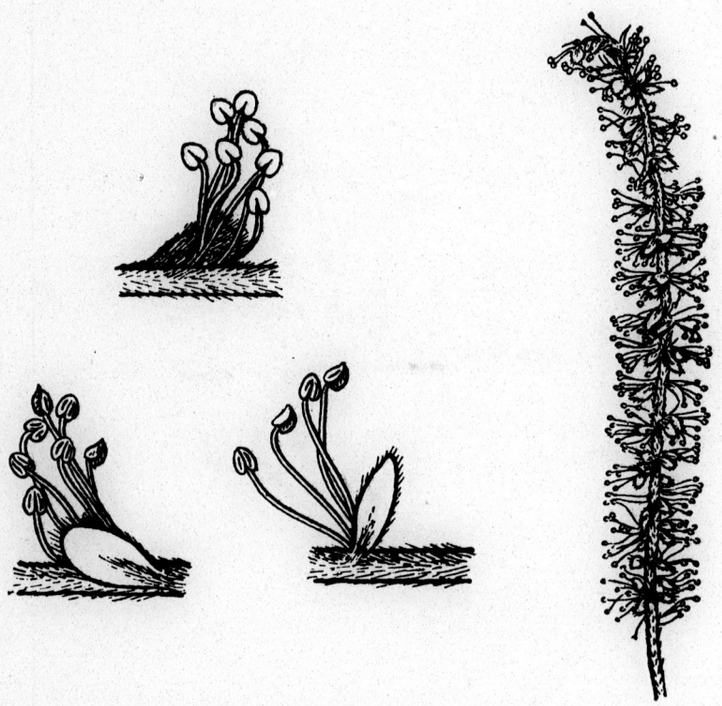
麥克福著

(摘要)

本文描述一新種屬，卽漳州柳。學名爲 *Salix changchowensis.* 其原標本爲鍾心煊教授在漳州元山所採集，號數鍾一千一百八十一與一千二百零七。此種屬與廣州柳 (*S. cantoniensis* Hance) 相近，惟柳絮較長，有三至五公分，且葉較短爲二至三公分長。此種標本早已于民國十七年發見于厦門。經作者在亞諾爾標本室，哈佛大學于民國十九至民國廿年之研究，復于歐洲之喬花園與之相比較，乃後由厦門借得標本而鑑定之，因獲研究之結果焉。



Salix changchowensis sp. nov. Syntype.



Salix changchowensis sp. nov.

Upper figure. Bract with seven stamens, ventral view × 8. Lower left figure. Dorsal view of same × 8. Center figure. Bract with 4 stamens, dorsal view × 8. Right figure. Staminate catkin × 2.

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A REVISED DESCRIPTION OF THE BAMBOO GENUS SCHIZOSTACHYUM

By F. A. McClure

Curator of Economic Botany, Lingnan Natural History Survey and Museum, Professor of Botany, Lingnan University, Canton.



SEPARATE FROM

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By F. A. McClure

Curator of Economic Botany, Lingnan Natural History Survey and Museum, Professor of Botany, Lingnan University, Canton.

In an earlier issue of this Journal (McClure, 1935) I published a revision of the Chinese species of the bamboo genus *Schizostachyum* Nees. With this was included an emended description of the genus, based on an intensive study of a fine series of specimens in the herbarium of the Lingnan Natural History Survey Museum, representing the critical structures of the known Chinese species. At that time I had not yet had the privilege of seeing authentic specimens of *Schizostachyum Blumii* Nees, the species on which the genus was based when first described. I have since had an opportunity of studying, at the Rijks Herbarium in Leiden, nine sheets of Blume's original collection which were gathered at Salak, Java (near Blume's place of residence, according to Dr. Henrard)—and on the basis of these[1] I have drawn up a revised description of the *type species*. This is to be published in *Blumea*, the scientific organ of the Rijks Herbarium.

During the course of this study, a most interesting discovery was made concerning the inflorescence of the type species. It may be recalled that one of the uniform features I found to characteride the fully developed spikelets of the *Chinese species* is their possession of a single functional floret, followed by a prolongation of the rachilla, which sometimes bears a minute rudimentary floret. It was rather surprising, therefore, to discover that in Blume's plant (the type species of the genus) the spikelets have *two* functional florets in additional to the occasional rudiment. So unexpected was this condition that, but for the complete agreement of my Chinese species with the type species in all other characters, I should have suspected that I had placed them in the wrong genus.

Although, in the past, characters of this striking nature have been made the occasion for setting up new genera, it is my feeling that the differences between Blume's plants and the Chinese species are *not* of generic significance. Taking the type species of the genus

[1] From Dr. R. Pilger, Director of the Botanic Gardens and Museums, Berlin-Dahlem, to whom I wrote asking for the loan of Nees's type of this species, which I had supposed was there (McClure, 1935, p. 577 footnote 3), I have the following response, dated Dec. 30, 1935: ". . . . die Type Exemplare von . . . . *Schizostachyum* Blumii . . . . is hier im Botanischen Museum nichts bekannt." Nees's type remains, therefore, to be located.

as the norm, characterized by two-flowered spikelets, with the lemmas and paleas, respectively, of the two florets somewhat divergent in form, there may be some who would insist that my Chinese species are not congeneric with it. I would point out, however, that although, at first sight, these discrepencies are rather striking, they may be seen, upon careful reflection, to represent actually but a single movement, morphologically speaking. Furthermore, they are not accompanied by any other difference that could, by any stretch of the imagination, be considered to be of generic rank. Differences in the number of florets in a spikelet may be interpreted in terms of promptness of determination of the floral axis (Schaffner, 1925). Such differences occur commonly within a single species, and even in a single individual, in other genera. So, one would be slow to attribute generic significance to this character alone. As to the other character in question, the divergence between the first and second florets in respect to the shape of the lemmas and of the paleas, respectively, has no separate significance whatever, since there is but one floret in the spikelets of all the known Chinese species.

Even if the Chinese species were taken as representing the generic norm and the present type species of the genus were assumed to be the abberant one, the diversity just mentioned might well be assumed to be potential in all the species in question (in their genic constitution, so to speak). It is my belief that if any of the Chinese species in question could be induced, by some physiological stimulus, to produce 2-flowered spikelets, the relationship between the two florets which has been described for the type species would be found to prevail.

These new data from the type species tend to broaden somewhat, in an unexpected direction, the concept of the genus *Schizostachyum* as formerly described by me (1935, p. 575) and it now becomes necessary to revise the description accordingly. I take this opportunity, therefore, to present a new characterization which embodies several important improvements over the last one.

Schizostachyum Nees[2] emend.

Clump habit more or less compact: *rhizome* sympodial; *culms* thin-walled, the *nodes* not prominent, the *internodes* cylindric, more or less siliceous, appressed-pubescent; *branches* in fascicles, numerous, slender, subequal; *culm sheaths* deciduous, strongly convolute, more or less siliceous, appressed-pubescent, the *auricles* obsolete or nearly so, the *oral setae* prominently developed, the *sheath blades* (pseudophylls) reflexed, linear-lanceolate, with involute margins and subulate tips; *inflorescences* consisting of more or less densely crowded clusters of pseudospikelets at the nodes of branches or, more

[2] Agrost. Braz., p. 535. 1829.

rarely, of the main culm, the *axes of pseudospikelets* (*rachis branches*) short, determinate, ultimately much branched, the branching system being indeterminate, each axis bearing a prophyll at its base, followed by one tc several gemmiferous bracts (but no true (empty) glumes), and terminated by a spikelet; fully developed *spikelets* early deciduous, with one, or two, perfect florets followed by a slender, bristle-like prolongation of the rachilla (the imperfectly developed spikelets more or less persistent); *lemma* convolute, somewhat firm in texture, several-nerved, the mid-nerve prominent near the apex and excurrent, I (where two functional florets are present) loosely convolute and shorter than II, II (*or* where but one functional floret is present) tightly convolute; *palea* I (where two functional florets are present) long exserted, chartaceous to somewhat firm, loosely convolute, broadly sulcate, the lower portion of the sulcus occupied by the a normal rachilla segment, keeled, especially toward the apex, II (*or* where but one functional floret is present) tightly convolute, thin, membranaceous below, increasingly indurate toward the short-exserted apex, narrowly sulcate, the sulcus occupied by the *prolongation of the rachilla; rachilla segment* (in species with two functional flowers in each spikelet) disarticulating just below lemma II; *lodicules* wanting; *stamens* 6, the *filaments* free,[3] flat, the *anthers* with blunt apices and unequally bifid bases; *ovulary* stipitate, narrow, linear, attenuate into a slender *style* terminated by 3 plumose *stigmas*;[4] *fruit* (in *S. dumetorum*) fusiform, with a long, slender beak, the coriaceous pericarp separable from the seed except at the back.

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[3] The filaments in some species (notably *S. funghomii* and *S. hainanense*) have a more or less pronounced tendency to cohere in pairs. They are easily separable, however. This incipient character may reflect a close relationship between this genus and the genus *Neohouzeaua* Camus.

[4] Sometimes with one poorly developed or lacking.

修述竹之一屬 (SCHIZOSTACHYUM)

莫古禮著

(摘要)

作者之能修正及重述新近發表 *Schizostachyum* 屬一文者，以其曾參考眞確之 *S. Blumii* Nees 標本也。

NOTE

After the above paper was in print the following information was received from the author (now in America): "Nees' type specimen has been discovered. It proves to be specifically distinct from Blume's alleged type collection." *Editor*

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By Carl J. Drake
Iowa State College, Ames, Iowa, U.S.A.,
and
T. S. Hsiung (Hsiung Ta Shih, 熊大仕)
Nankai University, Tientsin, China.



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By Carl J. Drake
Iowa State College, Ames, Iowa, U.S.A.,
and
T. S. Hsiung (Hsiung Ta Shih, 熊大仕)
Nankai University, Tientsin, China.

The new species of lace bug (Tingitidae) described below was found breeding on the Chinese Ash tree. It is very distinct from any known member of the family from the Orient.

Dictyonota mitoris sp. nov.

Elongate-ovate, moderately large. Head very long, brownish-black, tumid above; front and hind pairs of spines short, appressed, yellowish-brown. Eyes transverse, black. Bucculae very long, moderately broad, open in front, mostly testaceous, brownish in front. Rostral laminae testaceous; channel wide, becoming wider posteriorly, open behind; rostrum extremely long, brownish black, extending to the fifth venter. Body beneath dark reddish-brown to almost black. Legs rather slender, dark reddish-brown; the tibiae slightly lighter and the tarsi blackish. Antennae smooth, rather short, moderately slender, finely pilose, dark reddish-brown, the apical segment black; segments I and II very short, the latter reaching a little beyond tylus; III becoming slightly slenderer distally, slightly more than three times as long as IV, the latter slightly swollen and a little longer than the first two conjoined.

Pronotum grayish-brown, some places black, moderately transversely convex, pitted, tricarinate; lateral carinae considerably elevated, uniseriate, slightly diverging posteriorly, testaceous behind; median carinae slightly more elevated, uniseriate; collum strongly raised, reticulate, scarcely produced at the middle in front; paranota moderately broad, biseriate in front, uniseriate behind, slightly reflexed, the areolae moderately large. Elytra longer than abdomen, when at rest overlapping and jointly rounded behind, yellowish-brown, with grayish tinge, the nervelets varying from grayish-brown to black-fuscous; costal area biseriate at the base, thence varying from uniseriate to irregularly biseriate, the areolae moderately large; subcostal area slightly wider, almost entirely biseriate; discoidal area large, extending far beyond the middle of elytra, bounded by a raised nervure, longitudinally impressed along the middle, widest near middle, there five or six cells deep, the outer

margin sinuate. Veinlets variegated with black-fuscous. Triangular portion of pronotum reticulate, testaceous, rounded behind.

Length, 3.60 mm.; width, 1.70 mm.

Holotype (male), *allotype* (female) and 15 paratypes, Tientsin, China, July 9, 1935, on Chinese Ash, by Dr. Ta Shih Hsiung, in Drake Collection.

Dictyonota (*Dictyonota*) *comosa* Takeya from Japan is a very different species and appears to be very closely related to *Tingis beasoni* Drake from India.

Stephanitis nashi Esaki and Takeya

Specimens are at hand from Changsha, Oct. 20, 1925, collected by Dr. F. Silvestri, and from Canton, China, taken by G. Compere. This species was described from Japan. It breeds on the leaves of the pear tree.

白臘樹之一新花編蟲(半翅目)

CARL J. DRAKE 熊大仕著

(摘要)

本文記述首次發見之花編虫(*Dictyonota mitoris*)。此虫採自中國之天津，其寄主爲白臘樹，所述之新種與日本 *Dictyonota* (*Dictyonota*) comosa Takeya 大有殊異，在梨育得之品種，其學名爲 *Stephanitis nashi* Esaki and Takeya 亦發見於廣州及長沙。

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By L. Y. Wu (Wu Liang-yu, 吳梁如)
Department of Biology, Lingnan University.

(Concluded from *Lingnan Science Journal* Vol. 15, No. 1, p. 10.)

Discussion

The ultimate concern of a study of any phase of anopheline mosquitoes is primarily with the disease they may transmit. Since malaria depends exclusively on these insects for spreading we will expect that the abundance of anopheline mosquitoes should have direct relationship to the incidence of malaria. However, to consider the abundance of anopheline mosquitoes alone may not be sufficient, since not all anophelines are malaria carriers. Therefore, we must look for specific malaria vectors which are to a large extent directly related to the incidence of malaria. Furthermore, the abundance of anopheline mosquitoes may be closely related to the amount of rainfall, temperature and humidity, and therefore a study of these factors is indispensable in connection with any anopheline survey.

Let us examine first the incidence of malaria[3] (see table 3) in the region where collections of mosquitoes were made. An analysis of the data from the University Infirmary and the Village Hospital shows that a rise in malaria incidence appeared in September and reached its climax in November (table 3). Then it fell quickly and remained minimal through January, February and March, after which it rose again.

Of the six species of anophelines described in this paper only four of them, namely, *A. tessellatus*, *A. minimus*, *A. maculatus*, and *A. hyrcanus* var. *sinensis* need be considered here, since the remaining two are rare and may reasonably be ignored for the time being. From table 2 we note that September, October, November and December were the months in which anopheline mosquitoes were found most abundantly. The number decreased considerably in January, but showed a slight increase again in February for the

[3] Incidence of malaria is based on records from Lingnan University Infirmary and the Village Hospital. Records in hospitals in Canton would not give accurate results since patients may have come from Canton and vicinity, or from distant places which constitute an entirely different geographical unit, and at which no collections of mosquitoes were made in the present study.

TABLE 2

*Larvae of Anopheles collected from August, 1932 to October, 1933.**

	A. TESSELLATUS			A. MINIMUS			A. MACULATUS			A. JEYPORIENSIS VAR. CANDIDIENSIS			A. SFLENDIDUS			A. HYRCANUS VAR. SINENSIS		
	S.	C.	L.K.	S.	C.	L.K.	S.	C.	L.K.	S.	C.	L.K.	S.	C.	L.K.	S.	C.	L.K.
1932																		
August	5			21			140				0	0	0	1	0			
Sept.		515		25	42	5	64	3	31		0	0	0	0	0	Breeding throughout the year. Most abundant Sept. to Dec., least abundant in Mar. and April.		
Oct.		20		11	134	15	102	12	113		0	0	3	0	0			
Nov.		259		13	226	3	136	57	140		1	3	3	1	0			
Dec.		223		7	85	1	87	28	7		0	0	0	0	0			
1933																		
Jan.		0			12	0	41	0	5		0	0	0	0	0			
Feb.		6			136	5	5	2	43		0	0	0	0	0			
March		80			40	1	8	1	20		0	0	0	0	0			
April		0			16	0	0	0	20		0	0	0	0	1			
May		17			0	0	0	0	0		0	0	0	0	0			
June		35																
July																		
August																		
Sept.																		
Oct.		30																

* Figures for *A. tessellatus* indicate number of larvae collected during the month. The figures for all the other species indicate the number of larvae bred out from larvae collected. S.=Swakow; C.=Canton; L.K.=Loh Kong Tung.

rest of the year. With these facts in mind we will next examine the amount of rainfall. From table 3 we note that in 1932, in Canton, including White Cloud Mountain and possibly Loh Kong Tung (since the latter is only about twenty miles away), the maximal amount of rainfall occurred in June, July and August. Let us compare this with the fact that the four species of anophelines were most abundant in September, October, November and December, immediately after the maximal amount of rainfall. The significance of this comparison is in the fact that anopheline mosquitoes, especially hill-stream breeders, do not thrive when there is plenty of rain, which may wash the larvae away, but they appear most abundantly after a very wet season, when there is still plenty of water but with much less danger of larvae being washed away by heavy rains. As to the temperature from September to December of the same year (table 3) we find that in September the temperature dropped slightly from 28.65°C. to 27.07°C. and in the next three succeeding months it dropped considerably. This combined with an almost optimum amount of rainfall (except November which was quite dry) made these months ideal for anopheline mosquitoes. In November anophelines unquestionably continued breeding in the water left over from the preceding months, so that the apparent dryness did not have any material effect on the rate of breeding. On the other hand, we note that the decrease of the incidence of malaria in January, February, and March (table 3) corresponded approximately with dry weather, and the lowest temperature in the year. The face value of the precipitation in February and March as shown in table 3 may not be significant, since the three or four inches of rainfall might have been sufficiently absorbed by the already dry ground so that there was not enough water to provide for many good breeding sites.

Relative humidity is another factor that affects the survival of anophelines. In the present study the lowest humidity, of 67-70 per cent, during the year was from October to December (table 3), when the incidence of malaria was at its highest. This quite agrees with the results of Hartman (1929) who in his study of the incidence of malaria in relation to humidity and temperature in Canton concluded that the optimum conditions for malaria in this area are: a temperature between 18°C. and 28°C., and an average relative humidity of 70-78 per cent saturation. Cadbury (1935) also maintained that the maximum incidence of malaria corresponded in general with the so-called dry season, when the relative humidity is also low. According to his four-years' records (1928-31) the average monthly humidity was 68 to 78 per cent except in November, 1929, and May, 1930, when it was 87 per cent. At the same time it should be borne in mind that even though in the present study 60-70 per cent was the lowest humidity in this locality, it was really not low when compared with some other places. Treillard (1934) found in

Indo-China that in the laboratory *A minimus* could withstand a lower relative humidity than that occurring in nature at the end of the dry season (30 per cent). Mehta (1934) in his experimental study on some species of anophelines found that the most favorable humidity was about 70 per cent, which induced maximum longevity of adults. This relatively low humidity in this locality (67-70 per cent) appears, then, to be the optimum humidity for the survival of anophelines.

The above discussion indicates that there is a definite correlation between malaria incidence and other factors. But which of the four species is the most important in malaria transmission remains to be seen.

TABLE 3

Rainfall, temperature, and average humidity in relation to incidence of malaria in Canton from 1932 to 1933

	RAINFALL IN CENTIMETERS[1]	MEAN TEMPERATURE IN DEGREES CENTIGRADE[2]	INCIDENCE OF MALARIA[2]	AV. HUMIDITY IN % AT 7 A.M., 1 P.M. & 6 P.M.[1]
May	10.56	27.52		84.00
June	42.99	28.28	22	89.00
July	58.52	28.34	6	87.00
Aug.	35.79	28.65	14	85.00
Sept.	13.08	27.07	31	80.00
Oct.	5.38	23.12	52	70.00
Nov.	0.55	20.43	64	70.00
Dec.	4.63	16.09	39	67.00
Jan.	1.61	11.38	18	76.00
Feb.	3.23	15.98	18	80.00
Mar.	4.13	17.29	17	77.00
Apr.	10.78	22.94	26	83.70
May	22.67	24.68	29	81.20
June	21.67	28.19	34	85.10

[1] Record obtained from the Freeman Meteorological Observatory, Lingnan University.

[2] Data obtained from Lingnan University Infirmary and the Village Hospital.

By far the most common anopheline found was *A. hyrcanus* var. *sinensis*. No record was specially taken for this species, since they were breeding throughout the year. There is good reason to believe that this species is responsible for malaria on the plain, since when malaria was at its height this species was more abundant than at any other time of the year. Studies in North China, according to

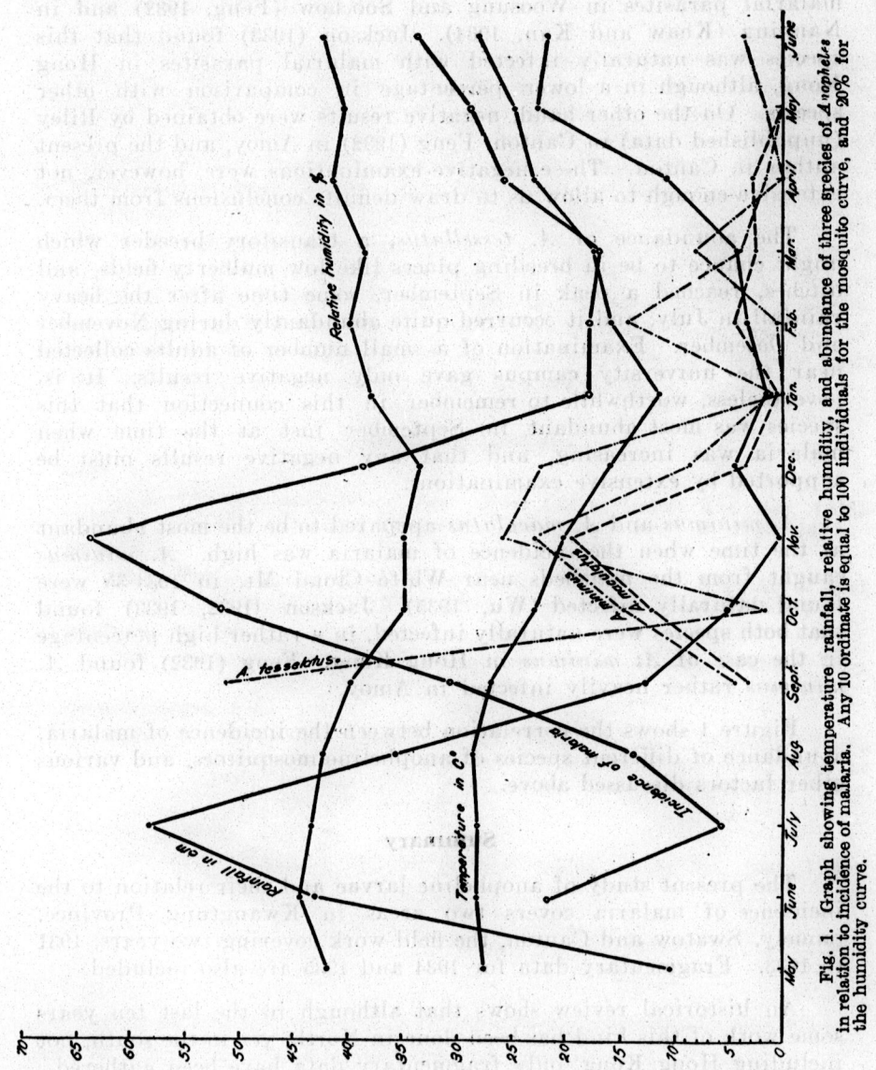

Fig. 1. Graph showing temperature rainfall, relative humidity, and abundance of three species of *Anopheles* in relation to incidence of malaria. Any 10 ordinate is equal to 100 individuals for the mosquito curve, and 90% for the humidity curve.

Hindle and Feng (1929), showed that this species could be experimentally infected. It was also found to be naturally infected with malarial parasites in Woosung and Soochow (Feng, 1932) and in Nanking (Khaw and Kan, 1934). Jackson (1933) found that this species was naturally infected with malarial parasites in Hong Kong, although in a lower percentage in comparison with other species. On the other hand, negative results were obtained by Riley (unpublished data) in Canton, Feng (1932) in Amoy, and the present author in Canton. These negative examinations were, however, not extensive enough to allow us to draw definite conclusions from them.

The abundance of *A. tessellatus*, a transitory breeder which might chance to be in breeding places like low mulberry fields, and ditches, reached a peak in September, some time after the heavy rainfall in July, and it occurred quite abundantly during November and December. Examination of a small number of adults collected near the university campus gave only negative results. It is, nevertheless, worthwhile to remember in this connection that this species was most abundant in September just at the time when malaria was increasing, and that any negative results must be supported by extensive examinations.

A. minimus and *A. maculatus* apepared to be the most abundant at the time when the incidence of malaria was high. *A. minimus* caught from the matsheds near White Cloud Mt. in 1934-35 were found naturally infected (Wu, 1935). Jackson (1932, 1933) found that both species were naturally infected, in a rather high percentage in the case of *A. minimus* in Hong Kong. Feng (1932) found *A. minimus* rather heavily infected in Amoy.

Figure 1 shows the correlation between the incidence of malaria, abundance of different species of anopheline mosquitoes, and various other factors discussed above.

Summary

The present study of anopheline larvae and their relation to the incidence of malaria covers two areas in Kwangtung Province, namely, Swatow and Canton, the field work covering two years, 1931 to 1933. Fragmentary data for 1934 and 1935 are also included.

An historical review shows that although in the last ten years some work of this kind has been done in North, yet in the south, not including Hong Kong, only fragmentary data have been gathered.

The following species of anopheline larvae were found during the present study: *A. hyrcanus* var. *sinensis*, *A. tessellatus*, *A. minimus*, *A. maculatus*, *A. jeyporiensis* var. *candidiensis*, and *A. splendidus*. Notes on their breeding habits and a table for the important diagnostic characters of the fourth instar larvae are given. A key to the anopheline larvae reported for Kwangtung Province is also given.

An examination of the relationship between the abundance of the different species of anopheline larvae and environmental factors, such as humidity, temperature, and rainfall, was made. The result of such a correlation was then compared with the incidence of malaria in the localities studied. It was found that rainfall and temperature have great effect on the abundance of anopheline mosquitoes. *A. minimus* is the natural carrier in the hilly region, while *A. hyrcanus* var. *sinensis* may be responsible for malaria on the plain, and *A. maculatus* appears to be also responsible for malaria in the former. The evidence for *A. tessellatus* as a carrier of malaria is less convincing. For the two remaining species. *A. splendidus* and *A. jeyporiensis* var. *candidiensis*, the present data are too scanty to warrant any definite conclusion.

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廣東省瘧疾蚊幼蟲之研究及其與瘧疾之關係

吳憲如著

(摘 要)

自民國廿至廿二年，作者曾作瘧蚊幼蟲及其與瘧疾關係之究研，其範圍僅限於廣東之廣州及汕頭與其附近各區而已。至於廿三至廿四年間有所得之記錄亦可見本文。

近十年來此種研究在華北各省頗多研究，惟在華南除香港外尚覺稀寥。此次採得瘧疾蚊共有六種： *A. hyrcanus* var. *sinensis*, *A. tessellatus*, *A. minimus*, *A. maculatus*, *A. jeyporiensis* var. *candidiensis*, and *A. splendidus.* 其滋生之習性各有所述，至於分類上之特徵亦備表列出。此外另有廣東瘧疾蚊幼蟲分類檢索表，以便辨別經已發表之品種。

各種幼虫繁生時期與濕度，温度，雨量及瘧疾之關係亦詳爲論及。雨量及温度對於幼蟲之繁生有密切之影響焉。 *A minimus* 乃近山區之瘧疾傳染媒介， *A. maculatus* 亦或爲近山區而 *A. hyrcanus* var. *sinensis* 則或爲平原之瘧疾傳染者，至於 *A. tessellatus* 亦尚未能證實，其餘兩種爲數甚小故亦不能作確實之明證焉。

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RICTULARIA TANI HOEPPLI FROM RATS IN CANTON (NEMATODA: RICTULARIIDAE)

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RICTULARIA TANI HOEPPLI FROM RATS IN CANTON (NEMATODA: RICTULARIIDAE)

By H. T. Chen

Department of Biology, Lingnan University, Canton.

In 1933 the writer reported an undetermined species of *Rictularia* from rats. A thorough study shows that it is *Rictularia tani* described by Hoeppli in 1929 from *Mus norvegicus*. A total of three females and one male were obtained from the intestine of *Mus norvegicus* Erxleben and *M. rattus* Linn. The male was not known hitherto, so far as the writer knows.

Male.—The body is curved ventrally at both ends, with a length of 8.73 mm. and a maximum width of 0.4 mm. Cuticular striations at intervals of 4 to 45 μ are present, the widest distance being at the posterior part of the body. They become indistinct at the two extremities of the body. The mouth opens slightly dorsally, guarded by a series of denticles at its opening. The buccal cavity is 0.042 mm. in its greatest depth. The head is 0.098 mm. in its dorso-ventral diameter at the base of the buccal cavity. The nerve ring is 0.31 mm. from the anterior tip. The oesophagus is 2.525 mm. long. Sixty-one and sixty-two sub-ventral "combs" are visible on the two sides of the body. The first fifty-seven pairs are close together and the last four or five are definitely spine-like and are farther from one another. The transition begins at about the fortieth "combs". The last pair of spines are 1.8 mm. from the posterior tip. In addition, there is one single large median ventral "comb" located a short distance in front of the anus. The two spicules are small and almost equal, being 0.088 and 0.084 mm. long. No accessory piece can be made out. The tail is 0.158 mm. long and conical. The caudal papillae cannot be made out in this specimen. A considerable area extending for about 1.45 mm. along the dorsal side of the body just anterior to the anus is covered with transverse rows of sub-cuticular outgrowths which disappear gradually toward the sides and ends of the area. See fig. 1.

Host: *Mus norvegicus* Erxleben.

Location: Intestine.

Allotype ♂: Department of Biology, Lingnan University, Canton.

The male is quite similar to that of *R. harrisi* Baylis and *R. taterilli* Baylis. The chief characteristics in the present species are the presence of only one mid-ventral "comb" in front of the cloaca, the presence of the dorso-posterior sub-cuticular outgrowths, and the

extension of the sub-ventral "combs". We find that there are from one to five mid-ventral "combs" in *R. harrisi*, and four in *R. taterilli*. Moreover, in *R. harrisi* there are present on the ventral surface in the cloacal region longitudinal rows of cuticular bosses. Neither the ventral cuticular bosses nor the dorsal sub-cuticular outgrowths are mentioned in *R. taterilli*. Furthermore, the sub-ventral "combs" in both *R. harrisi* and *R. taterilli* extend almost throughout the whole length of the body. Last of all, the present specimen is much bigger than *R. taterilli* and is considerably smaller than *R. harrisi*, although this may be due to the age of the worm.

Female.—The body is 20 mm. long and 0.67 mm. in greatest width. The width of the body increases considerably behind the vulva. The body curves dorsally and the anterior tip is bent ventrally, with the mouth opening somewhat dorsally. Cuticular striations are at intervals of about 6 to 58 μ, with greater distance between them toward the posterior end. In a very much coiled specimen the striations may be very indistinct on the greater curvature of the body. The head is 0.115 mm. in dorso-ventral diameter at the base of the buccal cavity. The mouth is guarded by a series of denticles at its opening. The buccal cavity is 0.05 mm.

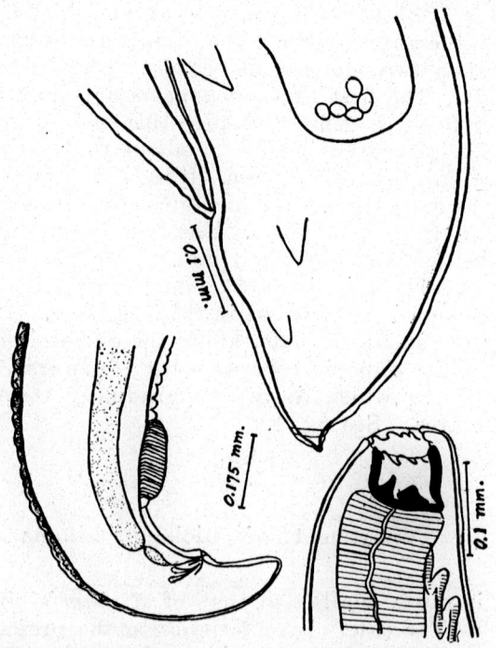

Fig. 1. *Rictularia tani* Hoeppli. Upper, lateral view of the posterior extremity of female. Left, lateral view of the poste_ior extremity of male. Right, lateral view of the anterior extremity of female. Drawings made with aid of camera lucida.

deep. The nerve ring is 0.324 mm. from the anterior tip. The oesophagus is 4.4 mm. long. The vulva is 0.216 mm. in front of the posterior termination of the oesophagus, and 4.2 mm. from the anterior tip. Forty-three to forty-five prevulvar and fifty to fifty-one postvulvar "combs" or spines are present. The first pair of "combs" begins immediately posterior to the buccal cavity, the last one to three behind the anus. The prevulvar "combs" are very close together while the postvulvar spines become progressively farther apart. The transition from "combs" to spines begins at about the level of the vulva. The tail is 0.274 mm. long, conical and terminated by a tiny spike. Eggs roundish oval, measuring 42×27 μ. Uterine loops may extend posteriorly behind the anus. See fig. 1.

TABLE 1

A comparison of the females of Rictularia tani from Amoy, R. whartoni from the Philippines, and R. tana from Canton

	Rictularia tani Amoy	*R. whartoni* Philippines	*R. tani* Canton
SIZE	18.5-28 x 0.6-0.7 mm.	25-30 x .65-.90 mm.	20 x 0.67 mm.
BUCCAL CAVITY	0.04-0.05 mm. Provided with 3 teeth	0.05-0.07 x 0.06-0.08 mm. Provided with 3 teeth	0.05 mm. Provided with 3 teeth
OESOPHAGUS	3.8-4.3 mm.	3.5-4.6 mm.	4.4 mm.
NERVE RING FROM ANT. TIP	0.3-0-4 mm.	0.30-0.35 mm.	0.324 mm.
VULVA FROM ANT. TIP	3.5-4.4 mm.	Vulva usually in front of level of post. end of oesophagus	4.20 mm.
PREVULVAR "COMBS"	41-42 pairs	42-43 pairs	43-45 pairs
POSTVULVAR "COMBS"	50-51 pairs	47-50 pairs	50-51 pairs
"COMBS" AND SPINES	Behind vulva come 2-3 pairs comb-like spines, followed by genuine spines	First three or four postvulvar are transitional types.	Same
LAST PAIR "COMBS"	At level of anus	Behind level of anus	Behind anus
EGGS	0.03-0.04 mm.	0.0442-0.0475 x 0.034 mm.	0.042 x 0.027 mm.
TAIL	0.2-0.25 mm.	0.215-0.27 mm.	0.274 mm.

Rictularia tani was originally described by Hoeppli (1929) from the rat, *Epimys norvegicus*, in Amoy. Tubangui (1931) described a species, *R. whartoni*, from the same species of rat in the Philippines. In both cases, only the females were known. Our present species agrees closely with both *R. tani* and *R. whartoni*. It is quite likely that whatever differences there are between *R. tani* and *R. whartoni* may be merely individual variations which may not have specific standing. It is therefore quite possible that *R. whartoni* may be a synonym of *R. tani*.

From table 1 we will note that there are only slight variations in the measurements and the number of sub-ventral "combs", and no fundamental differences in *Rictularia* from the three different places which can be considered here as of specific standing. However, the anterior ventro-lateral pair of cuticular expansions mentioned by Tubangui is not present in either Hoeppli's description or in the present specimens.

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廣州鼠類之陳氏棘蟲

陳心陶著

(摘要)

Rictularia tani 寄生於野鼠及家鼠體內。雌蟲早于一九二九年經何氏見之，惟雄蟲直至今日始發見。本文乃描述 *Rictularia tani* 之雌雄二性。

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HALIPLIDEN, DYTISCIDEN UND GYRINIDEN AUS WEST- UND ZENTRAL-CHINA (COLEOPTERA)

Von G. Falkenström
Stockholm, Sweden.

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HALIPLIDEN, DYTISCIDEN UND GYRINIDEN AUS WEST- UND ZENTRAL-CHINA (COLEOPTERA)

Von G. Falkenström
Stockholm, Sweden.

(Concluded from *Lingnan Science Journal* Vol. 14, No. 4, p. 99.)

13. **Ilybius apicalis** Sharp

Diese und die folgende Art werden gewöhnlich ohne weiteres unter den *Ilybius* Arten des Systems aufgenommen. Die mir de visu unbekannte Art *chinensis* Csiki, wenn sie nun wirklich Artberechtigung verdient, was Zimmermann (1917-19) infrage gesetzt hat, reiht sich wahrscheinlich den beiden erwähnten an, obwohl nichts aus den Beschreibungen in den betreffenden Beziehungen zu ersehen ist, da diese, abgesehen von Form und Grösse, nur Farbenmerkmale erwähnen. Die zuerst berührten beiden Arten unterscheiden sich von allen übrigen *Ilybius*-Arten durch flachere Form und kürzere, breitere Hinterbeine und durch die ganz andersartige, an *Rhantus* erinnernde doppelte. Retikulation der Oberseite, wovon die primäre an den Decken aus platten, relativ feinbegrenzten, vielkantigen Maschen mit eingestreuten, winzigen Pünktchen besteht. Ausserdem unterscheiden sie sich von den übrigen *Ilybius*-Arten mit einziger Ausnahme von *fenestratus* F. durch die nach vorn vergrösserten Hinterkoxen und durch die dadurch korrelativ verschmälerten, nach hinten hakenförmig gerichteten, nach aussen langen, gleich schmalen Seitenflügel des Metasternums. Durch die in die Breite vergrösserten Hinterbeine und Hinterkoxen und die dementsprechend kräftigere Muskulatur derselben nebst der flacheren Körperform dokumentieren sie sich als besser für das Wasserleben adoptiert zu sein als die übrigen *Ilybius*-Arten. Obwohl sie also die höchste Stufe der Entwicklung der *Ilybius*-Arten einnehmen und des halb auf Grund ihrer Sonderstellung vielleicht einen subgenerischen Eigennamen verdienen könnten, in welchem Fall *fenestratus* den von Des Gozis (1886) wegen der zungenförmigen Metasternallilügel gegebenen Namen, *Idiolybius*, als Subgenus allein behalten dürfte, halte ich jedoch, dieses wegen der geringen Zahl der Arten dieser Gattung derzeit nicht bin angebracht.

Feng (1933-34) hat die von ihm als chinesische aufgenommenen drei Arten, *apicalis*, *angustulus* und *chinensis* in der Weise behandelt, dass ich, gleich wie bei *Hyphydrus orientalis*, nicht stillschweigend an denselben vorübergehen kann. Zuerst hat er, wie es scheint, *apicalis* mit *angustulus* verwechselt. Der erstgenannte ist nicht, wie Feng behauptet, die kleinere, sondern die gössere Art, wie Regimbart, der Autor von *angustulus*, deutlich in seiner Beschreibung angibt. Weiter stimmen Fengs Abbildungen der Elytren

nicht mit seinem eigenen Text überein. Schliesslich gibt er in einem "Key to Chinese species of subgenus *Ilybius* Seidlitz" eine Auseinandersetzung der drei Species, die mit seinen betreffenden Texten und Abbildungen nicht übereinstimmt und übrigens irrig ist. So z.B. sollte *apicalis* "testaceous Elytra" haben. Im Texte steht dagegen richtig "with shining black or bronze color" und in Bezug auf *angustulus* auch richtig "Elytra black". Weiter sagt der "Schlüssel" hinsichtlich *angustulus* "the ante-apical spots usually indistinct". Dieses steht im Widerspruch mit seiner Abbildung sowohl wie auch mit den Originalbeschreibungen der betreffenden Arten, Sharp's, bzw. Regimbart's, und mit den Exemplaren meines Materials. Es könnte noch mehr hin zugefügt werden, das Gesagte dürfte indessen zur Genüge darlegen, dass Feng die Materie nicht beherrschte.

Drei Exemplare, 1♂ und 2♀, liegen vor. Länge des ♂ 9 mm. Breite 4.5 mm., Länge des ♀ 8.5 mm. Breite knapp 4.5 mm.

Fundort: China, Szechwan, Nitou Tatsienlu.

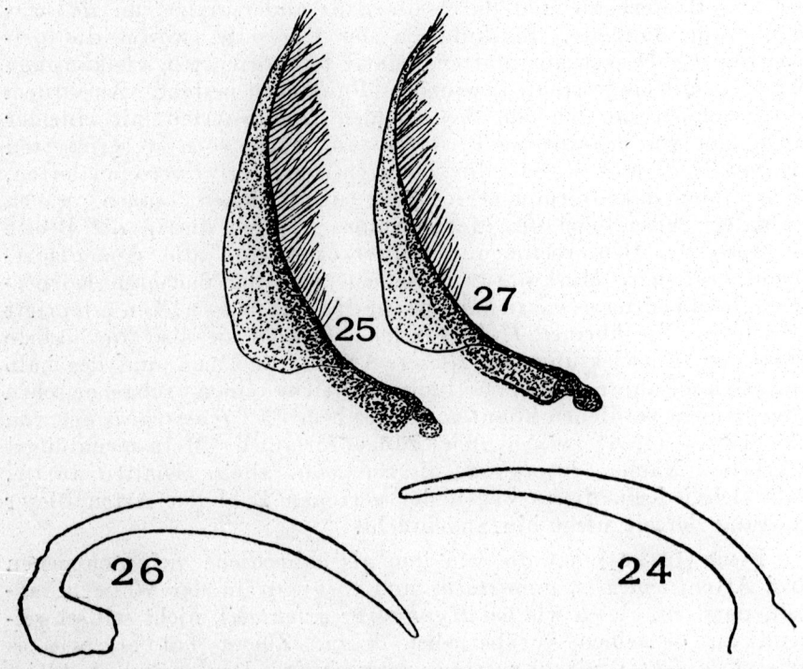

Abb. 24. Penis von *Ilybius apicalis* Sh. Vergr. 21 x (=Zeiss 7 x 3). Abb. 25. Linke Paramere desselben Tiers, von aussen. Vergr. 56 x (=Zeiss 7 x 8). Abb. 26. Penis von *Ilybius angustulus* Reg. Vergr. 21 x (=Zeiss 7 x 3). Abb. 27. Linke Paramere desselben Tiers, von aussen. Vergr. 56 x (=Zeiss 7 x 8).

14. Ilybius angustulus Reg.

6 Stücke, unter denen 4♂ sind, liegen vor. Länge 7.5—8.5 mm. Breite 3.75—4 mm. Sie ähneln ungemein der vorigen Art, haben dieselbe Form, Farbe und Zeichnung wie diese, sind aber durchaus kleiner und schmäler, haben deutlich schmälere Enden der Metasternalflügel und, wie es aus den beigegebenen Abbildungen hervorgehen dürfte, auch einige deutliche Unterschiede der Vermehrungsorgane. Der Penis ist bei *angustulus* schlanker und stärker gekrümmt. Die Paramere ist auch schmäler, schwächer chitinisiert, mit längerem parallelem Basalstück, mit auffallend lang ausgezogenem Spitzenteil, mit kürzerer Haarbesetzung an der Ventralseite, mit andersartiger Gelenkvorrichtung usw.

Fundort: China, Szechwan, Tatsienlu.

15. Rhantus Friedrichi n. sp.

Ein ♀ liegt vor. Länge 11.5 mm. Breite 6 mm. Form oval, Grundfarbe oben gelb, Kopf an der vorderen Hälfte gelb, an der hinteren schwarz mit einem abgekürzten Quermackel zwischen den Augen und mit einem medianen Längsmackel, der den ersten mit der gelben Vorderpartie stielartig zusammenbindet, gelb. Halsschild gelb mit dem Hinterrand schmal schwarz gesäumt und mit einem längeren, etwa gleich breiten Quermackel in der Mitte schwarz. Flügeldecken oben besonders nach der Mitte stark schwarz gesprenkelt, vorn und längs der Naht bis auf das hinterste Fünftel geib gesäumt, am Seitenrand mit einer breiten, gelben Binde, die die Spitze nicht völlig erreicht. Unterseite schwarz, Epipleuren, Antennen und Mundanhänge gelb. Vorderbein gelb mit dem Schenkel basal angedunkelt, Mittelbein gelblich mit Schenkel und Schiene breit geschwärzt, Hinterbein schwarz mit rötlich schwarzen Tarsalgliedern.

Halsschild am Hinterrand nicht viermal so breit wie in der Mitte lang, Hinterwinkel spitz, deutlich abgerundet. Punktreihen der Decken mässig gross und in Gruppen gesammelt. Metasternalflügel breit. Die längere Hinterklaue ist doppelt so lang wie die kürzere und von des Länge des letzten Tarsalglieds.

Skulptur oben (bei 100 Mal Vergr.) deutlich; sie besteht aus Retikulation und Mikropunktur. Die Retikulation ist am Kopf und Halsschild einfach, d.h. primär, an der Decke doppelt, primär und sekundär. Die primäre besteht aus vielkantigen, bei dieser Vergrösserung mässig grossen Maschen mit tiefen Grenzen, die am Halsschild noch gröber eingeritzt und in einer Querpartie der Mitte ein wenig vermikuliert sind. Die Maschen enthalten ein bis einige winzige Pünktchen, die an den Decken weniger deutlich hervortreten. Am Kopf und Halsschild sehr deutlich und ziemliih dicht, an den Decken spärlich und fast nur nach hinten kommt noch eine und

zwar etwas grössere Punktur vor. Die sekundäre Retikulation der Decken besteht aus winzigen, polygonalen Areolen, die in Mehrzahl die primären Maschen völlig aufnehmen.

Die Skulptur der Unterseite ist verschiedentlich. An den Hinterkoxen sieht man in alle Richtungen gehende, kurze Risse nebst längeren, queren Furchen. Die primäre Retikulation ist völlig verschwunden, die sekundäre ist dagegen in der äusseren Hälfte deutlich. An den beiden ersten Bauchsegmenten sind die längsgestellten, gestreckten, primären Maschen einigermassen deutlich abgegrenzt, an den mittleren sieht man dagegen nur quere Reste der Grenzen. Die sekundäre Retikulation ist auch mehr oder weniger deutlich, jedoch nie so erloschen wie die primäre. Am Endsegment ist die primäre Retikulation in der basalen Hälfte deutlich und quergestellt, um nach aussen in kürzere, wenigen deutliche Maschen überzugehen. Die sekundäre Retikulation ist auch basal deutlicher als distal. Ausserdem kommt am Endsegment eine ziemlich dichte Punktur vor, die aus zweierlei Punktsorten, feinen, bzw. etwas grösseren, besteht. Die Spitzenhälfte des Segments zeigt auch dichtstehende, seichte Runzeln.

Typus in meiner Sammlung.

Fundort: China, Szechwan, Tatsienlu Tjiji (Urwaldrodungen).

Das Stück ist deutlich kleiner und relativ breiter als ein europäisches *pulverosus*-♀, die Bodenfarbe oben ist strohgelb (ohne rötlichen Stich wie bei dieser Art), der transversale, schwarze Fleck nimmt mehr als die Hälfte der totalen Breite des Halsschilds ein und ist somit deutlich verschieden von demjenigen bei *pulverosus*, die Reihenpunkte der Decke sind grösser, die Maschengrenzen oben sind gröber eingeritzt, die Skulptur der Hinterkoxen und des Endsegments, die geschwärzten Schenkel der vorderen Beinpaare und die fast schwarzen Hinterbeine sind auch wesentlich andersartig als bei *pulverosus*. Sharp (1880-82) gibt folgenden merklichen Charakter für *pulverosus* Steph. an: "—tarsis posterioribus—, articulo quarto inferne haud posterius lobato-producto", etc. Dieses kannich hinsichtlich des ♀ Geschlechts, nicht aber für das ♂ von *pulverosus* aus Schweden bestätigen. In dieser Beziehung ist das ♀ der neuen Art deutlich von *pulverosus*-♀ verschieden, indem das hintere 4. Tarsalglied unten lobiert ist. Mit Ausnahme von letzerwähnten Merkmal ist die neue Art in den meisten, oben angeführten Beziehungen auch von den chinesischen Formen verschieden, die bisher als *pulverosus* Steph. gedeutet worden sind.

16. Rhantus chinensis n. sp.

Wiederum gab mir das ausgezeichnete Material Reitters Veranlassung, eine unserer allerältesten Dytiscidenarten einer schärferen Analyse zu unterziehen. Das Material enthält 50 Stücke, die dem Anschein nach zu *pulverosus* Steph. (=*punctatus* Fourcr., =*conspersus* Gyll. usw.) könnten gerechnet worden sein. Aus der Literatur —z.B. Sharp (1880-82), Regimbart (1899), Zimmermann (1920), Ganglbauer (1892) usw—ist ersichtlich, dass dieser Art eine weltweite Verbreitung in der alten Welt zugeschrieben worden ist.

Nun bin ich einmal und zwar aus Erfahrung ziemlich skeptisch gegen solche weltumfassenden Arten und die vorgenommene Analyse hat meine Skepsis nicht umgestossen. Im Gegenteil. Dadurch geriet ich wieder auf noch ein lehrreiches Beispiel nämlich, wie schlendrianhaft gerade die alten so gen. "wohlbekannten" Arten in der Literatur behandelt worden sind. Man sieht selbstverständlich die einen oder die anderen Differenzen, versäumt aber die oft umständliche, zeitraubende Prüfung derselben und schreibt ihnen eine mystische Variabilität zu, die man einer so verbreiteten Art analogischerweise auch reichlich beimisst. Ein wahrer *Circulus vitiosus*. Schade, da aus diesen über sehenen Verhältnissen viel Verständnis des formbildenden Kraftspiels im Tierreich einzuholen sein dürfte.

Die Untersuchung hat sich nicht nur auf Reitters Material beschränkt, sondern umfasst sowohl mein eigenes aus hiesiger Gegend und solches aus Süd- und West-Schweden als auch von Zimmermann u.A. bestimmte Stücke von *pulverosus*, bzw *punctatus* und *punctatus* var. *australis* Aubé aus Australien, die im hiesigen Reichsmuseum stecken. Mit Hinweis u.a. auf das bei der vorigen Art erwähnte, von Sharp (1880-82) zuerst hervorgehobene, ausgezei-

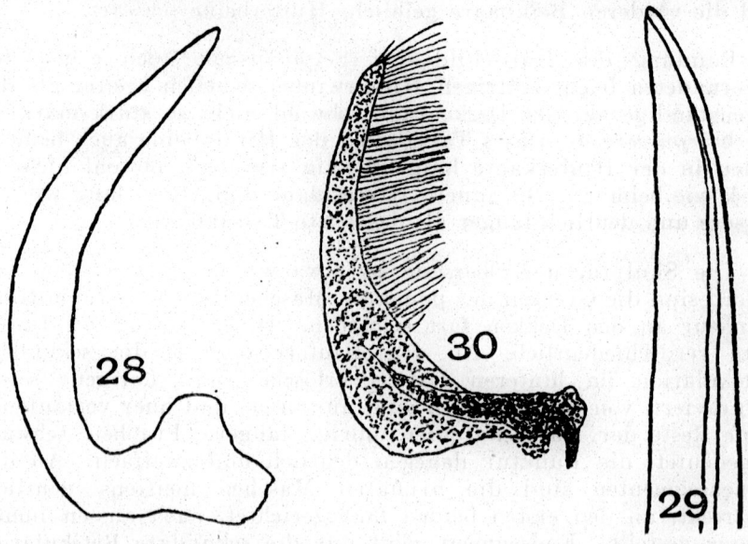

Abb. 28. Penis von *Rhantus pulverosus* Steph. Vergr. 21 x (=Zeiss 7 x 3. Abb. 29. Spitze desselben, von oben. Vergr. 56 x (=Zeiss 7 x 8). Abb. 30. Rechte Paramere desselben Tiers, von innen. Vergr. 21 x (=Zeiss 7 x 3).

chnete Merkmal in Bezug auf das 4. Hintertarsalglied bin ich davon überzeugt nämlich, dass die in England und Schweden als *pulverosus*, *punctatus* oder *conspersus* bekannte Art eine und dieselbe ist. Aus der Literatur geht's weiter sicher hervor, dass sie eine weite Verbreitung in Europa hat.

Meine Untersuchung hat nun das bemerkenswerte Ergebnis geliefert, dass diese Art spezifisch verschieden von den in China und Australien vorkommenden Formen ist, dass in China zwei und in Australien noch zwei andere von einander artverschiedene Formen vorkommen und, dass also die aus Europa, China und Australien als *pulverosus*, bzw *punctatus* und *punctatus* var. *australis* gekannte Art eine Mischart ist, die in fünf spezifisch verschiedene, gute Arten zerlegt werden muss. Nur die europäische Art ist zum Namen *pulverosus* Steph. berechtigt. Die beiden in Australien vorkommenden neuen Arten werde ich an einer anderen Stelle behandeln. Somit gehe ich nun auf die beiden in China vorkommenden sogleich über, wovon die eine die oben rubrizierte ist.

7 Stücke, wovon 4 ♂ sind, liegen vor mir. Länge 10, 5-11, 5 mm. Breite 5.5—6.5 mm. Form gestreckt oval, schmäler als bei *pulv.* Bodenfarbe oben rötlich gelb. Der mediane, dunkle Mackel in der Halsschildsmitte kurz oval, quer. Die Sprenkel der Decken fein, meistens kleiner als die Intervalle (das Gegenteil bei *pluv.*). Unterseite schwarz mit Epipleuren gelb, Mundanhänge, Antennen und die vorderen Beinpaare gelblich, Hinterbeine schwarz.

Randung des Halsschilds bei Seitenansicht auch gegen den abgerundeten leicht spitzigen Hinterwinkel deutlich breiter als der gegenständige vordere Deckenrand, obwohl nicht so stark markiert wie bei *pulverosus*. Das 4 Tarsalglied der Hinterbeine auch beim ♀ unten in der Hinterkante lappenförmig erweitert, obwohl nicht so stark wie beim ♂. Die innere Hinterklaue doppelt so lang wie die äussere und deutlich länger als das letzte Tarsalglied.

Die Skulptur der Oberseite ist etwa wie bei der vorigen Art, jedoch sind die Grenzen der primären Maschen fein und die mittlere Punktur an den Dekken fast erloschen. Die Skulptur der Unterseite verdschiedentlich. An den Hinterkoxen ist die sekundäre Retikulation im hinteren Drittel erloschen und übrigens seicht eingraviert, von der primären sind nur kreuz und quer verlaufende feine Reste der Maschengrenzen übrig, längere Furchen schwach angedeutet, die Punktur dagegen deutlich und zweifach. An den Bauchsegmenten sind die primären Maschen meistens deutlich, gestreckt, an den ersten beiden längsgerichtet, nach aussen immer querer gestellt. Endsegment zeigt nur die sekundäre Retikulation und eine gegen die Spitze dichtere und deutlichere, zweifältige Punktur.

Vorderklauen des ♂ ein wenig kleiner als die Klauen der Mittelbeine (aber nicht so viel wie bei *pulv.*). Die vordere (innere) des Vorderbeins einfach und schwach gekrümmt (bei *pulverosus* ist die entsprechende Klaue an der Basis geknickt und danach gerade, kurz sensenförmig), die hintere (äussere kürzer und ebenfalls einfach gekrümmt. Klauen der Mittelbeine ein wenig ungleich, die vordere (innere) am längsten, die hintere (äussere) in der Unterkante zweibuchtig, an der Spitze stärker abwärts gekrümmt.

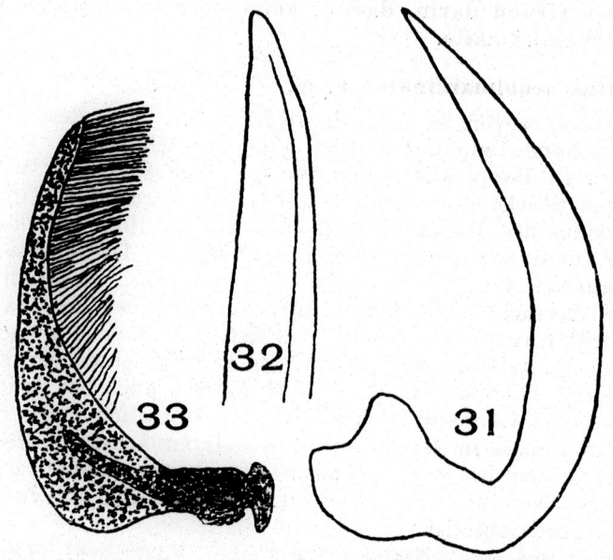

Abb. 31. Penis von *Rhantus chinensis* n. sp. Vergr. 21 x (=Zeiss 7 x 3). Abb. 32. Spitze desselben, von oben. Vergr. 56 x (=Zeiss 7 x 8). Abb. 33. Rechte Paramere desselben Tieres, von innen. Vergr. 21 x (=Zeiss 7 x 3).

Aus den beigegebenen Abbildungen ist ersichtlich, dass Penis und Paramere deutlich verschieden von den entsprechenden Organen des *pulverosus* sind. So z.B. ist der Penis in Seitenlage an der Basis stärker geknickt und an der Spitze viel schmäler, und in genauer Dorsalansicht ist die von den umgebogenen Seitenkanten gebildete Penisrinne gegen die Spitze durch die überdeckende, rechte Seitenkante wie geschlossen (bei *pulv.* fast zur Spitze offen, ein bedeutender Unterschied bei einem so stark chitinisierten Organ). Der Penis ist wie bei *pulverosus* gegen die Spitze unsymmetrisch, schwach nach rechts gebogen. Die Paramere zeigt auch Unterschiede im Vergleich zu derjenigen von *pulverosus*, indem der Spitzenteil viel schmäler und kürzer behaart ist und die basale Gelenkvorrichtung andersartige Einzelheiten aufweist.

Typen in meiner Sammlung.

Fundort; China, Szechwan, Nitou Tatsienlu.

Soweit ich aus den Beschreibungen der aus China und angrenzenden Ländern gekannten Arten finden kann, ist die vorliegende Art mit keiner Anderen zu verwechseln. Die von Feng (1933-34) als *pulverosus* Steph. aufgenommene Art bezieht sich aller Wahrscheinlichkeit nach auf *chinensis* mihi. Die von ihm dort in einem Schlüssel ("key") zu den chinesischen Arten der Gattung gemachte Behauptung, dass die Retikulation bei seinem *pulverosus* keine distinkten, polyädrischen Maschen bilden, muss irrig sein und hat wohl seinen Grund darin, dass er keine oder zu schwache Vergrösserung verwendet hatte.

17. **Rhantus aequimarginatus** n. sp.

43 Stücke, wovon 28 ♂ sind, liegen vor. Mit dem grösseren Material kommt, wie gewöhnlich, eine beträchtlichere Variationsbreite, z.B. in Bezug auf die Farbe der Oberseite, zum Vorschein. Die meisten Stücke sind ziemlich dunkel und zwar durch die starke Vergrösserung des Medianmackels des Halsschilds und besonders durch die Dominanz der schwarzen Sprenkel der Deckenscheibe über deren bräunlich gelbe Bodenfarbe. Vier Stücke, sämtlich ausgefärbt, sind beträchtlich heller und drei davon haben den Halsschildmackel nicht vergrössert, weshalb sie sich dem Anschein nach etwas fremdartig darstellen. Da indessen das 4. Stück einen vergrösserten Mackel des Halsschilds hat und dieser Mackel auch bei den dunkleren Stücken schwankend ist und da ich schliesslich keine nennenswerten Differenzen in Bezug auf die anderen äusseren Merkmalen nebst den Organpräparaten entdecken kann, meine ich, dass sämtliche Stücke einer und derselben Art angehören, die indessen in der Färbung variabel ist.

Länge 11-12.5 mm. Breite 5.75-6.5 mm. Form oval, etwa in der Mitte am breitesten, nach vern und nach hinten gleichmässig verjüngt. Körper ziemlich breit und platt. Der Medianmackel des Halsschilds oval, jederseits in einen kurzen, schmalen Streifen ausgezogen, nach hinten bei fast der halben Anzahl der Stücke zu einem grossen Fleck erweitert, der oft mit dem eng schwarz gesäumten Hinterrand zusammenhängt, bei etwa zehn der Stücke wird der Medianmackel auch nach vorn erweitert und erreicht fast den Vorderrand des Halsschilds. Die schwarzen Sprenkel der Deckenscheibe fliessen meistens zu gewundenen Schleifen zusammen, unter denen die gelbliche Grundfarbe nur bei stärkerer Vergrösserung wie diminutive Fleckchen sichtbar ist. Unterseite schwarz, Epipleuren gelb, Prosternum und Trochanteren rötlich, 3-5 Abdominalsegmente am Hinterrand breit rostgelb, Antennen und Mundanhänge einfarbig gelb, Vorderbein gelb mit dem Schenkel basal angedunkelt, Mittelbein rostgelb mit Schenkel und Schiene stark angedunkelt, Hinterbein pechschwarz.

Die seicht erhabene Seitenrandung des Halsschilds in der hinteren Hälfte im Gegensatz zu allen anderen mir bekannten

Rhantusarten fast so schmal wie der entsprechende, vordere Deckenrand, was den Namen der Art veranlasst hat und wodurch diese sich von den beiden vorigen Arten und von *pulverosus* Steph. leicht unterscheidet. Metasternalflügel breit, hinter dem Loch des Mittelbeins deutlich breiter als bei der vorigen Art. Vierte Hintertarsalglied beim ♀ nach aussen an der Hinterkante schwach lappenförmig erweitert. Innere Hinterklaue fast doppelt so lang wie das letzte Tarsalglied und wie die äussere Klaue.

Die Skulptur der Oberseite besteht aus Retikulation und Punktur, die bei 100 × Vergr. deutlich sind. Am Kopf und Halsschild ist jene einfach und überall deutlich mit Ausnahme von der Vorderpartie des Kopfes und der medianen Längslinie des Halsschilds, wo sie völlig erloschen ist; an den Seiten des Halsschilds sind die Maschen runzelig erhaben. An der Decke ist das Maschennetz in der Regel höchstens auf der hinteren Hälfte doppelt, nur bei einem ♂ sind die sekundären Maschen die ganze Deckenseite entlang einigermassen sichtbar. Die primären Maschen sind an den Decken ein wenig grösser und viel feiner eingeritzt als am Halsschild. Die primären Maschen tragen überall ein bis mehrere Pünktchen. Die mittlere Punktur ist am Kopf weitläufig, am Halsschild noch spärlicher und an den Decken nur gegen die Spitze sehr weitläufig vorhanden. Die primären Punkte der drei gewöhnlichen Deckenreihen sind ziemlich klein und zu Haufen gesammelt.

Skulptur der Unterseite ist verschiedenartig. An den Hinterkoxen sind sowohl das primäre als auch das sekundäre Maschennetz völlig erloschen. Man sieht nur kurze Risse in allen Richtungen, analogischerweise wohl Reste der primären Maschengrenzen, nebst einer mässig dichten, feinen Punktur. Ausserdem sind mehr oder weniger lange, unregelmässige, meistens quere und seichte Furchen in wechselnder Dichte vorhanden. An den Bauchsegmenten sind die basal longitudinal, nach aussen gegen das Endsegment quer verlaufenden, langgestreckten primären Maschen vorhanden, obwohl nur auf den 2 äussersten Segmenten einigermassen ringsum völlig abgegrenzt, wo auch das sekundäre, obenfalls gestreckte Maschennetz wenigstens angedeutet ist. Am Endsegment ist nur das sekundäre Netz nebst einer dichten, feinen Punktur vorhanden.

Am Vorder- und Mittelbein des ♂ sind die drei ersten Glieder der Tarsen mässig erweitert, an der Unterseite mit langen Haaren besetzt, die an der Spitse je eine schaufelförmige, in der äusseren unteren Hälfte längsgeriffelte Saugscheibe trägt. Diese Haftorgane sind in 4 Querreihen geordnet. Das letzte Tarsalglied dieser Beine verlängert, deutlich länger als die 3 zunächst vorherstehenden. Äussere Vorderklaue ein wenig kürzer als die Innere, beide an der Basis geknickt und danach gerade, sensenförmig. Klaue der Mittelbeine gleich und so lang wie die längste der Vorderbeine, einfach schwach gebogen. Der Penis ist basal gröber und gegen die Spitze

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stärker gekrümmt als bei der vorigen Art und bei *pulverosus*, ausserdem ist die Dorsalrinne an der Spitze offen. Die Paramere ist kürzer und gedrungener mit anders artiger Gelenkvorrichtung und trägt eine viel längere Haarbesetzung, was alles aus den beistehenden Abbildungen leicht ersichtlich ist.

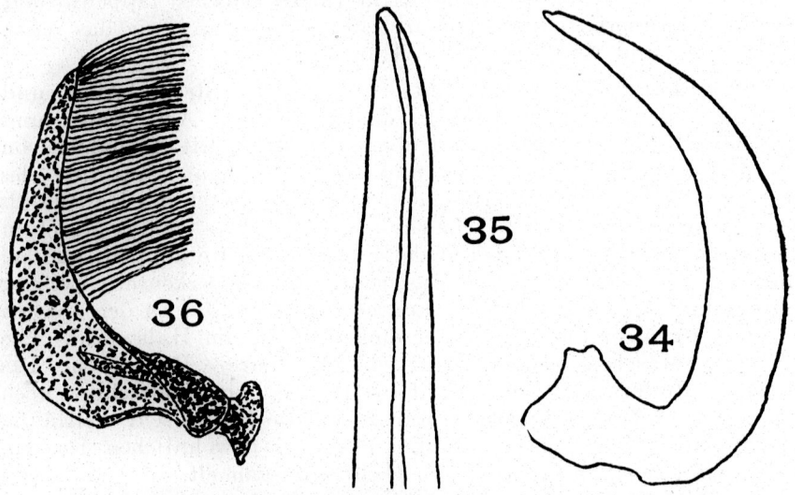

Abb. 34. Penis von *Rhantus aequimarginatus* n. sp. Vergr. 21 x (=Zeiss 7 x 3). Abb. 35. Spitze desselben, von oben. Vergr. 56 x (=Zeiss 7 x 8). Abb. 36. Rechte Paramere desselben Tiers, von innen. Vergr. 21 x (=Zeiss 7 x 3).

Ebenso wie bei der Vorigen ist auch diese Art in den übrigen nicht berührten Beziehungen dem *pulverosus* in der Hauptsache ähnlich.

Typen in meiner Sammlung.

Fundort: China, Szechwan, Tatsienlu, Yüling süd, 1 Stück; Nitou Tatsienlu, 2 Stücke; Chunghwa Wassuland, 13 Stücke; Giufu-Shan, 26 Stücke; Central-China, Ginyün bei Bébé, Tempelberg (900 m.), 1 Stück.

Aus all dem was ich oben mitgeteilt habe, nicht zum mindesten auf Grund der offenbar grossen Verbreitung dieser Art, ist es mir fast völlig unerklärlich, dass sie sich der Entdeckung hervorragender Forscher so lange entzogen haben konnte. Regimbarts *thibetanus* (Regimbart 1899), der jedoch bisher nur aus Tibet bekannt ist, sei wohl meiner Art am meisten ähnlich. In einigen vom Autor jener Art selbst erwähnten Kennzeichen liegen indessen zu grosse Divergenzen vor, um eine Identität annehmen zu können. So z.B. dürfte wohl ein Dytiscidenkenner wie Regimbart beim alleinigen Vergleich der Klauen der beiden vorderen Beinpaare die Sensenform der Vorderklauen sofort gewahr geworden sein, wenn er ein ♂ meiner Art vor sich gehabt hätte.

18. Eretes sticticus L.

54 Stücke, von denen 24 ♂ sind, liegen vor.

Diese Art kommt in den wärmeren Gegenden rings um die Erde vor, wie es scheint, überall gemein wenigstens in der alten Welt. Sharp (1880-82) erwähnt, dass keine andere Dytiscidenart auf einer grösseren Anzahl von Inseln angetroffen worden ist. Die weite Verbreitung zusammen mit einer beträchtlichen Variation in der Grösse und in der Farbe hat im Laufe der Zeit Veranlassung zur Errichtung einer Menge von Arten gegeben, die indessen nicht mehr aufrecht erhalten werden. Sie sind nur Grössen- und Farben-Aberrationen ohne genügende Konstanz und können nicht einmal für s.g. geographische Rassen gehalten werden.

In meinem Material befinden sich sowohl grössere und kleinere Stücke als auch solche mit oder ohne die undulierte Querbinde auf den Decken. Die ♂ sind durchschnittlich kleinder als die ♀. Das kleinste ♂ ist 12.5 mm. lang und 7 mm. breit, das grösste ♀ 14 mm. lang und 7.75 mm. breit.

Gleichwie in Bezug auf das oben behandelte *Rhantus*material unterzog ich das Vorliegende einer sorgfältigen Prüfung der Skulptur bei 100 Mal vergrösserung, ohne irgendein anderes Ergebnis als die völlige Gleichförmigkeit unter den in anderen Beziehungen verschiedenen Varianten zu finden Nur hinsichtlich des ♀ Geschlechts traf ich eine in der Literatur, so weit ich weiss bisher nicht erwähnte Geschlechtsdifferenz an, indem die Seitenflächen des Halsschilds kleine, in alle Richtungen gehende Furchen zeigten, eine Parallele zu der dort mitunter vorkommenden Strigosität beim ♀ anderer Dytiscidenarten. Sharps (1880-82) Ausspruch: "The species is in all its structural characters singularly constant", kann ich somit auf die Mikrostruktur ausdehnen, soweit mein Material reicht.

Die ungewöhnlich weite Verbreitung dieser Art, ihre dessenungeachtet grosse Gleichförmigkeit zusammen mit ihrem isolierten Platz im Systeme der Dytischinen verleihen ihr von phylogenetischem Gesichtspunkt aus ein besonderes Interesse. Sie gehört zu den s.g. lebenden Fossilen und bietet die bestmögliche Illustration dar zu der in meiner Schrift (1935a) anfänglich hervorgehobenen Kategorie von wohl balanzierten Lebewesen, demgemäss während langer Zeiträume stagnierend und von den neubildenden Kräften der Natur unbeeinflusst.

Fundort: China, Szechwan, Tatsienlu, Yüling süd, 32 Stücke; Nitou Tatsienlu, 22 Stücke.

In der Sammlung befand sich auch 1 Stück aus Masendran, Persien.

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19. **Hydaticus grammicus** Germ.

2 Stücke, ♂ und ♀ liegen vor. Das ♂ ist 10 mm. lang und 5.75 mm. breit, das ♀ 9 mm. lang und 5.25 mm. breit.

Fundort: China Szechwan, Chunghwa, Wassuland

20. **Hydaticus Fabricii** McLeay

4 Stücke, von denen 2 ♂ sind, liegen vor.

Fundort: China, Szechwan, Nitou Tatsienlu, 3 Stücke; Chunghwa, Wassuland, 1 Stück.

Diese Art hat eine weite Verbreitung in den orientalischen und malayischen Regionen und ist seit langem auch aus China bekannt. Feng (1933-34) nimmt sie in seiner mehrmals zitierten Arbeit auf, nur aber für zwei "localities". Dageben gibt er ebenda nicht weniger als 6 "localities" für *Leander* Rossi an, unsere aus Süd-Europa und Afrika von altersher bekannte Art, über die dadurch zum ersten Mal aus China berichtet worden ist. Ich zweifle jedoch an der Richtigkeit der Systematisierung Fengs. Aus dem Text und den Abbildungen der Elytren des angeblichen *Leander* und von *Fabricii* und *grammicus* finde ich als ziemlich sicher dargelegt, dass sein *Leander* eine Mischart ist, dem Anschein nach aus aberranten Stücken von *grammicus* und *Fabricii* zusammengesetzt. *Leander* Rossi hat nämlich nie "longitudinal yellow lines" auf den Elytren, wie *grammicus* sie hat. Von jeher ist es bekannt, dass die äusseren gelben Längslinien bei dieser Art mitunter in der Zahl reduziert, bzw. völlig erloschen sein können. Weiter scheint es mir, dass Fengs Abbildung der Flügeldecken des angeblichen *Leander* mit den schon von Aubé (1838) in Bezug auf *rufulus* (=*Fabricii*) erwähnten, mitunter vorkommenden, transversalen, dunkleren Binden an den Flügeldecken gut übereinstimmt. Anstatt *grammicus* ist es wohl auch nicht ausgeschlossen, dass ein Teil von Fengs angeblichem *Leander* sich auf die folgende Art bezieht, weshalb ich sie nach Feng benannt, habe.

21. **Hydaticus Fengi** n. sp.

Ein ♀ liegt vor. Länge 10.25 mm. Breite 5.75 mm.

Körperform eiförmig, hinter der Mitte am breitesten, nach vorn mehr als nach hinten verengt, ziemlich gewölbt. Oberseite kaffeebraun. Kopf braun, an der Stirn mit zwei keilförmigen, schräg abwärts gestellten, schwarzen Flekken und mit dem Scheitel hinter den Augen breit schwarz. Halsschild braun mit dem Hinterrand in fast voller Breite schmal schwarz gesäumt. Flügeldecken braun mit mässig dichten, schwarzen Sprenkeln, die kleiner als die Intervalle sind. Naht ziemlich breit schwarz gesäumt; ausserhalb der schwarzen Nahtbinde folgt eine gelbe Längslinie, die von den Sprenkeln, in einer ziemlich regelmässigen, schwarzen Linie geordnet, nach aussen begrenzt wird. Ausserdem sind basal an der Decke Spuren zweier anderer gelber Längslinien vorhanden. Die Sprenkel lassen nur eine schmale Randung der Deckenseite frei. Unterseite dunkel rötlich mit gelben Epipleuren, Antennen und Mundanhängen. Vordere Beinpaare gelblich, Hinterbeine dunkel rötlich.

Halsschild in der Hinterkante nicht 4 Mal so breit wie in der Mitte lang, und hinten am Winkel ausgeschweift, weshalb dieser spitz, aber abgerundet ist. Seiten des Halsschilds seicht runzelig. Prosternal fortsatz in der ganzen Länge gerandet (bei *Fabricii* nur an der basalen Hälfte). Innere Hinterklaue kräftig, gerade, stumpf, kürzer als das letzte Tarsalglied (bei *Fabricii* schmal, spitzig, abwärts gebogen, so lang wie das letzte Tarsalglied).

Skulptur der Oberseite besteht hauptsächlich aus Punktur, die überall gleichförmig, zweifältig und deutlich (bei 100 Mal vergr.) ist und zwar teils eine dichte, äusserst feine, teils eine etwas grössere, weitläufigere Punktur, die am Kopf und gegen die Deckenspitze sehr deutlich hervortritt. Nur am hinteren Drittel der Decke wird man bei genauer Ansicht eine äusserst feine Retikulation gewahr, die übrigens an der Decke sowohl wie am Kopf und Halsschild erloschen ist (im Gegensatz zum *Fabricii*- ♀, wo die entsprechende Retikulation auf der ganzen Decke und auf den Seiten des Halsschilds deutlich sichtbar ist). Von den gewöhnlichen Punktreihen der Decke sind nur die beiden inneren deutlich und zeigen ziemlich kleine Punkte, fast zu Haufen einander genähert. Retikulation der Unterseite besteht nur aus winzigen polygonalen Maschen, die an den 4 und 5 Bauchsegmenten ein wenig vergrössert, gestreckt und quer sind. Punktur fehlend, mit Ausnahme an den Hinterkoxen und dem Endsegment, wo ähnliche, äusserst feine Punkte wie auf der Oberseite vorhanden sind.

Typus in meiner Sammlung.

Fundort: China, Szechwan, Nitou Tatsienlu.

22. **Hydaticus Bowringi** Clark

5 Stücke, ♂ und ♀, liegen vor. Länge 12.5—14.5 mm.

Die äussere, gelbe Längsbinde hängt meistens durch eine schmale Verlängerung mit der inneren zusammen. Auf einem Stück aber hängen die beiden Binden an der Spitze in voller Breite mit einander zusammen.

Fundort: China, Szechwan, Wassuland (1400 m.), 3 Stücke. Wassuland, 1 Stück. Tatsienlu, Yüling süd, 1 Stück.

23. **Hydaticus vittatus** F.

23 Stücke, von denen 12 ♂ sind, liegen vor. Länge 12-13 mm. Breite 7-7.5. Die gelbe Bindenzeichnung ist sehr variabel, nur 1 ♂ und 1 ♀ zeigten die Binden in typischer Ausgestaltung. Es scheint mir deswegen ohne wissenschaftlichen Wert, die vielen Varianten in

der Bindenzeichnung mit eigenen Namen als Varietäten oder Aberrationen zu bezeichnen, wie z.B. Zimmermann (1920) es schlendrianhaft machte. Es genügt völlig eine Erwähnung derselben in dem beschreibenden Text.

Fundort: China, Szechwan, Tatsienlu, Yüling süd, 2 Stücke; Nitou Tatsienlu, 21 Stücke.

24. **Sandracottus fasciatus** F.

var. *Hunteri* Crotch

7 Stücke, von denen 4 ♂ sind, liegen vor.

Fundort: China, Szechwan: Tatsienlu, Yüling süd, 5 Stücke; Nitou Tatsienlu, 1 Stück; Central-China, Ginyün (bei Bébé), Tempelberg (900 m.), 1 Stück.

25. **Cybister sugillatus** Er.

Ein ♀ liegt vor.

Fundort: China, Szechwan, Giufu-Shan.

26. **Cybister brevis** Aubé

8 Stücke, von denen 2 ♂ sind, liegen vor. Länge 21-22 mm. Breite 12 mm.

Fundort: China, Szechwan: Tatsienlu, Yüling süd, 4 Stücke; Giufu-Shan, 4 Stücke.

Diese Art wird von Feng (1933-34) in seine "Classification of Chinese Dytiscidae" nicht aufgenommen, obwohl sie aus China schon Regimbart (1899) bekannt war.

27. **Cybister szechwanensis** n. sp.

4 Stücke, von denen 3 ♂ sind, liegen vor. Da diese zuerst unter meine Augen kamen, machten sie den Eindruck, dem in der alten Welt weit verbreiteten *tripunctatus* Ol. anzugehören. Laut der Literatur umfasst diese Art so viele verschiedene Formen aus fast allen wärmeren Gegenden, dass es nur wenig Mühe kosten sollte, sie darin unterzubringen. Mein Material von Cybisterinen war leider zu klein für eine eingehende Untersuchung dieser Art, zumal als die hervorragendsten Dytiscidenkenner wie Sharp (1880-1882), Regimbart (1899), Zimmermann (1917-1919), u.A.m. ungeachtet reichlichen Materials laut ihrer eigenen Worte Misserfolge gehabt hatten, sie in ihre von ihnen anticipierten Elemente zerlegen zu können. Da wurde es mir durch Zitat bekannt, dass Gschwendtner (1931) neuerdings besseren Erfolg mit einer Revision von *tripunctatus* gehabt hatte und zwar u.a. auf dem mühevollen Weg der Untersuchung der männlichen Propagationsorgane. Wiederum ein vorbildliches Beispiel, wie nötig es oft sein kann, mit den alten Systematisierungen aufzuräumen.

Ich bedaure nur, dass Gschw. sich durch einen Fernstehenden hat beeinflussen lassen und demzufolge der bald veralteten, ternären Nomenklatur und der für die morphologische Systematik fremden, auf hypothetischen, physiologischen Gründen fussenden Rassenauffassung anheimgefallen ist. Warum soll gerade *tripunctatus* einer "lex" von "noli me tangere" unterliegen und wie wären wohl übrigens morphologisch klar unterscheidbare Formen einer Sammelart als Rassen von den seit langem gutgeheissenen s. g. vikariierenden Arten ebenfalls angrenzender Faunengebiete ausseinanderzuhalten? Nun dies sind Dinge, die ich an einer anderen Stelle (1935a) näher erörtert habe, weshalb ich darauf hinweisen kann. Hier will ich nur erwähnt haben, dass die alte von Linné geprägte Sentenz "Varietas non curat studioso" noch heutzutage für den Systematiker ihre Geltung hat und zwar in dem Sinne, dass unter den nachweisbaren Unterschieden die artscheidenden Kennzeichen von den gewöhnlichen Variabilitätserscheinungen immer getrennt werden mussen. Unter den Dytisciden ist es von den verschiedenen Forschern an Hunderten von Fällen dargelegt werden, dass die männlichen Propagationsorgane einer Art in Bezug auf die Einzelheiten kaum merkbare Differenzen von Individuum zu Individuum aufweisen, abgesehen von Grössen unterschieden, und von unreifen Jugendstanden. Nur Ausnahmsweise trifft man Verstösse gegen diese Regel an, welche sich entweder als seltene Missbildungen oder, wie von mir (1932, 1933b und 1935a) gezeigt, als Kreuzungsprodukte heraus gestellt haben. Wie es sich in diesen Bezichungen unter anderer Tiergruppen verhält, ist naturlich für die Verwertung der Vermehrungsorgane der Dytisciden als artscheidendes Moment völlig belanglos. Wie wenig vom Grundbau z.B. der Penis der durch äussere Merkmale seit jeher geschiedenen Arten einer Gattung oft abweicht, darüber geben u.a. schon die von Scholz (1917) vorgelegten Photographien der Genitalien der *Ilybius*-Arten Aufschluss. Es is somit leicht einzusehen, auf welche Irrwege die Systematik der Dytisciden geraten würde, wenn nur Veranderungen des Grundplans des Penis als Kriterium selbständiger Arten vorgeschrieben würden. Uebrigens dürfte die heutige Wasserkäfersystematik insgemein hinter keiner anderen Tiersystematik zurückstehen, soweit es gilt, auf empirischem Weg die morphologisch nachweisbaren Charakterzüge der dazu gehörigen Einzelgruppen von Tieren zu entdecken und zu verwerten. Das schwer zu bewältigende Material hat verschärfte, anderwärts kaum oder wenig benutzte Arbeitsmethoden erzwungen, u.a. Auspräparierung von Genitalien, ♂, sowie ♀, Stärkere Vergrösserung für die Mikroskulptur, Verwendung von Züchtungen in den schwierigsten Fällen, um die reinen Arten festzustellen. Wo in der Tiersystematik arbeitet man noch schärfer, möchte ich fragen, um etwas davon kennen zu lernen?

Laut Gschwendtner soll von dem von ihm aufgelösten *tripunctatus* ostwärts vom 90. Meridian nur *C. tripunctatus orientalis* vorkommen. Die Fundorte meines Materials fallen hierunter. Wie es aus dem Nachstehenden hervorgehen dürfte, lassen die 4 eingangs erwähnten Stücke sich nicht unter diese Form, die schon Feng (1933-1934) kurzum *orientalis* nannte, einreihen, weshalb ich eine neue Art unter dem rubrizierten Namen errichten muss, deren Kennzeichen ich nun angeben will, dabei besonders die Abweichungen von *orientalis* Gschw. und *tripunctatus* (Ol.) s. Gschw. hervorhebend.

Länge 25 mm. Breite 13.25-13.75 mm. Form oval, hinter der Mitte am breitesten, nach vorn ziemlich stark verengt. Farbe oben olivengrün. Decken mit ziemlich breiter, die Kante überall erreichender Seitenbinde, die ein und ein halb Mal so breit wie diejenige des Halsschilds am Hinterwinkel ist. Die Clypealfärbung erreicht jederseits mit einem gleich breiten Läppchen die Orbita, längs deren Innerränder ein schmaler, mitunter wenig deutlicher Fortsatz sich bis an ein triangulares Punktfeld an der Stirn zicht. Quer über die Stirn is die Farbengrenze schwach wellig. Die gelbe Seitenbinde der Decke reicht an die Spitze und trägt unweit davon nach innen, wie gewöhnlich, einen kleinen Widerhaken. Epipleuren gelb. Unterseite schwarz oder dunkel schwarzbraun mit einigen gelblichen Flecken, je einem grösseren, triangularen am Metaepisternum und je einem kleineren, rundlichen an den 3.-5. Abdominalsegmenten seitlich am Hinterwinkel. Am ♀ und an dem einen ♂ sind ausserdem die Seitenflügel des Metasternums und die Hinterkoxen nach aussen breit gelblich durchscheinend. Vordere und mittlere Beinpaare gelb mit dunkelbraunen Mitteltarsen. Hinterbein schwarz mit gelblichem Knie. Oberlippe in der Vorderkante breit und tief ausgeschnitten.

Die Mikroskulptur der Oberseite is in beiden Geschlechtern gleich und bei genügender (z.B.80×) Vergrösserung überall deutlich, bestehend aus Punktur und Retikulation. Die Punktur is zweifältig, teils eine an der ganzen Oberfläche des Tiers gleichmässige, äusserst feine, sehr dichte Punktur, teils eine etwas grössere, weitläufige. Besonders an der Decke is diese Punktur zweiter Ordnung spärlich. Die Retikulation ist mit Ausnahme von Clypeus und Scutelle überall etwa gleichmüssig und besteht aus winzigen, polygonalen Areolen. Die Mikroskulptur der Unterseite ist ähnlich, jedoch sind die Punkte zweiter Ordnung noch weitläufiger mit Ausnahme vom Endsegment, wo ausserdem einige grosse Punkte nach aussen hinzukommen. Die drei gewöhnlichen Punktreihen an der Decke vorhanden und mit den ziemlich kleinen, einzelnen Punkten in zerstreuten Haufen dicht gesammelt, die in der inneren Reihe linear sind.

Das ♀ zeigt vorn an einem mittleren Längsfeld der Deck kurze Risse, und das ♂ is überall an der Deckenfläche dicht mit seichten, rundlichen Erhebungen bedeckt. Die Vorderklauen des ♂ sind viel kürzer als die Klauen der Mittelbeine. An den beiden Vorderen Beinpaaren sind die äusseren (hinteren) Klauen am kürzesten. Borstenaufsatz an der Unterseite der zwei ersten Tarsalglieder der Mittelbeine vorhanden.

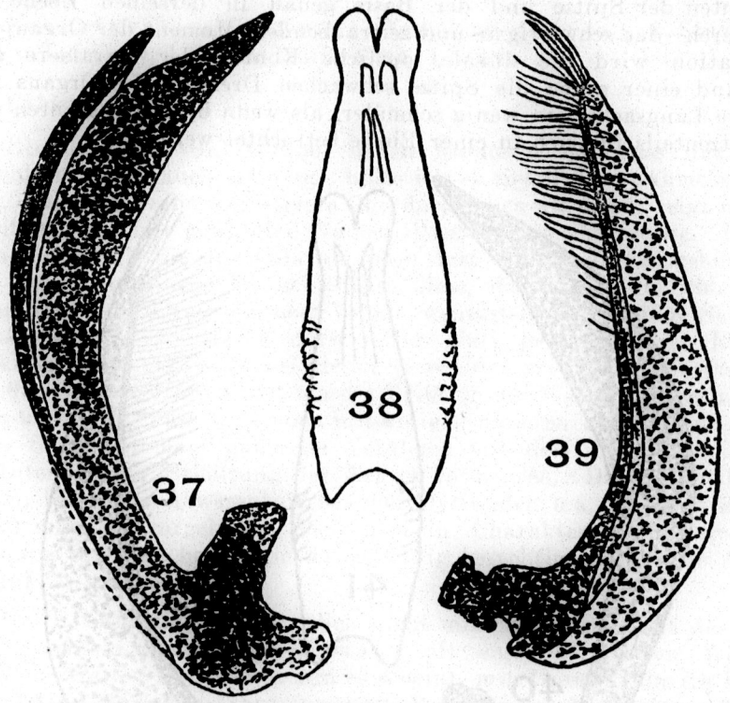

Abb. 37. Penis von *Cybister szechwanensis* n. sp. (s. den Text. Vergr. 12 x (=Zeiss 4 x 3). Abb. 38. Dorsalansicht desselben. Vergr. 12 x (=Zeiss 4 X 3). Abb. 39. Linke Paramere desselben Tiers, von innen. Vergr. 12 x (=Zeiss 4 x 3).

Aus den beistehenden Zeichnungen der ♂ Propagationsorgane (s. Abb. 37, 38 und 39) in Vergleich mit den entsprechenden Organen (s. Abb. 40, 41 und 42) eines aus Japan stammenden, von der Vega-Expedition heimgebrachten, im hiesigen Reichmuseum steckenden Exemplars, das in jeder Beziehung mit *orientalis* Gschw. gut übereinstimmt, sind die folgenden Unterschiede besonders augenfällig. Der Penis der neuen Art ist robuster, in Seitenlage näher gegen die Spitze breiter, basal auch breiter und hat eine deutlich andersartige Geglenkvorrichtung. Um Missverständnis zu verhindern, will ich hin zufügen, dass das Klaffen des Penisdeckels eine Anomalie ist, die wohl nur auf der Konservierung des Tiers beruht.

Sie zeigt indessen die zwar begrenzte Beweglichkeit des Deckels. Bei dicht verschliessendem Deckel ist die Verschiebung der grössten Breite gegen die Spitze in Seitenlage noch mehr augenfällig. Die Paramere ist gegen die Spitze breiter und hat ebenfalls ganz verschiedenartige Gelenkund Stützvorrichtungen. Der Vollständigkeit halber ist zu erwähnen, dass der Spitzenteil der Paramere in der Tat noch breiter ist, als die Zeichnung wiedergibt. Um die Kanten der Spitze und der Basis genau in derselben Ebene zu fixieren—das schwierigste und zeitraubendste Moment der Organpräparation—wird die distale, optische Kontur der Paramere auf Grund einer gegen die Spitze schwachen Drehung des Organs um seine Längsachse ein wenig schmäler, als wenn bloss die Kanten des Spitzenteils für sich in einer Ebene betrachtet werden.

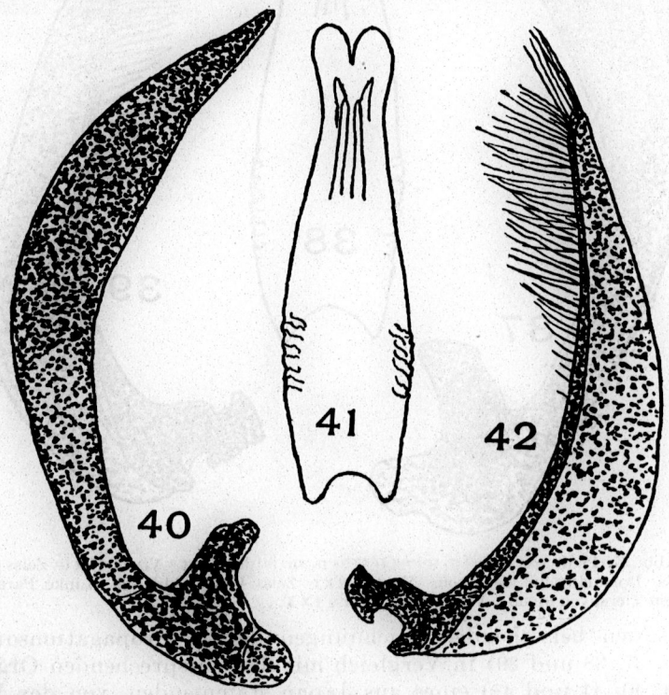

Abb. 40. Penis von *Cybister orientalis* Gschw. Vergr. 12 x (=Zeiss 4 x 3). Abb. 41. Dorsalansicht desselben. Vergr. 12 x (=Zeiss 4 x 3). Abb. 42. Linke Paramere desselben Tiers, von innen. Vergr. 12 x (=Zeiss 4 x 3).

Ausser den schon berührten Differenzen der Vermehrungsorgane der betreffenden beiden Arten ist es hervorzuheben, dass die Skulptur der äusseren Seitenwände des Penis bei geeigneter Vergrösserung auch völlig verschieden erscheint. Es sei nur erwähnt dass die Wand meiner neuen Art nach den in Abb. 38 angedeuteten Querrun-

zeln fast bis an die Spitze dicht mit groben und tiefen Längsfurchen besetzt ist, während *orientalis* (s. Abb. 41) dort bloss an einer kurzen Strecke feine, linienförmige Furchen ziemlich spärlich trägt.

Mit Ausnahme von dem Klaffen des Penisdeckels sind die drei ♂ in Bezug auf die Genitalien einander fast spiegelbildlich gleich.

Typen in meiner Sammlung.

Fundort: China, Szechwan: Wassuland (1400 m.), 2 Stücke; Nitou Tatsienlu, 1 Stück; Giufu-Shan, 1 Stück.

28. **Cybister laevis** n. sp.

Ein ♀ liegt vor. Obwohl es zu bedauern ist, dass das ♂ Geschlecht nicht auch vor liegt, halte ich es ziemlich unwahrscheinlich, dass dieses eine primitivere Oberfläche oben als das ♀ zeigt und somit den von mir gewählten Namen illusorisch machen sollte. Das ♀ hat nämlich die Retikulation oben fast vollständig eingebüsst. Die Regel unter den Dytisciden ist diese, dass das ♀ Geschlecht einer Art die Retikulation oben behält, wenigstens zu einem gewissen Masse, auch wenn das ♂ dort völlig glatt geworden ist. Eine retikulierte Oberfläche ist bei diesen Tieren der primitivere Zustand, den das ♂ oft verlassen hat, um die Friktion des Wassers zu vermindern und demgemäss zusammen mit einigen anderen Bauänderungen seine Schwimmschnelligkeit im Vergleich mit derjenigen des ♀:s im Interesse der Erhaltung der Art zu vermehren. Da die Retikulation, bzw. ihre Abwesenheit bei den Dytisciden u.a., wie von mir (1929) schon hervorgehoben, sich als ein Charakteristikum erster Ordnung erwiesen hat, finde ich es völlig berechtigt, eine neue Art darauf zu gründen.

Die Retikulation ist natürlich nicht mit einer Rissigkeit des ♀ zu verwechseln der in der Literatur oft sogar spezifischer Wert zugeteilt worden ist, jedoch, wie es scheint, mit Unrecht, da ich bei geeigneter, stärkerer Vergrösserung Risse tragende ♀ einer Art gefunden habe, die solcher entbehren sollten.

Ausser der Abwesenheit der Retikulation oben sind die Körperform, die Ausgestaltung der Oberlippe, der Augenabstand, die Färbung der Unterseite usw. Anhaltspunkte bei der Beurteilung des Stückes gewesen.

Länge 26 mm. Breite knapp 14 mm. Körperform gestreckt oval, nach der Mitte schwach erweitert, nach vorn durch die Erweiterung ein wenig mehr als nach hinten verengt. Farbe oben dunkelgrün mit rötlich gelbem Clypeus und mit gelben Seitenrandungen des Halsschilds und der Decke. Der Clypealmakkel sendet jederseits am inneren Augenrand einen rötlich durchscheinenden, allerdings schwach abgegrenzten, keilförmigen Vorsprung nach der Stirn hinauf und zeigt die Farbengrenze quer über die Stirn in der

Mitte schwach bogig nach vorn und seitlich geradlinig, schräg vorwärts gegen die Basis des Vorsprungs am Augenrand. Die gelbe Randung des Halsschilds ist mässig breit, vorn nach innen deutlich, hinten schwächer erweitert. Die gelbe Randung der Decke ziemlich breit, vorn nach innen nicht erweitert, sondern geradlinig, etwa ein Drittel breiter als die gelbe Randung des Halsschilds am Hinterwinkel, gegen die Spitze der Decke allmählich schwach verengt, unweit von der Spitze nach innen hakenförmig erweitert. Unterseite mit gelben Epipleuren, mit Vorderbrust, Hinterbrust und Hinterkoxen in der Mitte, mit Seitenkanten des Metaepisternums, der Hinterkoxen und der Abdominalschilder schwarz, mit Metaepisternum nach innen, mit Hinterbrust nach aussen und mit Hinterkoxen in der Mitte breit gelblich durchscheinend, mit Abdomen übrigens dunkelbraun, an 3.-5. Segmenten seitlich gelb gefleckt. Vordere Beinpaare gelb mit rötlich schwarzen Tarsen, Hinterbeine dunkelbraun mit schwarzbraunen Tarsen.

Vorderkante der Oberlippe zieht sich in sanftem Bogen nach innen fast ohne besonderen Ausschnitt an der Mitte (bei *orientalis* Gschw. in der Mitte kurz und tief, rundlich ausgeschnitten). Abstand zwischen den Augen etwa ein Viertel breiter als beim *orientalis*-♀ (♀ muss mit ♀ verglichen werden, weil der Augenabstand des ♂:s irgendeiner Dytiscidenart oft kürzer ist). Epipleuren von der Mitte des ersten Bauchsegments allmählich nach hinten erweitert, am breitesten am 4. Segment und zwar so breit wie am Ende des Seitenflügels des Metasternums.

Die Retikulation der Oberseite ist am Kopf völlig erloschen, am Halsschild und an der Decke ebenso bis auf je einen schmalen Streifen seitlich nach innen zu in den gelben Längsbinden. Mikroskopische Risse sind sehr spärlich vorhanden. Die Punktur der Obserseite ist etwa wie bei der vorigen Art, jedoch am Kopf und Halsschild vielleicht ein bischen weniger deutlich. Retikulation der Unterseite vorhanden und besteht aus winzigen, polygonalen Areolen. Punktur ähnlich derjenigen der Oberseite, jedoch deutlich spärlicher.

Typus in meiner Sammlung.

Fundort: China, Szechwan, Giufu-Shan

29. **Cybister bengalensis** Aubé

Ein ♀ liegt vor.

Fundort: China, Szechwan, Tatsienlu.

30. **Cybister japonicus** Sharp

Ein ♀ liegt vor.

Fundort: China, Szechwan, Wassuland (1400 m.).

GYRINIDAE

1. **Dineutus orientalis** Mod. (=**marginatus** Sharp)

Ein Weibchen liegt vor. Diese alte wohlbekannte Art zeigt ein bisher nicht erwähntes Skulpturdetail, das mir jedoch bemerkenswert zu sein scheint. Vorn an der Decke etwa in der Höhe des inneren Augenrands zeigt sich im Reste eines Dorsalstreifens die Retikulation von der übrigen Deckenretikulation ganz verschieden, indem die Areolen bedeutlich vergrössert und etwas gewölbt sind. Ganz Ahnliches habe ich an Exemplaren aus anderen Plätzen in China und Japan gesehen und zwar übereinstimmend bei den Geschlechtern.

Fundort: China, Szechwan, Tatsienlu, Yüling süd.

2. **Dineutus Mellyi** Reg.

Ein Weibchen liegt vor.

Fundort: China, Szechwan, Nitou Tatsienlu.

3. **Orectochilus Emmerichi** n. sp.

Zwei Exemplare, ♂ und ♀, liegen vor. Länge: ♂ 6.75 mm., ♀ 6.5 mm. Form oval (kurz oval beim ♀), wenig gewölbt. Farbe oben: schwarz, mässig glänzend ohne Metallschimmer, Kanten des Halsschilds und der Decken braun, innerhalb deren am Halsschild und an der vorderen Hälfte der Decken ein sehr schmaler gelbroter Steifen ziemlich undeutlich und abgebrochen hervortritt, der sich jedoch allmählich gegen die Spitze erweitert und deutlich wird und längs der Trunkatur nach der Naht fortsetzt; unten: schwarzbraun oder schwarzrot (♀) mit rostgelben Epipleuren und mit rötlichbraunen Beinen und letzten Abdominalsegmenten.

Scutelle deutlich, mehr als 2 Mal breiter als lang, Oberlippe rotbraun mehr als 2 Mal so breit wie lang, mit deutlich gebogenem Vorderrand, Clypeus deutlich von der Stirn abgesetzt.

Die Skulptur oben, bei den Geschlechtern gleich, zeigt Punktur und Retikulation. Die Punktur ist dicht, eher fein, am deutlichsten vorn am Kopf, wo sie eigentlich doppelt ist, indem sich runde Poren unter die bei dieser Gattung gewöhnlichen ritz oder keilförmigen Eindrückungen mengen. Halsschild und Flügeldecken zeigen nur die letzten, abgesehen von vereinzelten, gröberen Punkten an den Decken, Resten von Punktstreifen. Die Retikulation besteht aus rundlichen Netzmaschen am Kopf und Halsschild, ziemlich undeutlich in der Mitte, aus gestreckten, meistens queren Maschen an der Decke, am deutlichsten seitlich und apikal. Die Maschengrenzen überall fein.

Die gelbweisse Tomentbinde ist von proportionaler Breite (nicht auffällig schmal), erreicht vorn die Mitte des Auges, verent sich

in der Mitte des Halsschilds, erweitert sich an der Basis, fortsetzt an der Decke, verengt sich wenig gleich am Humeralwinkel, um sich wieder (etwa nach der halben, kürzesten Halsschildslänge) zu erweitern und mit allmählich zunehmender Breite die Trunkatur zu erreichen. Die Innenkante der Binde erreicht die Naht etwas verschieden bei den Geschlechtern, beim ♂ etwas näher der Nahtspitze und zwar in einem Abstand davon weniger als ein Drittel der Deckenbreite an der Trunkatur, beim ♀ mehr nach vorn in einem Abstand vom Nahtwinkel gleich der halben Deckenbreite. Die Tomentbinde ist also an der Deckenspitze etwas breiter beim ♀. Dadurch ist das glatte Feld der Decken nach hinten bei den Geschlechtern auch verschieden, indem es beim ♂ eiförmig ausgezogen, beim ♀ mehr gerundet ist, jedoch bildet das Feld an der Spitze bei der Naht einen Winkel, der beim ♀ nur stumpfer als beim ♂ ist.

Decken gerade abgeschnitten, Trunkaturkante beim ♂ gerade, beim ♀ nach aussen ausgeschweift, Marginalwinkel dadurch beim ♀ beinahe recht winkelig, spitz, beim ♂ stumpf, gerundet, Nahtwinkel beider Geschlechter recht winkelig, etwas gerundet.

Vordertibien beider Geschlechter etwa gleich, ziemlich schlank, triangulär, nach aussen am breitesten, dort gerade abgeschnitten mit rechtem Aussenwinkel, der beim ♀ stärker gerundet (beinahe abgeschnitten) als beim ♂ und mit einer Reihe breit triangulärer Zähnchen an der Tibialkante wie beim ♂ versehen ist. Vordertarsen beim ♂ erweitert, beinahe triangulär, nach aussen verengt, etwa so lange wie die Tibialhälfte.

Fundort: China, Szechwan, Nitou Tatsienlu. Beide Typen in meiner Sammlung.

Wie ersichtlich steht diese Form *chinensis* Reg. ziemlich nahe, lässt sich aber nicht an diese Art anschliessen, besonders nach Ochs' Auseinandersetzung bei seiner Beschreibung der neuen Art *Wui* aus China (Ochs 1931-32). Die vorn undeutlich gelbe Seitenkante passt nicht in Regimbarts (1907) Gruppe II, wohin er sein *chinensis* einreiht. Ausserdem folgt der nach hinten deutlichere Marginalstreifen auch sehr deutlich der Trunkatur in gleicher Breite wie seitlich, was für *chinensis* nicht angegeben worden ist. Dieses zusammen mit den auch deutlichen Verschiedenheiten in Bezug auf die Tomentbinde und auf das glatte Feld u.a.m. scheint mir die spezifische Selbständikeit dieser Form festzustellen.

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華中及華西之小頭小虫科，龍蝨科，及鼓豆科(鞘翅目)

G. Falkenström 著

(摘 要)

本文敘述華中及華西之甲虫凡三十六種。隸於小頭小虫科者三種（一新種），龍蝨科者三十種（一新屬及十二新種），及鼓豆科三種（一新種）。凡屬新種者，皆詳爲描述，至其他各品種亦有敘及焉。十五品種之生殖器，詳見於圖；此十五品種中，其中七種，經已描述，而其中二種，在本文內僅爲簡單述及而已。*Colymbinectes ater* 乃採自四川，此種屬均爲首次之記載。所述各品種，皆發見於四川省，間亦有發現於中國中部者。

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THE LIFE HISTORY OF LIMNOGONUS FOSSARUM (FABR.) IN CANTON (HEMIPTERA: GERRIDAE)

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THE LIFE HISTORY OF LIMNOGONUS FOSSARUM (FABR.) IN CANTON (HEMIPTERA: GERRIDAE)[1]

By William E. Hoffmann
Lingnan Natural History Survey and Museum, Lingnan University.

Limnogonus fossarum (Fabricius) 1775

1775. *Cimex fossarum* Fabricius, Syst. Ent., p. 727.
1794. *Gerris fossarum* Fabricius, Ent. Syst., 4, p. 188.
1803. *Hydrometra fossarum* Fabricius, Syst. Rhyng., p. 258.
1859. *Gerris discolor* Stål, Kongl. Freg. Eug. resa, Ins., 265.
1868. *Limnogonus fossarum* Stål, Hem. Fabr., 1, p. 133.
1868. *Limnogonus discolor* Stål, Hem. Fabr., 1, p. 133.
1870 [1871]. *Limnogonus discolor* Stål, Ofv. Vet.-Ak. Förh. 27 :705.
1903. *Gerris fossarum* Distant, Rept. Rhyn. Part I, Heterop. Fasc. Malay. Zool. Part II, p. 256.
1904. *Gerris fossarum* Distant, Fauna Brit. Ind., Rhyn. 2 :178.
1910. *Gerris fossarum* Dist., Fauna Brit. Ind., Rhyn. 5 :142.
1915. *Gerris fossarum* Bergroth, Meded. Rijks Mus. Nat. Hist. Leiden. 1 :120.
1918. *Gerris fossarum* Paiva, Rec. Ind. Mus. 14 :23.
1925. *Tenagogonus nymphae* Esaki, Phil. Jour. Sci. 26 :58, *pl. 1, fig. 3 & 4.*
1926. *Limnogonus nymphae* Esaki, Ann. Nus. Nat. Hung 24 :181.
1928. *Limnogonus fossarum* Esaki, Ins. Samoa. etc. II, p. 69.
1928. *Gerris fossarum* Dover, Treubia 10 :68.
1930. *Gerris fossarum* Hoffmann, Ling. Sci. Jour. 9(3) : 321.
1933. *Gerris fossarum* Hoffmann, Ling. Sci. Jour. 12 suppl. :245.
1933. *Limnogonus fossarum* Lundblad, Archiv f. Hydrobiol. Suppl.-Bd. 12 : 374, *text fig. 119; pl. 11.*

Distribution.—Celebes, Ceylon, China (including Hainan), Federated Malay States, Formosa, Hong Kong, India, Java, Philippines, and Sumatra.

Next to *Gerris paludum* Fabr., the present species is probably the commonest water strider in Kwangtung, where it breeds practically the year round. The data on which the present paper is based were secured in 1925 and 1926 in Canton. At that time aquatic insects were being studied in connection with a fisheries project. The rearing work was done by my wife, Winifred B. Hoffmann, over a period of several months and I wish to take this opportunity to acknowledge my gratitude for the painstaking manner in which the rearings were carried out.

[1] Contribution from the Lingnan Natural History Survey and Museum.

At the time these studies were made electric light was not available so the immature stages could not be described with accuracy. Ample material of all the stages was preserved for later use, but unfortunately during the intervening years all of the immature stages except the fifth instars have disappeared and are not now available for description.

It would not be difficult, of course, to rear a few specimens to get more material, but the writer is now engaged in a study of insects of agricultural importance and cannot take the time for this at present. It seems advisable, therefore, to publish these notes without further delay.

Habitat.—These bugs are common in pools, ditches, flooded fields, ponds, and in the quieter reaches of streams, at altitudes ranging from about sea level to 2000 meters. They prefer environments provided with emergent vegetation on which they spend much of their time. When disturbed they dart from one place to another but stay among the vegetation if possible. In this respect they are unlike *Gerris paludum* Fabr. which takes readily to the open water when disturbed. In open water *G. paludum* is difficult to net while *L. fossarum* is quite easy to capture. In vegetation *L. fossarum* is not very conspicuous. It also occurs in environments without growing vegetation, in which case it spends much of its time at the edge of the water or on any floating objects which may be in the water.

Overwintering.—This species spends the winter, in the region of Canton, in the adult stage. Breeding occurs during most of the year and, during the years when there is a mild winter, apparently all year long. During the very cold weather the adults are difficult to find and some of them at least leave the water and crawl under dead vegetation, debris, etc., on the bank.

Mating.—Mating occurs both during the day and night, and occurs from time to time during the breeding season which, in the laboratory at least, may extend over a period of four weeks. Mating habits are similar to those which usually obtain among water striders. The female seems to pay very little attention to the male during mating, for she carries on feeding, cleaning, and other activities just as though the male were not present.

Preoviposition Period.—No great effort was made to secure data on the preoviposition period. In fact, the only information on this point was secured during the winter from a specimen in an incubator. This female was reared in the laboratory and became an adult on Dec. 19 at which time she was placed with a reared male which also became adult on the same day. These were placed in an incubator where the temperature averaged about 23°C., for 5

or 6 days, by which time eggs had been laid. Another female, which became an adult on Nov. 29, 1925, did not lay eggs until March 19, 1926.

Oviposition.—The eggs are laid on the underside of grass blades and other floating objects. In the laboratory the eggs were laid on the sides of the glass containers if vegetation was not supplied. The eggs are attached by means of a small amount of translucent glue-like substance. Egg-laying took place mostly if not entirely at night. The eggs are not laid in any regular order but the majority of them are placed lengthwise of the stick or grass blade, frequently end-for-end in a single row. A female may lay as many as 32 eggs in one night.

Fecundity.—Two females collected on Oct. 8, 1925 had laid 110 eggs by Dec. 3 at which time one of them died. The remaining one laid 32 eggs between this date and Dec. 21 when she died. The female mentioned above as being kept in an incubator laid over 88 eggs during a period of about one month. A female collected on March 10, 1926 (at which time she was mating) laid 93 eggs in 17 days, in batches of 17, 12, 14, 7, 12, 10, 2, 6, and 13 eggs, on March 12, 13, 14, 15, 17, 18, 21, 23, and 28. This is an average of 10.33 eggs per laying or about 5.5 eggs per day. The female died on March 30; it is, of course, not known whether she had laid eggs before her capture. Another female laid 54 eggs during 16 layings over a period of 23 days.

Incubation.—The incubation period is determined, of course, by the temperature. Incubation required about 6 days, when the temperature was between 20° and 23°C. Eggs laid on Nov. 22 hatched in 17 days; those laid on March 18 required 24; on Mar. 24, 19 days; on Mar. 29, 16 days; on Apr. 8, 13 days; on Apr. 19, 14 and 15 days.

Hatching.—Some time before hatching the egg becomes darker, and through the chorion may be seen the eyes, antennae, egg-burster, and legs of the developing nymph. The nymphs are ventral-side up in the eggs, and the eggs in hatching split lengthwise for about two-thirds of their length.

Behavior of Newly Hatched.—Nymphs hatching from eggs which are not at the surface of the water become waterlogged and seldom survive unless they are assisted. Those which gain the surface of the water upon hatching commence their bath at once. This consists, first of all, of pulling the antennae between the anterior tibiae which are held close together. After the antennae are brushed, the rostrum, legs, and body are cleaned.

Number of Instars.—There are five nymphal instars; the duration of each stadium is shown in table 1.

TABLE 1

Record of rearings of Limnogonus fossarum (Fabricius)

REARING NUMBER	DURATION FIRST STADIUM	DURATION SECOND STADIUM	DURATION THIRD STADIUM	DURATION FOURTH STADIUM	DURATION FIFTH STADIUM	TOTAL DAYS	SEX	DATE
								1925
5-932	4*	5	6	3k				
5-933	4*	5	5	4k				
5-934	5*	4	6	4k				
5-935	4*	4	5	7	2k			
5-936	4*	5	6	7	5k			
5-937	5*	6	5	2k				
5-938	4*	5	5	7	1k			
5-939	4*	4	5	5k				
5-940	4*	5	6	2d				
5-941	5*	4	5	7	6k			
5-942	4*	5	6	6	10	31*	a♂	Oct. 27
5-943	5*	4	5	5	3k			
5-944	6*	5	5	8	9k			
5-945	5*	5	6	7	8k			
5-946	4*	5	5k					
5-947	2d							
5-948	4*	4	6	7	11		w♂	Nov. 28
5-949	5*	4	6	7	11k		a♂	
5-950	6*	5	5	7	10k			
5-951	3*	4	6	6	4k			
5-952	5*	6	4	7	7k			
5-953	3*	4	6	7	12		a♂	Nov. 28
5-954	4*	5	5	6	11		a♀	Nov. 27
5-955	1*	5	6	6k				
5-956	5*	5	4k					
5-957	4*	5	5	7	12		w♀	Nov. 29
5-958	4*	5	5	7	12		a♀	Nov. 29
5-959	4*	4	6	6	11		a♂	Nov. 27
5-960	4*	5	6k					
5-961	3d							
5-962	4*	6	6	7	14		a♀	Dec. 3
5-963	7*	6	5	7k				
5-964	5*	6	3k					
5-965	6*	6	9	9	23	53*	a♂	Dec. 19
5-966	7*	6	6	7	17	43*	a♂	Dec. 9
5-967	6*	6	6	1k				
5-968	6	2k						
5-969	5	6	5	7	16	39	a♂	Dec. 5
5-973	6	5	5	6	10	32	a♀	Nov. 29
5-974	7	5	5	7	12	36	w♂	Dec. 3
5-975	6	6	5	6	12	35	a♀	Dec. 2
5-976	6	5	5	6	10	32	w♀	Nov. 29
5-978	2d							
5-979	7	5	5	7	14	38	w♀	Dec. 6
5-980	2e							

*=incomplete; k=killed; d=died; dm=died molting; e=escaped; a=apterous; w=winged.

5-981	6	1k						
5-982	7	4k						
5-983	6	3k						
5-984	7k							
5-985	6	5	6	7	16	40	w♂	Dec. 8
5-986	7	5	5	7	15	39	a♂	Dec. 7
5-987	6	4	2k					
5-988	6	6	6	8	19	45	a♀	Dec. 13
5-989	7	5k						
5-990	2e							
5-991	7	6k						
5-992	6	5	1k					
5-993	5k							
5-994	6k							
5-995	6	5	6	7	19	43	a♀	Dec. 14
5-996	6	5	6	8	21	46	a♀	Dec. 17
5-997	4k							
5-998	3k							
5-999	1k							
5-1000	1k							
5-1001	2k							
5-1002	7	4	6	7	20	44	a♀	Dec. 15
5-1003	8	5	6	8k				
5-1004	7	6	6	9k				
5-1005	7	5	5	9	20	46	a♂	Dec. 19
5-1006	7	5	5	7	21	45	a♀	Dec. 19
5-1008	5	5	7	7	16	40	w♀	Dec. 8
5-1010	2d							
								1926
5-1011	6	6	7	14	34	67	a♂	Jan. 14
5-1012	7	5	7	14	30d	63*		
5-1013	5	5	7	10	28	55	a♀	Jan. 3
5-1014	5	5	7	14	30dm	61		
5-1015	6	4	7	12	26	55	a♀	Jan. 3
5-1016	5	5	7	14	28	59	a♀	Jan. 6
5-1017	5	5	6	10	32	58		Jan. 6
5-1018	6	5	7	15	28d	61*		Jan. 11
5-1019	7	6	6	17	33dm	69		Jan. 19
5-1020	7	6	7	15	31d	66*		
5-1021	7	5	10	k				
5-1022	7	6	7	18	14	52	a♀	Feb. 2
5-1023	8	6	11	21	7d			
5-1024	7	7	10	23	14dm	61		
5-1025	7	6	7	21	19dm	60*		
5-1026	8	8	16	28	55d	115*	w♂	Mar. 6
5-1027	7	6	7	20	45	85		Feb. 4
5-1028	7	6	9	23	18d			
5-1029	6	6	7	16	26d			
5-1030	6	6	8	18	45	83	a♂	Feb. 3
5-1032	6	5	7	15	4d			
Maximum	7	8	16	28	45	85		
Minimum	5	4	4	5	10	32		
Average	6.41	5.19	6.22	10.50	18.66	50.19		

Molting.—If the molting is successful it does not require much time. An underfed or partially waterlogged specimen usually succumbs at molting time. For some hours prior to molting the nymphs refuse food, and become sluggish. Shortly before molting they become darker and are swollen. The skin splits in a Y-shape on the head and along the median line of the thorax; the split occurs on the latter first.

Sexual Maturity.—Exact information as to this point was not ascertained, but in the case of the female kept in the incubator, mating took place sometime within 5 or 6 days after the female became adult.

Longevity.—The proper facilities were not at hand for a study of the longevity of this species. The longest record in the laboratory was that of a female which became adult on Nov. 29 and lived until May 12. She did not commence laying eggs until about the middle of March; eggs were laid the day before she died. It appears that the females live longer than the males and that the females die at the end of their egg-laying period. We do not have longevity data for individuals which became adult in the spring or summer, but this would be useful information.

Number of Generations.—It may be seen from the table that about a month and a half is required for completing the life cycle in the spring or fall; the time would be much shorter during the summer. As far as time is concerned, there could be several generations per year, and this is probably the situation which obtains.

Food Habits.—These bugs feed upon various animal organisms, but insects form their chief food. They eat both dead and living insects, but seem to prefer the latter. Mosquitoes, midges, may-flies, and damsel-flies just emerging from the pupal or naiad skin are particularly attractive to the water striders. Most if not all kinds of terrestrial insects which get into the water are attacked. Numerous insects ordinarily occur on the grass and weeds bordering pools and ponds or actually growing therein; and when this vegetation is disturbbed many insects jump or fall into the water and are seized by the striders. Chief among such insect victims are the Cicadellids. In the case of large insects, the water striders join forces in attack. Various insects were used as food in our laboratory rearing, but flies proved the most successful. Since flies do not become waterlogged and sink as do some insects, they can be easily and quickly removed after the bugs have finished feeding. Furthermore, flies seem to pollute the water less than do other insects used for food.

Behavior.—The members of this species are somewhat gregarious. They prefer places which are sheltered from strong wind or hot sun, and spend much of their time in or near vegetation. Although always willing, apparently, to capture luckless insects which fall into the water, this species seems to do its searching for food mostly in the mornings and in the evenings.

Enemies.—The earlier instars and all stages at molting time may be attacked by predaceous insects such as *Ranatra*, *Laccotrephes*, *Enithares*, *Hydrometra*, and *Mesovelia*. Sometimes molting or waterlogged water striders are attacked by other individuals of the same species. Fish also account for some specimens, but on the whole this species is not much subject to the attack of enemies.

Description of Stages

The Egg.—Unfortunately the eggs which were preserved are not now available for measurement, but they are a little more than 1 mm. in length, and elongate cylindrical in shape as may be seen by reference to plate 13, fig. 1. The anterior end is somewhat blunt, the posterior end tapered. They are whitish when laid, yellowish later. A translucent sticky waterproof substance secures the eggs to the leaf blade or other object on which they may be placed. The empty egg shell is translucent.

First to Fourth Instars.—Our specimens of these stages were lost before detailed measurements were made and, in the case of the third instar, before a drawing was made. The general appearance and relative sizes of the first, second, and fourth instars may be ascertained, however, from plate 13, fig. 2, 3, and 4. The first two instars are rather pale, with the result that the black markings on the thorax stand out prominently. These specimens have a decided spotted appearance as one sees them jumping about in pools or ponds.

Apterous Fifth Instar.—Measured dorsally this stage is as follows: Length of head along median line .90 mm.; antennal segments 1.45, .90, 1.13, and 1.40 mm., respectively; length of pronotum 1.04 mm.; rest of bug 5.53 mm. in length; length of intermediate tibia 4.76 mm.; width of head across eyes 1.49 mm.; width of pronotum 1.31 mm.; width of abdomen 1.72 mm.

General appearance a brown mixture. On examination with the binocular microscope the color is seen to be brown, dark brown, and buff. The head has a brown median band extending from apex to near the posterior margin. On either side there is an interrupted brown band extending from the base of the antennae to near the posterior margin of head. Eyes blackish; antennae uniformly brown; remainder of head pale. Pronotum with a large dark brown, shining, chitinized plate with a brown median line, rest of pronotum brown. The disk of the pronotum is slightly depressed. A word description of the meso- and metathorax is not easy. Fortunately the artist has accurately delineated the markings.

The areas indicated by black in plate 13, figure 6, represent dark shining brown. The extended triangular median marking is brown, the irregular area on either side of its apex is buff. These areas are surrounded by dark shining brown (black in the figure), this bordered by brown, then buff (on the latero-dorsal area), and finally brown again. The abdomen is dark shining brown, brown, and buff as indicated by black, stipples, and white, respectively, in the figure.

The anterior legs with femora and tibiae buff, the former with a median brown line in apical one-half, tarsi dark brown. Intermediate legs with femora and basal one-half of tibiae buff, remainder of tibiae and tarsi brown. Posterior legs with femora buff, tibiae and tarsi dark brown. Beneath, pale to buff. Rostrum with apical segment dark brown, remainder of rostrum pale with a brown median line. The winged specimens of this instar are the same as the apterous ones in coloration. The thorax, of course, is darker because of the wing pads.

Adult Winged Female.—The specimen before me is 9.5 mm. long and blackish or olivaceous-black as are many of the gerrids. The head is a little shining, the thorax strongly so. The head is with a median longitudinal black band which extends almost to the posterior margin. A longitudinal, irregular, dark brown marking extends from the base of the antenna to the posterior margin of head; remainder of upper surface of head yellowish. Proportion of antennal segments is as follows: 90;57;57;61. Antennae uniformly brown in color. Pronotum with lateral and posterior margins yellowish; a pair of longitudinal yellowish spots on the anterior part (constriction); a longitudinal median yellowish line extending from these spots to near the posterior margin. Hemelytra blackish-brown. Anterior legs pale brown with a longitudinal line on femur, apex of tibia, and tarsus dark brown. Middle leg medium brown with apex of tibia and tarsus dark brown. Hind leg with femur medium brown, tibia and tarsus dark brown. Beneath: Pale ochraceous, with a pair of obscure pale bands on mesosternum. These bands are more or less parallel along their centers, flare out anteriorly and posteriorly, more so posteriorly than anteriorly. Rostrum brown, apical segment dark brown. The male is similar to the female but smaller and frequently a portion of the under surface of the abdomen is brownish. Apterous adults are not at hand as these notes are written. The appearance of the male and female genitalia, as viewed ventrally, is useful for specific characterization. There are, however, minor differences as may be seen in figures 4 and 5 of plate 14.

Rearing Methods

The specimens were reared in glass containers of various sizes. Most of the specimens were kept in Petri dishes during the first

two instars after which they were transferred to larger vessels varying in size from jelly glasses to glass jars eight and ten inches in diameter. Covers for the jars consisted of tin, glass, cardboard, cloth or screen. Tap water was used, care being taken not to have the containers too full lest the striders jump out. In some of the containers a leaf, a piece of cork, a piece of bark, or some similar small floating object was provided. The water was changed occasionally. Except in very small containers pollution, by disintegrating food, seldom occurred; a more important factor was the formation of a scum because of dust in the case of the jars covered with large mesh screen. Also for one period of about two weeks the tap water had a tendency to readily form a scum thus necessitating frequent changes of the water. The presence of a certain kind of spider in the laboratory made it necessary to cover all containers. In a few cases where the covers were left off rather too long during feeding time the spiders were successful in capturing the gerrids and at all times one or more spiders could be seen on the outside of the container ceaselessly following every movement of the water-strider within the container.

Several methods were used to transfer the nymphs from one container to another during the times when the water was changed. In the case of the first and second instars a good method was to tip the jar containing the bug against the new jar in such a manner that the upper edges of the jars were together and the water in the first jar reached or nearly reached the top of the jar. By placing a forceps, pencil, or other object into the water and moving it toward the insect it can be made to jump into the new jar. It is also quite easy to hold a curved fine pointed forceps under the specimen and with one quick stroke actually throw the insect into the second container. The larger nymphs were transferred by grasping a leg with a pair of forceps and lifting the bug into the second jar, by "scooping" the bug up and out with a cloth ladle, or by use of a small strainer. With a little practice the first-named method is the best and quickest. It was found that in the course of caring for the life histories one usually had the forceps in the hand ready for adding or removing food and its use in transferring the nymphs avoided putting one instrument down to pick up another. If one is rearing only a few specimens such minor points of technique are of little importance but the case is quite different when hundreds of specimens are in rearing at the same time.

In containers where eggs were expected there were either growing plants, usually *Valisneria*, or else grass blades were added in such a manner that they rested horizontally on the surface of the water. When a scum formed upon the water and especially if no support had been provided the bugs were unable to keep the hairs of the body and legs clean. In these cases the legs would break

through the surface film and finally the insect, unless helped, would sink and drown. To remedy such a condition the water should be changed and a floating object provided. This permits the bug to clean one leg without the others breaking through the surface film. If the specimen is actually waterlogged it should be removed for a period of an hour or so to a container with damp sand or well-dampened blotting paper. Our observations indicated that it was not necessary to have anything in the breeding jars besides water but that vegetation or floating objects made the specimens appear more contented and lessened the danger of waterlogging. The size of the container did not seem to make any perceptible difference in the welfare of the insect, but the danger of the specimen getting out was greatly increased by the use of smaller containers.

Summary

Prefaced by an indication of the pertinent references this species is discussed as to distribution, habitat, overwintering, mating, preoviposition, oviposition, fecundity, incubation, hatching, behavior of the newly-hatched, molting, longevity, number of generations, food habits, etc. The several stages are described. The rearing records of 94 specimens are presented in tabular form. From table 1 it may be observed that 34 specimens reached maturity but 8 of these were not reared from egg to adult. Of the 34, fifteen were males; eighteen females and eight males were winged while the remainder were wingless. The average duration of the first stadium was 6.41 (minimum 5, maximum 7) days; the average duration of the second stadium was 5.19 (minimum 4, maximum 8) days; the average duration of the third stadium was 6.22 (minimum 4, maximum 16) days; the average duration of the fourth stadium was 10.50 (minimum 5, maximum 28) days; the average duration of the fifth stadium was 18.66 (minimum 10, maximum 45) days. The total nymphal life averaged 50.19 (minimum 32, maximum 85) days. The number of specimens on which the figures are based varies with the different instars. Relatively fewer first instars were available because many of the rearings started with nymphs of unknown age collected in the field. Of the other four instars the numbers making up the averages are progressively less because of mortality as rearing progressed. In no case is the duration of a given stadium used in the calculation if it is incomplete or if the specimen dies in that stadium. Deaths occurred mostly at or near molting time; a number of specimens were killed and preserved for later study. Specimens hatching late in October or early in November required a little more than a month to reach maturity; those hatching about the middle of November required three months or longer for maturity. About 38 or 40 days constituted the minimum requirement for development from egg to adult in our rearings. During the summer months this period would probably be reduced to a month or less.

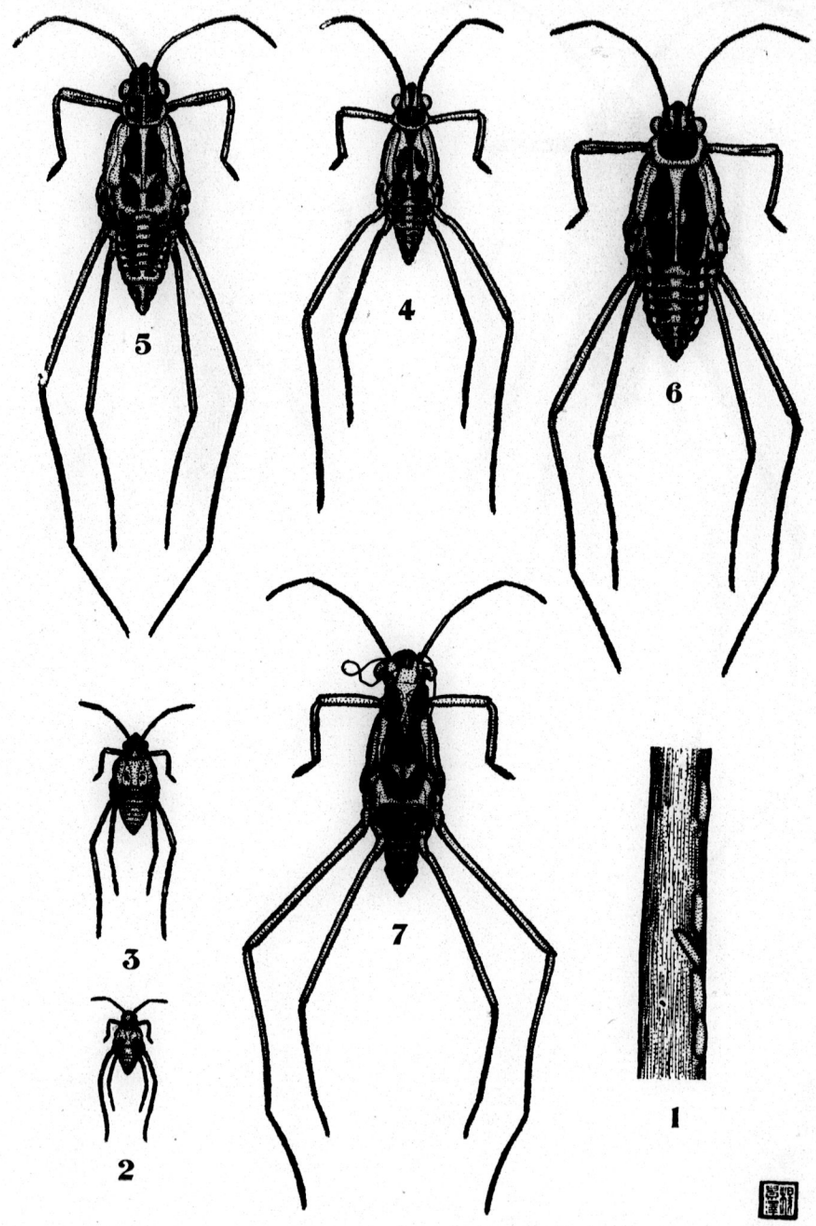
廣州黃斑水黽之生活史

(半翅目，水黽科)

賀輔民著

(摘要)

由研究所得之結果及考諸十九種文獻之記載；對黃斑水黽之分佈，越冬，交尾，產卵，孵化，脫皮，及新初孵化若虫之習性等，與其生殖力，卵期，若虫之齡數，雌雄之成熱，壽命之長短，每年發生之代數，食料，及天敵等皆分述文內。而卵，成虫，若虫（除第三齡若虫外）之描述尤詳且各見於圖。九十四黃斑水黽生活史之記錄亦詳見於表。至於卵期之長短，常視氣候而異。在攝氏表二十至二十三度，卵期長約六天。各齡期平均爲七・一一，五・一九，六・二二，一〇・五〇・及一八・六六天。每年秋季由卵至成虫，約需三十八至四十天。惟在冬季其生活史則較秋季長約四份之三倍。炎夏之際，約需一月則可完成其生活史矣。



Limnogonus fossarum (Fabr.)

Fig. 1, eggs. Fig. 2, first instar nymph. Fig. 3, second instar nymph. Fig. 4, fourth instar nymph. Fig. 5, apterous fifth instar nymph. Fig. 6, winged fifth instar nymph. Fig. 7, nymphal skin of fifth instar.

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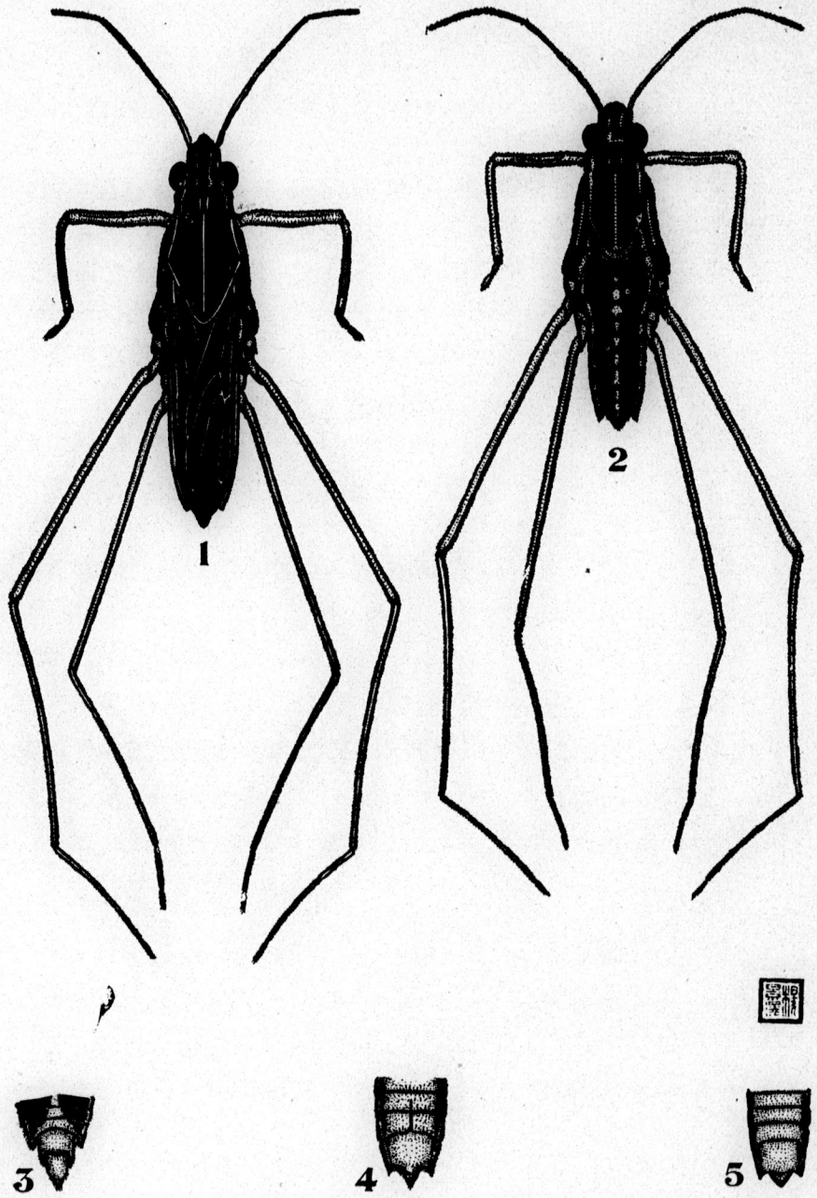

Limnogonus fossarum (Fabr.)

Fig. 1, winged male. Fig. 2, apterous female. Fig. 3, ventral view of tip of abdomen of male. Fig. 4, ventral view of tip of abdomen of female. Fig. 5, ventral view of tip of abdomen of apterous female.

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CATALOGUE OF THE PHYTOPHAGOUS BEETLES OF CHINA

By G. Liu (Gaines Liu, 劉崇芝)
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CATALOGUE OF THE PHYTOPHAGOUS BEETLES OF CHINA

By G. Liu (Gaines Liu, 劉 淦 芝)
Parker Fellow in Zoology, Harvard University, Cambridge, Mass.

(Continued from *Lingnan Science Journal* Vol. 15, No. 1, p. 30.)

Subfamily **Hispinae**

About 30 species in 7 tribes have been recorded from China. For further reference, see Hispinae in Genera Insectorum (Wytsman), fasc. 125, 1911 by Julius Weise.

Key to the Tribes

1. Prothorax provided with lateral spines ..... **Hispini**
   Prothorax without lateral spines 2
2. Elytra without an abbreviated row of punctures on the scutellum but as a rule having three primary ridges, the first interval striae with two rows of punctures at the suture 3
   Elytra provided with an abbreviated row of punctures on the scutellum 4
3. Prothorax without lateral margins ..... **Promecothecini**
   Prothorax provided with lateral margins; head small; neck short..... **Gonophorini**
4. Mouth reaching the suture of the antennal base and consequently the clypeus missing or in a very narrow band; prothorax provided with sensory bristles (Tastbursten) 5
   Mouth separated from the base of antennae by a distinctly triangular, quadrate or rectangular clypeus 6
5. Sensory bristles of the prothorax located near the posterior angles..... **Gallispini**
   Sensory bristles of the prothorax located near the anterior angles; eyes coarsely granulate; first segments of antennae not provided with support beneath; legs simple ..... **Anisoderini**
6. Clypeus more or less triangular or wedge-shape, glabrous on the margin but densely hairy in the center which is ascending toward the upper region, at base higher than the root of antennae and hence forming a resting place for the first segments of antennae..... **Lepthispini**
   Clypeus seldom transverse but as a rule quadrate or right-angles and ascending toward the upper region; body wedge-shaped, namely narrower in front and wider behind; front not provided with any appendages ..... **Choeridionini**

Tribe **Hispini**

Key to the Genera

1. Antennae with 9 segments; prothorax and elytra provided with broadly dilated lateral projections; the margin of the projections with short and thick spines ..... **Cassidispa**
   Antennae with 11 segments; elytra without lateral projections..... 2
2. Antennae provided with spines, at least on the first segments..... 3
   Antennae without spines 5

3. Tarsal claws free and spreading out; anterior margin and lateral margins of prothorax provided with spines (the spines on the anterior margin distant from the anterior angles) .....**Rhadinosa**

Tarsal claws united without leaving any trace of a suture 4

4 Tarsal claws of equal width throughout; body long .....**Acmenychus**

Tarsal claws spine-like; prothorax provided with spines on each side of the anterior margin .....**Monochirus**

5. Anterior margin of prothorax spined; claws free and spreading..**Dactylispa**

Anterior margin of prothorax not spined 6

6. Antennae cylindrical, subfiliform, slightly dilated toward the apex and extending far beyond the base of the pronotum; legs moderate; tibiae slender but a little dilated toward the apex.....**Hispa**

Antennae compressed, spinous, greatly dilated toward the apex and not extending beyond the base of the pronotum, the first segments provided with a long sharp spine above; legs short and robust; tibiae compressed and dilated externally; body more slender than the preceding genus .....**Hispella**

Tribe **Promecothecini**

Only one genus *Promecotheca* is known from China up to the present. It can be easily recognized by the prothorax being deeply laced up before the posterior angles. The antennae are slender and not dilated toward the apex.

Tribe **Gonophorini**

Key to the Genera

Sides of prothorax parallel; the three principal costae on each elytron much lower and sometimes flattened and broadened at base; elytra provided with 8 punctured striae, the first two united before the middle; fourth segments of tarsi somewhat longer than the third; claws free....**Downesia**

Sides of prothorax not parallel; the costae on elytra much higher, well developed throughout and never flattened and broadened at base; fourth segments of tarsi as long as the third; claws concealed in the spongy sole of the last segments of the tarsi; prothorax cylindrical, often being slightly narrowed before the middle and with the lateral margins smooth and even. .....**Agonia**

Tribe **Callispini**

The species of *Callispa*, the only genus in this tribe recorded from China at present, are all small beetles and generally with an oblong-ovate outline. The scutellum is small, transverse and with the posterior border always rounded. Other characters are: eyes prominent; pronotum provided with depressions; head produced between the antennae; elytra hardly or slightly broader than the prothorax; body moderately convex; third segments of antennae not enormously long; claws concealed in the hairy border of the bilobed segments.

Tribe **Anisoderini**

Key to the Genera

Anterior margin of the prothorax emarginate in the middle: body elongate and parallel-sided; antennae stout, cylindrical and not pointed at the apex; clypeus absent (for the upper border of the oral cavity being near very close to the roots of the antennae); mentum hexagonal; prothorax quadrate; elytra elongate and regularly punctate-striate, the inter-space smooth .....**Estigmena**

Anterior margin of the prothorax not emarginate in the middle; labrum large and on the same plane as the clypeus; upper side of body opaque or subnitidus; elytra provided with pronounced costae.....**Anisodera**

Tribe **Lepthispini**

Elongate, very narrow, parallel-sided and almost cylindrical beetles when looking from the above. Head oblong and free from the thorax; antennae gradually dilated toward the apex; prothorax quadrate and generally longer than broad with the upper surface convex and without depressions; legs short and stumpy; tibiae generally emarginate externally at the apex. General description of the genus *Lepthispa*.

Tribe **Choeridionini**

These are small and wedge-shaped insects. Labial palpi present; head not surmounted by a protuberance; antennae with the first segments ovate, the next five generally cylindrical and elongate, the third segments usually the longest, the apical four segments generally hairy, rough and stouter; prothorax more or less cylindrical with the dorsal surface convex and covered with deep and round pits; elytra dilated posteriorly and roughly punctate-striate; last segments of tarsi large and strong. General description of the genus *Prionispa* which is the only one recorded from China up to the present.

Tribe **Anisoderini**

J. Weise, Coleopterorum Catalogus (Junk), pars 35, 1911, p. 40.

Estigmena Hope, Col. Man. 3, 1840, p. 174.

chinensis Hope — China, India, Java, Sumatra

Hope, Coleopt. Man. 3, 1840, p. 175, pl. 2, fig. 1. Baly, Cat. Hisp., 1858, p. 100, pl. 7, fig. 7. Gestro, Ann. Mus. Civ. Genova, 1897, p. 49. Maulik, Fauna India, Col., 1919, p. 27.

Var. *atricollis* Pic, Mélanges 57, 1924, p. 29.

Anisodera Chevr., in d'Orbigny, Dict. Univ. Hist. Nat. 1, p. 535.

excavata Baly — Himalaya, Tongking

Baly, Cat. Hisp., 1858, p. 105, pl. 8, fig. 1.

Tribe **Callispini**

J. Weise, Col. Cat. (Junk), pars 35, 1911, p. 41.

Callispa Baly, Cat. Hisp., 1858, p. 4, pl. 1, fig. 2.

apicalis Pic — China
Pic, Bull. Soc. Ent. Fr., 1924, p. 99.

bowringi Baly — Hong Kong
Baly, Cat. Hisp., 1858, p. 5.
Var. *atripes* Pic, Mélanges 57, 1924, p. 27.

cyanipennis Pic — China
Pic, Mélanges 57, 1924, p. 27.

donckieri Pic — China
Pic, Bull. Soc. Ent. Fr., 1924, p. 99.

fortunei Baly — N. China
Baly, Cat. Hisp., 1858. p. 6, pl. 4, fig. 2.

ruficollis Fairmaire — China
Fairmaire, Ann. Soc. Ent. Fr. 9, 1889, p. 84.

Tribe **Lepthispini**

J. Weise, Col. Cat. (Junk), pars 35, 1911, p. 44

Lepthispa Baly, Cat. Hisp., 1858, p. 1, pl. 1, fig. 1 (*Leptispa*).

Syn.—*Leptomorpha* Germar, Fauna Ins. Eur., 22, 1842, no. 10.
Parallelispa Fairm., Ann. Soc. Ent Fr. 6, 1876, p. 238.
Paradownesia Maulik, Ann. & Mag. Nat. Hist., 1917, p. 130.

abdominalis Baly — N. China
Baly, Cat. Hisp., 1858, p. 3.

godwini Baly — Shanghai
Baly, Trans. Ent. Soc. Lond., 1869, p. 364.

Tribe **Choeridionini**

J. Weise, Col. Cat. (Junk), pars 35, 1911, p. 49.

Prionispa Chapuis, Gen. Col. 9, 1875, p. 337.

No records have been made from China but judging from its present distribution (India, Burma, Indo-Malay Region), species of this genus might occur in China.

Tribe **Promecothecini**

J. Weise, Col. Cat. (Junk), pars 35, 1911, p. 53.

Promecotheca Blanchard, Voy. pole Sud. 4, Zool., 1853, p. 312.

trilbyi Thomson — China
Thomson, Rev. Zool., 1856, p. 117, pl. 5, fig. 6. Baly, Cat. Hisp., 1858, p. 89.

Tribe **Gonophorini**

J. Weise, Col. Cat. (Junk), pars 35, 1911, p. 54.

Downesia Baly, Cat. Hisp., 1858, p. 107, pl. 2, fig. 5.
Syn.—*Hanoia* Fairm., Ann. Soc. Ent. Fr. 8, 1888, p. 375.

marginicollis Weise — China
Weise, Philip. Jour. Sci., 21, 1922, p. 71.

tarsata Baly — Hong Kong
Baly, Trans. Ent. Soc. Lond., 1869, p. 377.

Agonia Weise, Deutsche ent. Zeitschrift, 1905, p. 116.
Syn.—*Gonophora* Baly, Cat. Hisp., 1858, p. 108.
Distolaca Baly, Cat. Hisp., 1858, p. 116(pars).

chinensis Weise — China
Weise, Philip. Jour. Sci. 21, 1922, p. 75.

Tribe **Hispini**

J. Weise, Col. Cat. (Junk), pars 35, 1911, p. 59.

Monochirus Chapuis, Gen. Col., 11, 1875, p. 330.
Syn.—*Hispellinus* Weise, Deutsche ent. Zeitschrift, 1897, p. 144.

moerens Baly — China, Japan, Shanghai
Baly, Trans. Ent. Soc. Lond., 1874, p. 215 (*Hispa*).

Acmenychus Weise, Deutsche ent. Zeitschrift, 1905, p. 318.
Syn.—*Monochirus* Heyden, Schneid. Leder, Beitr. Kaukas. Käferfauna, 1878, p. 343.

potanini Weise — Mongolia
Weise, Horae Soc. Ent. Ross. 23, 1889, p. 486; Ins. Deutschl. 6, 1893, p. 1061.

Rhadinosa Weise, Deut. ent. Zeitschrift, 1905, p. 318.

nigrocyanea Motschulsky — Manchuria, Altai, Japan
Motschulsky, Schrenck's Reisen Amurlande 2, 1861, p. 237, pl. 2, fig. 26. Fairmaire, Ann. Soc. Ent. Fr. 9, 1889, p. 83 (*Hispa*).

Dactylispa Weise, Deutsche ent. Zeitschrift, 1897, p. 137.
Syn.—*Podispa* Chapuis, Gen. Col. 11, 1875, p. 335.
Hispa Chapuis, Gen. Col. 11, 1875, p. 333.
Monohispa Weise, Deutsche ent. Zeitschrift, 1897, p. 147.
Triplispa Weise, Deutsche ent. Zeitschrift, 1897, p. 147.

angulosa Solsky — China, Amur, Japan
Solsky, Horae Soc. Ent. Ross. 8, 1871 (1872), p. 262 (*Hispa*). Fairmaire, Revue d'Ent. 7, 1888, p. 157 (*Hispa*). Weise, Deutsche ent. Zeitschrift, 1897, p. 148.
Syn.—*japonica* Baly, Trans. Ent. Soc. Lond., 1874, p. 215.

chinensis Weise — China
Weise, Arch. f. Naturg., 1905, p. 102.

crassicuspis Gestro — Yunnan
Gestro, Bull. Soc. Ent. Ital., 1906 (1908), p. 184.

excisa Kraatz — China, Amur
Kraatz, Deutsche ent. Zeitschrift, 1879, p. 140, pl. 2, fig. 10 (*Hispa*).

Ab. *repanda* Weise — Kiautschau (Shantung)
Weise, Philip. Jour. Sci. 21, 1922, p. 81.

maculithorax Gestro — Yunnan
Gestro, Bull. Soc. Ent. Ital., 1906 (1908), p. 189.

maculosa Fairmaire — China(?)
Fairmaire, Ann. Soc. Ent, Fr. 9, 1889, p. 84.

masonii Gestro — China
Gestro, Ann. Civ. Mus. Genova 51, 1923, p. 9.

pungens Boh. — China
Boheman, Resa Eugen., 1859, p. 202 (*Hispa*).

spectabilis Gestro — Yunnan
Gestro, Ann. Mus. Civ. Genova 46, 1914, p. 75 (*Triplispa*).

vulnifica Gestro — Yunnan
Gestro, Bull. Soc. Ent. Ital., 1906 (1908), p. 186.

Hispa Linnaeus, Syst. Nat., ed. 12, 1767, p. 603.

Syn.—*Dicladispa* Gestro, Ann. Mus. Civ. Genova, 1897, p. 81.

subquadrata[1] Baly† — Kiangsu,* Japan
Baly, Trans. Ent. Soc. Lond., 1874, p. 216. Gestro, Ann. Mus. Civ. Genova, 1899, p. 227 (*Hispa*).

armigera[2] Olivier† — E. India, Kiangsu,* Chekiang,* Amoy*
Olivier, Ent. 6, 1808, p. 763, pl. 1, fig. 8. Weise, Deutsche ent. Zeitschrift, 1904, p. 457.

Syn.—*cyanipennis* Motsch., Reisen Amurl. 2, 1861, p. 238.
aenescens Baly, Jour. Asiat. Soc. Bengal, 1887, p. 412.

Cassidispa Gestro, Ann. Mus. Civ. Genova, 1899, p. 174.

mirabilis Gestro — Szechwan
Gestro, Ann. Mus. Civ. Genova, 1899, p. 175.

[1] *Hispa subquadrata* Baly is sometimes placed under *Dactylispa*.

[2] This species, *H. armigera* Oliv., is noticed in the collection of the Provincial Bureau of Entomology of Chekiang. But the determination is still somewhat doubtful. The insect causes serious damage to rice in the lower Yangtze.

Hispella Chapuis, Gen. Col. 9, 1875, p. 334.

atra Linnaeus† — Europe, Africa S. Shansi,* Chinghwangtao*
Linnaeus, Syst. Nat., 1767, p. 603. Weise, Ins. Deutschl. 6, 1893, p. 1065.

Syn.—*algira* Motsch., Reisen Amurl. 2, 1861, p. 238 (*Hispa*).
aptera Motsch., l. c. p. 238 (*Hispa*).
minuta Balbi, Boll. Soc. Rom. 1, 1892, p. 195.
balbii Donckier, Cat. Hisp. in Ann. Soc. Ent. Fr., 1899, p. 602.
cariosa Reiche, Ann. Soc. Ent. Fr., 1858, p. 54.

Subfamily **Cassidinae**

Key to the Genera

1. Head entirely covered by the pronotum 2
   Head more or less visible from above 11
2. Tarsal claws pectinate; third segments of tarsi at least twice as long as the second 3
   Tarsal claws simple or appendiculate but not pectinate 4
3. Antennae hardly or only slightly reaching beyond the base of the pronotum with the first six segments glabrous and the rest pubescent; scutellum rectilinear triangular and moderate in size ... **Aspidomorpha**
   Antennae reaching beyond the base of the pronotum by one-half or one-third of their length, slender at base and dilated toward the apex; scutellum curvilinear triangular and very large in size ..... **Laccoptera**
4. Claws of the tarsi appendiculate 5
   Claws simple. 6
5. Antennae free; anterior margin of prosternum unbroken ..... **Metriona**
   Antennae lying in grooves near the eyes; anterior margin of the prosternum broken on each side ..... **Chirida**
6. Antennae reaching the metathorax or passing beyond the pronotum by one-half of their length 7
   Antennae hardly reaching the base of the pronotum 9
7. Antennal grooves present; antennae reaching beyond the pronotum by the 9th segments with the first six segments glabrous and the second segments somewhat equal to the third; prosternum broad and strongly dilated posteriorly; antennal grooves provided with sharp borders on the outside; prothorax transverse, elliptical and with the sides broadly rounded; tarsal claws without tooth. ..... **Hebdomecosta**
   Antennal grooves absent 8
8. Elytral epipleura not hairy toward the apex; elytra with the humeral angles prominent, sides dilated, surface punctatostriate or rugose, and moderately convex or very convex ..... **Coptocycla**
   Elytral epipleura hairy toward the apex; elytra wider than thorax with the base sinuate, the dorsal surface deeply punctatostriate, hairy or pilose toward the apex and provided with some transverse ruga; antennae long and filiform and with the five basal segments glabrous ..... **Thlaspida**
9. Third segments of antennae shorter than the second ..... **Ischyronota**
   Third segments of antennae longer or as long as the second; elytra provided with 10 rows of coarse and distinct punctures 10

10. Antennae lying in the grooves near the eyes with the third segments as long as the second; elytra irregularly punctured and each elytron provided with 4 longitudinal ridges ..... **Hypocassida**

    Antennae with the third segments distinctly longer than the second and with the six basal segments more slender and less hairy than the apical five ones; prothorax more or less elliptical and transverse with the basal margin always more or less sinuate; body convex, rotundate, ovate, or slightly elongate and sometimes narrowed posteriorly **Cassida**

11. Episterna of metathorax not separated from epimera; antennae short with the first six basal segments more slender than the apical ones; last segments of maxillary palpi oval and attenuated; pronotum very short, strongly transverse and with the base of the indentation of the anterior margin straight (not sinuate); elytra tuberculate and hardly wider than the thorax at base; first segments of posterior tarsi very short; size small ..... **Hoplionota**

    Episterna of metathorax distinct from the epimera; antennae equal to or half as long as the body with the fourth segments equal to the two preceding ones united. 12

12. Elytra strongly dilated posteriorly; prosternum triangularly dilated behind; sides of elytra dilated most strongly at the middle, not carinate behind and without any margins..... **Prioptera**

    Elytra only slightly dilated and so is the apex of the prosternum; sides of elytra narrow, hardly dilated in the middle, carinate behind, and provided with a pad-like margin..... **Stenoprioptera**

Tribe **Priopterini**

Hoplionota Hope, Col. Man. 3, 1840, p. 153.

centinodia Spaeth — Yunnan
Spaeth, Verhandl. zool.-bot. Ges. Wien 63, 1913, p. 514.

fumida Spaeth — South China
Spaeth, Verhandl. zool.-bot. Ges. Wien 63, 1913, p. 513.

Stenoprioptera Spaeth, Verh. zool.-bot. Ges. Wien, 1914, p. (132).

thibetana Spaeth — Tibet, Yunnan
Spaeth, Verhandl. zool.-bot. Ges. Wien, 1914, p. 132.

Prioptera Hope, Col. Man. 3, 1840, p. 153, 176.

bimaculata Thunberg — South China
Thunberg, Nov. Ins. Spec. 5, 1789, p. 86, pl. 5, fig. 93 (*Cassida*) Boh., Monog. Cassid. 1, 1850, p. 52.

bisignata Boheman — Tsingtao (Shantung)
Boh., Monog. Cassid. 4, 1862, p. 22. Weise, Arch. f. Naturg. 78, 1912, p. 96.

chinensis Fabricius — Shanghai, Fukien, S. China
Fabricius, Syst. Ent. Suppl., 1798, p. 84 (*Cassida*). Herbst, Natursyst. Käfer 8, 1799, p. 353 (*Cassida*). Weise, Verhandl. Naturf. Ver. Brünn 48, 1910, p. 42; Arch. für Naturg., 78, 1912 1, p. 96.

Syn.—*satrapa* Boh., Monog. Cassididarum 4, 1862, p. 17.

whitei Boheman — Central China, Kiangsu*
Boh., Cat. Col. Ins. British Mus. 9, 1856, p. 11; Monog. *Cassididarum* 4, 1862, p. 26.

Ab. *trabeata* Fairmaire, Ann. Soc. Ent. Belg. 32, 1888, p. 46.

Tribe **Aspidomorphini**[3]

Aspidomorpha Hope, Col. Man. 3, 1840, p. 158.

difformis Motschulsky — Manchuria, Japan, Siberia
Motschulsky, Etudes Ent. 9, 1860, p. 27 (*Deloyala*). Boh., Monog. Cassid. 4, 1862, p. 277. Baly, Trans. Ent. Soc. Lond. 5, 1874, p. 211. Kraatz, Deutsche ent. Zeitschrift 23, 1879, p. 270. Gorh., Proc. Zool. Soc. Lond., 1885, p. 280. Weise, Arch. für Naturg. 66, 1900, p. 295.

furcata Thunberg — South China, India, Amoy*
Thunberg, Nov. Ins. Spec. 5, 1789, p. 87, pl. 5, fig. 96 (*Cassida*). Herbst, Natursyst. Käfer 8, 1799, p. 265, pl. 132, fig. 7 (*Cassida*).

Syn.—*dursata* Olivier, Encyc. méth. 5, 1790, p. 386.
micans Fabricius, Syst. Eleuth. 1, 1801, p. 398 (*Cassida*).

fuscopunctata Boheman — South China, India
Boh., Monog. Cassid. 2, 1854, p. 298. Weise, Deut. ent. Zeitschrift, 1897, p. 104. Spaeth, Sarawak Mus. Jour. 1, 1918, p. 117.

Ab. *rubrodorsata* Boh., Monog. Cassid. 2, 1854, p. 310.

indica Boheman — Yunnan, Himalaya, Formosa, India
Boh., Monog. Cassididarum 2, 1854, p. 318. Weise, Deutsche ent. Zeitschrift, 1905, p. 113.

miliaris Fabricius — Yunnan, Tongking, India, New Guinea
Fabricius, Syst. Ent., 1775, p. 91. Herbst, Natursyst, Käfer 8, 1799, p. 312, pl. 135, fig. 8 (*Cassida*). Boh., Monog. Cassididarum 2, 1854, p. 261. Weise, Deut. ent. Zeitschrift, 1896, p. 16. Spaeth, Ann. Mus. Nat, Hung. 1, 1903, p. 138.

Syn.—*celebensis* Blanchard, Voy. pôle sud (d'Urville) 4, 1853, p. 316.
quatuordecim-punctata Oliv., Ent. 6, 1808, p. 943.

Laccoptera Boh., Monog. Cassididarum 3, 1855, p. 55.

quadrimaculata Thunberg — South China, India
Thunberg, Nov. Ins. Spec. 5, 1789, p. 86, pl. 5, fig. 94 (*Cassida*).

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[3] In Coleopterorum Catalogus (Junk), Spaeth employs numerical indications to differentiate the tribes. In the present catalogue, the first three genera, namely *Hoplionota*, *Stenoprioptera* and *Prioptera*, form one tribe and the rest form another. These titles are temporarily used as substitutes for the numerals.

Syn.—*thunbergi* Spaeth, Suppl. Ent. 3, 1914, p. 15.
subsp. *bohemani* Weise, Verh. Naturf. Ver. Brünn 48, 1910, p. 42.

yunnanica Spaeth — Yunnan
Spaeth, Ent. Mitteil. 3, 1914, p. 226.

Ischyronota Weise, Ins. Deutschl. 6, 1881-1893, p. 1069.

conicicollis Weise — Mongolia
Weise, Horae Soc. Ent. Ross. 24, 1890, p. 487 (*Cassida*). Reitter, Wiener ent. Zeit. 20, 1901, p. 108. Spaeth, Verhandl. zool.-bot. Ges. Wien 64, 1914, p. 144.

desertorum Gebler — Central Asia
Gebler, Bull. Mosc. 6, 1833, p. 305 (*Cassida*). Reitter, Wiener ent. Zeit. 20, 1901, p. 103. Jacobson, Wiener ent. Zeit. 20, 1901, p. 125.

Hypocassida Weise, Ins. Deutschl. 6, 1893, p. 1074.

subferruginea Schrank — Palearctic (except Japan)
Schrank, Beytr., 1776, p. 62. Weise, Ins. Deutschl. 4, 1893, p. 1074, 1083.
Syn.—*cornea* Mars., Abeille 5, 1868, p. 214 (*Cassida*).
ferruginea Fabricius, Spec. Ins., 1781, p. 102.
fusca Laicharting, Verz. Tyrol. Ins. 1781, 1, p. 112 (*Cassida*).

Cassida Linnaeus, Syst. Nat., ed. 10, 1758, p. 362.

Deloyala Redtb., subg., Fauna Austr., ed. 2, 1858, p. 952.

vespertina Boheman — N. China, Mongolia, Japan
Boheman, Monog. Cassididarum 4, 1862, p. 357. Gorh., Proc. Zool. Soc. Lond., 1885, p. 292. Weise, Arch. für Naturg. 66, 1900, 1, p. 295. Spaeth, Suppl. Ent. 3, 1914, p. 19.

Cassida s. str. subg., Weise, Wien. ent. Zeit. 10, 1891, p. 204.

deltoides Weise — Mongolia
Weise, Horae Soc. Ent. Ross. 23, 1889, 1, p. 644.

fuscorufa Motschulsky — China, Japan, Amur
Motschulsky, Bull. Mosc. 39, 1866, p. 178.
Syn.—*russata* Weise, Horae Soc. Ent. Ross., 1889, p. 646.
consociata Baly, Trans. Ent. Soc. Lond., 1874, p. 213.

informis Boheman — Hong Kong
Boheman, Monogr. Cassididarum 4, 1862, p. 312.

juno Boheman — Hong Kong
Boheman, Monog. Cassididarum 4, 1862, p. 324.

jacobsoni Spaeth — Kuatien (Fukien)
Spaeth, Verhandl. zool.-bot. Ges. Wien 64, 1914, p. 138 (Sitzb.).

justa Spaeth — Himalaya
Spaeth, Deutsche ent. Zeitschrift, 1914, p. 554.

lenis Spaeth — China
Spaeth, Bestim.-Tab. hefte 95, 1926, p. 59.

lineola Creutz — China, Mongolia, Europe, Japan
Creutz, Ent. Vers., 1799, p 119, pl. 2, fig. 23. Suffrian, Stettiner Ent. Zeit. 5, 1844, p. 210. Boheman, Monog. Cassididarum 2, 1854, p. 450. Weise, Ins. Deutchl. 6, 1881, p. 1077, 1093. Reitter, Fauna Germanica 4, 1912, p. 216. Spaeth, Verhandl. zool.-bot. Ges. Wien 64, 1914, p. 138 (Sitzb.).
Syn.—*bicostata* Fisch., Cat. Col. Sib. or. Karel, 1842, p. 24♀.
signata Herbst, Natursyst. Käfer 8, 1799, p. 232, pl. 131, fig. 1.
Ab. *russica* Herbst — Mongolia, Europe, Siberia
Herbst, Natursyst. Käfer 8, 1799, p. 232, pl. 131, fig. 1♂.
Var. *sibirica* Gebler — Mongolia
Gebler, Bull. Mosc. 6, 1833, p. 306♀. Kraatz, Berl. Ent. Zeitschrift 18, 1874, p. 97. Spaeth, Verhandl. zool.-bot. Ges. Wien, 1914, p. 138.
Ab. *nigrostrigata* Fairmaire — Mongolia, Peiping
Fairmaire, Revue d'Ent. 7, 1888, p. 157. Spaeth, Verhandl. zool.-bot. Ges. Wien., 1914, p. 138.

mongolica Boheman — Mongolia, Kiautschau (Shantung)
Boheman, Monogr. Cassididarum 2, 1854, p. 449. Spaeth, Verhandl. zool.-bot. Ges. Wien 64, 1914, p. 139 (Sitzb.).
Syn.—*russata* Fairm., Revue d'Ent. 6, 1887, p. 335.

nigriventris Boheman — Tibet, Himalaya
Boheman, Monogr. Cassididarum 2, 1854, p. 410.

nebulosa Linnaeus† — Kiangsu,* Europe, N. Asia, Japan
Linnaeus, Syst. Nat., ed. 10, 1758, p. 363. Reitter, Fauna Germanica 4, 1912, p. 215, pl. 150, fig. 20.

nucula Spaeth — Yunnan
Spaeth, Ent. Mitteilung 3, 1914, p. 228.

obtusata Boheman — South China, Formosa, India
Boheman, Monogr. Cassididarum 2, 1854, p. 405. Spaeth, Suppl. Ent. 3, 1914, p. 19.

pallidicollis Boheman — Peiping. Mongolia, Korea
Boheman, Cat. Col. Ins. Brit. Mus. 9, 1856, p. 138: Monogr. Cassididarum 4, 1862, p. 340. Fairmaire, Revue d'Ent. 7, 1888, p. 158.

Syn.—*diabolica* Kraatz, Deutsche Ent. Zeit. 23, 1879, p. 142.

piperata Hope — East China, Japan, Formosa
Hope, Proc. Ent. Soc. Lond., 1842, p. 62; Trans. Ent. Soc. Lond. 4, 1845, p. 12. Boheman, Cat. Col. Ins. Brit. Mus. 9, 1856, p. 171; Monogr. Cassid. 4, 1862, p. 322. Weise, Arch. für Naturg. 66, 1900, p. 295. Spaeth, Suppl. Ent. 3, 1914, p. 19.

Syn.—*biguttulata* Kraatz, Deut. ent. Zeit. 23, 1879, p. 275.
labilis Boheman, Monogr. Cassididarum 2, 1854, p. 62.
sparsa Gorh., Proc. Zool. Soc. Lond., 1885, p. 284.

prasina Ill. — China, Palearctic
Ill., Käfer Preuss. 1, 1798, p. 481.

probata Spaeth — Yunnan
Spaeth, Ent. Mitteilung 3, 1914, p. 229.

spaethi Weise — Mongolia, Amur
Weise, Verhandl. zool.-bot. Ges. Wien, 1914, p. 138.

Syn.—*kraatzi* Weise, Arch. für Naturg. 65, 1899, p. 295.
stigmatica Kraatz, Deut. ent. Zeitschrift 23, 1879, p. 267.

stigmatica Suffr. — Tianshan
Suffr., Stettiner Ent. Zeits. 5, 1844, p. 206.

turcmenica Weise — Sungaria
See Spaeth, Verhandl. zool.-bot. Ges. Wien, 1914, p. 142.

Syn.—*hauseri* Weise, Deut. ent. Zeitschrift, 1894, p. 72.

undecimnotata Gebler — Tianshan, Sungaria
Gebler, Bull. Mosc. 6, 1833, p. 306.

Syn.—*undecimguttata* Reitter, Wien. Ent. Zeits., 1890, p. 265.

velaris Weise† — Kukunor,* Japan, E. Siberia
Weise, Deutsche ent. Zeitschrift, 1896, p. 28.

virguncula Weise — Shansi, Mongolia
Weise, Horae Soc. Ent. Ross. 23, 1, 1889, p. 645.

Chirida Chapuis, Gen. Col. 11, 1875, p. 405.

bowringi Boheman — S. China, Tongking
Boheman, Monogr. Cassididarum 3, 1855, p. 123 (*Coptocycla*).

promiscua Boheman — Kiaochow(?), India(?), Ceylon
Boheman, Monogr. Cassididarum 3, 1855, p. 131(*Coptocycla*).

Ab. *sexnotata* Herbst, Natursyst. Käfer 8, 1799, p. 271.

Thlaspida Weise, Arch. für Naturg. 65, 1899, p. 272.

japonica Spaeth — Chingkiang,* Japan, E. China
Spaeth, Suppl. Ent. 3, 1914, p. 17.

Var. *biramosa* Boheman, Monogr. Cassid. 4, 1862, p. 464.

Hebdomecosta Spaeth, Wien. Ent. Zeits. 34, 1915, p. 362.

reitteri Spaeth — Kiaochow
Spaeth, Wiener Ent. Zeits. 34, 1915, p. 363.

Coptocycla Boheman, Monogr. Cassididarum 3, 1855, p. 90.

lepida Spaeth — Chungching (Szechwan)
Spaeth, Verhandl. zool.-bot. Ges. Wien 64, 1914, p. 145.

Metriona Weise, Deutsche ent. Zeitschrift, 1896, p. 13.

expressa Spaeth — Yunnan
Spaeth, Ent. Mitteilung 3, 1914, p. 230.

circumdata Herbst — Kwangtung, Amoy,* E. India, Indo-China, Philippines
Herbst, Natursyst. Käfer 8, 1799, p. 268, pl. 132, fig. 11 (*Cassida*). Spaeth, Ann. Mus. Nat. Hung. 1, 1903, p. 128.

plausibilis Boheman — China
Boheman, Monogr. Cassididarum 4, 1862, p. 395(*Coptocycla*).

purpuricollis Spaeth — Yunnan
Spaeth, Ent. Mitteilung 3, 1914, p. 229.

thais Boheman — North China, Japan
Boheman, Monogr. Cassididarum 4, 1862, p. 463(*Coptocycla*). Baly, Trans. Ent. Soc. Lond., 1874, p. 214 (*Coptocycla*). Gorh., Proc. Zool. Soc. Lond., 1885, p. 284(*Coptocycla*).

versicolor Boheman — China
Boheman, Monogr. Cassididarum 3, 1855, p. 414(*Coptocycla*).

Glyphocassis Spaeth,[4] Deut. Ent. Zeitschrift, 1914, p. 547.

trilineata Hope† — Kiangsu,* Himalaya, Sikkim, Tongking
Hope in Gray, Zool. Misc., 1831, p. 30(*Cassida*). Weise, Deut. Ent. Zeitschrift, 1905, p. 124, note (*Odontionycha*).

[4] *Glyphocassis* is not included in the key. The following is a translation from German on some of its general characteristics as given by Spaeth. Antennae 11 segmented with the third segments twice as long as the second and longer than any one else except the apical segment and except segments 2—6, the rest of the segments are dilated and hairy. Prosternum broad and flat and pointed posteriorly with the anterior margined as in *Laccoptera* Boheman. Head entirely covered by the pronotum and not visible from above. Antennal grooves located near the head. Claws provided with basal tooth. Elytra punctato-striate.

(*To be continued.*)

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ON THE OCCURRENCE OF TWO LAMINARIACEOUS PLANTS ON CHINA COAST WITH A NOTE ON THEIR IODINE CONTENT[1]

By C. K. Tseng
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The absence of large seaweeds, the Laminariaceous and Fucaceous algae, on the Chinese coast has been a well known fact to phycologists who have touched more or less on the Chinese marine flora. This was first pointed out by Gepp (1904) who quoted Boyden. Grubb (1932) while discussing the problem of the distribution of Chinese marine algae agreed with Boyden in that the absence of *Fucus* or any of the larger Laminariaceae is due to the lack of cold currents. "That this is so has been made clear from the fact that north of Gensan on the east coast of Korea and along the coast of Asiatic Russia (Primorskaya, Kamchatka Prov.) there are found great beds of kelps. These are also recorded for the Kurile Islands . . . . These regions are all washed by the cold Kurile Current from the north."

The only Laminariaceous alga[2] so far reported from the Chinese coast is *Agarum Turneri* Post & Rupr. by Grubb (1932). The specimen on which Grubb based this record was "thrown up on the shore after a storm" and is apparently a deep sea form. This alga has quite a wide distribution in the Pacific. Since it is found on both coasts of Korea and since the marine flora of the North Chinese coast is similar to that of West Korea (cf. Grubb, *loc. cit.*), its occurrence on the North China coast is naturally very possible.

The two Laminariaceous algae which we are now adding to the floristic list of China are: *Laminaria japonica* Areschoug and *Undaria pinnatifida* (Harvey) Suringar.

The *Laminaria* was collected from Yantaishan, Chefoo, in August, 1935. Only four young, and rather small, specimens were obtained by dredging from a depth of about two fathoms. These grow on small stones, attached by dichotomously branched fibrous

[1] The writers wish to express their appreciation to the China Foundation for the Promotion of Education and Culture for financial assistance which has made travel and collecting trips possible.

[2] *Chorda Filum* (L.) Stackh. is now placed in another family, the Chordaceae.

rhizoids. The frond has an erect, more or less cylindrical "stem", slightly flattened upwards, measuring 2.5 mm. in thickness and 5.5 cm. in length, and expands into a broadly lanceolate lamina, to 13.5 cm. broad and 55 cm. long. The measurements show clearly that the specimens obtained are very young. They are sterile, as is expected.

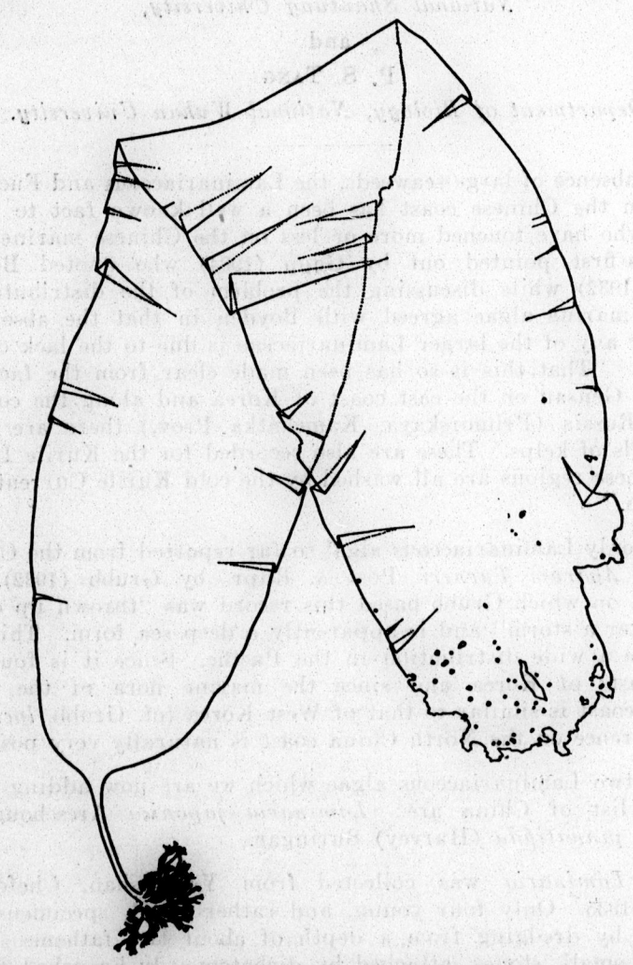

Fig. 1. *Laminaria japonica* Areschoug. Reduced about two-thirds.

The occurrence of this alga on the Chinese coast is interesting. *Laminaria japonica* is widely distributed along the Pacific coast of Japan from Muroran to Kinkwasan (cf. Okamura, 1925, p. 86) and is therefore a plant of the cold Kurile current, as are most of the

other members of this family. As the Chinese coast is not washed by the cold current, its occurrence here seems hard to explain. It is said that this *Laminaria* (the Hai-tai 海帶 or Makombu in Japanese) is now cultivated in Dairen.[3] If this is true, then its presence in Chefoo can be easily explained. These two places are so near to each other that spores of the *Laminaria* from Dairen would have no difficulty in reaching Chefoo. Water temperature and other environmental factors are most probably similar in both places, and they are washed by the same current (cf. Grubb, 1932).

That this *Laminaria* is not a native inhabitant in Chinese waters, but rather a recent immigrant, is clearly shown by its total absence in previous years. It is a large and conspicuous seaweed and could not, therefore, easily have escaped the attention of previous collectors. That the specimens collected were few and young, being of the first year's growth, indicates that it has been recently introduced. Its appearance on the Chinese coast does not imply that our coast is also washed by the cold Kurile Current.

The *Undaria* was collected from Chengshan (嵊山), a small island of the Chushan Islands (舟山羣島), Chekiang, in July, 1935. It was attached to rocks by dichotomously branched, fibrous rhizoids. The "stem" is short, compressed, and winged on both sides. It continues upward as the percurrent prominent midrib of the lamina. The latter is pinnately dissected. The sporangial sori are restricted to the sporophyll which is the dilated, undulately folded wing, formed on both sides of the stem. The stem measures only 5 or 6 cm. long and 1-2 mm. in diameter, the sporophyll 1-1.5 cm. broad from the stem to the margin, and the lamina 50 cm. long and 30 cm. broad. Our plant is referable to the forma *typica* Yendo.

This *Undaria* is abundant on rocks and in rock pools in the sublittoral region, extending 2—3 fathoms deep. It is edible and is known under the vernacular name *Hai-kai-ts'ai* or *Sea-mustard* (海芥菜). In the summer, during low spring tide period, boys, girls, men, and women of the near-by villages assemble on the exposed rocks, and collect this alga with pincer-like tools. This *Hai-kai-ts'ai* may be used in the fresh state or may be sun-dried and stored up for future use. It is sold at about $15 Mex. per picul.

[3] The writers were told that the cultivation of the Makombu in Dairen originated as follows: A certain Japanese merchant ship stopped at Dairen for some months for repair. In the latter part of the repairing process, the workmen discovered that the bottom of the ship had a luxuriant growth of young *Laminaria*. This suggested to them that the Makombu might grow in Dairen, so they tried it. The cultivation is said to be successful. However, we have not yet been able to confirm this report and furthermore we do not know definitely that *Laminaria* is cultivated there.

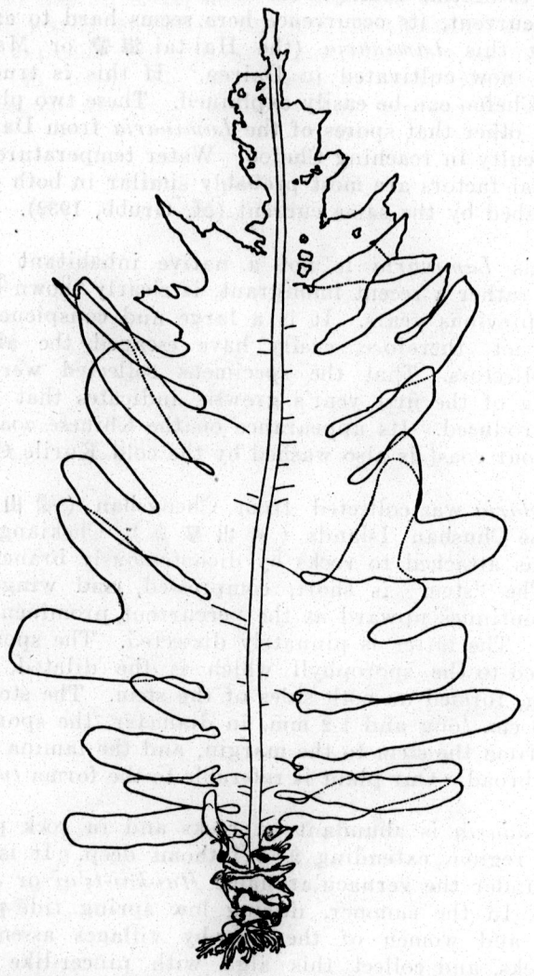

Fig. 2. *Undaria pinnatifida* (Harvey) Suringar. Reduced about two-two-thirds.

Unlike the *Laminaria* mentioned above, this alga is a native inhabitant of the Chinese coast. It is so common and grows so abundantly in this region that its being a native plant seems beyond question. It has been known under the above mentioned vernacular name for ages, probably since that island was inhabitated. It is pertinent, therefore, to discuss the distribution of *Undaria*.

According to Okamura (1915) *Undaria* is a plant of the Tsushima or Korean Current. "It is found in the warmer districts from Kyushu to almost northern extremity of the western coast of Hokkaido, where is a warm current known as 'Tsushima current' in the Japan Sea." Okamura wrote, "In the districts washed by the 'Kurile' current (cold) as well as the 'Kuroshiwo' (warm), it does not grow." According to the same author, the forma *typica* Yendo to which our plant belongs is a southern inhabitant while the forma *distans* Miyabe & Okamura is a northern one. It is therefore a species endemic to the coast bounding the Japan Sea and washed by the Korean Current. Its occurrence at Chengshan (East Sea) will therefore show the close relationship of these two regions. This fact has been further established by the discovery of a few other species formerly thought to be endemic to the Japan Sea[4].

Members of the Laminariaceae are greatly appreciated in the Orient for food. Another important use of these plants is found in the manufacture of iodine and potash because of the high contents of these substances in these plants. In fact, seaweeds are the second most important source of iodine. The iodine content of seaweeds have, therefore, attracted the attention of chemists and biologists. Recently, biochemists in China have been paying some attention to this problem, and a few papers on the iodine content of Chinese seaweeds have appeared. With the high iodine content of the Laminariaceous plants in mind, we analysed one of the two species here reported, namely, *Undaria pinnatifida*. Similar investigation on the *Laminaria* is not possible owing to the meager material available.

The iodine content of these two species of algae have been reported by McClenden (1933). Expressed in parts of iodine per million parts dry weight, the content of *Laminaria japonica* varies from 800 to 2000 while that of *Undaria pinnatifida* is only from 20 to 44. The iodine content for *Laminaria* has been investigated by several scientists and the figures obtained by them, including those of McClenden's, are in close agreement. With regards to the iodine content of *Undaria*, McClenden's data are the only set extant. In order to check over McClenden's data, we have analysed dry sample of *Undaria* by the Fellenberg method (cf. Tang and Whang, 1935). The value we obtained is 44 p.p.m. and this is in close accord with McClenden's figure. Thus it shows that *Undaria pinnatifida* unlike most members of the *Laminariaceae* has a very low iodine content and is unsuitable for the manufacture of iodine.

[4] The report on the marine algae from Chushan Islands will be prepared by the first author before long.

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我國海岸初發現之兩種海帶科植物及其碘之成分

曾呈奎　湯佩松著

（摘　要）

我國海岸之所以不能生產巨大海藻如海帶類 (*Laminariaceae*) 及墨角藻類 (*Fucaceae*) 者，蓋以未受寒流之影響故也。葛拉白氏 (Grubb) 曾記載一種海帶科植物名 *Agarum Turneri* 者，採於北戴河。此植物在太平洋之分佈頗廣，爲海帶科植物少數例外之一。本文所載兩種在我國海岸初次發現之海帶科植物爲：海帶 (*Laminaria japonica* Areschoug) 及海芥菜 (*Undaria pinnatifida* (Harvey) Suringar).

海帶採於煙台之煙台山，原產日本太平洋沿岸，爲寒流之植物，殊不應生於未受寒流經過之我國海岸。但據云大連日人之種海帶已告成功。若是，則其孢子儘可由大連飄流而生長於距離不遠之煙台。況且所採標本均甚幼小而爲今年生者。（海帶爲多年生）足見其爲最近方由外移入煙台，而非我國之原產植物。

海芥菜盛產於浙江舟山羣島之嵊山。由各方面觀察，可証明其爲我國固有，而非如上述海帶之由外移入者。海芥菜日名和布，爲日本海高麗海流經過海岸之特產物，今發現於我國之東海，則此兩地之海流必有特殊之關係在焉。

海帶之碘的成分已經甚多科學家之研究分析。以百萬分之乾量而算，則其碘成分爲 800—2000 。至於海芥菜，則僅有麥克蘭頓氏 (McClenden) 之數目而已。則爲 20－44。作者等分析此海藻之結果亦爲 44，與麥氏所得之結果相同。是則海芥菜所含之碘甚少，而不適爲製碘之原料者明矣。

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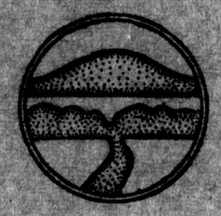
A NEW GENUS AND SPECIES OF APHIDIDAE FROM CHINA (HOMOPTERA)

By Ryoichi Takahashi
Department of Agriculture, Government Research Institute, Taihoku, Formosa.



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Volume 15 1936 Number 2

A NEW GENUS AND SPECIES OF APHIDIDAE FROM CHINA (HOMOPTERA)

By Ryoichi Takahashi

Department of Agriculture, Government Research Institute, Taihoku, Formosa.

Recently I have had an opportunity to examine many specimens of aphids taken by Mr. Y. T. Mao (毛應斗) at Peiping, China. A very interesting species representing a new genus was included in the collection and is described below. Other species in the collection will be recorded later by Mr. C. C. Tao (陶家駒). I express here my hearty thanks to Mr. Mao for his kindness in submitting the material to me, and also to Mr. Tao for his help in preparing slide specimens.

Sinochaitophorus new genus

Wingless viviparous female: Body oval, with many long bristles, and some minute lateral tubercles on the thorax and abdomen. Head entirely fused with the prothorax. Frontal tubercles not developed. Eyes normal, with distinct ocular tubercles. Antennae much shorter than the body, 6-segmented, with long setae and minute spinules; the third segment without sensoria; distal part of the last segment shorter than the basal part. Cornicles short, broadened toward the base, narrowed about the middle. Cauda constricted at the base, the knobbed part rounded. Anal plate deeply bilobed. Legs with defined trochanters, tarsi without capitate setae, empodial setae not capitate.

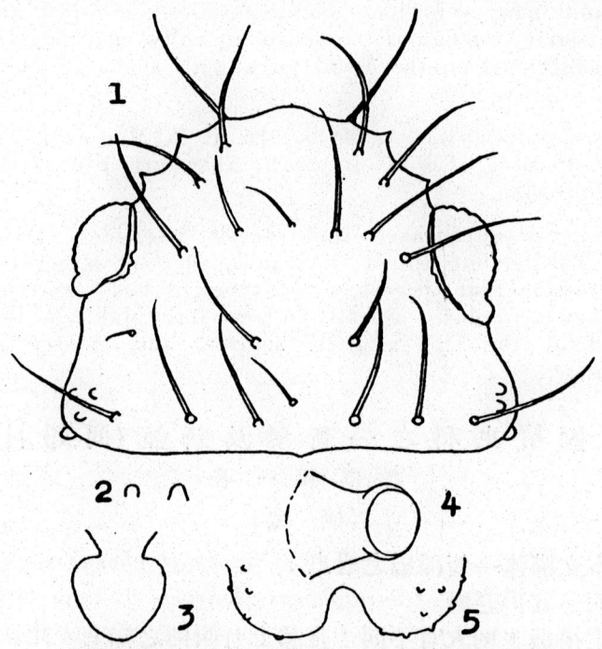
Genotype: *Sinochaitophorus maoi* new species.

Closely allied to *Hoplochaitophorus* Granovsky, but differs in having the head and prothorax fused and in wanting spines on the body. Distinguished from *Chaitophorus* Koch by having the head and prothorax fused, the anal plate deeply bilobed, and the distal part of the last antennal segment shorter than the base. Resembles the aphid described under the name of *Patchia spiraeae* Takah. from Japan, but differs in the head and prothorax being fused, the eyes well developed, the cauda rounded on the distal part, with many long setae, the dorsum not reticulate and not protruding at the bases of setae, the body bristles thinner, the cornicles not so much expanded towards the base, etc.

Sinochaitophorus maoi new species

WINGLESS VIVIPAROUS FEMALE: In specimens treated with caustic potash, body dark brown, paler on the median small area of the basal part of abdomen, antennae pale, slightly dusky on the tip of the fourth segment, dusky on the distal part of the fifth and on the sixth, cornicles dark brown, cauda and anal plate pale, legs pale brown, a little darker on the tarsi, body bristles pale brownish. Body oval, broadest on the second abdominal segment, about 1.9 or more times as long as wide in mounted specimens, sclerotized on the dorsum except on the median small area of the basal part of abdomen and a very narrow area along each eye, with many indistinct dorsal granules on the posterior abdominal segments, and many scattered very long dorsal bristles; the bristles a little curved, a little variable in length, pointed apically, but a little fimbriated at the tip in some individuals, each arising from a very small tubercle. Head not granular, slightly protruding anteriorly on the front, somewhat convex at the middle of the front, entirely fused with the prothorax, with 5 or 6 long bristles between the eyes, two pairs of similar bristles between the antennae, and a pair of them on the front; these bristles nearly as long as the basal two antennal segments taken together. Frontal tubercles not developed. Eyes normal, with distinct ocular tubercles. Antennae much shorter than the body, but much longer than the width of the pronotum, slender, 6-segmented, with some long simple bristles, which are curved, variable in length, much shorter than those on the body, but the longer ones are a little longer than the second segment; the second segment a little longer than wide, as long as, but narrower than, the first; the third segment much narrower than the tibiae, straight, wanting sensoria, with about 11 setae and many minute spinules in transverse rows; the fourth segment with about 4 setae; the fifth segment a little narrowed towards the base, wider than the fourth at the middle, about 3.5 times as long as wide, with a moderate circular sensorium and about 3 setae; the sixth with 2 setae on the basal part; the relative length of segments about as follows: III, 45; IV, 24; V, 21; VI, 20+9. Rostrum stout, reaching the hind coxae. Pronotum separated from the mesonotum, with about 10-12 dorsal bristles and 1-3 minute lateral tubercles; mesonotum fused with the metanotum. Basal 6 abdominal segments almost fused, with traces of segmentation, but the seventh and eighth well defined. The meso- and metathoracic and each of the basal 7 abdominal segments with a large nearly circular more sclerotized area, a longer bristle, and 1 or 2 minute tubercles on each side; the sclerotized areas much larger on the thorax, well defined; the lateral tubercles rounded apically, usually as long as or shorter than wide, somewhat smaller than the tubercles at the bases of dorsal long bristles. The eighth abdominal segment much narrower than the seventh, with 6 long bristles on the hind margin, but with 1 or none on the dorsum.

Abdominal spiracles not protruding, 6 on each side. Cornicles short, as long as wide, expanded toward the base, not defined from the abdomen, constricted near the distal part, much shorter than the lateral dorsal bristles, striate, not reticulate. Cauda prominently constricted basally, the knobbed part globular, or narrowed towards the apex, rounded at the apex, as long as wide, with some long setae. Anal plate deeply bilobed, the lobes much wider than long, rounded on the lateral and hind margins, wider than the cauda, with about 9-12 long setae, the mesal margins diverging;



Sinochaitophorus maoi n. sp. (wingless viviparous female).
Fig. 1. Head and pronotum. Fig. 2. Lateral tubercles. Fig. 3. Cauda.
Fig. 4. Cornicle. Fig. 5. Anal plate.

space between the lobes narrower than the cauda. Trochanters well defined; tibiae with many long fine simple setae and a few scattered minute spinules; tarsi with some rows of minute spinules, hind tarsi nearly as long as the fourth antennal segment, the basal segment with about 8 setae, of which 2 apical ones are much longer and a shorter median one is stiff; empodial setae a little shorter than the claws, much curved, flattened, not capitate.

Body about 1.25 mm. long, about 0.623 mm. wide; head including eyes, about 0.332 mm. wide; head and pronotum together, about 0.3 mm. long; antenna, about 0.63 mm. long, third antennal segment

about 0.022 mm. wide; dorsal bristle on head, about 0.097 mm., dorsal bristle on abdomen, about 0.1 mm., lateral dorsal bristle on abdomen, about 0.11 mm.; pronotum about 0.374 mm. wide; meso- and metanotum together about 0.28 mm. long; cornicle about 0.042 mm. in diameter at apex; cauda about 0.051 mm. wide at knobbed part; anal plate about 0.047 mm. long and about 0.138 mm. wide; hind tibia about 0.51 mm. long, about 0.028 mm. wide at middle; longer seta on tibia, about 0.072 mm.

GROWN NYMPH: Body with many dark sclerotized areas on the dorsum and many very long simple bristles. The last abdominal segment nearly triangular, rounded apically, as long as wide, slightly constricted on the distal part, with about 10 long ventral setae.

A few specimens were taken by Mr. Y. T. Mao on an unknown plant, at Peiping, China, in 1935. They are preserved in the writer's collection.

In general appearance this species resembles *Chaitophorus chinensis* Takah., but differs remarkably in body structures. It is very interesting that there are two types of body bristles in this species; they are pointed apically in some individuals, while slightly fimbriated at the tip, a little shorter, and stouter in other individuals.

中國蚜虫科之一新屬及新種(同翅目)

高橋眞一著

(摘要)

本文描述一新種屬之蚜虫 (*Sinochaitophorus maoi*) 及加圖以釋明。其形態與 *Chaitophorus chinensis* Takah. 相似，惟其體軀之搆造，則大有不同，且體上有兩種之綿毛。此新種係由毛應斗君採自北平之一植物上。此新屬與 *Hoplochaitophorus* Granovsky 甚相近。

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By F A. McClure

Curator of Economic Botany, Lingnan Natural History Survey and Museum.

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DR. ALBERT SPEAR HITCHCOCK—AN APPRECIATION

By F A. McClure

Curator of Economic Botany, Lingnan Natural History Survey and Museum.

Botanists, the world over, mourn the loss of a distinguished colleague; Dr. Albert Spear Hitchcock,[1] the leading authority on the grasses of the world, died on Dec. 16, 1935. With Mrs. Hitchcock, he was returning from an extended sojourn in Europe during which he attended the Sixth International Botanical Congress at Amsterdam, and spent several months visiting important herbaria for the purpose of locating and studying grass types. This latter enterprise was carried out in connection with the preparation of what was to have been his most comprehensive work; one dealing with the grass genera of the world.

Born September 4, 1865, at Owasso, Michigan, Albert Spear Hitchcock graduated from Iowa State Agricultural College in 1884, the youngest of his class. During his post graduate years of study he placed his major emphasis on Chemistry, with Botany, his chief extra-curricular hobby, as well as his favorite among several minor branches of study. He taught Chemistry for a time but soon succumbed to his love of botany, which was too dominant to be relegated to second place. His botanical career begins, properly speaking, with his acceptance, in 1889, of a position at the Missouri Botanical Garden, St. Louis, as instructor in the Engelmann School of Botany, Washington University, and curator of the herbarium and librarian at the Botanical Garden. He began immediately a program of botanical exploration and taxonomic writing that was unique in many respects, a few of which may be shown by illustration. He covered the United States and her possessions, and adjoining regions first, then systematically acquainted himself with the main vegetation areas of the world, collecting, during the course of his life, on every continent but Australia. He made a trip to the Orient in 1921, collecting in Japan, China and Indo-China. On the basis of his collections and those of the herbarium of Lingnan University (then Canton Christian College) he prepared a very useful paper, entitled The Grasses of Canton and vicinity. Dr. Hitchcock helped the cause of Botany in China tremendously through his willingness to lend assistance to co-workers on the Gramineae. Over a long period of years he made many identifications of grasses for botanical institutions in China. And for three years (1930-1933) he shared the working facilities of his office, the grass collection of the National Herbarium, and his own private agrostological library, with a young Chinese botanist Mr. (later Doctor) Y. L. Keng, to whom he was counsellor, tutor and friend. During this period Dr. Keng prepared his very scholarly dissertation on the Grasses of

[1] Principal Botanist and Agrostologist of the U S. Dept. of Agriculture, Custodian of Grasses of the National Herbarium, Washington, D. C.

China, in which he acknowledges his indebtedness to Dr. Hitchcock. After Dr. Keng's departure, the same generous arrangement was made for the writer, whose work on the bamboos, a special tribe of the grass family, has been facilitated in a thousand ways by Dr. Hitchcock's unstinted kindness.

He always had definite objectives in mind. Attacking these with dispatch and efficiency, he accomplished much in a short compass of time but without the appearance of haste. His field work was not perfunctory, however, and he set a rare example in the intimacy with which he penetrated the private life of the plants he studied. At the same time, his love of the grasses was so spontaneous and so strong that he never wasted an opportunity to extend his knowledge of them, even though it were but a brief moment, insufficient for a thorough investigation. A glimpse of this is seen in the following quotation from Mrs. Chase's biographical sketch: "Sailing from Mombasa, he writes, 'Having about two hours to wait before the departure of the steamer, I made a good collection of grasses from a hill near the dock.' " He travelled light and lived simply; treated everyone, of whatever station, with courtesy and consideration. His remarks on Travelling in Tropical America (Descr. Syst. Bot. p. 174 1925) reflect his wisdom and his logical, direct method of approach to any problem.

Dr. Hitchcock spaced his expeditions so as to give himself time to work up the main results of each before making another. His botanical writings, which number over 250 titles, based as they are, upon synthetic research in the herbarium and library, combined with thorough, related investigations carried out in the field, achieve a perfection and an approximation to finality, rarely attained in the realm of taxonomy. The continuous flow of scientific papers that proceeded, without abatement, from his pen over a period of more than forty years, and that culminated in his magnificent work on the Grasses of the United States (see review in *Ling. Sci. Jour.* 14(3):331, 1935), reflects the fluency of his thought processes and his fine articulateness, as well as his keen satisfaction in the completion of useful work.

Dr. Hitchcock occupied, for many years, a prominent place in the botanical world, having been a familiar figure at all the more important gatherings of botanists, and having served at all times on one or more committees, especially those dealing with matters relating to the Rules of Botanical Nomenclature. He distinguished himself by his perennial insistence that taxonomy is foundational to the other branches of botany, by his early and sustained advocacy of, as well as his loyal adhesion to, the Type Method, not only in the elucidation of *valid* genera and species but also for names that have been reduced to *synonomy*.

A fuller account of his life, prepared by Mrs. Agnes Chase who has been closely associated with Dr. Hitchcock in agrostological work for many years, is being published in *Science* (U.S.A.).

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Von R. KLEINE
Stettin, Germany.

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ZWEI NEUE PLATEROS AUS CHINA NEBST SYNONYMISCHEN BEMERKUNGEN (COLEOPTERA: LYCIDAE)

Von R. Kleine
Stettin, Germany.

Plateros koreanus n. sp.

Schwarzbraun, Hüften und Schenkel an der Basis gelb, Prothorax, Schildchen und Elytren graugelb, ersterer mehr oder weniger verdunkelt (Abbildung 1). Stirn beim ♂ so breit, beim ♀ breiter als ein Augenhalbmesser, kreisförmig eingedrückt, Fühler-beulen schwach entwickelt. Fühler Abbildung 2. Prothorax Abbildung 1, Ränder schach aufgebogen, Randpunktierung durch die Behaarung etwas undeutlich. Schildchen verkehrt-herzförmig, Hinterrand nur ganz schwach eingebuchtet. Elytren dicht behaart, aber die Rippen und Gitterung noch erkennen lassend. Penis Abbildung 3.

Länge 6-8 mm. Breite (hum.) 1-1.5 mm. circa.

Korea: Seishin.

1 ♂ ♀. Typen in meiner Sammlung.

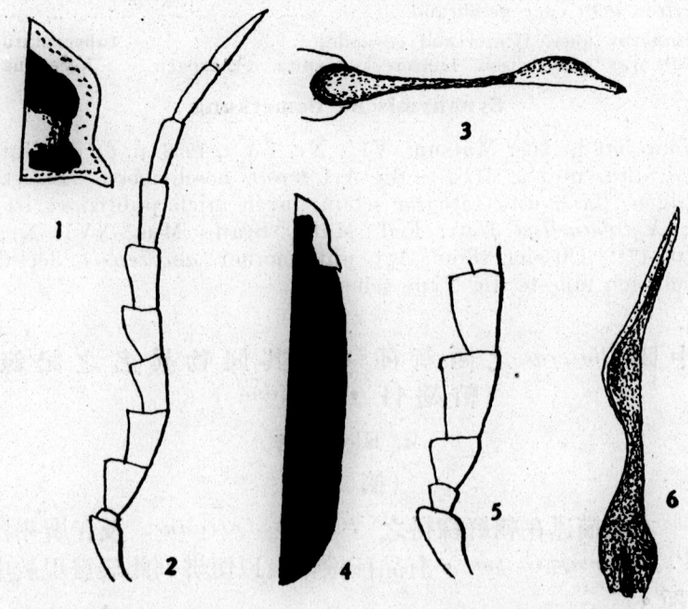

Abb. 1-3. *Plateros koreanus* n. sp. Abb. 4-6. *Plateros flavomarginatus* n. sp.

Plateros flavomarginatus n. sp.

Schwarzgrau, Hüften, Schenkelbasis und der Prothorax am Vorder-und Seitenrand schmutziggelb (Abbildung 4). Stirn so breit wie ein Augenhalbmesser, flach, kreisförmig eingedrückt. 1.-5. Fühlerglied Abbildung 5, die folgenden an Breite, nicht an Länge abnehmend. Prothorax in der Gestalt von *koreanus*, es sind aber nur die Seitenränder breit und flach aufgebogen, Randpunktierung schwach. Elytren und Schildchen wie bei *koreanus*. Penis Abbildung 6.

Länge 6 mm. Breite (hum.) 1 mm. circa.

China: Canton.

1 ♂ ♀. Typen in meiner Sammlung.

Bestimmungsschlüssel der chinesischen Plateros

1. Elytren rot 2
   Elytren andersfarbig 3
2. Purpurrot, 9 mm. .....**tsinensis** Pic
   Die rote Farbe wird durch schmutzigrote Behaarung hervorgerufen..... ..... **sordidus** Fairmaire
3. Elytren scharz .....**flavomarginatus** Kln.
   Elytren andersfarbig 4
4. Elytren an der Basis kurz schwarzgestreift .....**curtelineatus** Pic
   Elytren gelb oder gelbbraun 5
5. Prothorax quer, Hinterrand gerundet .....**tuberculatus** Pic
   Prothorax quadratisch, Hinterecken spitz vorgezogen .....**koreanus** Kln.

Synonymische Bemerkung

Kono hat in Ins. Matsum. VII, Nr. 1 & 2, 1932, p. 61 die Gattung *Chuzenjianus* und p. 61, f. 2 die Art *tenuis* beschrieben. Es ist ihm entgangen, dass, die Gattung schon durch mich publiziert ist und zwar: *Xylobanellus* Jour. Fed. Malay States Mus. XVI, Nr. 1-2, 1930, p. 171. Ob sich seine Art mit meiner *amurensis* deckt, ist fraglich, ich müsste die Type sehen.

中國 *Plateros* 之兩新種，及其同物異名之記錄
(鞘翅目，Lycidae)

R. Kleine 著

(摘 要)

本文描述在朝鮮採得之 *Plateros koreanus*, 及在廣州採得之 *P. flavomarginatus*。有品種檢索表以便辨別此屬發現於中國之六種。

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NOTES ON A SMALL COLLECTION OF ORTHOPTERA FROM HUPEH & KIANGSI WITH A KEY TO MONGOLOTETTIX REHN

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NOTES ON A SMALL COLLECTION OF ORTHOPTERA FROM HUPEH & KIANGSI WITH A KEY TO MONGOLOTETTIX REHN[1]

By E. R. Tinkham
Assistant Curator of Insects, Lingnan Natural History Survey and Museum.

The present paper is based upon material collected mainly by Mr. Y. W. Djou of the Lingnan Natural History Survey and Museum, in the summer of 1933. This collection was made while he was on a vacation trip to his home in Hupeh Province. A few additional specimens from Kiangsi (Kuling), and adjacent provinces have been recently received from Mr. K. S. Francis Chang of St. John's University and Father O. Piel of the Heude Museum, L'Aurora University, Shanghai, and these records augmented by a series of migratory locusts sent in by Mr. S. W. Djou, in July, 1935, are incorporated.

Hupeh, with Honan to the north and Hunan to the south, constitutes a large section of central China about which little biological information is available. As practically no reference is to be found in the literature relating to the Orthoptera of that region most of the specimens reported here will probably prove to be new records for Hupeh. Several of the records are new for China. On the other hand, Kuling, a mountain summer resort in northern Kiangsi, is much better known and the records from that area although perhaps not new are, nevertheless, interesting.

To simplify recording and obviate constant repetition, only the localities where the specimens were collected by Mr. Djou in Hupeh and Kiangsi are given. By referring to the complete collection data given below, full information concerning each specimen can be obtained. For those specimens received in exchange from Mr. K. S. Francis Chang and Father O. Piel full collection data are given.

All of the Hupeh specimens are from Hwang-mei District which lies about 90 li north of Kiukiang, Kiangsi, and is near the eastern border of Hupeh.

HUPEH PROVINCE

6 miles south of Hwang-mei, Hwang-mei Dist., Aug. 1-6, 1933 (Y. W. Djou).

20 li[2] from city wall of Hwang-mei, Hwang-mei Dist., Aug. 3-6, 1933 (Y. W. Djou).

[1] Contribution from the Lingnan Natural History Survey and Museum, Lingnan University, Canton, China.

[2] 3.3 Chinese li=1 English mile.

Si Tsu Tsz (Mt.), about 30 li NW. of Hwang-mei, Hwang-mei Dist., Aug. 8-12, 1933 (Y. W. Djou).

Top of Si Tsu Tsz (Mt.), about 30 li NW. of Hwang-mei, Hwang-mei Dist., Aug. 8-12, 1933 (Y. W. Djou).

Tai Ho Po, 20 li NW. of Hwang-mei on road to Si Tsu Tsz (Mt.), Hwang-mei District, Aug., 1933 (Y. W. Djou).

Wu Tsu Tsz (Mt.), 30 li NE. of Hwang-mei, Hwang-mei Dist., Aug. 25-29, 1933 (Y. W. Djou).

KIANGSI PROVINCE

Kuling (Mt.), Kiu Kiang District, July 23-26, 1933 (Y. W. Djou).

BLATTIDAE

POLYPHAGINAE

1. **Polyphaga?** sp.

45 specimens in different stadia from Hwang-mei Dist., June 26, 1935 (S. W. Djou). This species is almost spherical in shape and with a sparse coverage of appressed setae. Without the males it is impossible to determine the species and whether they represent *Polyphaga* Brullé or *Eupolyphaga* Chopard.

MANTIDAE

2. **Paratenodera acridifolia sinensis** (Saussure)

Tai Ho Po, 1♀; Wu Tsu Tsz, 1♂. This large mantis is fairly common in S. China.

3. **Hierodula patellifera** (Serville)

Wu Tsu Tsz, 2♀. *H. bipapilla* (Serv.) is a synonym. Hebard (1920) considers *H. saussurei* Kirby as a variation of this plastic species. This species occurs in Japan, Formosa, China south to Malaya and Java, and in the Philippines.

PHASMIDAE

PRISOMERINAE

4. **Phraortes bicolor** Brunner

Tai Ho Po, 3♀; Wu Tsu Tsz, 1♂. The subgenital operculum in the female of this species is distinguished by having the tip pointed in the middle and reaching the tip of the supra-anal plate.

5. **Phraortes kumamotoensis** Shiraki

1935. *Phraortes kumamotoensis* Shiraki, Mem. Fac. Sci. & Agri., Taihoku Imp. Univ., 14(3) :66.

20 li from city wall of Hwang-mei, 2♂; Tai Ho Po, 3♂; Kuling, 2♂, 1♀. The female of this species recently described from Kumamoto, Japan, is distinguished by having the subgenital operculum not reaching to the tip of the supra-anal plate. The males agree closely with the description of the type by having the cerci moderately bent near the apex and by having the subgenital plate carinate and triangularly sinuate at the apex.

6. **Phraortes formosanus?** Shiraki

1935. *Phraortes formosanus* Shiraki, Mem. Fac. Sci. & Agri., Taihoku Imp. Univ. 14(3) :62.

Kuling, 1♂, 1♀; These specimens are close to *P. formosanus* Shiraki. The female agrees closely with the description given especially in having the subgenital operculum reaching to the tip of the supra-anal plate and broadly rounded at the apex, but differs in having the supra-anal plate slightly exceeding lateral apices of the ninth abdominal tergite. The male differs in having the subgenital plate squarely excised and not triangularly sinuate as in the type, and the tip of the plate is also broader.

7. **Phraortes** sp.

Tai Ho Po, 1♀. This female is dark chocolate brown in color and quite similar to females of *P. bicolor* which are all green in life. It differs in having the spines on the head longer and more acutely pointed, and the femora somewhat longer. This may prove to be only a color variety of *P. bicolor*.

ACRIDIDAE

ACRYDIINAE

8. **Paratettix indicus** Bolivar

20 li from city wall of Hwang-mei, 1♂; river by city wall of Hwang-mei, 2♂, Aug. 3, 1933 (Y. W. Djou). This species occurs from central China to India.

9. **Acrydium bipunctatum** Linnaeus

6 mi. S. of Hwang-mei, 1♂, 3♀; river by city wall of Hwang-mei, 1♂, Aug. 3, 1933. Si Tsu Tsz, 2♀; Top of Si Tsu Tsz, 1♀; 20 li from city wall, 1♂; Kuling, 2♂, 1♀. This common species has a wide distribution in Asia and Europe.

10. **Hedotettix arcuatus** Shiraki

6 mi. S. of Hwang-mei, 1♂. This species is known from central and southern China and Formosa.

11. **Hedotettix japonicus** (Shiraki)

6 mi. S. of Hwang-mei, 1♂, 4 nymphs; 20 li from city wall, 1♀; Kuling, 2 nymphs. This species is known from central China and from Japan.

EUMASTACINAE

12. China mantispoides (Walker)

Wu Tsu Tsz, 1♂, 2♀; Kiangsu, Ihing, 2♂, Aug. 6-8, 1933 (O. Piel, Heude Museum). This interesting Eumastacid is found in central China and as far south as northern Kwangtung (not previously recorded) but at present its distribution is undefined.

ACRIDINAE

13. Acrida turrita (Linnaeus)

20 li from city wall of Hwang-mei, 4♂, 1♀; 6 mi. S. of Hwang-mei, 2♂; Si Tsu Tsz, 1♀; Top of Si Tsu Tsz, 3♂; Tai Ho Po, 1♀. This abundant grassland species has an extremely wide distribution in the Old World, and occurs from Japan to Africa.

14. Acrida sp. No. 1

Hwang-mei, 1♂, July. This species is smaller than *A. turrita*.

15. Acrida sp. No. 2

Wu Tsu Tsz, 3♀; Tai Ho Po, 2♀. Both sexes of this species are much larger than those of *A. turrita* but the taxonomics of the genus *Acrida* are in such a hopeless state that without a revision it is impossible to ascertain the species.

16. Phlaeoba infumata Brunner

20 li from city wall of Hwang-mei, 1♀; Kuling, 2♂. This species is abundant in south China.

17. Ceracris nigricornis laeta (Bolivar)

Kuling, 1♂, Aug. 31, 1934 (O. Piel); Kuling, 1♀, Sept. 3, 1934 (O. Piel). The male from Kuling is slightly more slender than males from Kwangtung. This, the more robust race of *C. nigricornis*, is common in Kwangtung, Tongking, and Formosa.

18. Ceracris kiangsu Tsai

1929. *Ceracris kiangsu* Tsai, Jour. Coll. Agri., Tokyo, 10:140-141, 1 text fig.

1931. *Ceracris kiangsu* Uvarov, Ling. Sci. Jour. 10(2 & 3):217.

HUPEH: 20 li from city wall of Hwang-mei, 1♂; Wu Tsu Tsz, 1♂.

CHEKIANG: Chusan, 1♂, Aug. 8, 1931 (O. Piel).

KIANGSU: Ihing, 1♀, July 29, 1933 (O. Piel).

Tsai (1929) described this species from specimens collected in a bamboo jungle at Liyang, Kiangsu Province, in August, 1927. The above records indicate the range of the species as known at present.

This is the handsomest species of the genus and quite distinctive looking with its exceptionally long antennae; one male from Hupeh has the length of the antenna equal to the total length of the body. Uvarov (1931) had no specimens for examination and his statement, ". . . appears to be closely allied to *C. fasciata*, but differs in the much longer elytra," based on the description, is incorrect. In size, length of the antennae and tegmina and in body build, *C. kiangsu* undoubtedly has closest affinities with *C. nigricornis laeta*, but the pointed fastigium and other characteristics indicate that it belongs to a separate group, though more closely related to *C. n. laeta* than to any other species. The species, *C. fasciata*, *C. hoffmanni*, and an undescribed one before me from Yunnan, represent another closely related group of the genus. The zoocenter of the genus *Ceracris* appears to be China.

19. Gonista bicolor de Haan

Si Tsu Tsz, 1♂; Wu Tsu Tsz, 5♂, 3♀. This common species is widely distributed in the Orient, being known from Formosa and from central China to Malaya.

20. Mongolotettix anomopterus (Caudell)

1921. *Chrysochraon anomopterus* Caudell, Proc. Ent. Soc. Wash. 23(2): 32, 1 fig.

1928. *Mongolotettix anomopterus* Rehn, Proc. Acad. Nat. Sci. Phila. 80:200, 2 pl.

1932. *Mongolotettix anomopterus* Bei-Bienko, Eos 8(1):83, 86-87.

Kuling, 2♂; Kuling, 1♀, Sept. 14, 1934 (O. Piel).

In 1928 Rehn erected the genus *Mongolotettix* (with *Chrysochraon japonicus* Bolivar as the genotype) to which genus Caudell's *C. anomopterus* belongs. The two species are very closely allied. Caudell's original diagnosis was that the two species were separable by the form of their mesosternal interspace. This seems to have been the chief character used up to the present. Another useful character appears to be the form of the fastigium. In *anomopterus* it is slightly more rounded than in *japonicus*, and the plane of the fastigium is on a level with the occiput thus giving the vertex, as seen in profile, an elevated appearance, while in *japonicus* the vertex is gently arched with the occiput, and sloping in front. The median carina of the vertex is more prominent and the inter-ocular space more strongly convex in *japonicus* than in *anomopterus*. Plate 12, figures 3-6, illustrates these differences. Both Rehn (1928) and Bey-Bienko (1932) use, as a key character, Caudell's original statement that there is no post-ocular or lateral stripe in *anomopterus*. Males of *anomopterus* do, however, possess this broad post-ocular band just as *japonicus* does and although it is fainter it is nevertheless quite evident. This character, therefore, is clearly of no value in the separation of the two species.

A female of *M. j. japonicus* collected along with 3 males at Gotemba, base of Fujiyama, July 13, 1933, by Mr. John Shackford, enables me to make comparisons between the females of the two species. Since the female of *anomopterus* has not been described I present below the description of the allotype.

Allotype.— ♀, Kuling, Kiangsi Province, central China, Sept. 14, 1934 (O. Piel). Measurements: Body length 36.5; pronotum 6.5; tegmina 7.0; hind femur 17.5; antenna 12.0 mm. The type is in the collection of the Lingnan Natural History Survey and Museum (see plate 12, fig 1). It differs from *M. j. japonicus* by its much larger size (cf. fig. 1 & 2) and in the following minute details: geniculum of the hind femur without a dorsal posterior tooth (*M. japonicus* has a small tooth as shown in fig. 8); lateral edges of the fastigium straighter and not so rounded as in *japonicus;* mesosternal interspace slightly more elongate with the lobes less convex than in *japonicus*, consequently the space not so constricted in the center as in that species.

Body color uniformly dark yellowish-brown (probably discolored) without any post-ocular stripe; the hind tibiae pale golden brown. Head as seen in profile with the dorsum gently curved and face receding strongly from the produced fastigium. Fastigium of the vertex with its level slightly above the eyes, from above broadly parabolic in outline with lateral margins almost straight; the lateral margins strongly and smoothly rounded; length slightly less than the inter-ocular width. Median carina of the vertex smooth and prominent in front, evanescing between the eyes but evident as a smooth line to the rear of the head. Frontal costa parallel, diverging in basal third, moderately sulcate throughout. Eyes suboval in outline. Antennae of 18 segments, ensiform and triquetrous in basal third, their length equalling the combined length of the head and pronotum.

Pronotum, as seen in profile, almost straight, very slightly subsellate. Disk moderately tectiform, cut a little behind the middle by the principal sulcus; surface weakly granulate. Median carina rounded and equally prominent throughout, notched by the principal sulcus; lateral carinae weakly evident on the prozona and almost obsolete on the metazona. Lateral lobes much broader than deep, the posterior lower angle squarely rounded.

Tegmina small, oval elliptical with minute subacute tip, extending to the basal portions of the third abdominal segment. Color testaceous with the central and prominent vein fuscous. Posterior femur extending to the base of the ovipositor; the geniculum lacking a dorsal posterior tooth in the middle of the posterior edge. Mesosternal interspace about twice as long as broad (in *japonicus* one and one half times the width), the space considerably constricted by the rounded lobes which are very slightly flattened

(in *japonicus* the lobes are smoothly rounded). Metasternal interspace much narrower, but lobes not contiguous. Valvae of the ovipositor long and narrow with blunt recurved teeth at their apices; their respective upper and lower keels rough but not toothed.

Caudell's single male specimen came from Mokanshan, Chekiang Province, and at present the species is known only from Mokanshan and Kuling.

I present below a key for the separation of the males and females of the two species of *Mongolotettix*. I am omitting the Manchurian subspecies *M. j. vittatus* (Uvarov) as I have no material available for study.

Key to the Species of Mongolotettix

MALES

Head, in profile, with the plane of the fastigium and the occiput in a straight line thus giving the vertex an elevated appearance. Fastigium broadly parabolic in outline, sides not flattened. Mesosternal interspace about twice as long as broad ..... **M. anomopterus** (Caud.)

Head, in profile with the plane of the fastigium and occiput forming a gently curved line. Fastigium broadly parabolic, sides almost straight. Mesosternal interspace about one and one half times as long as broad, subquadrate or elongated ..... **M. j. japonicus** (Bol.)

FEMALES

Length about 37 mm. Geniculum of the hind femur without a dorsal posterior tooth in the middle of the posterior edge. Mesosternal interspace about twice as long as broad, the lobes slightly flattened..... ..... **M. anomopterus** (Caud.)

Length about 31 mm. Geniculum of the hind femur with a small dorsal posterior tooth. Mesosternal interspace about one and one half times as long as broad, the lobes smoothly rounded ..... **M. j. japonicus** (Bol.)

21. **Mecostethus alliaceus** (Germar)

1817. *Gryllus alliaceus* Germar, Fauna Ins. Eur. 11, pl. 19 (Illyria).
1902. *Parapleurus fastigiatus* Rehn, Proc. Acad. Nat. Sci. Phila. 54 :629 (Japan).
1911. *Parapleurus alliaceus* Ikonnikov, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersb. 16 :244.
1924. *Mecostethus alliaceus* Hebard, Trans. Amer. Ent. Soc., 50 :213.
1929. *Parapleurus alliaceus* Bei-Bienko, Konowia 8(2) :100.

Hebard states that Kirby's great dislike for tautonymy led that author, in 1910, to select *Gryllus parapleurus* (=*alliaceus*) as the type of *Mecostethus* and *Gryllus grossus* as the type of *Stethophyma*. This unfortunate action placed into synonymy the long recognized name of *Parapleurus*.

Kuling, 1♂. This appears to be the first record for central China. Bey-Bienko records it, through Ikonnikov, from Tsitsikar, Manchuria. It is also known from Japan as the synonymous *P. fastigiatus* Rehn. The race *M. alliaceus turanicus* described by

Tarbinsky, was based on specimens larger than the typical form, from Transcaucasia.

22. **Megaulocobothrus fuscipennis** Caudell

1921. *Megaulocobothrus fuscipennis* Caudell, Proc. Ent. Soc. Wash. 23 (2) :27-29.

Kuling, 10♂, 6♀. I am at present retaining Caudell's generic name although *M. fuscipennis* is closely related to *Chorthippus latipennis* I. Bol. However *C. latipennis* appears to differ considerably from other species of *Chorthippus*, such as *C. hammarstroemi* (Mir.), by its larger size and much longer tegmina especially marked in the female. Whatever the final assignment may be, it seems best to retain these two closely associated species in the same genus. *M. fuscipennis* is known only from Mokanshan, Chekiang, and Kuling, Kiangsi.

23. **Arcyptera coreana** Shiraki

1930. *Arcyptera coreana* Shiraki, Trans. Nat. Hist. Soc. Formosa 20 (111) :328-330.

Kuling, Kiangsi, 1♀, Sept. 3, 1934 (O. Piel). The species was described from Korea and Kuling probably marks the known southern distributional point. The wings of the Kuling specimen are considerable shorter than in specimens which I have examined from Shantung. Further material is needed to determine whether Kuling specimens will require racial recognition; I am inclined to believe they will prove to be a new race.

24. **Aiolopus tamulus** (Fabricius)

Si Tsu Tsz, 1♀. This species is widely distributed in southeastern Asia.

OEDIPODINAE

24. **Oedaleus abruptus** (Thunberg)

6 mi. south of Hwang-mei, 2♂, 1♀; 20 li from city wall, 2♂, 1♀. This is a common grassland species in southeastern Asia.

25. **Heteropternis respondens** (Walker)

6 mi. south of Hwang-mei, 4♂, 4♀; 20 li from city wall, 8♂, 15♀; Si Tsu Tsz, 9♂, 1♀; Top of Si Tsu Tsz, 8♂, 11♀; Wu Tsu Tsz, 5♂, 7♀. This species is common throughout southeastern Asia.

26. **Gastrimargus africanus orientalis** Sjöstedt

20 li from city wall, 12♂, 7♀; Top of Si Tsu Tsz, 2♂. The habitat of this species seems to be the grassy slopes of mountains rather than the plains where *G. marmoratus* is a common inhabitant. As indicated this is the Oriental race of the African *G. africanus* Saussure.

27. **Gastrimargus marmoratus transversa** (Thunberg)

6 mi. south of Hwang-mei, 1♀; 20 li from city wall, 1♂; Top of Si Tsu Tsz, 1♂, 1♀; Wu Tsu Tsz, 1♂. This abundant grassland species ranges from China to India.

28. **Gastrimargus marmoratus grandis?** Saussure

6 mi. south of Hwang-mei, 1♂; 20 li from city wall, 1♀; Top of Si Tsu Tsz, 3♂, 1♀; Wu Tsu Tsz, 1♂, 3♀. Specimens that I am recording as this subspecies differ from *G. m. transversa* as follows: pronotal carina more cristate and arched, size larger, head distinctly larger; pronotum darkly colored with broken infuscated striae; the narrow light colored postocular line of the head extends onto the pronotum where it has an upwardly pointed notch. In *transversa* the pronotum is green with a single infuscated and isolated postocular band on either side of the dorsum. The narrow light colored line is present only on the head. *G. m. grandis* has been recorded from China, but as I do not have Sjöstedt's "Monograph of the genus *Gastrimargus*" my assignment may be questioned. This subspecies has also been reported from the Philippines, Malacca, Sunda Islands and the Cape of Good Hope.

29. **Locusta migratoria** phase **migratoria** Linnaeus

Hwang-mei vicinity, 6♂, 16♀, June 27-28, 1935; 1♀, July 2; 3♀, July 1-14. Undoubtedly the most destructive of all the insect pests of China. In 1932 the estimated damage done in central China was computed at 25 millions of dollars, National currency. Mr. S. W. Djou who forwarded the specimens stated that the locust was doing great damage to the rice crops in Hupeh Province, in July, 1935. In his important work on locusts and grasshoppers,[3] Uvarov remarked that "it is not definitely known which swarming phase of the Migratory Locust occurs in China and Formosa; apparently in the latter country it is *migratorioides* and in China *migratoria*." This then is the first positive record of this migratory phase from central China and proves Uvarov's assumption to be correct.

30. **Trilophidia annulata** (Thunberg)

6 mi. south of Hwang-mei, 1♂, 1♀; 20 li from city wall, 1♂, 1♀; Si Tsu Tsz, 2♂, 2♀; Top of Si Tsu Tsz, 1♂, 1♀; Wu Tsu Tsz, 1♂, 1♀. A very common species from southeastern Asia to Africa.

PYRGOMORPHINAE

31. **Atractomorpha crenulata?** (Fabricius)

20 li from city wall, 2♂; Si Tsu Tsz, 1♀. These specimens seem nearest this species but as a number of closely allied species, such

[3] B. P. Uvarov: Locusts and Grasshoppers. Imp. Bur. Ent. London. xii, 352 p., 9 pl., 118 fig., 1928.

as *concolor*, *bedeli*, *aurivillii*, *sinensis*, *angusta* and *ambigua* occur in central China, precise determination is difficult at the present.

CYRTACANTHACRINAE

32. **Spathosternum prasiniferum sinense** Uvarov

6 mi. south of Hwang-mei, 2♂, 1♀; 20 li from city wall, 1♂, 3♀. For a discussion of this race see a recent paper by the writer in Ling. Sci. Jour. 15(1):47-54, pl. 6.

33. **Oxya intricata** (Stål)

6 mi. south of Hwang-mei, 2♂; 20 li from city wall, 2♂, 2♀; Si Tsu Tsz, 8♂, 4♀; Top of Si Tsu Tsz, 7♂, 8♀; Wu Tsu Tsz, 1♂, 1♀; Kuling, 1♀. This species, one of the commonest of the injurious rice grasshoppers, is widely distributed in the Orient.

34. **Oxya chinensis** (Thunberg)

Top of Si Tsu Tsz, 1♂. This species is slightly larger than *O. intricata*, and like it, is an important pest of rice in China.

35. **Oxya velox** (Fabricius)

Top of Si Tsu Tsz, 1♀. *O. velox* is considerably larger than *O. chinensis* and is a serious rice pest in the Orient. In determining species of *Oxya*, size is relatively unimportant; the key characteristic being found in the dentation on the posterior edge of the female subgenital plate.

36. **Oxya agavisa** Tsai

1932. *Oxya agavisa* Tsai, Mit. Zool. Mus. Berlin 17(3):36.

1934. *Oxya agavisa* Chang, China Jour. 21(4.):186.

Wu Tsu Tsz, 2♂; Kuling, Kiangsi, 1♂, 1♀, (O. Piel); Tien Mo Shan, Chekiang, 1♂, July 26, 1935 (K. S. F. Chang); Chungking, Szechwan, 1♀, Aug. 30, 1934 (K. S. F. Chang). Chang (1934) has recorded five localites in Chekiang Province while Tsai's type specimen came from Chungking, Szechwan. Two unrecorded females before me from Linchow, Lin-hsien [Dist.], northern Kwangtung, winter of 1933-34 (Van Etten) represent the southernmost localities for the species whose distribution is defined by the above records.

37. **Hieroglyphus annulicornis** (Shiraki)

20 li from city wall, 1♂, 1♀; Si Tsu Tsz, 1♂; Top of Si Tsu Tsz, 1♀; Wu Tsu Tsz, 1♂, 1♀. Described originally from Formosa this important grasshopper is now known to range from Hupeh and Szechwan south to Tongking. It is also found in Hainan.

38. **Hieroglyphus tonkinensis** I.Bolivar.

20 li from city wall, 1♂. This injurious pest of rice and sugar cane is known from Hupeh south to Cochin China.

39. **Catantops pinguis** Stål

Wu Tsu Tsz, 1♂. This inhabitant of grassy mountain slopes is a common species in south China. It ranges from central China to India.

40. **Catantops brachycercus** Willemse

Si Tsu Tsz, 1♀. This species, described in 1932, is found in central China but its distribution is poorly understood at present.

41. **Chondacris rosea rosea** (De Geer)

6 mi. south of Hwang-mei, 1♂; Si Tsu Tsz, 1♂; Top of Si Tsu Tsz, 2♀; Wu Tsu Tsz, 1♂; Hwang-mei, 1♀ sixth instar nymph, July. This large and showy species with rose colored wings is known from Japan and Formosa, central China south to French Indo-China and west to India.

42. **Melanoplus viridifemoratus** (Caudell)

1921. *Catantops viridifemoratus* Caudell, Proc. Ent. Soc. Wash. 23(2): 32.

1929. *Podisma viridifemoratus* Tsai (described as a new species), Jour. Coll. Agri. Tokyo 10(2):143. New synonym.

HUPEH: 20 li from city wall, 2♀.

KIANGSI: Kuling, 2♂, 8♀, 1♀ nymph. Kuling, 1♂, Sept. 7, 1♀, Sept. 3, 1934 (O. Piel).

CHEKIANG: Tien Mo Shan, 2♂, 3♀, July 25, 1935 (K. S. F. Chang).

It is surprising that Tsai should have redescribed this species giving it the same specific name when as it appears, Caudell's description was available to him for the cerci of the male is so distinctive that it is not likely to be confused with any known Chinese Acrididae. I have examined the type of *Melanoplus okinawaensis* Shiraki, preserved in the Entomological Museum of the Government Research Institute in Taihoku, which was described from the Okinawa Islands by Dr. Shiraki, in 1930, and find the two species congeneric. In fact I strongly suspect *M. okinawaensis* to be only a more robust and and brachypterous race of *M. viridifemoratus*. Certainly they are at least very closely related. The present assignment of *viridifemoratus* to *Melanoplus* rather than to *Podisma* seems to be a more correct one on account of the fully developed tegmina and wings and the somewhat inflated nature of the prozona of the pronotum. The form of the cerci strongly suggests that found in various species of Nearctic Melanopli centering around the species *M. ponderosus* (Sc.) and *M. eumera* Hebard. Whether Shiraki's placement is correct or not can only be determined when the *Podisma*-group is restudied, a task the writer some day plans to undertake.

Tsai's remarks that the species is somewhat allied to *Podisma pedestris* Linn. and to *P. sapporense* Shiraki, and that it presents a close relationship to the genus *Navasia* reveal the superficiality of that author's observations. He said his specimens were "collected in south China (probably in Canton)." No further information was given. Caudell's type came from Mokanshan, Chekiang Province, and the species belongs to the Palaearctic fauna. Kuling, Kiangsi, is, therefore, at present the southernmost authentic distributional point.

43. **Podisma** sp.

Kuling, 1♂, 1♀. Without any specimens of the Manchurian or Siberian species of *Podisma* available for comparison I am not able to ascertain whether these specimens represent a new species or not. They are distinct from any of the known Formosan or Japanese species of *Podisma*.

44. **Euprepocnemis shiraki** I. Bolivar

6 mi. south of Hwang-mei, 1♂; 20 li from city wall, 2♂; Top of Si Tsu Tsz, 3♀; Wu Tsu Tsz, 3♂. This species is not uncommon in central and southern China. The type came from Japan.

45. **Calliptamus abbreviatus** Ikonnikov

6 mi. south of Hwang-mei, 1♀; 20 li from city wall, 2♂, 1♀; Top of Si Tsu Tsz, 1♂, 3♀; Wu Tsu Tsz, 1♂, 2♀; Kuling, Kiangsi, 1♂, Sept. 5, 1934 (O. Piel); Sishans near Peiping, Hopei, 1♂, Aug. 12, 1934 (K. S. F. Chang); Tai-shan, Shantung, 2♀, July 23, 1934 (K. S. F. Chang). A single female before me from Keung Tin Heung, Lin-hsien [Dist.], northern Kwangtung, July 16, 1934 (F. K. To) has the tegmina reaching to the apex of the hind femora. Further material may determine whether this form should receive racial recognition. Bey-Bienko (1929) states that *C. abbreviatus* was described from Korea and it is also known from the Russian Far East. A subspecies *C. a. sibiricus* Vnuk. is found in Manchuria. The range of this species is probably extensive.

TETTIGONIIDAE

PHANEROTROPINAE

46. **Ducetia thymifolia** (Fabricius)

Wu Tsu Tsz, 1♂. This is a common and widely distributed katydid in southeastern Asia.

47. **Holochlora japonica?** Brunner

Top of Si Tsu Tsz, 1♂ nymph; Wu Tsu Tsz, 1♀. These specimens probably represent this species which has been reported from Shanghai, but without the male, positive identification is difficult.

PSEUDOPHYLLINAE

48. **Togona unicolor** Matsumura & Shiraki

Kuling, Kiangsi, 1♀ (O. Piel); Kuling, 1 small ♀ nymph. This beautiful green katydid, originally described from Formosa, is now known from central and southern China.

HEXACENTRINAE

49. **Hexacentrus japonicus** Karny

Tai Ho Po, 1♀; 20 li from city wall, 1♀. I have compared these specimens with Japanese specimens and found them to to be identical. This appears to be the first record of *H. japonicus* for China.

50. **Hexacentrus unicolor** Serville

20 li from city wall, 1♂; Si Tsu Tsz, 1♀; Tai Ho Po, 1♀: This widely distributed species is known from Japan, Formosa, central China to Malaya and the Malay Archipelago.

MECONEMINAE

51. **Teratura? suzukii** Matsumura & Shiraki

20 li from city wall, 2♂, 1♀; Wu Tsu Tsz, 1♂, 2♀. I am retaining the generic name *Teratura* Redtenbacher because the peculiarly shaped process of the supra-anal plate seems nearer the description of this structure in that genus than in *Xiphidiopsis* Redt. This is the first record of the genus for China.

52. **Xiphidiopsis** sp.

Wu Tsu Tsz, 1 specimen with abdomen missing. This species is similar to *T. suzukii* but is much smaller. It is probably a new species as only one species, *Xiphidiopsis clavatus* Uv. from Kansu Province, is at present known from China, and this does not appear to be that species.

CONOCEPHALINAE

53. **Conocephalus gladiator** Redtenbacher

20 li from city wall, 1♂, 1♀ nymph; Si Tsu Tsz, 1♀; Wu Tsu Tsz, 4♀. The female of this species is easily recognized by the extremely long ovipositor. The species is fairly common in Canton and the range is now known to extend from Japan and central China. This appears to be the first definite record for China.

54. **Conocephalus maculatus** Le Guillon

6 mi. south of Hwang-mei, 1♂; Wu Tsu Tsz, 1♀. This species is widely distributed and is common in south China.

55. **Conocephalus melas** de Haan

20 li from city wall, 1♀ last nymphal instar This pretty species is found in Formosa, Hupeh, Kwangtung, Kwangsi and Tongking, all of which are new records, and it is also known from Malaya east to the Celebes.

COPIPHORINAE

56. **Homorocoryphus lineosus** (Walker)

20 li from city wall, 1♂; Tai Ho Po, 1♀; Wu Tsu Tsz, 1♀; Kuling, 1♂. This common inhabitant of the tall grass areas has a wide distribution in the Old World.

DECTICINAE

57. **Tettigonia chinensis** Willemse

1933. *Tettigonia chinensis* Willemse, Ov. Nat. Maandblad, No. 2, Jrg. 22, p. 17.

Kuling, 1♀. This specimen agrees closely with the description and measurements given by Willemse for the type female which came from Chungking, Szechwan. This is the first additional record.

58. **Gampsocleis sinensis** (Walker)

20 li from city wall, 1♀; Wu Tsu Tsz, 1♂. This species was previously known from Amoy, Fukien, and from Mokanshan, Chekiang, whence came Caudell's synonymous *Drymadusa mokanshanensis*. Specimens before me indicate that its distribution in China ranges from Hupeh and Chekiang to Kwangsi and Kwangtung. In August, 1935, I collected this species in Formosa. The present record is the first published one for that island.

59. **Gampsocleis** sp.

Tai Ho Po, 1♂. The head and front part of the pronotum destroyed by a large mantis, *Paratenodera acridifolia sinensis*, (Sauss.), that was feeding on it so specific identification is impossible. This species appears to be very close to *G. inflata* Uvarov, described from Shantung Province, in that the cercal tooth is located post-medianally, but the hind femora are larger and the tegmina shorter than in that species. Additional material is needed to ascertain whether this species is new or not.

GRYLLACRIDAE

GRYLLACRINAE

60. **Gryllacris permodesta?** Griffini

Top of Si Tsu Tsz, 1♀. This specimen runs down to *G. permodesta* in Karny's Key (1931) but the ovipositor bears no resemblance to that figured for this species in his work of 1926, p. 380. Judging by the blunt straight form of the ovipositor in his figure it would appear that Karny's specimen was an immature female. In the Hupeh specimen the ovipositor is 12 mm. long and is a tapering,

sharply pointed, recurved blade. This specimen may prove to be new but lack of material for comparison prevents making a positive determination at present.

GRYLLIDAE

TRIGONIDIINAE

61. **Paratrigonidium bifasciatum** Shiraki

20 li from city wall, 1♂; Si Tsu Tsz, 2♂; River by city wall of Hwang-mei, Aug. 3, 1♀. These specimens agree closely with Shiraki's type from Formosa which I have examined. This is the first Chinese record.

62. **Paratrigonidium striatum?** Shiraki

20 li from city wall, 1♀. This species differs from *P. bifasciatum* in its smaller size and unicolorous hind femora. The hind femora are twice banded in *bifasciatum* as the name indicates. Without a male specimen I cannot give an exact determination at present. This is the first record of the species for China.

63. **Trigonidium cicendeloides** Rambur

6 mi. south of Hwang-mei, 1♂. This species is very common in Kwangtung and Hainan Island. It is found throughout southern Asia and Europe to Africa.

ENEOPTERINAE

64. **Dionymus marmoratus** de Haan

Wu Tsu Tsz, 2♀. This rather uncommon graminiphilous cricket is known from Japan and Formosa; the Hupeh specimens constitute the first Chinese record. It is also found in Kwangtung.

PODOSCYRTINAE

65. **Madasumma** sp.

Top of Si Tsu Tsz, 1♀ nymph. This may be *M. marmoratus* de Haan, a species reported from Soochow by Hsu in 1930-31, but further determination from a nymph is not possible.

66. **Euscyrtus hemelytrus** de Haan

Wu Tsu Tsz, 2♀. Hsu, 1930-31, records this species from Soochow and also Japan, Korea, Java, Malacca and Samarang. Shiraki's studies, in 1930, indicate that this species is not present in Japan, but instead the closely allied *E. japonicus* Shiraki is found.

GRYLLOTALPIDAE

TRIDACTYLINAE

67. **Tridactylus japonicus** de Haan

6 mi. south of Hwang-mei, 2 specimens, 1 nymph; Kuling, 2 specimens. This black pygmy mole cricket, often very abundant around the edges of ponds and wet earth, is known from Japan and Formosa and in China from Peiping, Soochow, and Hangchow.

68. **Gryllotalpa africanus** Palisot de Beauvois

Hwang-mei, 1 specimen, June 15-17, 1935 (S. W. Djou). A species widely distributed from Asia to Africa.

Summary and Conclusion

Four hundred and seventy-one specimens representing eight families and 68 species are reported on. The great majority of these, 354 specimens in 38 different genera, belong to the Acrididae. While this list by no means comprises the complete Orthopteran fauna of southern Hupeh and northern Kiangsi, the writer believes that the collection is representative. Most of the records for Hupeh and many for northern Kiangsi are new records for those provinces. In addition distributional and taxonomical notes are given. The following species are additions to the known Orthopteran fauna of China: *Phraortes kumamotoiensis* Shiraki, *P. formosanus*? Shir., *Hexacentrus japonicus* Karny, *Teratura suzukii* Mats. & Shir., *Conocephalus gladiator* Redt., *Paratrigonidium bifasciatum* Shir., *P. striatum*? Shir., *Dionymus marmoratus* de Haan. Several undetermined species may prove to be new when additional material is available for study. The allotype of *Mongolotettix anomopterus* (Caudell) is described and figured. A key is given for differentiating two closely related species of *Mongolotettix* Rehn; both species are illustrated.

The collection as a whole seems to be mainly Oriental in character as practically all of the species of the lowlands are similar to those found in South China. A number of Palaearctic species are included and these appear to be found at higher elevations, in the mountains. A strong representation of the Japanese fauna is noted; the additions to the China list are mainly Japanese species.

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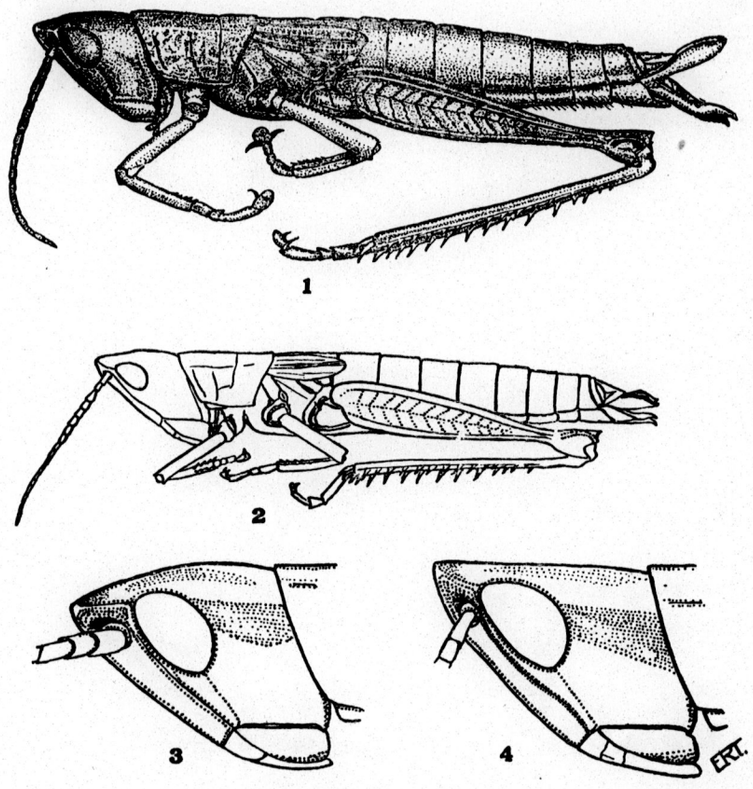
研究湖北江西直翅目標本紀要，及 *MONGOLOTETTIX* REHN. 檢索表

丁 謙 著

(摘 要)

所研究之標本，凡四百七十一。隸屬八科，共六十八種。屬蝗科者凡三百五十四，分爲三十八屬。作者深信此區區之標本，可爲湖北南部及江西北部一般直翅目昆虫之代表。大多數之採自湖北及江西北部者，皆爲鄂贛兩省之新紀錄。茲將未經發表之品種列下：*Phraortes kumamotoiensis* Shiraki, *P. formosanus*? Shir., *Hexacentrus japonicus* Karny, *Teratura suzukii* Mats. & Shir., *Conocephalus gladiator* Redt., *Paratrigonidium bifasciatum* Shir., *P. striatum*? Shir., 及 *Dionymus marmoratus* de Haan. 本文詳述 *Mongolotettix anomopterus* (Caudell) 及加插圖以釋明。至於甚相近之 *Mongolotettix* Rehn. 兩品種，有檢索表以便辨別，及亦有圖以釋明焉。



Mongolotettix anomopterus (Caud.) and *M. j. japonicus* (Bol.)

Fig. 1. *M. anomopterus*, allotype, female. Fig. 2. *M. j. japonicus*, female. Fig. 3 and 4. *M. anomopterus* and *M. j. japonicus*, lateral view of heads. Fig. 5 and 6. *M. anomopterus* and *M. j. japonicus*, males, dorsal views of fastigium of the vertex. Fig. 7 and 8. *M. anomopterus* and *M. j. japonicus*, females, dorsal views of geniculum of the hind femur.

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NEW AND LITTLE KNOWN FERNS FROM CHINA AND NEIGHBORING REGIONS

By R. C. Ching,
Fan Memorial Institute of Biology

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NEW AND LITTLE KNOWN FERNS FROM CHINA AND NEIGHBORING REGIONS

By R. C. Ching
Fan Memorial Institute of Biology

Plagiogyria gigantea sp. nov.

Species maxima *P. pycnophyllae* (Kze.) Mett. affinis. Folio sterili usque ad 1.5 m. longo, stipite 40 cm. longo, valdo, sordide brunneo, basi applanta, carinis tuberculis 3-4-jugis ca. 1 cm. inter se et sursum usque ad basin laminae tuberculis promimentis 5-6 cm. inter se distantibus instructis, lamina 100 cm. longa vel longiore, medio 45 cm. lata, late lanceolata, deorsum paulo angustata, pinnata infra apicem caudatam brevum pinnatifidumque, textura chartacea, colore sicco fulvo-opaco, glabra, rachi trisulcata, ad bases pinnarum tuberculis instructi, pinnis 45-jugis aut pluribus, alternis, subpatentibus, inferioribus ca. 3 cm. inter se remotis, superiorbius spatio ca. 2 cm. lato separatis, omnibus sessilibus, supremis 4-6-jugis leviter adnatis, infimis ca. 10 cm. longis, mediis 16-20 cm. longis 1.5-2 cm. latis, lineari-lanceolatis, longe acuminatis, basi subaequaliter et utraque oblique truncatis, marginibus e basi regulariter erosodentatis, apicibus grosse serratis, costis pinnarum utraque prominente elevatis, venis creberrimis, subpatentibus, utraque distincte visis, indivisis aut prope basin vel raro medio furcatis. Stipite folii fertilis 55 cm. vel ultra longo, parte inferiore ca. 8 mm. crasso, triangulari et marginibus lateris acute carinatis, subtus tereti, lamina 1-1.2 m. longa, medio 24 cm. lata, pinnis infimis ad 7 cm. longis, 6 cm. inter se remotis, mediis 16-20 cm. longis, proximis, vix 4 mm. latis, sporangiis subtus ominino obtectis, rachi trisulcati ad bases pinnarum tuberculis magnis globosis instructis.

Yunnan sept.-occid.: Shweli-Salwin divide, *G. Forrest 25279*, sterile (type), Oct. 1924, plants 4-5 ft. Szechwan austro-occid.: *W. P. Fang 6830* (both fertile and sterile fronds), August 20, 1930.

Tongking: Chapa, *Pételot 1968* (pro parte); Massif du Pia Quac, *Vieillard 662* (1923); *Pételot 662* (fertile frond).

The present new fern proves to be the second largest known species of the genus, the first one being *P. maxima* C. Chr. recently described from Tongking and belonging to the group of *P. euphlebia* Mett., while our new species is of the group of *P. pycnophylla* (Kze.) from which it differs in enormously larger size, numerous close larger pinnae with regularly serrate margin and very patent and mostly simple veins.

I first detected this new species from Forrest's specimen which is, unfortunately, sterile, over six years ago, but later collection of more complete material made by Mr. Fang in the south-western Szechwan has made possible its description. *Pételot 1968* from Tongking, which is smaller than the type, represents only a part of this species, while the other part is *P. maxima* C. Chr.

Diplazium heterocarpum sp. nov.

Rhizomate brevi, erecto vel subprocumbente, redicoso, foliis caespitosis, stipite gracili, 6-15 cm. longo, ca. 1 mm. crasso, sordide stramineo, glabro, basi paleis brunneis late lanceolatis integris parce obtecta excepto, lamina lanceolata 10-20 cm. longa, 3-4 cm. lata, pinnata infra apicem acuminatum pinnatifidum, basi paulo angustata, pinnis 10-20-jugis utroque latere, petiolatis, subpatentibus, proximis, 2-3 cm. longis, ad 7 mm. latis, inferioribus minoribus, subtrapezoideo-lanceolatis, subobtusis vel acutiusculis, basi anteriore semper deltoideo-auriculatis, inferioribus leviter cuneatis, marginibus arcte serratis, textura tenuiter herbacea, colore opaco, utraque glaberrima, venis unifurcatis sed in auricula bifurcatis, soris linearibus, ca. 4 mm. longis, rectis, e costa pinnarum fere ad marginem extensis, secus venulos anteriore positis, vix diplazioideis, indusiis latis, membranaceis, brunneis, integris, persistentibusque.

KWEICHOW: Tin-fan, *Cavalerie 1904, 1830* (type in Herb. Riksmuseum, Stockholm, co-type in Herb. Fan Memorial Institute of Biology).

A unique species to which I can not recall any close relative of the region except perhaps *D. Pullingeri* (Baker), from which it differs altogether in smaller size and entirely naked leaves. In general habit, our new species resembles most closely the small form of *Asplenium unilaterale* Lam. In spite of the soral conditions which are rarely found diplazioid in specimens cited, I have no hesitation to refer this species to *Diplazium*.

Diplazium brevicarpium sp. nov.

Diplazium asperum C. Chr., Contrib. U. S. Nat. Herb. 26 : 306, 1931 (*non* Blume, 1828).

Species habitu et dimensione *D. asperae* Bl. Asiae tropicae magis similis, sed omnibus venis in segmentis ultimis furcatis, soris brevioribus (ca. 1 mm. longis), oblongo-ovalis vel breve oblongis, indusiis rufescens, turgidis, persistentibus, basali diplazioidei, folio textura non rigide herbaceo insigniter differt.

Rhizomate stipiteque desunt, pinnis primariis 45-60 cm. longis, 10 cm. latis, rachibus principalibus lateralibusque pallide stramineis et parce spinulosis, pinnulis ca. 30-jugis, erectis, sessilibus, ca. 8 cm. longis, 2.5 basi latis, apice truncatis vel rotundo-truncatis,

marginibus regulariter serratis, venis 8-jugis, e basi furcatis, soris oblongo-ovalis vel breve oblongis, basalibus, uniseriatis, costulae pinnulae adpressis.

BURMA: Between Pan Sop Lao and Ban Yan Kha, *J. F. Rock 2183* (type in Herb. Mus. Bot. Hauniense, Copenhagen; co-type in U. S. Nat. Herb.); Valley of Meh Len, *J. F. Rock 2183*.

Diplazium axillare sp. nov.

Diplazium sikkimense C. Chr., Contrib. U. S. Nat. Herb. 26 : 304, 1931 (*non Asplenium sikkimense* Clarke, 1880).

Diplazium polypodioides C. Chr., *loc. cit.*

Diplazium polypodioides var. *vestita* C. Chr., *loc. cit.*

Species prior valde affinis, differt rachi pinnarum inermi, textura molliter herbacea, venis in segmentis ultimis solummodo 5-jugis, simplicibus aut furcatis.

BURMA: Between Sadon and Yunnan border, *J. F. Rock 7434* (type in Herb. C. Chr., co-type in U. S. Nat. Herb.).

Diplazium chattagramicum (Clarke) comb. nov.

Asplenium chattagramicum Clarke, Trans. Linn. Soc., ser. 2, Bot., 1 : 499, pl. 64, fig. 1, 1880.

Rhizome short, erect, stipes tufted, 20-30 cm. long, atratous and scaly near base, glabrous and dark straminous upwards, frond ovate-lanceolate, as long as the stipe, fully bipinnate, pinnae 10-14-jugate, lower ones long-petiolate, upper ones subsessile, the basal ones slightly shorter, pinnate, pinnules oblong-lanceolate, lower ones reduced, subpetiolulate, upper ones adnate below pinnatifid apex, margin pinnatifid or crenato-serrate, texture thin herbaceous, veins in lobes pinnate, sori as in *D. Petri* Tardieu-Blot.

SIKKIM: Chattagong, in hills, *C. B. Clarke* (type in herb. Kew).

Clarke has erred in lumping this distinct endemic species with the common and variable *D. japonicum* to which it bears no resemblance whatsoever, and from which it distinguishes itself by, among other characters, fully bipinnate frond and entirely glabrous and simple sori. In habit and other details, the species seems most closely related to *D. Petri* Tardieu-Blot from Tongking, from which it can be easily distinguished by its thin leaf-texture, somewhat shorter basal pinnae, etc.

Diplazium Metcalfii sp. nov.

Rhizomate? stipite uti videtur 30-40 cm. longo, sordide viridi-stramineo, parte inferiore dense paleaceo, superiore subglabro, paleis ad 1 cm. longis, anguste linearibus, patentibus, atro-brunneis, marginibus nigris, dense fimbriatis, lamina ampla, deltoideo-ovata,

uti videtur 40-60 cm. longa, basi 40 cm. lata, impari-pinnata vel potius bipinnatifida, pinnis uti videtur 8-12-jugis, petiolatis, 30-35 cm. longis, 5-7 cm. latis, anguste lanceolatis, acuminatis, basin versus angustioribus, parte inferiore fere ad costam pinnatifidis, parte superiore lobato-incisis, apice crenatis, laciniis 10-15-jugis, 2-3 cm. longis, ca. 1.5 cm. latis, basali minore, elliptico-ovalis, confertis, acutis vel subacuminatis, integerrimis, pinnis mediis ad 25 cm. longis, lobato-incisis, dentibus deltoideis, ad 1 cm. longis, pinna terminali consimili, basi lobis 5-8 cm. longis, 2 cm. latis, sessilibus vel adnatis, crenulatis, instructi, rachi costisque subtus copice, supra parce paleaceo-puberulis, textura tenuiter herbacea, venis 8-10-jugis, valde obliquis, liberis, basalis furcatis ad sino protensis, supremis simplicibus, soris 6-8-jugis, proximis, linearibus, regulariter e costa fere ad marginem extensis, basalis curvatis, indusiis membranaceis, angustis, demum evanidis.

KWANGTUNG: Fan Shiu Shan, Wung Yuen-hsien, *S. K. Lau 2777*, Nov. 1-12, 1933 (type in Herb. Fan Memorial Institute of Biology; co-type in Herb. Lingnan Natural History Survey and Museum, Lingnan Univ., Canton).

A unique endemic species of the group of *D. maximum* (Don), from which and other related species it differs in partially bipinnatifid frond with unusually long, linear-lanceolate lobato-pinnatifid lower pinnae with close elliptical-ovate entire segments with constricted base in the lower part and in the brown fibrillose scales on rachis and costa underneath.

The present species is dedicated to Prof. Franklin P. Metcalf, curator of herbarium, Lingnan University, from whom I twice received ample material for study of this distinct fern.

Diplazium spectabile (Wall.) comb. nov.

Asplenium spectabile Wall., Cat. No. 237A (nomen nudum); Mett., Farngatt. Aspl., p. 240, 1856.

Athyrium spectabile Presl., Tent. Pterid., p. 98, 1836 (nomen nudum); C. Chr., Ind. Fil., p. 146, 1905.

Asplenium multicaudatum Wall., Cat. No. 229 (nomen nudum); Clarke, Trans. Linn. Soc., ser. 2, Bot., 1 : 502, 1880.

Athyrium multicaudatum Bedd., Ferns Brit. Ind., Suppl. 12, 1876.

Diplazium Griffithii Bedd., Ferns Brit. Ind., pl. 325, 1869; Diels *in* Engl. u. Prantl: Nat. Pflanzenfam. 1(4) :227, 1899; C. Chr., Ind. Fil., p. 233, 1905 (non Moore, 1861).

Asplenium Griffithii Hook. & Bak., Syn. Fil., p. 239, 1865.

Athyrium Griffithii Milde, Bot. Zeit., 1870, p. 354; Bedd., Ferns Brit. Ind., Suppl. 12, 1876.

Diplazium Jerdoni Bedd., Ferns Brit. Ind., pl. 327, 1869.

Asplenium umbrosum var. *spectabile* Bak. *in* Hook., Syn. Fil., p. 489, 1874.

Athyrium umbrosum var. *multicaudatum* Bedd., Handb. Ferns Brit. Ind., p. 190, 1883.

The present fern which seems common in Eastern and Northern Himalayas and also in western part of Yunnan, has hitherto been utterly confused in its identity as well as nomenclature, as indicated in the above synonymy. *Diplazium Griffithii* Moore, under which name the present fern has been accepted by Diels and others, proves to be entirely different. The species has been admitted under *Athyrium* by Christensen in his Index Filicum, but it seems to be more logical to refer it and other closely related species (*Asplenium umbrosum* (Aiton) J. Sm. and its close allies, many of which have been also placed under *Athyrium* in Index Filicum) to *Diplazium* if the name *Allantodia* R. Br. expressly created for this group of *Diplazium* be not upheld. A more careful study will decide the issue.

Diplazium pin-faense sp. nov.

Rhizomate brevi, erecto, foliis fasciculatis (4-5), stipite tenui, ad 17 cm. longo, 2 mm. basi diametro, pallide stramineo, basi paleis minutis, ovato-oblongis, acuminatis, integris parce onusto, sursum glabro, lamina 20-26 cm. longa, ad 16 cm. lata, ovata, simpliciter pinnata cum impari, pinnis 2-3-jugis, raro unijugis, 10-14 cm. longis, 3-3.5 cm. latis, oblongo-lanceolatis, acuminatis, petiolatis (petiolo ad 6 mm. longo), basi rotundatis vel rotundo-cuneatis, marginibus e basi aristato-serratis, pinna terminali simili, textura flaccide herbacea, utraque glabra, colore virescenti, rachi subflexuosi, venis furcatis, tenuibus, in dentibus extensis, basali semper posteriore saepe sorifera, soris 1-1.6 cm. longis, angustis, e costa ad partem tertiam pinnarum extensis, indusiis latis, membranaceis, primo griseis, demum brunneis.

KWEICHOW: Pin-fa, *Cavalerie 2966, 2577* (type in Herb. Riksmuseum, Stockholm); Sanhoa, *Y. Tsiang 6298;* Cheng-feng, *Y. Tsiang 4393*, in valley, Oct. 24, 1930. FUKIEN: Shang-han-hsien, *Schindler 428* (1900); *Dunn 3853* (1905); Foochow, Pagoda Hills, *Dalziel*, Oct. 23, 1883.

A very distinct species of the group of *D. Donianum* (Mett.), from which it differs in much slender habit, soft and flaccid texture, light green color of frond, regularly aristato-serrate pinnae and in broader, curved sori extending from costa outwardly to about one-third from the margin. From *D. megaphyllum* (Baker), our new species distinguishes itself by its much smaller size, base of slender stipes clothed only in a few scales of a different outline and by impari-pinnate frond with 2-3 pairs of pinnae.

Diplazium crassiusculum sp. nov.

Species habitu et configuratione *D. Donianae* (Mett.) valde similis sed folio textura crasse coriaceo, pinnis lateris latioribus, basi plerumque rotundo-cuneatis, marginibus e basi sursum distincte

crenulato-serratis, dentibus ad apicem prominentis, soris magis patentibus et inter se multo remotis insigniter differt.

Rhizome oblique or procumbent, fronds subcaespitose, stipe 30-40 cm. long, pale green but atratous towards base which is sparsely clothed in linear black rigid scales to 1 cm. long, lamina broadly ovate, impari-pinnate, pinnae 3-6-jugate, alternate, 4-3 cm. apart, oblique, all petiolate (petiole of basal pinna about 1 cm. long), broadly lanceolate, 15-20 cm. long, 4-5 cm. broad, gradually acuminate, base roundish or rotundo-cuneate, margin remotely serrate above base, the terminal pinna as large as the lateral ones and long-petiolate, texture crass coriaceous, pale green, glabrous, margin slightly revoluted, veins rather distinct on both sides, each group consists of 3-4 parallel straight veinlets with incrassate apices ended in teeth, the anterior basal veinlets soriferous, sori linear, straight, 4-5 mm. apart, from costa extend to about 5 mm. to the margin, indusium narrow, membranaceous, entire, mostly simple.

KWANGTUNG: Lungt'au-shan near Iu, *Y. K. Wang 31699* (type in Herb. Fan Memorial Institute of Biology; co-type in Herb. Bot. Inst. Coll. Agri., Sun Yatsen Univ.); *ibid. CCC 12372* (*W. T. Tsang, K. P. To & U. K. Tsang*) ex herb. Lingnan Univ., May 22-July 5, 1924; Ting-U Shan, *Sampson 3380* in herb. Hance; Lien-hsien, *C. L. Tso 22676* (1929); Lokchong, *N.K. Chun 42104* (1930); Swatow, *Dalziel*, July, 1901; Wah Shiu Shan, between Wung-yuen-hsien and Ying-teh-hsien, *S. K. Lau 954*, Jan. 8-10, 1933; Sin-i, *Y. K. Wang 31187* (1930). KWEICHOW: Cheng-feng, *Y. Tsiang 4413*, Oct. 25, 1930. FUKIEN: Shang-hang-hsien, *Schindler 428* (pro parte); Yenping, *H. H. Chung 3598*. KWANGSI: Tsinlung Shan, Lin-yen-hsien, *R. C. Ching 7036;* Bako Shan, *R. C. Ching 7722;* Yuan Tong Shan, Lu-chen-hsien, *R. C. Ching 5772*.

The present species has been what authors on South Chinese ferns called *D. bantamense* in part, a fern known from Malesia-Polynesian region but not from the mainland, including South China, India and French Indo-china and also Japan, where the species seems to have been replaced by both *D. Donianum* (Mett.) and the present new species, the latter differing from the former in elongate lanceolate, distinctly petiolate larger pinnae with rotundo-cuneate base and rather prominent teeth above the middle, in wide apart and more patent, regular sori and in, above all, its crass coriaceous texture. These distinguishing characters are rather difficult to describe but they become all the more apparent in the presence of actual specimens of the two closely related species. Previously, I did not recognize the species as distinct from *D. Donianum* (Mett.) to which was referred by me a number of specimens chiefly in the herbarium at Kew, but the more I work on them, the more has it become clear to me that each is intrinsically

different from the other. *D. Donianum* (Mett.) has chartaceous rather flexible leaves with deep green, shining, greasy upper surface and the pinnae of a different outline with a few obsolete teeth above the middle.

Forma **simplex** n.f.

A type differt frondis ambitu oblongo-lanceolatis, indivisisque.

CHEKIANG: Ping-yang-hsien, Nan Yen Tung Shan, *K. K. Tsoong 167*. Kwangtung, Swatow, *Dalziel*, July, 1901.

Diplazium Wangii sp. nov.

Rhizomate subarboreo, cylindrico, erecto, ad 10 cm. longo, 2 cm. diametro, radicoso, foliis fasciculatis (plerisque 10), strictis, stipite 17-30 cm. longo, pallide stramineo, nudo, ad pedem sordide nigrescenti et paleis e basi deltoideo-lanceolatis, duris, atrobrunneis, subintegris copice ornato, lamina ovato-oblonga, 14-40 cm. longa, ad 15 cm. lata, impari-pinnata, pinnis 4-9-jugis, subpatentibus, alternis, 2-3 cm. inter se remotis, 10-14 cm. longis, ad 1.5 cm. latis, anguste lanceolatis, acuminatis, basi cuneato-rotundatis, breve petiolatis, duplo-serratis, e.g. marginibus leviter lobato-crenatis et laciniis 2-4-dentatis pinna terminali simili, sed ad basin 1-2-lobatis, textura tenuiter herbacea, utraque nuda, sicco virescenti, venis 3-5-jugis, omnibus in dentibus lacinium excurrentibus, subtus prominentis, basali anteriore posterioreque sorifera, soris e costa pinnae ad partem tertiam inter costam et marginem extensis, anterioribus diplazioideis, indusiis sat latis, brunneis, persistentibus, secus nervum positis.

HAINAN: Chang-kiang-hsien, *C. Wang 34335*, under dense forest, Sept. 28, 1933 (type in Herb. Fan Memorial Institute of Biology; co-type in Herb. Bot. Inst., Coll. Agri., Sun Yatsen Univ., Canton).

A critical species which resembles, in several respects, *D. Mettenianum* var. *Fauriei* (Christ) Tagawa of Japan and south-eastern China, and *D. pallidum* (Bl.) Moore of tropical Asia. From the former our new species differs in thick erect and cylindrical rhizome with fasciculate fronds, in shortly petiolate pinnae of which the uppermost ones are only slightly shorter than those down below, in thinner texture and in the prominently cuspidato-denticulate short lobes; from the latter species, in scales on the base of stipe being not of black color, in lateral pinnae being shallowly lobato-crenate and in its much thinner texture. It, however, seems very closely related to *D. platychlamys* C. Chr. Bull. Mus. Paris, sèr. 2, 6: 100 (1934) from Annam, of which I have seen no specimen and from which it seems, according to the description, to differ in having narrower pinnae with equal base and the double serrate margin.

Onychium Ipii sp. nov.

Rhizomate late repente, 2 mm. crasso, dense paleaceo, paleis imbricatis, lanceolatis, atro-brunneis nitidisque, foliis proximatis vel 1 cm. inter se remotis, uti videtur sterilis fertilisque conformis, stipite gracili, pallide stramineo, 10-20 cm. longo, facie profunde sulcato, uti totta planta glabro, basi atro-brunneo, parce paleaceo excepto, lamina anguste lanceolata, 10-20 cm. longa, 3-7 cm. lata, tripinnata vel versus apicem attenuatum simpliciter pinnatifidum bipinnatifida, textura rigidulius herbacea, colore utradue viridi, pinnis utraque latere 10-13-jugis, infimis 4-7 cm. longis, superioribus gradatim abbreviatis, petiolatis (petiolo ad 1 cm. longo), valde obliquis, lanceolatis, attenuatis, bipinnatis, pinnulis subrhomboideis, breviter petiolulatis, basalis majoribus, 1.5 cm. longis, 1 cm. latis, subacuminatis, pinnatisectis, segmentis inferioribus maximis, profunde trilobatis, superioribus integris, lobis ultimis elliptico-lanceolatis, 2-3 mm. longis, acutis, soriferis, pinnis mediis 2-3.5 cm. longis, deltoideo-ovatis, soris brevibus, ad 2 mm. longis, 1 pro lobo, indusio conformi, griseo, integro, sorum tegente.

HUPEH austro-occid.: Koo Chen-hsien, Wu-lung Shan, *K. C. Chow 3982*, Oct. 14, 1935, 1060 m. alt., in shade (type in Herb. Fan Memorial Institute of Biology; co-type in Herb. Department of Biology, Wu-han Univ., Wu-chang).

Our new species is closely related to *O. moupinense* Ching from South-western Szechwan, from which it differs in decidedly slender habit with uniform fronds, in shorter ultimate segments and very short sori.

In my recent monograph of the genus *Onychium*,[1] 6 species and one variety have been recognized from Continental Asia. The present new species is a noteworthy addition to the known list.

At the recommendation of Prof. H. H. Chung, Department of Biology, Wu-han University, I take great pleasure in naming this distinct and pretty fern after my former teacher, Prof. N. K. Up of the same institution in recognition of his keen interest in recent botanical exploration in Hupeh Province under the auspices of the Department of Biology of the said university.

[1] *Ling. Sci. Jour.* 13(3):493-501. 1934.

(*To be concluded in next issue.*)

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Polydelphis attenuata (Nematoda: Ascaridae) from a Hainan Python.

By F. G. WALLACE



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Polydelphis attenuata (Nematoda: Ascaridae) from a Hainan Python.—Some nematode worms from a specimen of *Python molurus bivittatus* Schlegel collected on Hainan Island by the Lingnan Natural History Survey and Museum were turned over to the writer for identification. The collection consisted of 71 females and 37 males taken from the intestine of the snake. The host, a male 14 ft. 4 in. long, was brought from Hainan Island to the University alive so the parasites were obtained in a living condition. They are referred to the species *Polydelphis attenuata* (Molin, 1858) and as this appears to be the first record from China and these specimens are in slight disagreement with the description given by Baylis (1921), a short account seems advisable.

Male.—Length up to 170 mm. and width up to 2.5 mm.; slender anteriorly and thicker posteriorly. Tail curved ventrally. Cuticular striations about 5 microns apart. Three lips (fig. 1); no interlabia; lips longer than wide; slightly emarginate at anterior end. Dorsal lip bears two lateral double-headed papillae (fig. 2); each lateral lip bears a single ventro-lateral double-headed papilla. Dentigerous ridges around margins of lips. Oesophagus 10 mm. long. Tail .25 mm. long, bearing a spike at the tip; spicules 14 mm. long. Just anterior to anal opening is a large mound bearing a small median papilla (fig. 3); at each side of anal opening a large papilla. Anteriorly from each large lateral papilla runs a row of smaller papillae, at first close together but becoming farther apart and irregularly arranged anteriorly. The number of pairs of these pre-anal papillae varies from 26 to 52 but the most common number is 42. Among the 37 males one had 52 pairs, 2 had 50 pairs, 26 had from 40 to 45 pairs, 6 had 30 to 40 pairs, and two had less than 30. In average specimens, i.e., those with 40 to 45 pairs of papillae, the most anterior papilla is about one tenth of the body length from the posterior extremity. There are on each side 3 ventral post-anal papillae and 2 (in some specimens 3) lateral post-anal papillae.

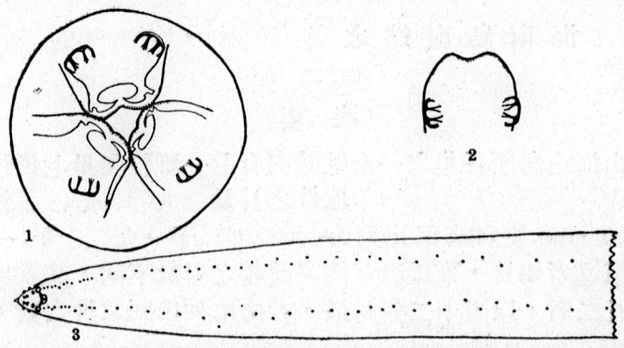

Fig. 1-3. *Polydelphis attenuata* (Molin). (1) Front view of lips, x 91.7. (2) Dorsal lip, dorsal view, x 91.7. (3) Tail of male, ventral view; x 4.6.

Female.—Length up to 190 mm. and width up to 3 mm.; slender anteriorly, thicker and bluntly rounded posteriorly. Vulva in anterior third of body length; vagina and undivided part of uterus about 30 mm. long; uterus divided into 4 parallel branches. One pair of small lateral post-anal papillae. Lips as in male.

Polydelphis attenuata has been found previously in *Python molurus bivittatus* as well as related species of snakes in southern Asia and Africa. *Polydelphis anoura* Dujardin, 1845 was reported from China by Hoeppli (1932) from the same host.

Our specimens agree with the description given by Baylis (1921) in every particular but one. He gives the number of pre-anal papillae in the male as 36 while in the present series the modal number is 42. However as some specimens with the smaller number were found and as there is a continuous series in papilla number from 26 to 52 pairs it appears that this characteristic is subject to variation.

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F. G. WALLACE

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LINGNAN UNIVERSITY.

海南島南蛇之 *Polydelphis attenuata*

華理斯

(摘要)

由海南島所採集之一南蛇體內有七一雌性與卅七雄性寄生線蟲 (*Polydelphis attenuata*) 雌性之長爲一九〇 mm., 雄性則近乎一七〇 mm. 此種蟲與比列氏 (Baylis) 于一九二〇年(一九二一) 所描述者相符，唯雄蟲肛門突前起之對數不同，其差別乃由二六至五二對，以四十二對爲最，若據比列氏則爲卅六對。

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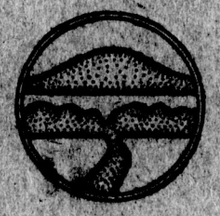
Quercus litseoides Dunn and Q. Chun (Fagaceae)

By FRANKLIN P. METCALF



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Quercus litseoides Dunn and Q. Hui Chun (Fagaceae).—Recently in checking over the undetermined Fagaceae material in the herbarium at Lingnan University I noticed a specimen *LU 19404* (*McClure*) tentatively labeled *Lithocarpus* sp., a unicate, which definitely represents a re-collection of the rare species *Quercus litseoides* Dunn, only the third collection known. Merrill and Chun[1] have recently pointed out that *Q. litseoides* Dunn is a good species, not to be confused with the more common and recently described species *Q. Hui* Chun.[2] They also give a few distinguishing characters. This specimen and others seen at Lingnan University and at Sun Yatsen University make it possible to compare these two species in considerable detail and to illustrate *Q. litseoides* Dunn and certain features of *Q. Hui* Chun which have not been previously figured.

The type of this rare species, *Q. litseoides* Dunn, is represented by *HK 6437* (*Tutcher*), Lantau Island, 1000 ft. exposed rocky slope, collected by Tutcher in March, 1909. It was not collected again until 1930 when it was found on Fung Wong Shan (*N. K. Chun 41859*), Lantau Island, Hong Kong New Territory, Oct. 4, 1930. The third collection, specimen with very young fruits, was from Tai Ue Shan, Lantau, Hong Kong New Territory, top of mountain peak on July 22, 1931.

The leaves of this species (from fragment of type at the Botanical Institute, Sun Yatsen University) as well as from this Tai Ue Shan specimen are very characteristic and are somewhat different from the leaves of *Quercus Hui* Chun. In *Q. litseoides* Dunn the subsessile (not over 2 mm.) leaves (up to 4 cm. long and 13 mm. wide) are very coriaceous, elliptical to oblanceolate with rounded apex, a shining upper surface, and are chestnut colored below. On the other hand, in *Q. Hui* Chun, if we include all numbers as cited by Merrill and Chun (*l.c.*), we have a variable species, which includes a number of leaf forms. One isotype at Sun Yatsen University, and another isotype, Lingnan University, have elliptical to oblanceolate, pedicellate (about 10 mm.) leaves (5-7 cm. long and 1.5-2.5 cm. wide) with pointed, not rounded, apex, dull green above, paler and grayish beneath, not chestnut colored. Other sheets, not type collection, show a great deal of variation, broader more coriaceous leaves (up to 3.5 cm. diam.) with more prominent serrations—*LU 14535* (*Tsang & Wong*), topotype—and larger acorns (2.5 cm. diam., 2.0 cm. long), or narrower, longer and more pointed leaves (up to 12 cm. long and averaging 2 cm. wide)—*Tsang 20272*, from Naam Kwan Shan.

[1] Merrill, *Ling. Sci. Jour.* 13(1) :22 (Jan. 1934).
[2] Merrill & Chun, *Sunyatsenia* 2(1) :5 (Sept. 1934).

The fruit in the two species is quite different. In *Q. litseoides* Dunn the fruits are only 9 mm. in diam. and 13 mm. long with grayish short pubescent cups; in *Q. Hui* Chun the acorns are larger, 2 cm. in diam. and 1.5 cm. long with shallow densely yellow tomentose cups.

Plate 15 gives a clearer idea of the differences between these two species

FRANKLIN P. METCALF

CURATOR OF HERBARIUM
LINGNAN NATURAL HISTORY SURVEY AND MUSEUM

杯菓及雷公菓(殼斗科)

麥克福著

(摘要)

第三次採得之杯菓，新近鑑定其學名爲 *Quercus litseoides* Dunn, *LU 19404* (*McClure*), 乃一罕見之品種。本文將杯菓與一普遍之雷公菓 (*Q. Hui* Chun) 互相比較。上述兩品種，其特徵各詳見於圖。

Explanation of Plate 15

Quercus litseoides Dunn, all figures one-half natural size.

Fig. 1. Branches, *LU 19404* (*McClure*), topotype, Lantau Island, third collection (Lingnan University).

Fig. 1a. Branches with young fruit, same collection.

Fig. 2. Branches, *HK 6437* (*Tutcher*), fragment of type, Lantau Island (Sun Yatsen University).

Fig. 3. Mature acorn. *N. K. Chun 41859*, topotype, Lantau Island, second collection (Sun Yatsen University).

Fig. 3a. Mature cup, same collection.

Quercus Hui Chun, all figures one-half natural size.

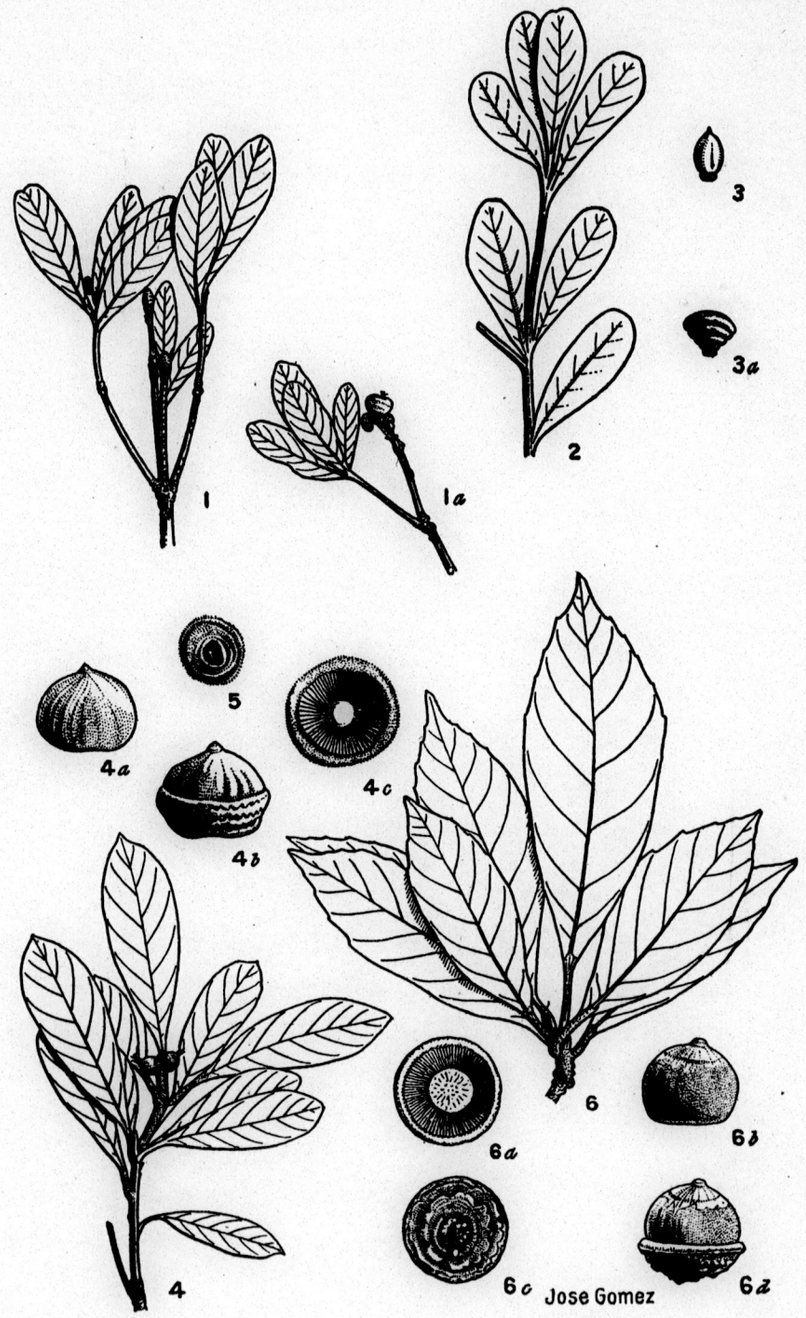
Fig. 4. Branches with young fruit, *W. Y. Chun 5868*, isotype, North River (Lingnan University).

Fig. 4a, b, c. Acorn and cup, *LU 6304* (*Levine*)*, Ting Wu Shan.

Fig. 5. Young stage of fruit, *Ko 51744*, Kwangtung (Sun Yatsen University).

Fig. 6a, b, c, d. Acorn and cup, same collection.

* This number was also used by Hu and Chun (Ic. Sin. Pl. 4:5, *pl.* 155, 1935) for illustrating the fruit. The type of the fruit is the herbarium of the Arnold Arboretum, Harvard University; the isotype at Sun Yatsen University is sterile.





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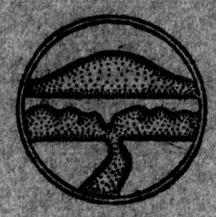
Alucita niveodactyla Pag. (Microlepidoptera: Pterophoridae), a Pest of Sweet Potatoes in Kwangtung.

By William E. Hoffmann



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Alucita niveodactyla Pag. (Microlepidoptera: Pterophoridae), a Pest of Sweet Potatoes in Kwangtung.—During the winter months, especially during December, there is extensive caterpillar damage to the leaves of sweet potato (*Ipomoea Batatas* Lam.) in the Canton area. One of the chief species involved is *Alucita niveodactyla* Pagenstecher, the caterpillars (fig. 1) of which are pale, delicate green, and possess relatively long whitish hairs. The caterpillars are from 7.5 to 8.0 mm. in length, and occur on the undersurface of the leaf; they turn yellowish before pupation. The larval period is about three weeks. Pupation occurs on the leaves of the host plant, on trash, and even on the ground, the pupae frequently being found in a horizontal position on vertical objects, ventral side against the object.

The pupa (fig. 2) measures 7.5 to 8.5 mm. in length, and a little less than 2 mm. in width. The anterior end is truncate, while the

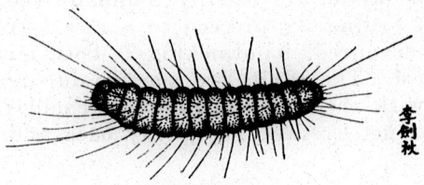

Fig. 1, larva.

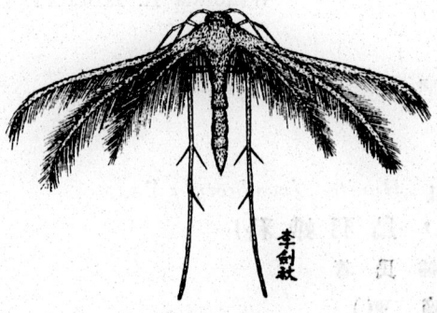

Fig. 3, adult.

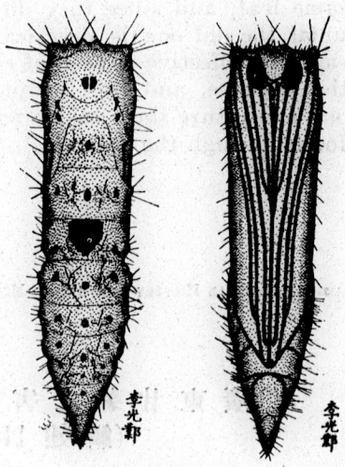

Fig. 2, pupa.

posterior end is pointed. The pupa is very hairy. At first whitish, later it is a beautiful green color, the dorsal surface being characterized by a number of brown spots, as indicated in the figure, which become more pronounced as transformation progresses. There is also a whitish or yellowish spot a little caudad of the middle, at least in pupae about one week old. The ventral side is characterized by the great length of the wing-pads, which extend for more than three-fourths of the entire length of the pupa. A few days before emergence the pupa become darker and more uniform in appearance. Specimens pupating on Jan. 3 emerged on Jan. 17, in Canton.

The adults (fig. 3) are delicate snowy-white insects with fringed wings and very long hind legs. They have a wing-expanse of 16 to 18 mm. The wings are deeply cleft, the fore-wings divided into two parts, the hind wings into three parts.

The eggs are light green in color, and are laid on the underside of the leaves.

In the literature available to the writer, only two references to *A. niveodactyla*, and these but brief mentions, have been found. In the Report of the Proceedings of the Third Entomological Meeting held at Pusa, India, in 1919, the species is recorded from the hills of India and Ceylon, the larvae feeding on *Ipomoea* sp. The other reference is an article by G. H. Corbett (*Malayan Agri. Jour.* 17(8):261-276, 1929) in which he records *A. niveodactyla* on sweet potato in Malaya.

Inasmuch as a number of the larvae are usually found on the same leaf, and since they do not ordinarily proceed to a new leaf until the old one is practically devoured, handpicking is both an easy and effective method of control. The adults are inactive during the daytime, and this, coupled with their conspicuousness, enables one to capture them easily with a net by sweeping gently back and forth through the foliage.

WILLIAM E. HOFFMANN

LINGNAN NATURAL HISTORY SURVEY AND MUSEUM

廣東甘薯之害虫 *Alucita niveodactyla* Pag.

(鱗翅目，鳥羽蛾科)

賀輔民著

(摘 要)

本文描述此甘薯害虫之幼虫，蛹，成虫；各期皆詳見於圖。幼虫色青。蛹色亦青，惟有有祿色之斑紋。成虫色白，翅有長毛。每年冬季，爲害最烈，幼虫期約三星期，蛹期亦約兩星期，赤手捕殺乃此害虫之最便防治法也。

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THREE SPECIES OF ALEYRODIDAE FROM CHINA (HOMOPTERA)

By Ryoichi Takahashi

Department of Agriculture, Government Research Institute, Taihoku, Formosa

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THREE SPECIES OF ALEYRODIDAE FROM CHINA (HOMOPTERA)

By Ryoichi Takahashi

Department of Agriculture, Government Research Institute, Taihoku, Formosa

Aleurolobus chinensis sp. nov.

(Pupa case.) Black, strongly sclerotized, not becoming clear when treated with caustic potash, but becomes yellowish-brown by being soaked in Schulz's mixture,[1] with a little white wax along the whole margin, but not covered with wax dorsally. Broadly elliptic, not narrowed on both ends, broadly rounded on the anterior and posterior margins not indented at the hind end, not constricted, about 1.27 times as long as wide, flattened. Suture between the meso- and metanota distinct, thin, as long as the sutures between the abdominal segments; transverse suture between the thorax and abdomen reaching the margin of dorsal disk, extending forward on the lateral part, reaching the hind part of mesonotum; abdominal segments distinct on the median area, the 7th segment shortest. Submarginal area well defined from the dorsal disk except on the posterior small part, wide, with many pale narrow markings running mesad from the margin, some small circular pale pores scattered, and 20 small circular dark spots in a row along the whole mesal margin, of which 12 are on the abdomen; a pair of similar dark spots present between the vasiform orifice and the hind end of pupa case; the pale narrow markings irregularly interrupted on the mesal part of submarginal area and some of them branched; the dark spots probably bear a minute seta. Dorsal disk distinctly reticulate on the marginal area except on the hind end, not corrugated, about 5.6 times as wide as the submarginal area, with some minute circular pores scattered, a pair of very short setae on the cephalothorax nearly between the eyes, and a pair of minute setae near the base of vasiform orifice; the 2nd–7th abdominal segments with a pair of small paler areas on the anterior margin; rhachis absent.

Eyes distinct, a little distant from the margin of dorsal disk. Thoracic tracheal combs not indented, not protruding, with about 5 short teeth, which are much wider than long, rounded on the distal margin, and much smaller than other marginal teeth; thoracic tracheal folds not discernible on the venter, but a distinct area

[1] Nitric acid (50 per cent)+a small amount of Kalium chloricum. The latter is added when the insects are soaked in the fluid.

present on the dorsum adjacent to each comb, which area is much narrower than the combs, reaching the mesal margin of submarginal area, and densely marked with many polygonal sculptures on the whole surface. Margin with 2 pairs of short usual setae and a pair of long fine setae at the hind end; marginal teeth sclerotized, short, wider than long, broadly rounded or truncate distally, and 8 or 9 of them occupying a space of about 0.092 mm.; no paler areas present at the bases of the teeth. Vasiform orifice somewhat longer than wide, normal in shape, without teeth, reticulate. Operculum similar in shape to the orifice, occupying most of the orifice. Lingula concealed. Lobes surrounding the orifice obscured on the distal half of submarginal area. Caudal furrow narrow, not prominent, with many polygonal sculptures on the distal half, the comb as in the thoracic ones. Antennae long, rather slender, with a very short process at the tip. Pupa case—about 1.12 mm. 0.074 mm. long; submarginal area—about 0.115 mm. wide; thoracic comb—about 0.042 mm. wide; antenna—about 0.231 mm. long; distance between vasiform orifice and hind end of pupa case—about 0.115 mm.

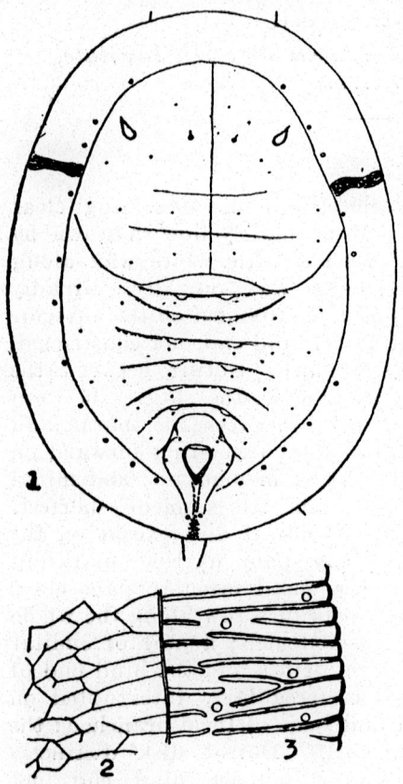

Fig. 1-3. *Aleurolobus chinensis* sp. nov. (pupa case). (1) dorsal view (2) markings on the marginal area of dorsal disk (3) submarginal area and marginal teeth.

Host: *Cercis chinensis*, attacking the leaf.

Habitat: Hwangyen, Chekiang.

Many specimens were collected by Mr. F. G. Chen, March 26, 1936. This species differs from other members of the genus in the marginal area of dorsal disk reticulated and in possessing a distinct sculptured area adjacent to each thoracic tracheal comb. The type specimens are in the collection of the author.

Aleurocanthus inceratus Silvestri

Boll. Lab. Zool. Portici, Italia, Vol. XXI, p. 6 (1927).

Hosts: *Citrus* sp., *Michelia champaca* L.

Habitat: Canton.

Many specimens were taken by Prof. Wm. E. Hoffmann in March and April, 1936. Hitherto known from Indo-China only.

Aleuroplatus pectiniferus Quaintance & Baker

Proc. U. S. Nat. Mus. Vol. LI, p. 393 (1917); Takahashi, Dept. Agri., Government Res. Inst. Formosa, Rept. No. 59, Aleyrodidae of Formosa, Pt. I, p. 30 (1932).

Host: An undetermined tree.

Habitat: Hwangyen, Chekiang.

A few specimens were collected by Mr. F. G. Chen in March, 1936, which are identical with the Formosan forms. New to the fauna of China. In Formosa this species is common and is sporadic in habit, attacking a wide range of plants, which include *Ficus*, *Salix*, *Gordonia*, *Morus*, *Alnus* and *Bischofia*.

I express here my sincere thanks to Prof. Wm. E. Hoffmann and Mr. F. G. Chen for their kindness in sending me these interesting specimens.

中國三種粉蝨

(同翅目)

高橋眞一著

(摘要)

Aleurolobus chinensis 乃一新種，採自浙江省之 *Cercis chinensis*。文中對此新種之描述尤詳，及加圖以釋明。此新種之異於其同屬之品種者，因其背盤緣成網狀，及近胸部氣管孔櫛之刻形部甚顯明。*Aleurocanthus inceratus* Silvestri 則採自廣州之柑橘，惟 *Aleuroplatus pectiniferus* Quaintance & Baker 則發現於浙江。此二者，在中國尙屬首次之記載。

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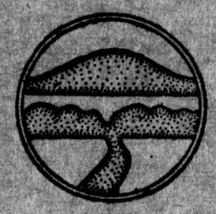
NEW AND LITTLE KNOWN FERNS FROM CHINA AND NEIGHBORING REGIONS

By R. C. Ching

Fan Memorial Institute of Biology



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NEW AND LITTLE KNOWN FERNS FROM CHINA AND NEIGHBORING REGIONS

By R. C. Ching

Fan Memorial Institute of Biology

(Concluded from *Lingnan Science Journal* Vol. 15, No. 2, p. 275)

Gleichenia cantonensis sp. nov. (§ *Dicranopteris*)

Rhizomate stipiteque desunt, gemma furcationis foliacea et paleis atrocastaneis, duris, 4 mm. longis, ovato-oblongis, subacuminatis, marginibus densissime fimbriatis dense arcte obtecta, ramis primariis usque ad 80 cm. longis, 40 cm. vel ultra latis, textura rigida, subtus glaucescenti, utraque glaberrima, bipinnatifia vel subbipinnata, rachibus teretibus, cinnamomeo-brunneis, subnitidis nudisque, pinnis numerosis, alternis, 3-3.5 cm. inter se distantibus, breve petiolatis, ad 30 cm. longis, 4 cm. latis, lineari-lanceolatis, basi aequaliter truncato-cuneatis, e medio versus apicem acuminatum sensim angustatis, fere ad rachin pectinato-pinnatifidis, segmentis 60-70-jugis, linearibus, subobliquis, ad 2 cm. vel paulo ultra longis, 2 mm. latis, sinubus latioribus separatis, marginibus integerrimis, leviter revolutis, apice obtusis, subemarginibus vel saepe cuspidatis, venis 20-jugis, supra basin regulariter unifurcatis, soris medialibus, in ramis anterioribus venarum furcatarum positis, sporangiis 2-4 (saepissime 3), magnis, globosis, superficialibus, flavescentibus, receptaculo elongato, nudo.

Kwangtung: Sin-i, *Y. K. Wang 30967* (type), roadside, July 17, 1931; Whampoa, one specimen without collector's name in Herb. Riksmuseum, Stockholm (type in Herb. Fan Memorial Institute of Biology; co-type in Herb. Bot. Inst., Coll. Agri., Sun Yatsen Univ., Canton).

The present remarkably distinct and pretty fern seems to have an intermediate systematic position between *G. glauca* Hk. and *C. laevissima* Christ, with, however, a stronger approach to the former, from which it differs in enormously larger size, the petiolate pinnae being up to 30 cm. long, 4 cm. broad, in suboblique (not patent) linear segments to 2.3 cm. long and only about 2 mm. broad with obtuse and emarginate (not abruptly acute) apices and reflexed margin, separated from each other by a broader sinus and in the axillary scales only half as long. From *G. laevissima* Christ, our species differs in its enormously large size, much smaller, short-acuminate axillary scales with densely fimbriate margin (not entire, nor long-acuminate) and in much less oblique segments with obtuse and emarginate (not sharply pointed) apices.

Gleichenia Blotiana C. Chr., Bull. Mus. Paris, ser. 2, 6: 103, 1934.

HAINAN: Kan-en-hsien, Chim Fung Ling near Sam Mo Watt village, *S. K. Lau 3810*, April 18, 1934, fairly common on dry wooded steep slope.

Additional description: Stipite uti videtur ad 65 cm. longo, basi fere ad 1 cm. diametro, paulo compresso, superne late sulcato, subtus tereto, paleis rufo-brunneis stellatis nec non paleis linearibus majoribus fimbriatis intermixis dense obtecto.

The Hainan specimen matches Christensen's diagnosis very well except that it is smaller, the primary division of frond hardly up to 30 cm. wide and over 100 cm. long, the middle pinnae up to 16 cm. long, 2.5 cm. broad. Clemens' specimen from Mt. Bana, Annam, is of the same dimension as the Hainan plant.

The species was originally described from specimens collected in Chapa and Massif du Tam Dao, Tongking (leg. *l'ételot No. 3900* & *524*) and also Mt. Bana, Annam (leg. *Sallet No. 3542*), wherefrom were described in the past several species of ferns which have subsequently been also found in the Island of Hainan.

Pteris sinensis nom. nov.

Pteris inaequalis Baker, Jour. Bot., 1875, p. 199 (*non* Presl, 1836, *nec Litobrochia inaequalis* Fée, 1866).

Caudex procumbente, thick, subnaked, stipe tufted, 30-45 cm. long, base castaneous, upward straminous, subglabrous, lamina oblong-deltoid, bipinnate or semibipinnate, 30-60 cm. long, 25-40 cm. broad, pinnae oblique, touch each other in the middle, 4-8 pairs, opposite, petiolate, 5-7 cm. apart, oblong, very caudate, base unequal-sided, the lowest pair much the largest, 15-20 cm. long, 5-7 cm. or broader, pinnatifid down nearly to costa into numerous lanceolate and upward-curving pinnules, of which those on the lower side are the largest, about 3-5 cm. long, 1-1.5 cm. broad, those on the upperside are shorter or entirely obliterated towards the long tail-like apical segment, margin finely toothed especially towards tip, texture flaccidly herbaceous, quite naked and green on both sides, veins fine but distinct, moderately close together, forked from above the base or the middle, veinlets with clavate apices, sori narrow, falling short of the tip of segments, indusium firm, persistent, about 1 mm. broad.

KIANGSI: Kiukiang (probably Lu-shan), *Dr. Shearer* (type). Also Japan, where it seems very common.

Pteris inaequalis Baker, which has subquently been reduced as *P. semipinnata* L. var. in C. Chr., Ind. Fil., is not at all related to that species but rather a close ally of *P. excelsa* Gaud. which differs in its much larger size and equally pinnatifid pinnae and pinnules with different shape of segments of almost equal length. Ample herbarium material has shown that the species seems to be common in Japan where it has generally been known as *P. excelsa* by authors on Japanese flora, including Franchet and Savatier[3]. It is, however, strange enough that the species has since the time of Shearer never been re-collected in Lu-shan or vicinity where much intensive collecting work in past two years has been conducted, especially by the Lu-shan Arboretum and Botanical Garden.

Pteris Porphyrophlebia C. Chr. and Ching sp. nov. (§ *Lithobrochia*)

Species pulchra *P. McClurei* Ching Chinae australis valde affinis, differt: pinnis lateralibus duplo longioribus et laciniis multo numerosis, nervis areolas pauces secus costulam lacinae aut efformantibus.

Rhizomate? stipite 30 cm. longo, ca. 3 mm. crasso, rufo-stramineo, vel laete castaneo, supra trisulcato, uti totta planta glabro, lamina oblongo-ovali, 60-45 cm. longa, ca. 30 cm. lata, profunde bipinnatifida, pinnis 5-jugis, 6-8 cm. inter se distantibus, valde obliquis, ca. 30 cm. longis, 6 cm. latis, apice breve caudatis, basi sessilibus decurrentibusque, infimis basiscopice furcatis, pinnuli basali inferiore quam superiore breviore sed consimili, omnibus fere ad costam profunde pinnatifidis, segmentis, ca. 30-jugis, 2-3.5 cm. longis, 7 mm. latis, sinu angusto separatis, versus basin pinnae sensim brevioribus, patentibus, obtusis vel acutis, marginibus remote crenato-serratis, textura crasse herbacea, utraque glabra, obscure viridi, rachi costisque subtus laete castaneis, ad basin costae superne setis spiniformibus instructis, venis areolam elongatam secus costam areolasque angulares puaces in segmentis efformantibus.

TONGKING: Province de Hoo Binh, *E. Colani 3451*, Dec. 1926 (type in Herb. C. Chr.).

Pteris amoena Bl., Enum. Pl. Jav., p. 210, 1828; Hook., Sp. Fil. 2: 204, 1858; Syn. Fil., p. 479, 1867; C. Chr., Ind. Fil., p. 592, 1905.

Stipe castaneous or rufo-straminous, glabrous, nitid, about 30 cm. long, lamina ovate-oblong, bipinnatifid, pinnae 2-4-jugate, the basal pair forked, sessile, 20-30 cm. long, 5-6 cm. broad, base shortly decurrento-cuneate, apex caudate, pinnatifid to a narrow wing along the costa (wings about 3-4 mm. broad on each side), rachis and underside of costa also shining and castaneous, segments oblong-subfalcate, 3-4 cm. long, 7 mm. broad, obtuse or acutish, margin serrate, sinus narrower or as broad as segments, veins forked, the anterior veinlet branching from the base of costule and the posterior one from the costa, campterid but never meet each other, indusium entire, membranaceous from base of segment upward to about one-third from the serrate apex.

[3] Enum. Pl. Jap. 2: 214.

JAVA: In shady place in mountains, *Blume* (type); *Raciborshi* in Herb. Hort. Bot. Bog.

INDIA: Northern Cashmia, *Gustav Mann*, 2500 ft. alt. Khasia: *Godwin Austen*, May, 1896.

The present species which is remarkably distinct in itself has been nearly forgotten by students of ferns. For this reason a complete description is here added. Although Hocker and later Baker accepted the species, its identity was perhaps never clear to them, as both have compared the species with *P. semipinnata*. In Recensio Specierum Generis Pteridis, J. G. Agardh questioned in a note whether the species should not be referred to *P. quadriaurita*, to which it is, in fact, not at all related. It appears that the species has frequently been confused with *P. excelsa* Gaud., *P. longipinnula* Wall. and forms of *P. quadriaurita* of authors, from all of which it differs in flaccid herbaceous leaves, and castaneous shining stipe, rechis and underside of costa, and in imperfectly campterid venation. In general appearance, the species resembles most closely *P. gemmata* Wall. of South India, differs chiefly in free venation.

Pteris tenuissima sp. nov.

Pteris quadriaurita var. *setigera* Hooker ex Bedd., Ferns Brit. Ind., pl. 202, 1868; Bedd., Handb. Ferns, Brit. Ind., p. 111, 1883.

Stipe 20 cm. long, pale straminous, naked, subnitid, lamina 25-35 cm. long, 10-15 cm. broad, narrowly oblong, caudate, pinnae 12-14-jugate, patent, sessile, but the lower ones shortly petiolate, the basal pinnae always forked or sometimes with several additional pinnae below, the upper ones sometimes likewise forked (as figured by Beddome), 3 cm. apart, 6-8 cm. long, 1.4 cm. broad, the sterile ones much longer (to 15 cm.), base truncate, apex caudate, pinnatifid nearly down to costa, segments 20-jugate (more in sterile ones), close, or with very narrow sinuses, 5-7 mm. long, 2 mm. broad (the sterile ones 1-1.5 cm. long, 3 mm. broad), rounded and entire, but inciso-serrate in sterile ones, texture membranaceous, pale green, glabrous, the spines on the costa above rather weak, pale-colored, veins free, 7-jugate, very oblique, the basal ones branching from the costule, mostly simple (but forked in sterile ones), sori continuous to near the apices, indusium gray, membranaceous, entire or sometimes suberosed.

INDIA: Moulmein, *C. Parish* (type), ter.

A very distinct endemic species of the group of *P. quadriaurita* of authors to which it is in fact not related at all, nor is the upperside of costa so strongly setiferous as some other species of the group; part of Beddome's figure which shows interrupted indusium can not be correct, as I can find no such thing on the type at Kew, and his habit sketch represents only a sterile frond of Parish's

collection, of which a part with fertile fronds is found in Hooker's herbarium.

Pteris pseudopellucida sp. nov.

Pteris pellucida f. *simplex* Hook., Sp. Fil. 2:161, pl. 129B, 1858.

Rhizomate brevi, foliis caespitosis, numerosis, stipite stramineo vel rufo-stramineo, gracili, stricto, glabro, 3-20 cm. longo, lamina ambitu valde variabili, aut simplex, lanceolata, 15-25 cm. longa, 2.5-5 cm. lata, aut trifoliata, aut pauci-pinnata cum pinnis unijugis infra apicem trifoliolatum, pinnis ca. 15 cm. longis, 3 cm. latis, acuminatis, serrulatis, versum apicem grosse serratis, basi pinnae terminalae secus rachin decurrenti, textura subcoriacea, paginis utraque laevibus nitentisque, marginibus foliis fertilibus cartilagineis et regulariter crenato-serratis, venis tenuibus, creberrimis (ca. 10 pro 1 cm.), obliquis, simplicibus aut furcatis, apice clavati, usque ad basin dentibus extensis.

ASSAM: Lushai W. J. L. *Wenger 202* (fronde pinnata); North of Cachar Hill, *Wm. C. Craib*, Aug. 24, 1808. KHASIA: *Griffith* (type); Chittagong, *C. B. Clarke 8281*, Jan. 10, 1869 (frondis simplex aut trifoliolatis).

This variable but distinct species is by no means related to *P. pellucida* Presl of the Philippine Islands and its affinity to *P. stenophylla* Wall. of the same region seems to be apparent enough, which differs in much longer and narrower pinnae with very entire margin even on the sterile fronds.

Pteris barbigera sp. nov.

Species ex affinitate *P. quadriauritis* (sen. lat.), a qua differt stipite spinis planis ad 4 mm. longis, atropurpureis, nitidis, rigidis, deltoideo-acuminatissimis integris, patentibus densissime barbato.

Stipe 30 cm. or longer, 2.5 mm. thick, densely beset through its entire length with dark purple, nitid, rigid, deltoid-acuminate, entire and patent spines about 4 mm. long, lamina broadly ovate-oblong, as long as the stipe, 25 cm. broad, tripinnate, pinnae 4-jugate, the basal ones much the largest, and forked at base below, the upper ones linear-lanceolate, 15-18 cm. long, 4-5 cm. broad, sessile, caudate, oblique, pectinately pinnatifid almost down to costa, segments 20-25-jugate, erect, close together, linear, 2.5-3 cm. long, 5 mm. broad, the basal ones shorter, apex rounded, margin entire, veins 14-jugate, distinct, forked, apice clavate, provided at the base above with a long gray spine, the anterior basal vein branching from costule, while the posterior basal one from costa which is provided at base above with a short stout spine, indusium membranaceous, entire, as long as the segment except the very tip.

NORTHERN INDIA: Nullab near Baybee, *J. Sykes Gamle 5217A*, Oct. 1872 (type in Herb. Kew).

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The present species is unique among the numerous closely related members of the group of *P. quadriaurita* in that its stipe is densely beset with dark purple shining strong flat spines; in other respects, however, it appears not much different from its relatives. The specimen at Kew has apparently been overlooked by early English botanists on British Indian ferns.

Athyrium Boryanum (Willd.) comb. nov.

Aspidium Boryanum Willd., Sp. Pl. 5 :285, 1810.

Lastrea Boryana Moore, Ind. Fil., p. 86, 1858; Bedd., Handb. Ferns, Brit. Ind., p. 266, 1883.

Nephrodium Boryanum Bak. *in* Hook., Syn. Fil., p. 284, 1867 (non Hook. 1862); Clarke, Trans. Linn. Soc., ser. 2, Bot., 1 :527, 1880; Diels *in* Engl. u. Prantl : Nat. Pflanzenfam. 1 :177, 1899; v.A.v.R., Handb. Mal. Ferns, p. 201, 1909.

Dryopteris Boryana C. Chr., Ind. Fil., p. 255, 1905.

Aspidium divisum Wall., Cat. No. 393, 1828 (*nomen nudum*).

Lastrea divisa Moore, Ind. Fil., p. 90, 1858; Bedd., Ferns S. Ind., pl. 97, 1863.

Nephrodium divisum Hook., Sp. Fil. 4 :135, 1862; Copel., Polyp. Philip., p. 26, 1905.

Dryopteris divisa O. Ktze., Rev. Gen. Pl. 2 :811, 1891.

Polypodium subtripinnatum Clarke, *op. cit.*, p. 545, pl. 80, fig. 1.

KWANGTUNG: Tsing Wan Shan, Wung Yuen-hsien, *S. K. Lau 2391*, Sept. 1, 1933, "fairly common in thickets by stream side, to 2 m. tall". ISLAND OF HAINAN: Without exact locality, *C. Wang 35351, 35301*, by stream side. KWANGSI: Bian Chen, W. Lin-yen-hsien, *R. C. Ching 6726*, August 5, 1928. YUNNAN: Mengtze, *W. Haucock 159* (1893-5); Valley of Fan-kian-ouan, *E. E. Maire*.

Distribution: Malesia, Réunion, the Philippines, India generally, Tongking, South and South-western China.

Type of the species, collected by Bory in insula Borbourn, is now found in Willdenow's herbarium at the Botanical Garden, Berlin. A large fern to 2 meters tall with ample and deeply tripinnatifid frond, pinnules oblong-lanceolate to 9 cm. long, the lower ones distinctly petiolulate, segments oblong with subtruncate or roundish apex and inciso-serrate margin from the sinus upward. The upper side of leaves and especially on rachis, costa and costules is rather copiously provided with pustulate puberulous rufo-brown hairs.

Almost without exception, authors have hitherto generally considered this well-known fern as a *Dryopteris*, or else under some of its later synonyms in earlier times, for the only reason that it is provided with *Dryopteris*-like but very fugaceous indusium. This character, however, is only superficial and rather misleading, for in regard to the general habit, the soft herbaceous green leaves,

manner of forking as well as internal structure, the species reveals to trained eyes at once its apparent affinity with *Athyrium* and especially the group represented by *A. unifurcatum* (Bak.) C. Chr., *A. Henryi* (Bak.) Diels, *A. Okuboanum* Makino and *A. virifrons* Makino, all native to East Asia, and all of which were previously described under *Nephrodium* or *Aspidium* on account of its *Dryopteris*-like indusium. I recognized the athyrid affinity of the species over six years ago; and in this Dr. C. Christensen agrees with me, as we see that the species proves itself to be very foreign from the members of any group of *Dryopteris* (cf. C. Chr. *in* Gard. Bull. Str. Settl. 7(3) :254, 1934).

Athyrium edentulum (Kze.) comb. nov.

Aspidium edentulum Kze., Bot. Zeit., 1846, p. 474; Mett., Farniat. Pheg. u. Aspid., No. 146, 1858.

Lastrea edentula Moore, Ind. Fil., p. 90, 1858.

Nephrodium edentulum Bak. *in* Hook., Syn. Fil., p. 279, 1867; Diels *in* Engl. u. Prantl : Nat. Pflanzenfam. (4)1 :174, 1899.

Dryopteris edentula O. Ktze., Rev. Gen. Pl. 2 :812, 1891; C. Chs., Ind. Fil., p. 262, 1905.

Nephrodium Boryanum var. *microstegioides* Clarke, l.c., p. 528.

Aspidium Boryanum Christ, Bull. Acad. Géogr. Bot., 1902, p. 256 (*non* Willd.).

Dryopteris Boryana C. Chr., Gard. Bull. Str. Settl. 7 :254, 1934 (*non* Ind.).

YUNNAN: Mengtze, *W. Hancock 7*. Kweichow: Gan-chow, *Cavalerie 2854, 7268, 7260, 7187; Paul Michel 981;* Houang-tsa-pa, *Cavalerie 7025;* Tuhshan, *Y. Tsiang 6690;* Sanhoa, *Y. Tsiang 6309;* Tu-yun, *Y. Tsiang 4957;* Kwei-yang, *Bodinier 2420*. SZECHWAN: Pa-hsien, *T. H. Tu 5096*. KWANGSI: Bako Shan, south of Peiseh-hsien, *R. C. Ching 7459*.

JAPAN: Skikuku, *Faurie 4533*.

Distribution: Malesia-Polynesia, Ceylon, Tongking, India generally, the Philippines, Japan and South-western China.

Although accepted in leading botanical literature, the identity of the present species has perhaps never been clear to most students of ferns. In Synopsis Filicum, Baker stated that he only quoted the description from Mettenius, who actually saw Kunze's species according to his diagnosis. In Malayan Ferns, Rosenburgh has entirely ignored the species. According to the type which is based upon *Zollinger 2746* from Java, the species proves to be most closely related to the preceding, differing chiefly in somewhat smaller size, the more or less adnate secondary pinnules, the oblong subtruncate or obtuse segments with entire margin (sometimes with a few remote incisions towards apex) and the mostly simple veins. Practically all herbarium material examined by me was labelled as *Dryopteris*

Boryana to which the species may perhaps equally be referred as a variety. *Athyrium viridifrons* Makino of Japan seems hardly different. This and the preceding ferns represents two species of the group with most finely divided leaves, while *A. unifurcatum* (Bak.) C. Chr. of Central China of the same group with least divided leaves. Between the two exremities there is a complete series of almost inseparable forms known as *A. Henryi* (Bak.) Diels, *A. Okuboanum* Makino and *A. viridifrons* Makino, all referable, in my mind, to a single species.

Polystichum semifertile (Clarke) comb. nov.

Aspidium aculeatum var. *semifertile* Clarke, Trans. Linn. Soc., ser. 2, Bot., 1 :509, 1880; Bedl., Handb. Ferns Brit. Ind., p. 209, 1883.

Polystichum eximio (Mett.) C. Chr. similinum, differt: soris indusiatis, pinnulis ultimis aristato-serratis rachi costisque subtus paleis fulvo-brunneis fibrillosis sparsioribus, ornatis.

Polystichum eximium (Mett.) has been found exindusiate or perhaps the indusium is very fugaceous, pinnules entire or crenate with blunt or acute teeth and underside of rachis and costa clothed in denser fibrillose scales.

YUNNAN: Szemeo, *Henry 12841, 13517;* Shweli-Salwin divide, *Forrest 26302;* Mengtze, *Hancock 86, 95;* Without locality, *T. H. Tsai 52572, 52578.*

SIKKIM: *Clarke* (type).

TONGKING: Environs du Chapa. *Pételot 5909.*

The chief interest in the species lies, primarily, in only its lower part of leaves being fertile, while the upper one-third remains sterile; but reversed conditions are found to be not unrare, as presented by Henry's plants from Yunnan, which were marked in pencil as n. sp. by Hope in the herbarium at Kew. That Clarke has referred the species to *P. aculeatum* is almost inconceivable, for it is altogether too big a fern to be considered as that species, the typical form of which has been so far unknown in the region concerned.

Gymnopteris bipinnata var. **auriculata** (Franch.) comb. nov.

Gymongramme vestita var. *auriculata* Franch., Pl. David. *in* Nouv. Arch. Mus. Paris, ser. 2, 10 :123, 1887.

YUNNAN: Mao-kou-tchang près Tapin-tze, *Delavay.* SZECHWAN: Moupin, *David.* HOPEI (formerly Chihli): Paita near Hsuenhwa, *Licent 9472,* July 16, 1930; Lungling, *Mr. Kwan 83* in herb. Tsinhua Univ., *T. Tang 1662; C. Wang 60880, 60571.* HUPEH: Packang, *Wilson 1840.*

Differs from the typical form in simple pinnate frond with entire, auriculately cordate pinnae.

A common fern inhabiting xerophytic conditions in Hopei and extending as far north as the border of Jehol and westwardly to Siawutai Shan bordering Chahar province. From the Himalayan *G. vestita* (Wall.), the type and its variety differ in their slender habit, thinner leaves, different type of indumentum of an albido-brown color, free venation and deeply auriculato-cordate pinnae, of which the lower ones are long-petiolate.

中國及其鄰邦之未經詳細研究與新蕨類植物

秦仁昌著

(摘要)

此文分兩期發表於本雜誌中。所論述之新蕨類植物，共凡十四種。發見於我國各省，印度支那，緬甸及印度等處。其中之一新變種，敘述頗詳。而每新種均用臘丁文描述。至其分佈等亦一一列明。本文應用新編名稱者六種；採用新名者二種；曾經研究而再加詳細討論者亦二種。

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TWO NEW TREMATODE PARASITES OF CANTON SNAKES (TREMATODA: LEPODERMATIDAE)

By F. G. WALLACE
Department of Biology, Lingnan University.

SEPARATE FROM
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LINGNAN SCIENCE JOURNAL
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Volume 15 1936 Number 3

TWO NEW TREMATODE PARASITES OF CANTON SNAKES (TREMATODA: LEPODERMATIDAE)

By F. G. Wallace
Department of Biology, Lingnan University.

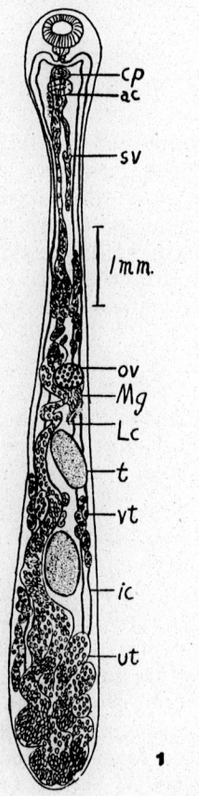
In making a survey of the parasites of local snakes the author encountered several species of trematodes, of which the two most common are here described as new species. Names of the reptile hosts are taken from Pope (1935). Where other authors have referred to a snake under a different generic name this name is included in parentheses. Names of the possible frog hosts are taken from Boring (1934). The author wishes to express his gratitude to Dr. W. A. Riley and Mrs. M. C. Spriestersbach of the University of Minnesota for furnishing abstracts and copies of certain literature.

Saphedera cantonensis n. sp. (fig. 1, 2, 3)

The following description is based on 15 whole mount slides and one series of transverse sections. Measurements of length and width are from specimens in alcohol. Other measurements are averages from 10 representative whole mounts.

Description.—Elongate cylindrical trematodes about 10 mm. long and 1 mm. wide. Anterior end rounded, second quarter of body narrow but posterior half approximately same width as anterior end (fig. 1). Entire body covered with irregular rows of spines which are more sparse toward posterior end. Oral sucker sub-terminal, ventral, .580 mm. wide. Acetabulum about 1 mm. posterior to oral sucker, .450 mm. wide. No pre-pharynx. Pharynx .400 mm. long and directed postero-dorsad. Oesophagus very short, branches into two caeca which double forward to level of pharynx before continuing backward nearly to posterior tip of body. Ovary (fig. 1, ov) median, approximately in middle of body length, sub-spherical, about .400 mm. in diameter. Testes (fig. 1, t) tandem, behind ovary, sometimes displaced slightly from mid-line toward alternate sides. Anterior testis .680 mm. × .462 mm., posterior testis .788 mm. × .480 mm. Testes separated by a distance less than their length. Vasa efferentia pass forward to a point about two thirds of distance from ovary to ventral sucker where they unite

to form seminal vesicle (fig. 1, sv). Seminal vesicle passes forward with a few twists and loops, dorsal to acetabulum, and at front margin of the latter enters cirrus pouch (fig. 1 & 2, cp). Cirrus pouch a pyriform sac with dilated end, about .150 mm. in transverse diameter, narrow end directed ventrad toward genital pore which is in mid-line (fig. 2 gp). Cirrus pouch contains terminal portion of seminal vesicle and ductus ejaculatorius (fig. 2 de), both of which are surrounded by prostate gland cells. No cirrus. Vitellaria



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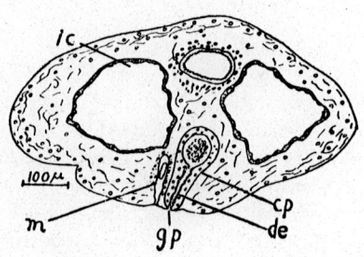

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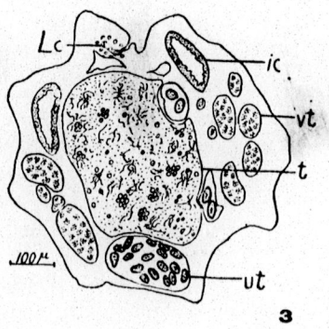

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Saphedera cantonensis n. sp.

Fig. 1 Ventral view of *Saphedera cantonensis* n. sp. Fig. 2 Transverse section through cirrus pouch. Fig. 3 Transverse section through testis.

Explanation: ac—acetabulum, cp—cirrus pouch, de—ductus ejaculatorius, gp—genital pore, ic—intestinal caecum, Lc—Laurer's canal, m—metraterm, Mg—Mehlis' gland, ov—ovary, sv—seminal vesicle, t—testis, ut—uterus, vt—vitellaria.

(fig. 1, vt) consist of 3 to 6 clusters of large follicles ventral to intestinal caeca on each side, those on left extending farther posteriorly than those on right. Large Mehlis' gland (fig. 1, Mg) directly behind ovary. Laurer's canal (fig. 1 & 3, Lc) long, extending through Mehlis' gland and posteriorly as far as first testis where it opens on dorsal surface. Loops of uterus fill entire posterior end of body and most of space between testes but straighten out at anterior testis to continue with few deviations from a direct course over ventral sucker to open at one side of and slightly behind male opening (fig. 2, m). Metraterm or portion of uterus from just behind acetabulum to genital pore thick-walled and surrounded by glandular cells. Eggs about .035 mm. × .017 mm.

Host: *Natrix piscator* (Schneider).

Location in host: Lung.

Distribution: Canton, China.

Type specimens: Department of Biology, Lingnan University.

This species is very closely related to *Saphedera longicollis* (Abildgaard 1806), which was first described as *Fasciola longicollis* and was later separately described as *Distomum naja* by Rudolphi. Looss in 1899 designated the latter species as type of his new genus, *Macrodera*, but in 1902 (Looss, 1902, footnote 2, p. 732), because of the preoccupation of the name by *Macroderes* Westwood 1843, which differs only in the ending, renamed the genus *Saphedera*. Lühe (1909, p. 102) gave a description and figure of *Saphedera longicollis* listing *Distomum naja* Rud. as a synonym. This species is found in the lung of *Tropidonotus natrix* (L.) in Europe (Lühe, 1909 and Rizzo, 1902).

The species here described agrees with *Saphedera longicollis* in every respect but the size of the suckers. Lühe's figure and description explicitly state that the ventral sucker is larger than the oral. In our specimens the relative sizes of the suckers are reversed. As this genus is supposed to stand in a position intermediate between *Haplometra* Cohn and *Pneumonoeces* Looss it appears that *Saphedera cantonensis* represents another step in evolution toward *Pneumonoeces* which has a very small acetabulum.

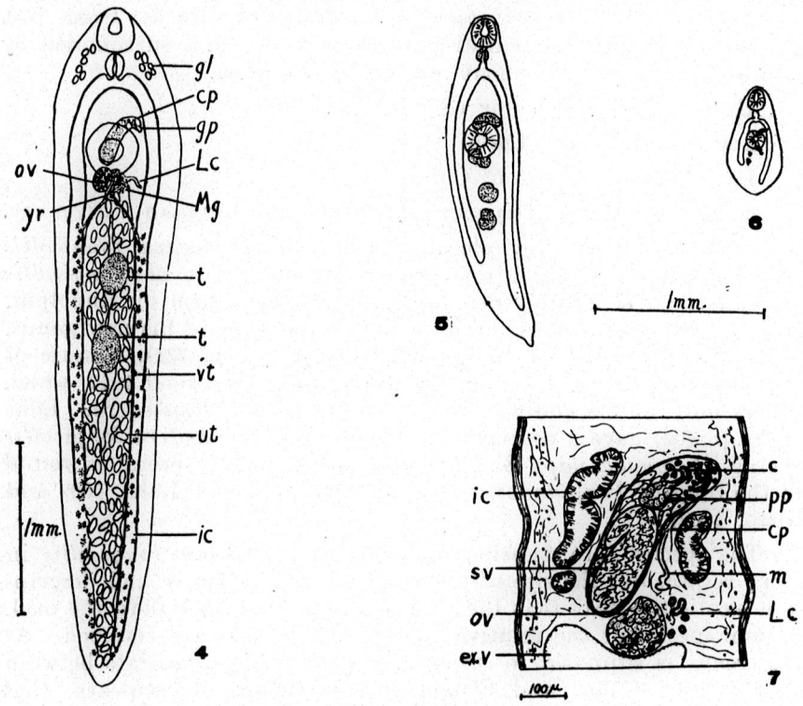
Saphedera cantonensis is found in the lung of *Natrix piscator*, one of the most common snakes of this region. Twenty out of 52 snakes of this species were found infested. The intensity of infestation varied from one or two worms to more than one hundred per snake.

Encyclometra asymmetrica n. sp. (fig. 4, 5, 6)

The following description is based on a study of 15 whole mount slides, 3 sets of transverse, 2 sets of sagittal, and 1 set of frontal serial sections. Unless otherwise stated measurements are averages taken from the 15 whole mount slides.

Description.—Flattened elongate distomes averaging 4.48 mm. in length and 1.07 mm. in width. Dimensions of mature specimens vary from 7.16 mm. × .9 mm. to 3.2 mm. × 1.5 mm. depending on

the degree of contraction. Body flat below and rounded above. Cuticula unarmed. Oral sucker sub-spherical, sometimes slightly elongate, opens ventrad, .385 mm. wide. Acetabulum .431 mm. wide, sometimes slightly elongate (fig. 4). Pre-pharynx very short, visible



Encyclometra asymmetrica n. sp.

Fig. 4. Ventral view adult. Fig. 5. Ventral view of immature form from snake. Fig. 6. Ventral view of metacercaria, possibly *E. asymmetrica*, from muscles of *Rana limnocharis*. Fig. 7. Frontal section through cirrus pouch and ovary.

Explanation: c—cirrus, cp—cirrus pouch, gl—pharyngeal glands, gp—genital pore, ic—intestinal caeca Lc—Laurer's canal, m—metraterm, Mg—Mehlis' gland, ov—ovary, pp—pars prostatica, sv—seminal vesicle, t—testis, ut—uterus, t—vitellaria, yr—yolk reservoir.

only in sections. Pharynx ovoid, .150 mm. wide. Oesophagus very short. Glands present in parenchyma lateral to pharynx and oesophagus (fig. 4, gl). Intestinal caeca (fig 4, ic) practically straight no matter what the degree of contraction of body. Left caecum nearly reaches posterior end of body, right caecum invariably shorter. Difference in caecal length evident but slight in contracted specimens while very great in extended specimens. In one specimen 6.7 mm. long the right caecum is only 56 per cent as long as left caecum. Excretory bladder an irregularly cylindrical chamber extending from posterior end of body, dorsal to testes, to a position between ovary and first testis where it divides into two wide branches

which continue forward to posterior margin of acetabulum. Ovary dorsal to posterior margin of acetabulum (fig. 4, ov), slightly to right, sub-spherical, .181 mm. wide. Laurer's canal (fig. 4 and 7, Lc), much coiled and convoluted, lies on left of ovary and opens on dorsal surface some distance to left of main coiled part and posterior to or at level of ovary. Small, bent, cylindrical seminal receptacle directly dorsal to Laurer's canal into which it opens. Directly below Laurer's canal is the compact Mehlis' gland (fig. 4, Mg) through which oviduct passes. Below Mehlis' gland oviduct is joined by yolk reservoir (fig. 4, yr) which receives a vitelline duct from each side. Vitellaria (fig. 4, vt) are small rounded follicles in two more or less regular lines on either side of body extending from posterior end nearly to ovary. Vitellaria ventral to intestinal caeca. Uterus (fig. 4, ut) extends to posterior end of body passing on either side of both testes. Metraterm (fig. 7 m) lies beside cirrus pouch and at distal end of latter opens with cirrus into common genital sinus. Testes (fig. 4, t) directly behind one another or sometimes diagonal in contracted specimens, varying in shape from elongate in extended specimens to transversely elongate in contracted specimens. Anterior testis .223 mm. long and .242 mm. wide. Posterior testis .231 mm. long and .262 mm. wide. Cirrus pouch (fig. 4 and 7, cp) large, lies diagonally above acetabulum with anterior end toward left, always curved so that distal end is directed latero-ventrad or even postero-ventrad. Total length about .385 mm. in a few favorable specimens. In its proximal two-thirds cirrus pouch contains seminal vesicle (fig. 7, sv) which is bent twice upon itself. In distal third of cirrus pouch seminal vesicle continues into thick-walled pars prostatica (fig. 7, pp), .085 mm. long in one section. This opens into cirrus (fig. 7, c) which is bent into several loops. Seminal vesicle and pars prostatica surrounded by relatively large vesicular cells. Cirrus surrounded by smaller, more deeply—staining cells. At distal, i.e. ventro-lateral, end of cirrus pouch metraterm joins male duct and the common genital sinus formed by this union passes postero-laterad to genital pore (fig. 4, gp) which lies a considerable distance to left of and about level of middle of acetabulum. Genital sinus about .100 mm. in length. Eggs .088 mm. in length.

Hosts: *Natrix piscator* (Schneider), *Natrix stolata* (L.), *Enhydris chinensis* (Gray), *Enhydris plumbea* (Boie), *Ptyas korros* (Schlegel), and *Ptyas mucosus* (L.).

Location in host: Stomach and oesophagus.

Life history: Metacercariae probably in muscles of *Rana limnocharis* Gravenhorst and *Ooeidozyga lima* (Gravenhorst).

Distribution: Canton, China.

Type specimens: Lingnan University, Department of Biology.

Encyclometra asymmetrica is very closely related to *Encyclometra caudata* (Polonio 1859) and obviously belongs to the same genus. Baylis and Cannon (1924a) described a trematode parasite of the snake *Tropidonotus natrix* (L.) in Italy as *Encyclometra natricis* n. g., n. sp. On the same day appeared another description (Baer, 1924) of the same species as *Odhneria bolognensis*, n. g., n. sp. Later Baylis and Cannon (1924b) called attention to this duplication of names and pointed out that the name *Odhneria* was preoccupied, and that *Encyclometra* must be used. As the date on the journal containing Baer's paper was January 31, while that on the journal containing their own was February, Baylis and Cannon grant priority to the specific name *bolognensis* (Baer). Dollfus, in Joyeux and Houdemer (1928), states that this name is a synonym of *Distoma caudata* (Polonio 1859) so the species should be known as *Encyclometra caudata.*[1]

Encyclometra caudata is reported from the digestive tract of *Tropidonotus natrix* (L.) in Italy, *Ptyas* (*Zamenis*) *mucosus* (L.) in Tongking (Joyeux & Houdemer, 1928), and *Natrix* (*Tropidonotus*) *piscator* (Schneider) in Burma (Bhalerao, 1926).

Another closely related species, *E. japonica* Yoshida & Ozaki 1929 has been recently described in Japan from the snake *Elaphe quadrivirgata* (Boie). This differs from *E. caudata* in the more anterior position of the ventral sucker and in the position of the testes which lie obliquely in the middle of the body instead of tandem in the posterior half of the body as in *E. caudata*. The caeca of *E. japonica* are of equal length, even in elongate specimens, so the present species is distinct from it.

Encyclometra microrchis (Yamaguti 1933) described from a single specimen found in "*Enhydrus plumbeus*" in Formosa, is distinguished from other species in the genus by its small testes and the position of the uterus which lies above the testes and does not extend into the posterior part of the body. The right caecum is slightly shorter than the left but Yamaguti ascribes no particular significance to this point. Though similar to the present new species in the inequality of the caeca, *E. microrchis* differs in the points noted above and in the diagonal position of the small spherical testes. In *E. asymmetrica* the ellipsoidal testes are directly behind one another except in extremely contracted specimens in which they take the diagonal position because of mutual pressure.

[1] At the same time Dollfus lists as a possible synonym *Distomum colubrimurorum* (Rudolphi) but states that in the absence of type specimens and an adequate description this name must remain in question. Later Dollfus (1929) in a footnote gives *Encyclometra colubrimurorum* as the proper name of the species with no explanation of his change in opinion. It is not our purpose here to decide in favor of any of the many names applied to this parasite but the author feels that the identity of the worm in question is clear.

Certain errors in the measurements given by Baer were pointed out by Baylis and Cannon in their later paper so their original measurements are taken as the basis for comparison.

The species here described is similar to *Encyclometra caudata* in the general size and shape of the body, spineless cuticula, arrangement of the reproductive organs, branching of the excretory vesicle, and in particular in the position of the uterus, which passes around rather than between the testes. It differs from *E. caudata* in several respects. Though the average size of *E. asymmetrica* is near the upper limits of size given by Baylis and Cannon, the suckers are smaller. The oral sucker of *E. caudata* is .460 mm. – .660 mm. wide, while that of *E. asymmetrica* is .246 mm. – .446 mm. wide, the average being .385 mm. The acetabulum of *E. caudata* is .490 mm. – .780 mm. wide, while that of *E. asymmetrica* is .231 mm. – .780 mm. wide, while that of *E. asymmetrica* is .231 mm. – .693 mm., average .431 mm., wide. The pharynx is smaller, being, on the average, .130 mm. wide and reaching an extreme of .260 mm. only in two specimens that were contracted and artificially compressed. The pyriform shape of the pharynx mentioned by Baylis and Cannon and observed by Bhalerao in some of his specimens was not noticed. The ovary and testes are somewhat smaller in *E. asymmetrica* than they are in *E. caudata.*

Aside from these differences the author wishes to direct particular attention to the chief distinguishing feature of this new species, the asymmetry of the intestinal caeca, the left caecum always being longer than the right. On first consideration it may seem that a difference in these organs is not sufficient basis for distinguishing a new species. Indeed Baer, referring to the caeca of *E. caudata*, writes, "It is hard to estimate their exact length for in the same specimen, when alive, the length of the coeca varies, attaining sometimes half the original length, without showing any signs of contraction, at one time one coecum was even longer than the other. It seems clear that this character cannot be regarded either as generic or specific, and should not be considered of systematic importance." Despite this statement the author believes that, whatever may be the case in *E. caudata*, in *E. asymmetrica* the difference in length of the caeca can not be considered to be due to fortuitous variation but is an integral feature of the structure of the worm. The caeca were examined in 37 whole mounts and in 6 sets of serial sections as well as in a large number of living specimens, and in every case the left caecum exceeded the right in length.

The question arises as to whether the same difference, though un-noted, may exist in *E. caudata*. In contracted specimens, such as that illustrated by Baylis and Cannon, the difference is always slight, and in their figure the right caecum appears to be slightly

shorter. On the other hand they make no mention of any constant asymmetry, a feature that could hardly be overlooked if present in a series of several specimens such as they had available. Furthermore Baer, who studied a large number of living specimens, and Bhalerao, who studied 16 or 18 specimens, did not find this condition. It is believed that this inequality in the length of the intestinal caecum constitutes a sufficiently striking and constant peculiarity to be used, along with the minor differences noted above, to differentiate *E. asymmetrica* from its nearest known relative.

Encyclometra asymmetrica has been found in the stomach and œsophagus of 44 out of 52, or 85 per cent, of the *Natrix piscator*, 9 out of 19, or 47 per cent, of the *Enhydris chinensis*, 4 out of 4, or 100 per cent, of the *Enhydris plumbea*, 2 out of 11, or 18 per cent, of the *Natrix stolata*, 1 out of 1, or 100 per cent, of the *Ptyas korros*, and 1 out of 3, or 33 per cent, of the *Ptyas mucosus* examined. The intensity of infestation per snake varied from 1 worm to nearly 100, the heaviest infestations being found in *N. piscator*.

Yamaguti (1936) has experimentally proved that *Rana nigromaculata* Hallowell acts as the intermediate host of *E. japonica* in Japan.

Though no feeding experiments to determine the source of infestation have been attempted on account of the difficulty of obtaining parasite-free snakes, certain evidence as to the identity of probable second intermediate hosts is at hand. In the muscles of the frogs, *Rana limnocharis* and *Ooeidozyga lima*, collected from the same area as were the infested snakes, metacercariae bearing a suspicious resemblance to the adult parasites were found (fig. 6). These metacercariae were found in spherical transparent cysts which appear opaque white in reflected light. The worms removed from the cysts were from .650 mm. to .725 mm. in length. The relative size and positions of the suckers, genital primordia, and cirrus pouch were similar and in addition, in some specimens, the right intestinal caecum was shorter than the left. In some of the snakes, immature *E. asymmetrica* of various sizes (fig. 5) were found mixed with the mature parasites. The similarity of the metacercariae to the immature forms in the snakes, together with the fact that *Natrix piscator*, the most common host, is known to subsist largely on a diet of frogs and tadpoles, suggests strongly that these two species of frogs act as the second intermediate hosts of *E. asymmetrica*.

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廣東蛇類蛭蟲之兩新種

華理斯著

(摘要)

花蛇 (*Natrix piscator*) 肺內有一種蛭蟲，與 *Saphedera longicollis* 頗相似；其不同之點在於本蟲之口吸盤，比較腹吸盤大，因乃以新種視之，稱之爲 *Saphedera cantonensis.*

更有一種蛭蟲住於花蛇，紅頭蛇 (*Natrix stolata*)，水蛇 (*Enhydris chinensis* 與 *E. plumbea*)，過樹蓉 (*Ptyas korros*)，與大眼蓉或稱水律 (*Ptyas mucosus*) 食管與胃內，其屬名爲 *Encyclometra.* 本蟲之與他種 *Encyclometra* 不同之點，在於右盲腸較左盲腸短；且二睾丸係前後直列，因乃命名之爲 *Encyciometra asymmetrica.*

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A TAXONOMIC STUDY OF THE GENUS ASPERGILLUS AROUND WUCHANG, CENTRAL CHINA (HYPHAMYCETES)

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A TAXONOMIC STUDY OF THE GENUS ASPERGILLUS AROUND WUCHANG, CENTRAL CHINA (HYPHAMYCETES)[1]

By Y. K. Shih (Shih You-Kuang, 施有光)
Laboratory of Applied Mycology, College of Agriculture, Hokkaido Imperial University, Sapporo, Japan.

This work is a taxonomic study of the genus *Aspergillus* found around Wuchang, Central China. In the course of study, more than two hundred pure cultures were isolated from diverse sources of material. These have been submitted to Dr. Charles Thom of the U. S. Department of Agriculture, Washington D. C. for determination. Of these cultures, forty-two species and strains, including two new species and three new varieties, were recognized by him. The new species and new varieties have been named *A. Chungii*, *A. laokiashanensis*, *A. luchuensis* var. *rubeolus*, *A. terreus* var. *floccosus*, and *A. terreus* var. *subfloccosus*. The following is a brief report of the morphological studies of these organisms.

This work was started in the fall of 1932 at the Department of Botany of Wu-Han University, Wuchang, China, under the direction of Professor H. H. Chung and finished in 1935 at the laboratory of Applied Mycology of the Hokkaido Imperial University, Sapporo, Japan, under the direction of Professor Jun Hanzawa. The writer carried on the studies as a fellow of the China Foundation for the Promotion of Education and Culture. He is greatly indebted to the officers of the foundation for financial support; to Dr. Charles Thom for his great favor in identifying the species; to the authorities of Wu-Han University and the Hokkaido Imperial University for the facilities supplied; finally to Professors H. H. Chung and Jun Hanzawa for their kind suggestions and valuable criticisms throughout the work.

Method of Investigation

The culture medium used in this work is Czapek's agar unless otherwise stated. Potato agar, Koji agar, nutrient agar, Koji and Czapek's gelatine, and dung decoction agar were also occasionally used when comparative study of the cultural characters of some species was made. The sources of material used in this experiment are different kinds of foodstuffs, fruits, vegetables, meats, dead twigs and leaves, waste paper, old leather, manures, feathers, etc., as stated under the habitat of each species and strain. These materials were at first placed in moist chambers and incubated at various temperatures, from which the molds were then isolated.

[1] Supported by a research grant of the China Foundation for the Promotion of Education and Culture.

Cultures have also been obtained from the air by exposing the sterilized agar plates in different places. The pure cultures were incubated at 27°C. for microscopic examination. The color descriptions are based entirely on Ridgway's Color Standards and Color Nomenclature.

Generic Characterization of Aspergillus

Aspergillus is one of the largest and most familiar genera in the Hyphomycetes. They are easily recognized by their characteristic heads which are more or less round, columnar, or clavate and consist of conidial chains and sterigmata. The whole appearance simulates a brush which suggests the generic name *Aspergillus*, meaning "rough brush." The submerged mycelium, which consists of interlacing septate hyphae, gives rise to unbranched stalks or conidiophores which terminate at their tips in globose, elliptical or clavate fertile vesicles. From the vesicles sterigmata are given off in either one or two series; in the latter case they are called primary and secondary sterigmata respectively. The sterigmata in turn give rise to conidia with characteristic colors and markings. Occasionally some species produce sclerotia with specific markings and colorations.

Description of Species and Strains

1. **A. giganteus** Wehmer

Colonies from gnaphalium green (Plate XLVII 29′′′′. GG-Y. d) to olive gray (Plate LI 23′′′′′. yellow, b), with yellow drops, smooth in Czapek's agar but slightly wrinkled in koji agar, aerial hyphae very few in Czapek's agar but so very abundant as to cover entirely the colonies in koji agar, reverse and agar light greenish-yellow (Plate V 25. YG-Y. b) when young, becoming yellow ocher (Plate XV 17′. O-Y) when old; heads clavate, with conidial chains diverging into 2, 3, or 4 compact bundles; stalks smooth, colorless, more or less sinuous, 210 to 800μ by 18 to 35μ, but up to 1 cm. long in its natural substratum, the monkey dung, and in koji gelatine; vesicles clavate, 84 to 182μ by 35 to 50μ; sterigmata in one series, closely covering, colorless, 7 to 10μ by 2.3 to 3.4μ; conidia smooth, yellowish-green in mass, predominantly elliptical, rarely globose, 2.8 to 4.6μ by 2.4 to 3.7μ.

Habitat: On monkey dung (culture No. A195).

2. **A. clavatus** Desm. strain I

Colonies at first dark porcelain green, through nickel green (Plate XXXIII 39′′. B-G. i, k) to final tea green (Plate XLVII 25′′′. G-Y. b), broadly spreading in two days in koji agar, with narrow white margin during the growing period, showing powdery in age, elaborately wrinkled, drops colorless and abundant, reverse and agar colorless when young, gradually becoming Saccardo's umber (Plate XXIX 17′′. O-Y. k) in age; heads clavate; stalks with walls thin and smooth, colorless, gradually enlarged upward, easily collapsed in glycerine mount, showing uneven ends when broken, 600 to 1400μ by 16 to 30μ; vesicles clavate, thin-walled, uncolored, 60 to 150μ by 30 to 50μ; sterigmata in one series, light greenish-yellow, densely covering the fertile area, 8 to 13μ by 2.5 to 3.5μ; conidia elliptical, greenish in mass, smooth, thin-walled, 2.5 to 5.2μ in long axis.

Habitat: On bread (culture No. A52).

3. **A. clavatus** Desm. strain II

This differs from the foregoing strain in that its colonies are floccose, with white woolly base, growing much more vigorously, and with far longer stalks up to 4 mm.

Habitat: from air culture in the kitchen of Wu-Han University (culture No. A266).

4. **A. repens** (Corda) Saccardo

Colonies at first lumiere green (Plate XVII 29′. GG-Y. b) then chalcedony yellow, light chalcedony yellow (Plate VVII 25′. YG-Y. b, d) for the development of yellow perithecia, becoming buffy brown (Plate XL 17′′′. O-Y. i) in age, growing very slowly but rapidly spreading and showing grape green (Plate XLI 25′′′. YG-Y.) in koji agar, conidial production greatly reduced by the growth of perithecia, not wrinkled, reverse at first grape green then isabella color (Plate XXX 19′′. YO-Y. i); heads globose, green colored; stalks arising directly from substratum or occasionally as branches of the aerial hyphae, smooth, colorless or somewhat dark yellow at the upper portions, mostly septate, gradually enlarged upward, 350 to 840μ by 8 to 14μ; vesicles varying from only slight apical dilations of the stalks to globose, 13 to 32μ in diameter, sterigmata loosely clustered, fairly large and yellow colored, sometimes abnormally proliferating to become short secondary stalks with or without smaller heads, in one series, 7 to 10μ by 2.5 to 4μ; conidia green, finely pitted, with distinct connectives, thick-walled, predominantly elliptical, varying greatly and of extraordinarily large size, 5.6 to 11.5μ in long axis; perithecia bright yellow, globose or subglobose, with wall cells polygonal, 46 to 90μ in long axis; asci roughly globose, thin-walled, 8-spored, 7 to 11μ in diameter; ascospores elliptical, colorless or nearly so, thick-walled, without ridges and definite furrows, 4.2 to 5μ in long axis.

Habitat: From air culture in a kitchen in a village near Wu-Han University (culture No. A434).

5. **A. amstelodami** (Mangin) Thom and Church

This species was lost after identification, and no description can be given here.

Habitat: On old cloth (culture No. A422).

6. **A. fumigatus** Fresenius strain I

Colonies from artemisia green (Plate XLVII 33′′′. GY-G.) to dull greenish (Plate XLVII 33′′′. GY-G. m), becoming fuscous (Plate XLVI 13′′′. OY-O. k) in age, slightly folded but deeply wrinkled in koji agar, velvety, broadly spreading, with white margin and colorless drops even in age, reverse and agar colorless when young, becoming cinnamon-buff (Plate XXIX 17′. O-Y. b) when old; heads columnar, with conidial chains up to 200μ long; stalks more or less sinuous, with walls colorless or fuliginous gray near the apex, smooth, gradually enlarged upward, 100 to 280μ by 5 to 8.4μ; vesicles globose or flask-shaped, with fertile area nearly hemispherical, 10 to 28μ in diameter; sterigmata in one series, closely packed and evenly arranged, roughly parallel to axis of the stalks, brownish-yellow, 5 to 8μ by 1.7 to 2.5μ; conidia dark green in mass, globose, delicately roughened, 2.4 to 3μ in diameter.

Habitat: From air culture in the dormitory of Wu-Han University (culture No. A250).

7. **A. fumigatus** Fresenius strain II

It resembles strain I in microscopic characteristics and measurements; but it differs from the latter in colony characters, especially in the color changes; colonies colored from nickel green (Plate XXXIII 37′. GB-G. k) to deep slate-green (Plate XLVII 29′′′. GG-Y. k), becoming dark olive (Plate XL 21′′′. O-YY. m) in age, drops light yellowish, not wrinkled, reverse and agar at first deep olive buff (Plate XL 21′′′. O-YY, b) then cinnamon buff to final cinnamon (Plate XXIX 17′. O-Y. b; 15′′. Y-O.).

Habitat: From soil culture (culture No. A375).

8. **A. nidulans** (Eidam) Winter

Colonies from white to Kronberg's green (Plate XXXI 25′. YG-Y. k), becoming olive (Plate XXX 21′. O-YY. m) in age, showing shade of empire green (Plate XXXII 33′. GY-G. m) in maturity in koji agar, thinly felt, sometimes conidial production reduced and showing leathery incrustation in the perithecial area, a tuft of white aerial hyphae persistently growing over the initial area, not wrinkled, reverse from fawn color to bone brown (Plate XL 13′′. OY-O.; m), agar becoming clay color (Plate XXIX 17′. O-Y.) when old; heads columnar, up to 360μ long; stalks smooth, cinnamon brown, gradually enlarged upward, formed from the slight dilations of the stalks, with the same color as the stalks, 9 to 16μ in diameter; sterigmata roughly parallel to axis of the stalks, yellow, easily fallen, in two series, primary 5 to 7μ by 2 to 2.5μ, secondary 7 to 9μ by 2μ; conidia rather uniform in size, globose, green in mass, roughened, 3 to 3.5μ in diameter; perithecia ripening slowly over a period of two weeks, globose, reddish-brown, up to 200μ in diameter,

surrounded by abundant light yellowish Hülle cells up to 22μ in diameter and with walls 4 to 7μ in thickness; asci 8-spored, with walls easily collapsed, roughly globose, 9 to 13μ in diameter; ascospores purple red, thick-walled, elliptical or globose, with valves slightly separated, with trace of furrow and two frills, 4 to 5.5μ in long axis.

Habitat: From air culture in a kitchen of a village near Wu-Han University (culture No. A202).

9. **A. laokiashanensis** nov. sp.

Caespitulis albis dein flavidis olivaceis et demum leviter fusco-olivaceis, velutinis, hyphis aeriis sterilibus; capitulo columnari; conidiophoris simplicibus, sursum sensim incrassatis, levibus, fusco-cinnamoneis, aseptatis, brevibus, 50-140×3-5.6μ; vesicula minuta, subglobosa, 5-10μ diam.; pseudobasidiis superum vesiculis tantum obtegentibus, ramosis, flavidis, 4-6 × 2.5μ; pseudosterigmatibus 5.5-7×2μ; conidiis catenulatis, globosis, spinulosis, viridulis, 2.6-3.5μ diam.; non peritheciis.

This species is related to *A. nidulans* (Eidam) Winter, but it differs apparently from the latter in its lack of perithecia which is the chief character of the *A. nidulans* group.

Habitat: On leather (culture No. A370).

10. **A. versicolor** (Vuillemin) Tiraboschi strain I

Colonies from white through water green, deep grape green (Plate XLI 25′′. YG-Y. d; 29′′. GG-Y. i) to yellowish olive (Plate XXX 23′′. yellow, k) after one month, showing pois green (Plate XLI 29′′. GG-Y. i) when mature in koji agar, liquefying gelatine, growing very poorly in nutrient agar, very wrinkled, drops light yellowish, reverse at first ochraceous-salmon (Plate XV 13′. OY-O. b) then partly raisin black (Plate XLIV 65′′. RR-Y. m) to final vinaceous-tawny (Plate XVIII 11′. orange), agar colorless when young, becoming congo pink (Plate XXVIII 7′′. R-O. b) when old; heads green, incompletely spherical; stalks smooth, hyaline, with uneven ends when broken, 400 to 650μ by 4.6 to 7μ; vesicles globose or flask-shaped, fertile only on the upper two-thirds, 8 to 15μ in diameter; sterigmata radiate, light yellowish, in two series, primary 3 to 5μ by 2.5μ, secondary 4 to 6μ by 1.5μ; conidia globose, delicately roughened, green in mass, 2.5 to 3μ in diameter.

Habitat: On salted beef (culture No. A381).

11. **A. versicolor** (Vuillemin) Tiraboschi strain II

It differs from the foregoing strain in that colonies at first white then buff pink with white margin, becoming dark cress green (Plate XXXI 29′′. GG-Y. m) to buff olive (Plate XXX 21′′. O-YY. k) in age, drops colored brownish-red and remaining abundant even in

very old stage, reverse from morocco red through Victoria lake (Plate I 5. OO-R. k; 1. red, i) to final black, agar colored carmine (Plate I 1. red, i); in koji agar reverse and agar characteristically colored kaiser brown (Plate XIV 9′. OR-O. k)

Habitat: From air culture (culture No. A256).

12. **A. versicolor** (Vuillemin) Tiraboschi strain III

This differs from the foregoing strains only in colony characters and color reactions of the medium. Colonies colored from light grape green through dark greenish-glaucus to pois green (Plate XLI 25′′′. YG-Y. b; 33′′′. GY-G.; 29′′′. GG-Y. i) after one month, not wrinkled, with mars violet drops even in old culture, reverse coral pink (Plate VIII 5′. OO-R. d) when young, becoming warm blackish-brown (Plate XXXIV 1′′′. red, m) in age, agar colored from hellebore red (Plate XXXVIII 71′′. V-RR. i) to vinaceous brown (Plate XXXIX 5′′′. OO-R. i); in koji agar, reverse colored mars yellow (Plate III 15. Y-O. i) in maturity.

Habitat: From air culture (culture No. A391).

13. **A. sydowi** (Bainier and Sartory) Thom and Church strain I

Colonies at first white, through light terre verte (Plate XXXIII 41′′. BB-G.) to deep mouse gray (Plate LI 15′′′′′. Y-O. i) after one month, becoming light drab (Plate XLVI 17′′. O-Y. b) after three months, occasionally with area colored flesh pink (Plate XIII 5′. OO-R. f) when young, slightly floccose, overgrown with more or less trailing hyphae in old culture, with narrow white margin and small reddish drops during the growing period, usually leaving pits when the drops evaporated, smooth or slightly folded, reverse from dragon's blood red to hessian brown (Plate XIII 5′. OO-R. i; m), agar affected; in koji agar without conidial production at five days although white mycelium broadly spreading, colored artemisia green (Plate XLVII 33′′′′. GY-G.) when mature, very wrinkled and with agar becoming cracked in age; heads incomplete or abortive; stalks smooth, colorless, 180 to 300μ by 4 to 6.5μ; vegetative mycelium colored reddish-brown; vesicles subglobose, 8 to 14μ in diameter; sterigmata radiate, closely borne all over the vesicles, yellowish, in two series, primary 6 to 7μ by 2.5μ, secondary 5 to 7μ by 1.7μ; conidia globose, blue green in mass, delicately roughened, thick-walled, 2.5 to 3.5μ in diameter; no sclerotia or perithecia found.

Habitat: On cloth (culture No. A342).

14. **A. sydowi** (Bainier and Sartory) Thom and Church strain II

This differs from strain I in colony characters and in the size and markings of the conidia; colonies remaining white and without conidial production in five days, then through vetiver green (Plate XLVII 25′′′′. YG-Y.), deep olive buff (Plate XL 21′′′. O-YY. b) to final avellaneous (Plate XL 17′′. O-Y. b) after three months, over-

grown with a layer of aerial hyphae in age, not wrinkled, with large reddish-brown drops even in age; in koji agar, it is characterized by the colonies being covered with cottony aerial hyphae and the substratum colored from ochraceous orange (Plate XV 15′. O-Y.) to Sanford's brown (Plate II. 11. orange) in age; conidia with distinct inner and outer walls, 2.8 to 4μ in diameter.

Habitat: On decaying wood (culture No. A243).

15. **A. terreus** Thom strain I

Colonies at first white then pinkish buff (Plate XXIX 17′′. O-Y. d), becoming pale ochraceous-buff (Plate XII 15′′. Y-O. f) in age, strictly velvety, wrinkled, with light yellow drops, thinly spreading, growing very slowly and with broad white margin, reverse colored from ochraceous orange, ochraceous tawny (Plate XII 15′. i) to ferruginous (Plate XIV 9′. OR-O. i) in age, agar colored from light pinkish to dark yellow; in koji agar conidial production greatly reduced; heads more or less columnar, up to 160μ long; stalks smooth, uncolored, occasionally septate, more or less flexuous, 100 to 250μ by 4 to 7μ; vesicles mostly globose, uncolored, 12 to 20μ in diameter; sterigmata closely packed, with light yellowish tint when old, roughly parallel to axis of the stalks, in two series, primary 5 to 7μ by 2μ, secondary 4 to 6μ by 1.5μ; conidia globose, smooth, uncolored or nearly so, very small, 1.7 to 2.5μ in diameter.

Habitat: From air culture (culture No. A208).

16. **A. terreus** Thom strain II

This differs from the foregoing strain chiefly in colony characters; colonies at first white then sea-foam yellow (Plate XXXI 25′′. YG-Y. f), vinaceous buff to final wood brown (Plate XL 17′′′. O-Y. d), very wrinkled so as to form deep depressions, with light yellow drops, velvety, without aerial hyphae, broadly spreading, conidial mass abundant, reverse and agar at first light greenish-yellow (Plate V 25. YG-Y. b) then lemon chrome (Plate IV 21. O-YY.) to final yellow ocher (Plate XV 17′ O-Y.); in koji agar colonies with a few aerial hyphae, colored buffy brown (Plate XL 17′′. O-Y. i) when mature.

Habitat: From air culture (culture No. A308).

17. **A. terreus** var. **subfloccosus** nov. var.

Caespitulis caseo-fuscatis dein cinnamoneis et demum rubicundo-exalbidis, leviter floccosis, marginatis, guttulosis minutis; hyphis aeriis interdum sterilibus; capitulo columnari; conidiophoris simplicibus, leviter flexuosus, levibus, hyalinis, leptodermis, 110-260×6-8μ; vesicula globosa, achroa, 13-22μ diam.; pseudobasidiis ramosis, compactis, obtegentibus, flavidis, 6-8×2.5μ; pseudosterigmatibus 5-7×1.7μ; conidiis catenulatis, globosis vel ellipticis, levibus, flavidis, minutis, 1.7-2.5μ diam.

The present variety differs from *A. terreus* Thom in that its colonies are floccose, with aerial hyphae, and conidia colored yellow in mass.

Habitat: From air culture (culture No. A206).

18. **A. terreus** var. **floccosus** nov. var.

Caespitulis albis dein sensim rubicundo-exalbidis, abundanter guttulosis et flavidis; capitulo columnari; conidiophoris simplicibus, erectis, levibus, hyalinis, leptodermis usque ad 560×4.6-6μ; vesicula globosa, 9-14μ diam.; pseudobasidiis ramosis, flavidis, superum vesiculis tantum obtegentibus, 4.5-5.6×2.5μ; pseudosterigmatibus 3.5-5×1.5μ; conidiis catenulatis, globosis, achrois, leptodermis, levibus, 2-2.8μ diam.

This variety differs from *A. terreus* Thom in its floccose colonies and very scanty conidial production; and from *A. terreus* var. *subfloccosus* nov. var. in color change of the substratum and in its colorless conidia.

Habitat: On waste cloth (culture No. A369).

19. **A. ustus** (Bainier) Thom and Church strain I

Colonies at first white then hair brown (Plate XLVI 17′′′′. O-Y. i), olive brown (Plate XL 21′′′. O-YY. k) to final dark olive-buff (Plate XL 21′′′. O-YY.), floccose, with purple brown aerial hyphae in age, with white margin and yellow drops during development, not wrinkled, reverse and agar empire yellow (Plate IV 21. O-YY. b) when young, becoming antique brown (Plate III 17. O Y. k) when old; in koji agar colonies colored dusky olive green (Plate XLI 25′′′. YG-Y. m) when mature; in koji gelatine colonies overgrown with abundant dirty yellow aerial hyphae in age, gelatine not liquefied; heads mostly columnar, up to 400μ long; stalks sinuous, smooth and thin-walled, light brown near the vesicles, 200 to 500μ by 5 to 8μ; vesicles globose or subglobose, brownish, 10 to 18μ in diameter; sterigmata semi-radiate, yellow in color but described as colorless by Thom and Church, in two series, primary 5 to 6μ by 2.8μ, secondary 6 to 8μ by 2μ; conidia globose, brownish yellow in mass, spinulose, thick-walled, 2 to 3.5μ in diameter.

Habitat: On decaying wood (culture No. A398).

20. **A. ustus** (Bainier) Thom and Church strain II

This strain resembles the foregoing one in microscopic characters but differs from it in its colonies colored from white through brownish drab (Plate XLV 9′′′′. OR-O.) to wood brown (Plate XL 17′′′. O-Y.) in age, without drops; in koji gelatine colonies colored Prout's brown (Plate XV 17′. O-Y. m) when mature, without aerial hyphae, gelatine greatly liquefied.

Habitat: On walnut (culture No. A138).

21. **A. flavipes** (Bainier and Sartory) Thom and Church strain I

Colonies at first persistent white, gradually becoming pale pinkish cinnamon (Plate XXIX 15′′. Y-O. f) in age, floccose, closely woven with sterile aerial hyphae, conidial mass very scanty, with light yellow drops, mature conidia usually germinated and developed over the mass, thickly and broadly spreading, slightly folded, reverse at first colorless, gradually becoming chamois (Plate XXX 19′′. YO-Y. b) in age, agar affected; in koji agar colonies growing more vigorously, colored deep olive-buff (Plate XL 2′′′. O-YY. b) when mature, with abundant white aerial hyphae in the upper part of the agar slant, agar colored auburn (Plate II 11. orange, m) when when old; heads globose in small ones but columnar in large ones; stalks light yellowish, smooth but usually with disk-like concretions on the surface of walls, occasionally septate, 600 to 2000μ by 4 to 7μ; vesicles globose or elliptical, 8 to 20μ in diameter; sterigmata radiate, colorless, closely packed, in two series, primary 6 to 8μ by 3μ, secondary 5 to 7μ by 2μ; conidia globose, colorless, smooth, 2.5 to 3μ in diameter.

Habitat: On ox dung (culture No. A332).

22. **A. flavipes** (Bainier and Sartory) Thom and Church strain II

This one differs from strain I in respect to its colonies from white to ochraceous-salmon (Plate XV 13′. OY-O. f), reverse clay color (Plate XXIX 17′′. O-Y.) when mature, producing much more conidial mass; in koji agar colonies showing light pinkish cinnamon (Plate XXIX 15′′. O-Y. f) and without white aerial hyphae.

Habitat: From air culture (culture No. A281).

23. **A. candidus** Link strain I

Colonies at first persistent white, gradually becoming cream color or cartridge buff (Plate XXX 19′′. YO-Y. f) in age, with more or less aerial hyphae, sometimes with heads and stalks forming long anastomosing ropes or coremiform, drops scanty and colorless, slightly folded, more or less zonate in young stage in koji agar, reverse at first strontian yellow (Plate XVI 23′. yellow), becoming buff yellow (Plate IV 19. YO-Y. d) in age; occasionally but not always producing sclerotia with yellow color, globose or oval, up to 530μ in diameter; heads globose, radiate, with periphery more or less loosely fimbriate; stalks smooth, colorless, 350 to 630μ by 6 to 10μ; vesicles globose, 18 to 35μ in diameter; sterigmata radiate, in two series, primary 5 to 13μ by 2.5μ, secondary 4 to 9μ by 2μ; conidia globose, smooth, colorless, thin-walled, 2.5 to to 3μ in diameter; liquefied gelatine.

Habitat: On wheat (culture No. A333).

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24. **A. candidus** Link strain II

This differs from strain I only in colony characters and color reaction of the substratum; colonies from white to pale pinkish cinnamon (Plate XXIX 15′′. Y-O. f), growing very slowly and restricted, thinly felt, not wrinkled, without drops, reverse and agar at first colorless, becoming light cinnamon-buff (Plate XXIX 17′′. O-Y. b) in age; in koji agar colonies broadly spreading, elaborately wrinkled, colored tilleuf-buff (Plate VL 17′′′. O-Y. f) when mature; no sclerotia.

Habitat: On dog dung (culture No. A65).

25. **A. niger** Van Tieghem strain I

Colonies at first yellowish-black, rapidly becoming sooty black, deeply wrinkled, with drops at first colorless then turning to black probably owing to the dissolution of coloring substance of the conidia, with a few long aerial hyphae in koji agar, reverse at first colorless then yellowish, gradually becoming black in age, agar colored dark yellow; heads typically globose, more or less rimose at the periphery; stalks erect, smooth, showing yellowish-brown and somewhat constricted near the vesicles, with uneven ends when broken, up to 2400μ by 10 to 23μ; vesicles globose, 30 to 58μ in diameter; sterigmata radiate, evenly and closely covering the vesicles, brownish-yellow, in two series, primary 10 to 18μ by 3μ, secondary 7 to 13μ by 2μ; conidia markedly spinulose, globose, carbonaceous black in mass, 2.5 to 4μ in diameter.

Habitat: On a mushroom collected in Laokiashan, Wuchang (culture No. A60).

26. **A. niger** Van Tieghem strain II

This differs from strain I in its far longer stalks up to 3.5 mm., and reverse colorless throughout the development; otherwise the same strain.

Habitat :On preserved fruit of *Euphoria longana* Lam. (culture No. A154).

27. **A. luchuensis** var. **rubeolus** nov. var.

Caespitulis maturis rubeolus vel cofeicolore, late effuso-rugosis; capitulo globoso; conidiophoris erectis, simplicibus, leviter fuscis, levibus, 1200-2000×9-15μ; vesicula plerunque ovoidea, raro globosa, 15-56μ diam.; pseudobasidiis radiatis, crebris, achrois vel umbrinis, non ramosis, 5-9×3-4.5μ; conidiis umbrinis, plerunque globosis, raro ellipticis, spinulosis, 3-5.8μ diam.

This variety is related to *A. luchuensis* Inui but it differs from the latter in its colonies colored chocolate brown, not carbonaceous or sooty black.

Habitat: On cooked rice (culture No. A160).

28. **A. wentii** Wehmer strain I

Colonies at first white then through primuline yellow, old gold (Plate XVI 19′. YO-Y. i), orange citrine (Plate IV 19. Y-OY. k) to raw umber (Plate III 17. O-Y. m) in age, persistently overgrown with more or less aerial hyphae, with small light yellow drops, wrinkled, thickly matted, growing more vigorously in koji agar, reverse at first mustard yellow (Plate XVI 19′. YO-Y. b), quickly turning to light seal brown (Plate XXXIX 9′′′. OR-R. m), becoming blackish-brown in age, agar affected; heads brown, nearly globose, with periphery fimbriate; stalks smooth, colorless, thin-walled, 560 to 840μ by 6.5 to 13μ; vesicles mostly globose, rarely subglobose, 12 to 30μ in diameter; sterigmata radiate, yellow, closely packed, in two series, primary 7 to 9μ by 3μ, secondary 9 to 13μ by 2.5μ; conidia more or less irregular, slightly roughened, brownish-yellow in mass, 4 to 6.5μ in diameter.

Habitat: On a large specimen of *Polyporus* collected from Kiu-haw Shan in Anhwei Province (culture No. A74).

29. **A. wentii** Wehmer strain II

This differs from strain I chiefly in the color changes of the colonies and substratum; colonies from pinard yellow through empire yellow, aniline yellow (Plate IV 21. OY-Y. d; b; YO-Y. i) to final snuff brown (Plate XXIX 15′′. Y-O. k), reverse at first maize yellow (Plate IV 19. YO-Y. f) then isabella color (Plate XXX 19′′. YO-Y. f), becoming clay color (Plate XXIX 17′′. O-Y.) in age, showing dark citrine (Plate IV 21. O-YY. m) when mature in koji agar.

Habitat: On sugar-preserved lotus tuber (culture No. A171).

30. **A. ochraceus** Wilhelm strain I

Colonies at first ochraceous buff (Plate XV 15′. Y-O. b), becoming buckthorn brown (Plate XV 17′. O-Y. i) in age, crowded, slightly wrinkled, with golden yellow drops, reverse at first colorless, then russet (Plate XV 13′. OY-O. k), showing partly lincoln green (Plate XLI 25′′′. YG-Y. k) during development, agar darkened; heads radiate; stalks warty or granular, with concretions on the walls, thick-walled, yellow colored especially in the upper portions, abruptly dilating into vesicles, 350 to 1000μ by 7 to 12μ; vesicles yellow, globose, 17 to 35μ in diameter; sterigmata yellow, radiate, evenly arranged, always in two series, primary 8 to 25μ by 3 to 4μ, secondary 5 to 9μ by 2.5μ; conidia globose or elliptical, smooth and thin-walled, yellowish, with inner and outer walls distinct, 3.5 to 7μ in long axis. It is characterized by producing sclerotia which are scattered, usually submerged, colored white to gray, globose or subglobose, up to 1300μ in long axis; but they are absent in koji agar.

Habitat: On bread (culture No. A66).

31. **A. ochraceus** Wilhelm strain II

This differs from the foregoing strain in its colonies colored from warm buff (Plate XV 17′. O-Y. d) to pale ochraceous; stalks 700 to 1600μ by 7 to 19μ; conidia slightly yellow almost colorless, globose, much smaller in size, 2.5 to 3μ in diameter; no sclerotia.

Habitat: On cooked rice (culture No. A163).

32. **A. ochraceus** Wilhelm strain III

This is characterized by its colonies colored antimony yellow (Plate XV 17′. O-Y. b) throughout the development, conidial production very scanty, with woolly base at first white then pinkish buff (Plate XXIX 17′′. O-Y. d), reverse from army brown (Plate XL 13′′′. OY-O. i) to blackish; heads mostly columnar, up to 1000 by 200μ; no sclerotia.

Habitat: On dried bamboo shoot (culture No. A303).

33. **A. melleus** Yukawa

Colonies isabella color (Plate XXX 19′′. YO-Y. i) when young, gradually becoming wood brown (Plate XL 17′′′. O-Y.) when old, velvety, broadly spreading, slightly folded, drops very abundant and colored reddish-brown, reverse at first colorless, turning to yellow ocher (Plate XV 17′. O-Y.) in age; heads radiate; stalks occasionally septate, yellow, granular, more or less sinuous, 250 to 700μ by 6 to 11μ; vesicles globose, 12 to 38μ in diameter; sterigmata radiate, yellow, in two series, primary 6 to 14μ by 3μ, secondary 7 to 12μ by 2μ; conidia globose, smooth, light yellow in mass, 2 to 3μ in diameter; no sclerotia.

Habitat: On salted and dried cabbage (culture No. A310).

34. **A. sulphureus** (Fresenius) Thom and Church

Colonies at first white then maize yellow (Plate IV 19. YO-Y. f) in fruiting areas, broadly spreading but with conidial production so scanty that the most part of the colonies remained sterile when mature, wrinkled, without drops, reverse at first colorless then cream color (Plate XVI 19′. YO-Y. f), becoming buff-yellow (Plate IV 19. YO-Y. d) in age, agar affected; in koji agar conidial production abundant, with more or less aerial sterile hyphae, reverse colored deep chrome (Plate III 17. O-Y. b) when mature; heads globose; stalks with walls yellow and thick, granular, more or less sinuous, 500 to 850μ by 7 to 10μ; vesicles globose, 18 to 30μ in diameter; sterigmata yellowish, in two series, primary 7 to 9μ by 3.5μ, secondary 10 to 14μ by 2.5μ; conidia globose, colorless, smooth, 1.5 to 2.5μ in diameter.

Habitat: On a felt hat (culture No. A395).

35. **A. tamarii** Kita

Colonies at first citrine then medal bronze (Plate IV 21. O-YY. k; 19′′. YO-Y. m), light brownish olive (Plate XXX 19′′. YO-Y. k) to final raw umber (Plate III 17. O-Y. m) conidial production very abundant, massively spreading, smooth or slightly wrinkled, drops colorless, reverse at first or sometimes reed yellow (Plate XXX 23′′. yellow, b), becoming drab (Plate XLVI 17′′′′. O-Y.) in age; heads from irregularly globose to more or less columnar; stalks colorless, pitted more prominently in upper than lower half, thick-walled, occasionally septate, 700 to 1600μ by 7 to 24μ; vesicles globose or subglobose, uncolored, 22 to 24μ in diameter; sterigmata radiate, colorless, in one series in small heads, 7 to 15μ by 3 to 4μ, or in two series in large heads, primary 7 to 10μ by 4μ, secondary 8 to 12μ by 3μ; conidia yellow in mass, globose rarely elliptical, with inner and outer walls distinct, roughened, 4 to 7.5μ in diameter.

Habitat: On walnut (culture No. A105).

36. **A. flavus** Link strain I

Colonies at first citron green then rainette green (Plate XXXI 35′′. YG-Y. b; 27′′. G-Y. i), becoming Kronberg's green (Plate XXXI 25′′. YG-Y. b) in age, rapidly and broadly spreading, slightly folded, reverse at first colorless, gradually turning to snuff brown (Plate XXIX 15′′. Y-O. k) or partly showing violet after about two months; in nutrient agar conidial production very scanty; in koji gelatine colonies growing luxuriantly as in Czapek's agar and colored jade green (Plate XXXI 27′′. G-Y. k) when mature, gelatine slightly liquefied; heads roughly globose; stalks finely pitted, uncolored, broadening upward, up to 2 mm. by 6 to 16μ; vesicles subglobose 23 to 52μ in diameter; sterigmata colorless or occasionally yellow, radiate, in one series, 7 to 16μ by 3 to 3.5μ, or in two series, primary 10 to 12μ by 3.6μ, secondary 7 to 9μ by 3μ; conidia globose or pyriform, smooth, thick-walled, greenish-yellow in mass, 2.5 to 5.5μ in long axis.

Habitat: On Irish potato, bread, rice, and pasting paper; very common in starch materials (culture No. A26).

37. **A. flavus** Link strain II

This strain differs from strain I in the reverse of colonies colored cinnamon-buff (Plate XXIX 17′′. O-Y. b) when old, without shades of snuff brown or violet, agar colored dark yellow; in koji gelatine colonies growing very poorly, yellow with little green color, gelatine not liquefied.

Habitat: On salted watermelon seeds (culture No. A393)

38. **A. flavus** Link strain III

This one differs from the foregoing strains in the following characters: colonies from citron yellow through yellow citrine, olive

lake (Plate XVI 23′. yellow, b, i; 21′. O-Y. i) to final light brownish olive (Plate XXX 19′′. YO-Y. k); reverse at first colorless then cacao brown (Plate XVIII 9′′. OR-R. i), turning to sorghum brown (Plate XXXIX 9′′. OR-R. i) in age; and stalks very short, 300 to 550μ by to 12μ.

Habitat: On cake (culture No. A412).

39. **A. effusus** Tiraboschi

Colonies at first cottony white, then yellowish oil green (Plate V 25. YG-Y. k), dark olive buff (Plate XL 21′′. O-YY.) to final light brownish olive (Plate XXX 19′. YO-Y. k) in age, floccose, usually with much more sterile aerial hyphae at the lower part of the agar slant, drops colorless, slightly folded, thickly matted, reverse and agar colorless; heads mostly globose, or more or less columnar; stalks colorless, pitted, broadening upward, up to 3.5 mm. by 12 to 25μ; vesicles subglobose or elliptical, uncolored, with two-thirds fertile area, 20 to 54μ in diameter; sterigmata radiate, yellow, either in single series 9 to 12μ by 4μ or with primary 7 to 14μ by 4μ and secondary 6 to 9μ by 3 to 3.5μ; conidia yellow, predominantly elliptical rarely globose, smooth, with inner and outer walls distinct, varying greatly in size, 4.5 to 9.5μ in long axis.

Habitat: From air culture (culture No. A409).

40. **A. Chungii** nov sp.

Caespitulis albis dein viridis et demum viridi-olivaceis, late effusis, non rugosis, inmarginatis; capitulo globoso; conidiophoris aculeolatis hyalinis, sursum sensim leviter incrassatis, 500-800×5-12μ; vesicula subglobosa, 12-35μ diam.; pseudobasidiis flavis, non ramosis, subellipticis, 6-9×4-5μ; conidiis globosis, flavis, adparenter echinulatis, 4.5-6.5μ diam.

This species is related to *A. flavus* Link from which it is easily distinguished by its colony color, far shorter stalks, and especially echinulate conidia.

Habitat: From air culture (culture No. A411).

(*To be concluded in next issue*)

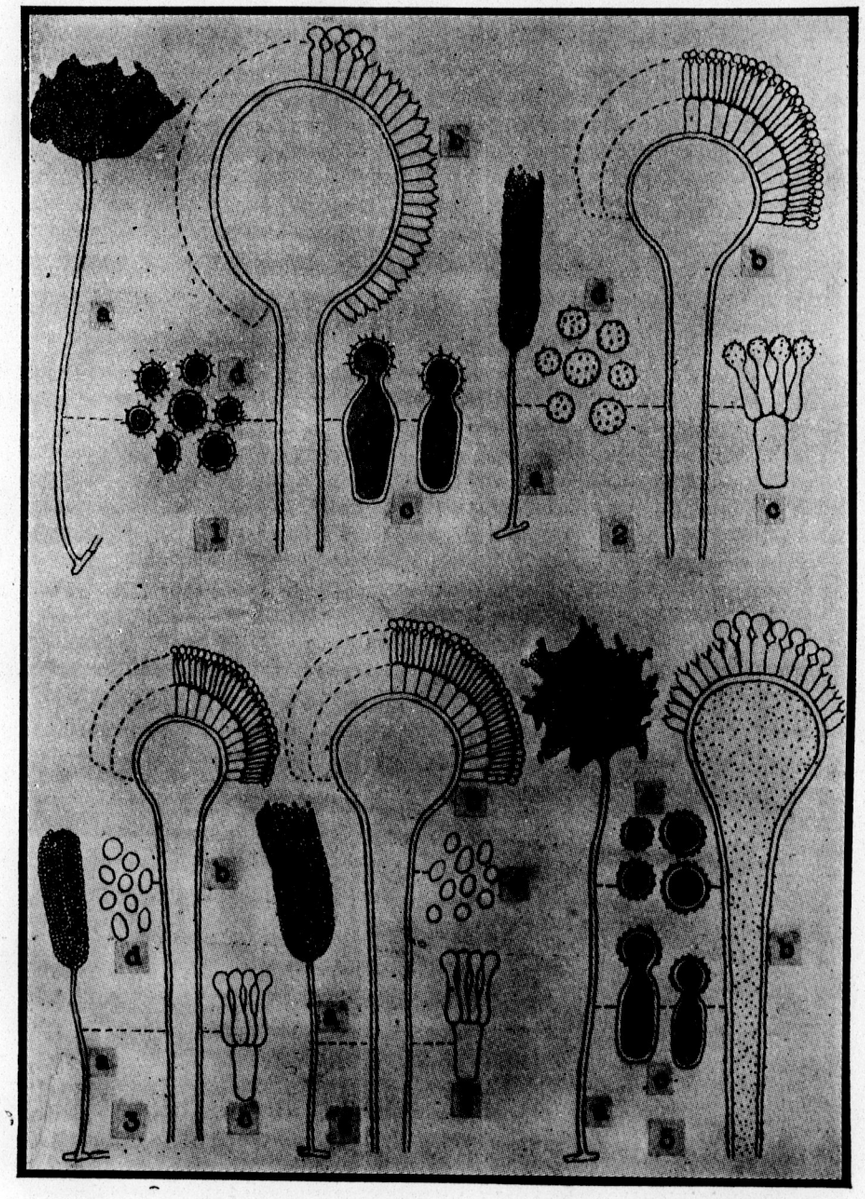

Fig. 1, *A. luchuensis* var. *rubeolus* n. var.; fig. 2, *A. laokiashanensis* n. sp.; fig. 3, *A. terreus* var. *floccosus* n. var.; fig. 4, *A. terreus* var. *subfloccosus* n. var.; fig. 5, *A. Chungii* n. sp. (a) Conidiophore with head, Olympus 10×12; (b) Head magnified, Olympus 12×60; (c) Sterigmata, Olympus 15×60; (d) Conidia, Olympus 15×60.

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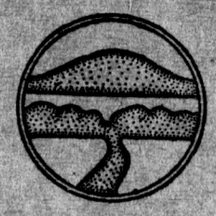
THE OCCURRENCE OF NAVEL ORANGES IN KWANGTUNG PROVINCE

By A. N. Benemerito
Lingnan University



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THE OCCURRENCE OF NAVEL ORANGES IN KWANGTUNG PROVINCE

By A. N. Benemerito
Lingnan University

Probably the first oranges possessing navel character which came to public notice among the citrus enthusiasts of Kwangtung Province were fruits exhibited by Lai Kam-tai during the Citrus Exhibition held at Canton from January 22 to February 22, 1933. During this exhibition I was in charge of the photographing of the materials exhibited and in so doing, came to this particular orange which the ordinary spectator may not have noticed. The fact that this fruit is very similar to the Washington Navel Orange of America which is reputed to be the world's best commercial orange, interested me in its origin with the hope that in the future there may be established in this province a fruit of great commercial value. Inquiry was made as to the origin of the parent tree and Mr. Lai Kam-tai, the exhibitor, kindly consented to allow me to visit his orchard.

The orchard where the parent tree of the fruit exhibited is grown, is located in the vicinity of Luntau, a village at the east end of Honam Island near Whampoa. I found several trees in the orchard which bear fruit possessing navel character. Some of the fruit is shown in plate 19. With the hope of establishing a new strain or variety of this fruit budwood stick were collected from the trees and grafted in Lingnan University citrus collection. So that this strain of fruit might be segregated, only branches which bore navel fruits were collected. Each tree was given a separate number.

During the following citrus season, December, 1933, the orchard was again visited and several more trees bearing navel fruit were found. Budwood sticks from these were grafted in the citrus collection of the university.

In my trip to Sin-hwei and Chung-shan Districts during the month of November, 1934, I collected citrus fruit with navel character from eight different trees in the vicinity of Hoichow, a village in Chung-shan District. The first of these eight trees is in an orchard about a mile from the center of the village; the rest are all in an orchard on a small island called Lung Lin Sha. The occurrence of the navel orange fruit in various orchards is not uncommon and may readily be found if one takes the trouble to search for it. The seven trees in the one orchard were planted close to each other; the owner did not know that he had planted trees of such character. All these seven trees are of the same variety, Heung Shui Chang, while the other one is an Om Lau Chang

variety. The branches bearing the navel fruit in these different trees were gathered, labeled separately, brought back to Lingnan and grafted in the citrus collection. Some of the grafted plants are now growing at Lingnan and they will be used for future study.

The occurrence of navel oranges is not limited to the above mentioned areas but is also observed in other regions such, as Loh Kong Tung, P'an-yu District. In the fruit market of Canton fruit possessing naval character has been seen. In other species and varieties of citrus fruit such as *Citrus nobilis* Loureiro there are also trees bearing fruit with this character. From Kwangsi Province, Prof. G. W. Groff has collected a mandarin orange fruit with navel character. In the citrus collection of Lingnan University there is also a mandarin orange (*C. nobilis* Lour.) tree, which bears fruit with the navel mark.

It may be said, therefore, that the occurrence of navel oranges in Kwangtung Province is not uncommon. The method by which to segregate this form of fruit in order to establish a new form or variety remains to be solved. In view of the length of time required before a new variety or form of citrus fruit can be established, the object of this paper is to deal only with the occurrence of the navel orange in Kwangtung Province, the description of the fruit collected which possess this particular character, and the principles involved in the perpetuation of bud mutation

History of the Washington Navel Orange (Citrus sinensis Osbeck, var. Brasiliensis Tanaka)

In view of the similarity of the oranges with navel mark in Kwangtung Province to those which led to the discovery of the navel orange of Bahia, Brazil, I mention here the history of the Washington Navel Orange of America which has gained a world reputation as being a fruit par excellence.

Shamel, Pomeroy, and Caryl (1918) say that the Washington Navel Orange originated at Bahia, Brazil as a bud variation from the Portuguese orange variety, Laranja Selecta. They further state that this fruit was probably first propagated about the year 1820 at Bahia by a Portuguese gardener. Because of the seedlessness and the superior quality of this orange as compared with the seed-bearing Selecta fruits, it has almost entirely supplanted the parent variety in the orchards at Bahia.

The United States Department of Agriculture imported navel orange trees from Bahia for trial purposes, and these plants were grown in the government greenhouses at Washington, D. C. Plants propagated from them were distributed to citrus growers in Florida and California; two of these young budded trees were sent to Mrs. L. C. Tibbets at Riverside, California in 1873. These became the parent plants of the world-known Washington Naval Orange. In

1875, these trees came into bearing and their fruits aroused great interest among the citrus growers and propagators in California because of their superior quality, absence of seeds, the distinctive navel mark, and other characteristics. Since then, it has become the most widely grown variety in California.

Other names are used for this orange, such as Bahia, but the universally recognized variety name at present among citrus growers of the world over is Washington Navel Orange.

The Navel Orange in Kwangtung Province (Citrus sinensis Osbeck)

Chi Chang or Luntau Navel Orange. Citrus Exhibit No. 225 & Ben. 99; pl. 19

The parent tree of this horticultural variety is a ten-year old plant about three meters high with low spreading branches. Leaves at the end of fruiting branches are elliptical in form, 6.5 to 11 cm. long, 3 to 6 cm. at the widest part, with both ends more or less acuminate, apex somewhat indented. Fruits oval or globose in form, the pistil end is rather projecting with a conspicuous navel mark at the center of which is a hole of about three to five mm. diameter; the stem or calyx end is lightly depressed; the rind is orange-red outside, white inside, tight, adhering closely to the flesh, about 5 mm. thick, oil cells small, projecting; longitudinal diameter is about 7 cm., latitudinal diameter 6.6 cm.; pith solid, about 10 mm. thick at its broadest part; segments 10, sometimes more, closely adhering to each other; flesh yellowish orange, finely grained, juicy, taste very sweet; seeds few, about 18 mm. the longest, 6 mm. the widest, pinkish when seen through the shell, pinkish brown when the shell is removed, lightly striated outside, embryo white.

The natives of the village where this fruit is grown called it *Chi Chang* because of the mark at the pistil end of the fruit which resembles that of the navel or umbilicus of a man; *Chi* means navel and *Chang* orange. As this fruit was found in Luntau Village, it is called here Luntau Navel Orange. This orange is Accession No. 1001 of the Plant Receiving Station, Lingnan University, Canton.

Hushuae Orange. Ben. Sw. C.S. 6; pl. 20, fig. 1

A tree with low spreading branches, over four years old, about 2.5 meters high, grown in the vicinity of Hoichow Village, Chungshan District in an orchard called Kong Fa. Leaves elliptical, those at the end of fruiting branches, 7.5 cm. or more long, 3 cm. or more wide, both ends broadly or narrowly acuminate, sometimes with indented apex; petiole is about 1.2 cm. long, very narrowly winged or slightly so. Fruit almost globose in form, wider than long, longitudinal diameter is 7 cm.; latitudinal diameter 7.5 cm.; pistil end is rounded to slightly projecting with conspicuous navel mark at the center of which is a small hole; the navel mark in this case is not so large as that of the Luntau Orange; the stem or calyx end

is slightly depressed; rind is about 6 mm. thick, adhering tightly to the flesh; pith or core solid, about 9 mm. thickest part; segments usually 13, adhering closely to each other; flesh light orange, juicy, sweet; seeds few with the same character as the Luntau orange; three fruits weigh about 560 grams.

I am calling this orange "Hushuae" in honor of Miss Hu Shiu Ying, a student of Lingnan University, who accompanied me when this fruit was collected in Hoichow Village, Chung-shan District. It is Accession No. 1203 of the Plant Receiving Station, Lingnan University, Canton.

Hoichow Navel Orange. Ben. Sw. C.S. Nos. 7 to 13; pl. 20, fig. 2

From seven different trees of the same age, about six years old, and almost of the same height, 2.5 meters high, with low spreading branches. The leaves at the end of the fruiting branches are elliptical in form, more or less acuminate, sometimes indented at the apex; 6.5 to 8.8 cm. long, 2 to 4 cm. wide; petiole narrowly winged or slightly so. Fruit globose or subglobose, usually oblique; pistil end rounded or very slightly projecting, the navel mark small, not so conspicuous as that of the Hushuae and the Luntau orange; calyx end slightly depressed; wider than long; longitudinal diameter usually 5.5 to 6 cm., sometimes less; latitudinal diameter 6 to 7 cm.; core usually 10 to 12 mm. at the thickest part, sometimes less; segments 12 to 14, sometimes less; flesh light orange in color, very juicy, sweet blended with acid taste; seeds sometimes many, large and rather short and stout; weight of fruit 115 to 172 grams or an average of 139.34 grams.

This orange is called "Hoichow Navel Orange" by the author because the trees are grown in Hoichow Village. All of the budwood was gathered from the same orchard on the small Island of Lung Lin Sha, Hoichow Village, Chung-shan District. They are Accession Nos. 1204, 1205, 1206, 1207, 1208, 1209, and 1210 respectively, of the Plant Receiving Station, Lingnan University, Canton.

Principles Involved in the Perpetuation of Bud Mutations

In the establishment of a form of plant different from the parent tree, there are two principal points to consider, namely, the existence of the form to be perpetuated and the methods involved in its perpetuation. From the characters of the fruits already described, it is evident that there is a marked difference between the navel fruit and the other fruit borne on the same tree. This is called bud variation.

Bud variations in plants are of two kinds, modifications and mutations. Modifications are differences between individuals in degree rather than in kind, due to external conditions existing during the development of the buds. Such variations are not transmissible and their selection would be useless in any attempt to establish an improved strain. Mutations, on the other hand, are differences due to chemical or physical changes, of internal origin, are transmissible, and hence constitute a means by which organic life can be molded. In this respect, the occurrence of oranges possessing navel character is a bud mutation.

De Vries, the Dutch botanists, first proposed the theory of mutation in order to account for the many diverse forms he found in the wild and in controlled cultures of many different species taken from the wild. Since then, different investigators have found that bud mutation can be perpetuated by vegetative propagation, that is by cutting or grafting and that the effects are either retrogressive or progressive. If the inferior characters such as unproductiveness are perpetuated, it is retrogressive, and when the superior characters of the plant such as productiveness are perpetuated, it is progressive. In the case of the navel orange, if its characters are superior its perpetuation will not only be progressive as compared to the parent plant but it may also create a new form of plant having commercial value.

Munson in 1906 recognized the importance of bud selection to the improvement of pomology in America, and advocated its practice in the following words: "Select through successive generations buds, that is cuttings or scions, from branches which bear fruit most nearly approaching the ideal". J. P. Englehart who first recognized and propagated the Golden Nugget Navel Orange, a sport from the Washington Navel, was convinced that many of the variations in fruit characters could be perpetuated by budding. According to the results of the extensive experiments done by Shamel and his associates (1918-1928) the perpetuation of bud sport or mutation in plants does not only improve fruit growing but it also brings about the establishment of new forms of individual plants. They also came to the conclusion that bud or limb variations are transmissible characters and are capable of perpetuation through budding. From this it may be inferred that the navel fruit bud variation in the oranges of Kwangtung Province are perpetuable characters through vegetative propagation by cutting or grafting.

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1920. Citrus-fruit improvement. A study of bud variation in the Eureka Lemon. *U. S. Dept. Agri. Bull.* 813, 88 p. *22 fig.*

廣東省臍橙發現誌

李馬松著

(摘要)

作者曾發見臍橙於番禺縣之河南島，蘿岡洞，及中山縣。文中所述三種即崙頭臍橙 (Luntau Navel Orange) 胡氏臍橙 (Hushuae Orange) 及海洲臍橙 (Hoichow Navel Orange) 此三者皆甜橙 (*Citrus sinensis* Osbeck) 之芽變種所致。上述三種，各見於圖。對於華盛頓臍橙 (Washington Navel Orange) 在商業之史畧，橙芽變種之恆久性原理，及在粵省有培植一新種之可能亦有論及焉。



Chi Chang or Luntau Orange.

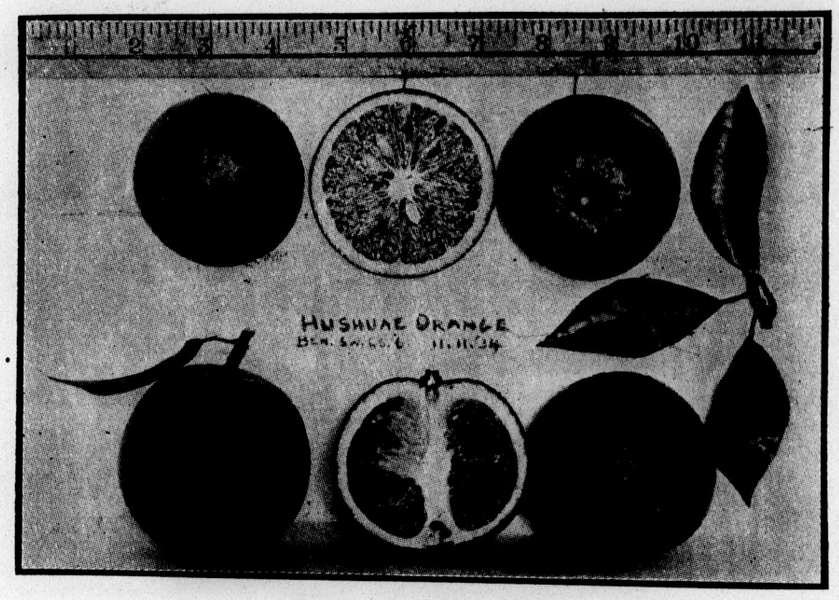


Fig. 1. Hushuae Orange.

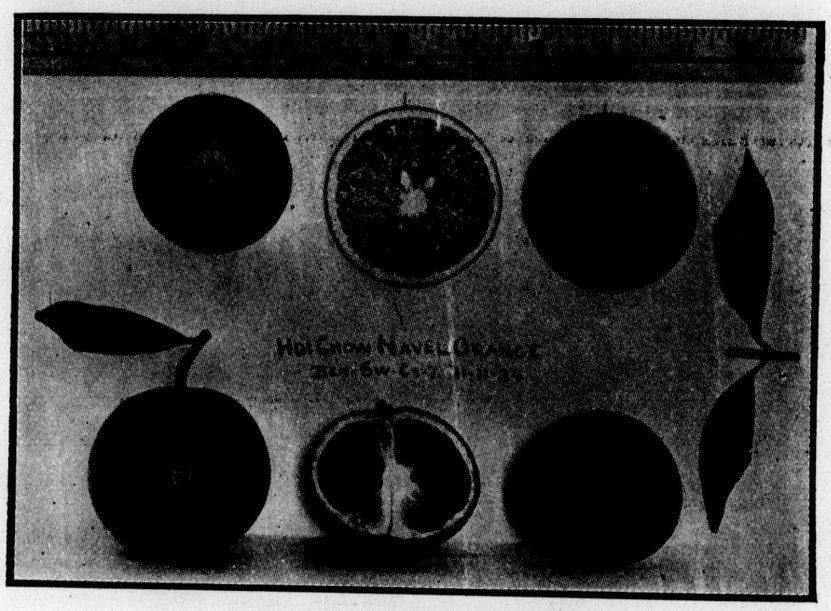
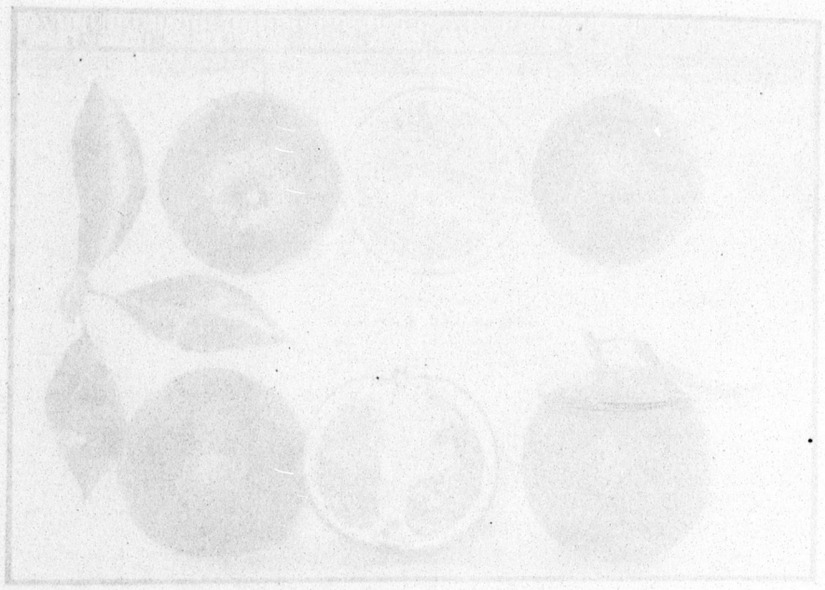
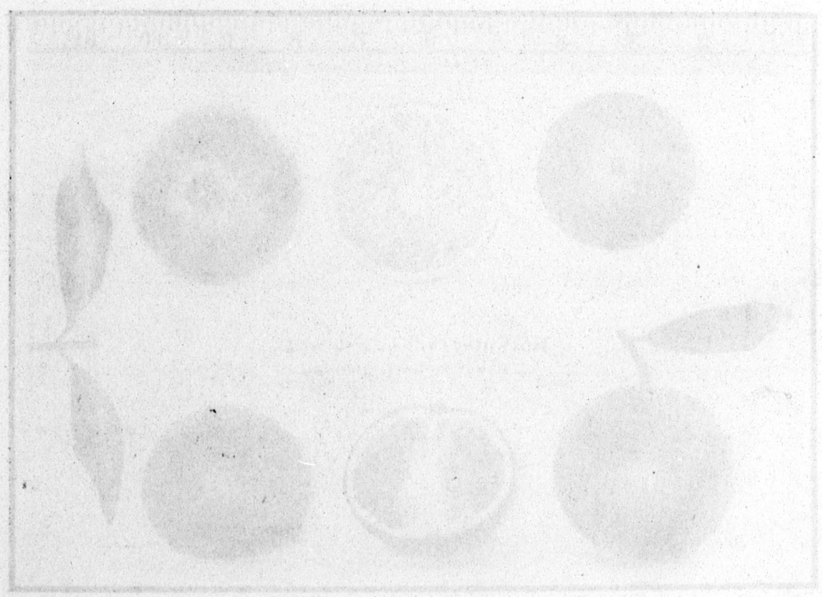


Fig. 2. Hoichow Navel Orange.





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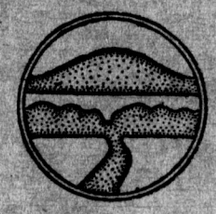
DESCRIPTIONS OF TWO NEW SPECIES OF TIPHIA FROM EAST CHINA (HYM., TIPHIIDAE)

By T. C. Ma (Ma Tsing-chao, 馬駿超)
Assistant Curator, Bureau of Entomology, Hangchow, Chekiang.



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DESCRIPTIONS OF TWO NEW SPECIES OF TIPHIA FROM EAST CHINA (HYM., TIPHIIDAE).[1]

By T. C. Ma (Ma Tsing-chao, 馬駿超)
Assistant Curator, Bureau of Entomology, Hangchow, Chekiang.

Tiphia minutostriata sp. nov.

Female.—Vertex with primary punctures of first-degree density (terminology of Allen and Jaynes, 1930), narrowly along eye orbits and outer-sides of lateral ocelli. Front polished, with interrupted medial groove; primary punctures everywhere of third-degree density, and fewer on the upper portion (still fewer just below ocellar triangle). Clypeus with medial margin nearly truncate; medial apex entirely impunctate. Mandible reddish; without trace of medial groove. Antennae black, but suffused with brown below; third segment distinctly longer than its greatest width. Pronotum with its transversal carina interrupted medially and weakly developed; primary punctures mostly of third-degree density except those closely adjacent to transversal carina where they are of first-degree density; secondary punctures almost lacking; apex well-polished and impunctate, without transversal discal band; longitudinal extension of the punctate area medially less than the impunctate area. Side of pronotum with more or less distinctly separated punctures in a band posterior to carina. Scutum with its anterior medial groove vestigial; primary punctures of third-degree density, irregularly distributed. Mesepisternum without trace of premarginal groove on its posterior aspect; dense, appressed white hairs directed ventrally. Metanotum with a vague medial groove; primary punctures of third-degree density and much smaller than those of the scutellum; either sides of medial portion strongly shagreened and with an irregular, longitudinal, deep impression. Hind tibiae with outer sides heavily punctate and armed with irregular rows of brownish lanceolate spines; inner sides finely punctate; major calcarium tapering uniformly. Hind basitarsus grooved; outer-side with two prickle-shaped spines, but none of the same type at its apex. Tegula black, conical, polished and sparsely hairy; inner hind corner not produced into a broad angle. Wings smoky, without cubital mark; radial cell not closed; second transversal cubital vein tortuous. Propodeal areola keystone-shaped; medial carina nearly complete, weakly flattened; enclosed area

[1] Contribution from the Bureau of Entomology, Hangchow, Chekiang, China. The writer wishes to acknowledge hereby his gratitude to Prof. G. P. Jung, Director of the Bureau, and Mr. C. Y. Wong, Curator of the same institution for their kind guidance and encouragement during the course of the study.

rugose-shagreened; carinae with crenulate grooves adjacent to either side. Lower portion of side of propodeum very sparsely hairy and finely striated, not well-defined from the upper rugose region. Posterior aspect of propodeum very finely wrinkled. First tergite finely punctate; primary punctures shallow and rather small; preapical groove deep; preapical band nearly as long as the punctate portion medially. First sternite without conspicuous lateral groove; primary punctures sparse and shallow. Intermediate tergites with impunctate border three to four times the diameter of hindmost primary punctures. Pygidium rugose-punctate on basal three fifths; impunctate apex with poorly-defined wrinkles. Length of body, 9.5 mm.; of fore-wing, 5 mm.

Male.—Unknown.

Holotype.—1 ♀, from Sien-yah-ling, Kiangshan, (江山仙霞嶺), Chekiang, April 13, 1935 (Tsing-chao Ma, coll.), deposited in the Bureau of Entomology, Hangchow.

Allied to *T. popilliavora* Rohwer but can be easily separated from the latter by: (1) vertex without minute punctures posterior to ocellar triangle; (2) mandibles without medial grooves; (3) pronotum without any fairly well-differentiated transversal groove; (5) major calcarium of hind tibia tapering uniformly.

Tiphia wangpeisunana sp. nov.

Male.—Vertex with a few punctures of first-degree density just behind ocellar triangle and narrowly along upper eye orbits; punctures sparse, of third-degree density elsewhere. Lower portion of front shagreened and masked by dense, appressed white hairs directed more strongly laterally than posteriorly; primary punctures of first-degree density; height of secondary punctures extending to lower one-third of front medially, two-thirds along eye orbits; medial carina conspicuous; preocellar area with primary punctures of third-degree density and irregularly distributed. Antenno-ocular distance much greater than width of antennal fossa. Clypeal extension with apex deeply emarginate, sparsely punctate, masked by dense, appressed hairs; lateral margin strongly convex. Mandible fusco-brownish. Clypeo-antennal distance two times width of medial extension. Antennae with all segments of flagellum reddish-brown below; scape and pedicel wholly black; apex of scape strongly angulated. Pronotum more or less masked by appressed white hairs directed posteriorly; primary punctures poorly differentiated from the secondary ones which are numerous in antero-discal patch; side of pronotum with upper half polished and striated, lower half more or less shagreened. Mesepisternum masked with dense white hairs directed posteriorly; primary punctures small, of third-degree density; secondary punctures very shallow and poorly defined from lowest primary punctures but much more

numerous than the latter. Metanotum conical, with a deep medial callosity which is surrounded by primary punctures (of first-degree density and smaller than the largest ones of scutellum). Tibiae of first two pairs of legs, tarsi of fore-leg and apex of femora reddish. Tegula black and opaque, non-transparent. Wings smoky; radial cell much exceeding second cubital cell in apical extension; first cubital cell with a well-defined cubital mark. Propodeal areola keystone-shaped in outline, nearly twice longer than smallest width; longitudinal carinae with crenulate grooves on either side; medial carina extending to anterior two-thirds; enclosed area finely punctate. Propodeum with latero-dorsum heavily punctate; lower portion of sides finely striated and well-defined from the upper rugose region; posterior aspect with fine setulose punctures. First tergite with preapical band of deep and well-outlined punctures of first-degree density. First sternite weakly convex anteriorly; disk polished and sparsely fine-punctate; apical groove obsolete, lateral grooves not present; medial keel well-outlined. Intermediate tergites with primary punctures small, shallow, but rather dense; impunctate apex of fourth tergite as wide as six times the diameter of nearest adjacent primary punctures. Length of body, 9 mm.; of fore-wing, 6.5 mm.

Female.—Unknown.

Holotype.—♂, from Yellow Mountains (黃山), Anhwei, August 7, 1935 (C. Y. Wong, coll.), deposited in the Bureau of Entomology, Hangchow.

This fine species is respectfully named in honor of my teacher Mr. Pei-sun Wang (王培孫) of Shanghai. It is rather closely related to *T. capillata* Allen and Jaynes of India, but can be readily distinguished by the following points:

T. capillata A. & J.	*T. wangpeisunana* sp. nov.
Vertex with primary punctures of third-degree density everywhere.	Vertex with a few punctures of first degree density just behind the ocellar triangle and narrowly along the upper eye orbits.
Tibiae and tarsi of legs all reddish.	Hind tibia and tarsi of first two pairs of leg black.
Tegula reddish-yellow, very thin and nearly transparent.	Tegula black and opaque, not transparent.
Propodeal areola rectangular in outline, slightly longer than width.	Propodeal areola keystone-shaped in outline, nearly twice longer than smallest width.
Primary punctures of intermediate tergites sparse, never of first-degree density.	Primary punctures of intermediate tergites of first-degree density anteriorly.

華東黑土蜂之兩新種

馬駿超著

(摘要)

本文所記之兩新種，一即細紋黑土蜂，學名 *Tiphia minutostriata*；一即王氏黑土蜂，學名 *Tiphia wangpeisunana*, 所以尊崇著者恩師王培孫（植善）先生者也。前者爲著者在浙江江山仙霞嶺所採得，與食蝶黑土蜂 (*Tiphia popilliavora* Rohwer) 相似，惟可由其頭頂點刻，大顯中溝，前胸背片橫帶及第一腹節前緣溝之有無以分別之。後者爲王啟虞先生在安徽黃山所採得，與印度黑土蜂 *Tiphia capillata* A. & J. 相近，然其脛節，跗節及翅肩之色澤以及中節中央部之構造，完全不同。此二兩新種之原標本，均存浙江省昆蟲局標本室。

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A NEW SPECIES OF MACROMIA FROM CANTON (ODONATA: ANISOPTERA: LIBELLULIDAE)

By E. R. Tinkham

Assistant Curator of Insects, Lingnan Natural History Survey and Museum, Lingnan University, Canton.

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*Names arranged alphabetically.

A NEW SPECIES OF MACROMIA FROM CANTON (ODONATA: ANISOPTERA: LIBELLULIDAE)[1]

By E. R. Tinkham

Assistant Curator of Insects, Lingnan Natural History Survey and Museum, Lingnan University, Canton.

While studying the Odonatan collection in the Lingnan Natural History Survey and Museum, the writer ascertained that a small species of *Macromia* collected by him in the spring of 1935 represented a new species. This was found along one of the streams at the southwest base of White Cloud Mountain, a few miles north of Canton. The description follows.

Macromia cantonensis n. sp.

Though very small for *Macromia* and but little larger than *Idionyx claudia* Ris, this species possesses all the characteristics attributed to *Macromia*, namely, trigonal of hind wing distal to the arc; trigonals and subtrigonals without crossveins; discoidal field commencing with 2 rows of cells and not one as in *Idionyx* Hagen-Selys and *Idiophya* Fraser, and the anal loop short and rounded in the male, slightly narrower in the female, but not with an elongate lobe-like anal loop bearing two rows of similarly shaped cells as in *Idionyx*, *Idiophya*, or *Phyllomacromia* Selys.

Holotype.—♂, Kwangtung, S. China, White Cloud Mountain, Canton, May 12, 1935 (E. R. Tinkham; mountain stream in shade of small trees). Measurements in millimeters: Fore wing 35.0; hind wing 34.0; expanse of fore wings 71.0; total length 50.0; abdomen 37.0. Holotype in the collection of the Lingnan Natural History Survey and Museum.

Only one rather large species, *Macromia clio* Ris, is at present known from China. The new species may be readily distinguished from it by its much smaller size and lack of yellow banding across the dorsum of the thorax and the abdomen. It is not closely related to *M. clio* but appears to have its nearest affinities with *Macromia trituberculata* Fraser from Assam, India.

Size small. Labium pale testaceous brown with fine pale brown hairs on the posterior border and shorter golden brown bristles on the anterior edge. Labrum and clypeus darker testaceous brown. Occiput and the entire front of the face clothed with long fine black hairs. Lower edge and sides of the frons dark testaceous brown, the prominences impresso-punctate, metallic greenish-blue in the

[1] Contribution from the Lingnan Natural History Survey and Museum.

center and shading to purplish-blue at the sides of the prominences. Frons with a deep longitudinal groove in the center, which is highly polished. Vertex punctate, metallic bluish green. Ocelli pale reddish-brown; eyes very dark castaneous brown with a slight violet cast in certain lights. Antennae black. Occiput black, very smooth; a posterior subocular fringe of long reddish-brown hairs.

Prothorax pale testaceous. Synthorax metallic green with a little reddish-brown just above the base of the meso-legs. No antehumeral or humeral stripe but the second lateral stripe, broad, canary yellow, passing from below up through the metinfraepisternum to encircle the thorax just to the rear of the bases of the fore wings. Posterior lateral borders of the metepimeron yellow, the yellow extending forward on the sternum so that the metallic band is considerably narrower below that on the sides of the metepisternum just caudad of the yellow second lateral stripe. Synthorax with a pale brown pilosity.

First and second abdominal segments dull metallic green, third segment shining black, segments 4-6 duller black and segments 7-10 mat black. Posterior edge of first abdominal segment, narrow dorsal median line on segment 3, segment 6, and basal portions of 7, yellow. Auricle also yellow. Inferior border and lower posterior lateral border of segment 2 and basal part of inferior border of segment 3, yellow. Ventral edges of seventh to ninth segmental tergites along the median line edged with whitish-yellow and moderately covered with short black hairs. Segments 6-10 with a sparse coverage of very short black setae.

Anal appendages of moderate length, slightly longer than the ninth segment, white, the white slightly infumated with gray at the base and with the outer edge of the apical third, black, the whole sparsely covered with black hairs. Lower edge slightly beyond the middle with a small dentate prominence. Inferior appendages as long as the superiors, slightly recurved in the apical one-third and dull blackish white, with very short black setae above and longer black hairs below.

Wings hyaline with black veins and stigma and with a very slight narrow infuscation at the extreme base of the hind wing. Legs are black with black spines.

Paratype.—♂, same data as holotype. Measurements in millimeters: Fore wing 33.0; hind wing 32.0; expanse of fore wings 68.0; total length 47.0; abdomen 36.0. Coloration similar to the holotype.

Allotype.—♀, Hong Kong, elevation 500-800 feet, May 26, 1935 (E. R. Tinkham; along mountain stream). Measurements in millimeters: Fore wing 38.0; hind wing 37.0; expanse of fore wings 78.0; total length 52.0; abdomen 38.0. Allotype deposited in the collection of the Lingnan Natural History Survey and Museum.

Slightly larger than the holotype but otherwise very closely similar in coloration except that the yellow markings on the abdomen are slightly broader and more extensive. Mid-dorsal line of the abdomen with a very fine yellow line from the base of segment three to basal half of 7, the line missing on parts of segments 5 and 6. Cerci very short, acuminately pointed, white, and covered with black hairs. Ovipositor shining black with a deeply cleft bifurcate process at the end of the eighth abdominal segment. Wings more infumate at the base than in the holotype, the infuscation extending out to the level of the arculus in the second subcostal row of cells and to the anal crossing.

Paratype.—♀, data same as the holotype. The Hong Kong specimen was selected as the allotype because the colors are more intense; the Canton female is a slightly teneral adult with the colors not fully developed. Measurements in millimeters: Fore wing 37.0; hind wing 36.0; expanse of the fore wings 76.0; total length 50.0; abdomen 37.0. Paratype in same collection as the holotype and allotype.

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廣州蜻蛉之一新種誌

(蜻蛉目，殊翅亞目，蜻蛉科)

丁謙著

(摘要)

此新蜻蛉，之學名爲 *Macromia cantonensis*，乃採自中國之廣州。有異於 *M. clio* Ris。上述品種，發見於中國者，僅有一種而已。新述品種與薩密，印度之 *M. trituberculata* Fraser較相似，惟形軀細小。翅頗透明，翅脈及緣紋色黑。在後翅之基部，有一狹小部分，其色灰。本文所述之品種，乃根據廣州嶺南大學自然博物採集所之標本。

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ON THE OCCURRENCE OF FRESH-WATER MEDUSAE IN AMOY

By D. S. Tang (湯獨新), P. F Yang (楊佩芬),
and T. C. Fang (方宗熙).
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By D. S. Tang (湯獨新), P. F Yang (楊佩芬),
and T. C. Fang (方宗熙).
Department of Biology, The University of Amoy, Amoy, Fukien.

Fresh-water medusae are rare organisms. On October 1, 1935, the writers had an unusual chance to collect a number of fresh-water medusae in a concrete pool on the right side of the Biology Building of the University. From the shape of its manubrium and the position of its gonads, this medusa undoubtedly belongs to the genus *Craspedacusta* (Lankester 1880, June 17=*Limnocodium* Allman 1880, June 24), which is represented by three species, *C. sowerbii* Lank., *C. kawaii* (Oka), and *C. isaenum* (Oka). The first two species are so closely related that it is doubtful that they are distinct; the third is very different in detailed structure from the others. *C. sowerbii* was discovered by Mr. Sowerby in a waterlily tank in Regent's Park, London, in 1880, and is believed to have been brought in with waterlilies from South America or the West Indies. The discovery of *C. kawaii* by Captain M. Kawai, 1907, from the Yangtze River near Ichang was the first time that China was recorded as being the home of fresh-water medusae. The specimens from Hangchow are said to be determined as *C. kawaii* by Oka, and may also be associated with waterlilies in nature.

The sudden and unexpected occurrence of medusae in the pool induced us to study the physical, chemical, and biological conditions of the pond in order to find why the organism occurred here in 1935. The results are given in this paper as a contribution toward further studies of the morphology, biology and ecology of fresh-water medusae.

Description

The specimens are similar in size, measure about 11 mm. in diameter when their bodies are expanded and about 7 mm. when contracted. The body varies in form during pulsation from a bell-like structure to a shape resembling a shallow dish. The width of the velum is about 2 mm. The manubrium is about 7 mm. long with four lips per-radial in position at the tip. The tentacles are more than 448 in number and arranged in 6 or 7 different orders of size in an arrangement of 1,3,4,8,16,16,64 in each quarter; the fifth and sixth orders are not very distinctive, and additional tentacles are usually found in the last order. The tentacles are hollow and the ectoderm bears prominent nematocyst-warts at fairly regular intervals; each wart contains about 15 nematocysts. The four leaf-shaped gonads arise from the ventral surface of the four radial

canals and become ribbon-like structures after the elements are discharged. The margin of the umbrella is provided with notches and near each notch on the ventral surface of the velum there are two lithocyst-organs or "otoliths". The lithocyst-organ is composed of a spherical body within a pyriform capsule.

Summary of the Genus Craspedacusta

It has been noted above that *C. sowerbii* is very similar to *C. kawaii*. In the study of the Amoy fresh-water medusa we were fortunate in having Hangchow specimens, labeled *C. kawaii*, for comparison. These were received from Dr. T. Y. Chen, to whom we are indebted. The number of tentacles of the Hangchow specimens was found to be 320, while the number in the type of *C. kawaii* is given by Oka as 256. These organisms from different localities have been identified by Oka as belonging to the same species. It is thus doubtful that *C. sowerbii* and *C. kawaii* and the Amoy medusa represent distinct species, though the last possesses a greater number of tentacles, 448, than the first two, and has also other minor differences. Since we do not have specimens of *C. sowerbii* nor the type-specimen of *C. kawaii*, and since we could not obtain larvae of the Amoy medusa, no conclusions will be drawn here although the Amoy specimens may prove to be a new subspecies. The Amoy and Hangchow specimens are in the museum of the university. In table 1, a comparison of the members of the genus *Craspedacusta* is given.

Biology

Locomotion.—The animal moves by means of the systole and the diastole of its umbrella. During locomotion the animal is usually with its aboral surface upward, with the larger tentacles on top of the umbrella and the manubrium below. When the umbrella contracts the animal is pushed upward and forward; when it relaxes the animal stops its motion. By the continuous pulsation of the umbrella an upward straight course usually results. In descending, the pulsation ceases and the animal lowers itself gradually to the bottom or to any desired level. When the medusa meets obstacles, it inclines its body and moves in an oblique direction. In the laboratory the animal spends most of its time resting on the bottom of the museum jar. Occasional pulsations occur, their probable function being respiration, or to secure food.

Pulsation.—A normal healthy animal pulsates quite regularly, about two times per second at a water temperature of 28.5°C.

Food.—Daphnia has been reported as the food of medusae. At this time we were able to observe that several Cyclops were ingested and completely digested within three hours. In feeding the animals with Volvox, the process of ingestion also occurred, but we failed to observe digestion.

Duration of Life.—The animals are able to live in the laboratory about four weeks.

Simple Tests

Temperature.—Five active specimens were kept in a piece of tubing of 2 liters content with a thermometer on each side, containing the original pond water at a temperature of 28°C. The tube was held in a horizontal position by clamps and ring-stands. When

TABLE 1

A comparison of the several species of Craspedacusta

	C. SOWERBII LANK. 1880	C. KAWAII (OKA) 1907	HANGCHOW SPECIMEN	AMOY SPECIMEN	C. ISEANUM (OKA) 1922
Diameter in mm.	12	20	8	7-11	20
Velum to bell opening		1/4	1/4	1/4	1/2
Orders of tentacles	3[1] or 3-4[2]	7	7	6-7	9
Number of tentacles	200	256	320	448	128
Number of lithocysts	128	128	128	128	128
Position of lithocysts	Between tentacles	Between tentacles	Between tentacles	Between tentacles	Base of tentacles
Arrangement of nematocysts	Grouped	Grouped	Grouped	Grouped	Isolated
Ring canal	Present	Present	Present	Present	Absent
Where found	Water-tank, England.	Yangtze River, China.	Fountain, Hangchow, China.	Pool, Amoy Island, China.	A well, Ise Prov., Japan.

[1] This number is given by Lankester, 1880.

[2] This number is given by Allman, 1880.

one end of the tube was cooled to 27°C. with ice, all the medusae moved to the opposite end where the temperature was still 28°C. When the other end was gradually warmed with hot water, the medusae moved to the middle. This shows that the animals are very sensitive to temperature changes, and that around 28°C. appears to be the most favorable temperature for them.

Another test was to keep specimens in beakers subjected to different temperatures, to ascertain when the animals became

abnormal or motionless. One beaker was cooled by placing ice on the sides; abnormal motion occurred at from 16° down to 9°C. The animals contracted and relaxed very slowly. The mode of pulsation was much different from the normal, the tentacles curved and shrank, the body lost its shape and regained not a circular shape but became somewhat rectangular in outline. The animals became motionless at 8°C., but recovered at about 16° to 19°C., when the beaker was placed in a warm water bath. Another beaker was warmed, the animals becoming abnormal at 31° to 35°C., motionless at 36°C., but recovering when the beaker was cooled to about 30°C. After the experiments were concluded, the beakers containing the specimens were left undisturbed in the laboratory. The next morning we found the medusae alive and exhibiting their normal pulsations, the room temperature being 27.5°C.

Reaction to Light.—To determine the reaction of the specimens to solar light, both ends of the cylinder were covered with black paper, leaving the middle portion exposed to sunlight. After about twenty minutes, the three specimens all moved to the uncovered portion. When electric light was used, the result was the same. When moonlight was used, no response occurred.

Behavior in Various Media.—Two specimens were transferred to a beaker of sea water, in which they immediately appeared to suffer injury. Only a few complete pulsations took place, after which the animals floated to the surface and died in half a minute.

In the case of normal saline, the result was similar to what occurred in sea water. When one specimen was transferred to a beaker containing one-third sea water and two-thirds pond water, the rate of pulsation was lowered one time per 1.4 seconds. After about half a minute, no complete contractions could be observed. Death ensued in about two minutes. Another specimen was transferred to a beaker containing one-tenth sea water and nine-tenths pond water. Normal pulsation occurred at different intervals for about two hours, and death resulted in about eight hours.

When specimens were placed in a beaker of tap water, normal pulsations took place at unequal intervals for a comparatively long time. The specimens showed abnormalities, such as the shrinkage of tentacles and slight contracting of the margin of the bell. They died the next morning. Two specimens were placed in a beaker of distilled water, where pulsations continued for awhile, then a pause occurred. After this, they were unable to continue complete pulsations, and died within a few hours. This result is similar to that obtained by Hargitt (1908).

Conditions of the Pool

Physical.—The pool in which the medusae were found is small, round, about 16 feet in diameter and 4.5 feet in depth. It is made entirely of concrete and is situated on the western side of a small hill near the Biology Building. The amount of water in the pool is dependent upon rainfall, as the pool itself has no connection with a river, spring, or the sea. We understand that it was built as a fish pool, not as a pool for waterlilies. During October, the temperature of the surface water varied from 26° to 33°C., while that of the bottom remained almost constantly 28°C. The medusae would swim freely just below the surface of the water from 8:00 to 9:00 a.m., while the sunlight was weak; they disappeared when the water temperature increased to 29°C., or decreased to about 26°C.

Analysis of the Pool Water.—As soon as various experiments indicated the inability of the organisms to live in artificial environments, it was deemed advisable to analyse the water from the pool in which the specimens had been collected. We are grateful to Mr. T. H. Huang for making an analysis, the results of which are as follows:[1]

Salinity	Cl 0/00[2]	0.0178	
	S 0/00	0.0629	
Phosphate		0.03	P.P.M.[3]
Nitrite		Free	
Silica		27.5	P.P.M.
pH		8.3	
Free carbon dioxide		0.5	P.P.M.

We wish to note that the salinity of the pond water is a little above that of Amoy tap water, and much below that of sea water. The pH value of the pond water is also higher than that of tap water. The high percentage of silica may be due to the presence of plankton in the pond.

Biological.—The greenish color of the water was due to the presence of two kinds of free floating unicellular blue-green algae, *Chroococcus* and *Merisopedia*. The former was abundant, the latter much less so. A microscopic examination of material from the edge of the pond indicated the presence of two algal species, the

[1] Method of analysis: "Salinity was determined by titration of the chloride and calculated according to the equation given in Harvey: 'Biological Chemistry and Physics of Sea water.' The determinations of phosphate and nitrite were estimated by Atkin's modification of the Coeruleomolybdate calorimetric method of Denigés' Orr's modification of Dienert, and Wandenbulck's method but 40 mg. of picric acid per liter as equivalent to 50 mg. of silica were used. The determination of hydrogen ion concentration and free carbon dioxide were made according to the 'Standard Methods of Water Analysis' using phenol red and phenolphthalein as the indication respectively."——by Mr. T. H. Huang (黃大烜).

[2] Grams per 1000 grams of pond water.

[3] Parts per million.

filamentous *Oscillatoria* and the stalked diatome *Brebissomia*. The only flowering water plant in the pond was *Potamogeton* sp.[4] Animals in the pond were largely Cyclops and rotifers. Besides these there were a few fishes (*Carassius auratus*), nymphs of mayflies, and beetle larvae. A species of water-strider occurred on the water surface, and one species of *Vorticella* was found attached to the *Oscillatoria* and *Potamogeton*. No Daphnia or waterlilies were present.

Summary

1. The presence of fresh-water medusae in South China is recorded for the first time in the present paper.

2. This medusa is allied to *C. kawaii* and *C. sowerbii*, and may be a new subspecies.

3. The medusae are not always associated with waterlilies, but may occur with other water plants such as *Potamogeton*. The sudden occurrence of the medusae in the present instance must have some relation to the presence of this plant in the pool after 1934.

4. The food of the medusae may be Cyclops.

5. The most favorable temperature for medusae is 28°C.; they become motionless at a temperature of 36°C., or of 8°C.

6. The specimens are sensitive to light, to temperature, and to changes in salinity and pH of their medium.

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厦門淡水水母發現誌

湯獨新，楊佩芬，方宗熙著

(摘 要)

在厦門大學校園之池中，發見一水母亞種。此亞種與楊子江之 *Craspedacusta kawaii* (Oka) 及英倫之 *C. sowerbii* Lankester 相近，故或爲一新亞種。文中描述厦門水母，且與上述二種。*C. iseanum* (Oka)， 及杭州之品種互相比較。對厦門水母之生態與習性等皆一一詳述。至其發見處之地勢情形，亦曾作生物，化學，物理等分析。並附參考文献二十九篇。

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0225

FOUR NEW SPECIES OF ORTHOPTERA FROM LOH FAU SHAN, KWANGTUNG, SOUTH CHINA

By E. R. Tinkham

Assistant Curator of Insects, Lingnan Natural History Survey and Museum.

SEPARATE FROM

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0227

FOUR NEW SPECIES OF ORTHOPTERA FROM LOH FAU SHAN, KWANGTUNG, SOUTH CHINA[1]

By E. R. Tinkham

Assistant Curator of Insects, Lingnan Natural History Survey and Museum.

Although Kwangtung is a mass of mountains, few of them rise to any considerable elevation; for the most part they are mere hills and, except in the wilder regions, devoid of forests. Loh Fau Shan, Lung T'au Shan, Man Chi Shan, and Sam Kwok Shan rise to an altitude of four to five thousand feet, while the Ling Mountains which form the northern boundary of Kwangtung are reported to be even higher. Of these Loh Fau is perhaps the best known. It is situated just south of the Tropic of Cancer at 114.5 degrees East Longitude, some 20 miles northeast of Sheklung. Loh Fau Shan is 4150 feet in height, massive in structure, and as it rises from the rice fields (which are little above sea-level) surrounding its base, it presents an inspiring sight. Its upper one-third is seldom free of clouds which envelop the peaks and gives the higher reaches a cool and invigorating climate.

Because of its surroundings, because its lower levels pertain to the Oriental Faunal Region and its upper third to the Palaearctic, and because of its isolated geographical position, Loh Fau can be expected to reveal some interesting facts concerning zoogeographical distribution of insects and other animal and also plant life.

The writer has studied Loh Fau Shan at every available opportunity, and has paid especial attention to the altitudinal distribution of the Orthopteran life found there. It was on Loh Fau, during the month of August, 1933, that he had his first experience with the insect life of the Old World, shortly after he arrived in China. Later trips, in June and October, 1934, and July and October, 1935, were made to collect new material and obtain additional information. Not only has Loh Fau proved to be most fascinating to the entomologist, but the grandeur of the mountain with its deep wooded gorges, pools and waterfalls, with its delicate flowers in the woods and huge white lilies in the grassy meadows on top, and its balmy climate, embues him with respect and admiration something akin to the reverence that the Chinese have for this mountain.

The present paper describes four new species collected on the mountain, and will serve as a contribution toward later studies.

[1] Contribution from the Lingnan Natural History Survey and Museum, Lingnan University, Canton, China.

ACRIDIDAE

ACRYDIINAE

Hancockia Kirby

In 1914, W. F. Kirby described this remarkable genus from Madras, India, stating that *Hancockia portentosus* Kirby resembled in profile *Platytettix reticulatus* Hancock from Peru, South America, but lacked the projecting shoulder spines. The new species described below differs from *Hancockia portentosus* in several respects. Later comparisons with the genotype may determine whether it properly belongs to this genus or represents a new one. I have examined several Formosan specimens in the Museum of the Government Research Institute in Taihoku, determined as *Potua platynotum* Karny, and am of the opinion that they are more closely related to *Hancockia* than to *Potua* as exemplified by the genotype *Potua coronata* Bolivar. I prefer to consider the new species as belonging to *Hancockia* until a time when more detailed study can be made of the types of these closely related genera and species. From these two species the new species is readily distinguished by the greater humeral width of the pronotum.

Hancockia kwangtungensis n. sp. (pl. 17, fig. 3; pl. 18, fig. 5)

Size about that of *Hancockia portentosus*, but readily distinguished by the following characters: Entire lack of pubescence, greater width of humeral angles which almost equals that of the lateral lobes, strongly marginate apex of the pronotum, and the present of a pair of prominent cone-like swellings on the pinnae of the outer paginal face of the hind femora.

Holotype.—♀. Kwangtung, S. China, Loh Fau Shan, Big Pool, elev. about 2800 ft., Aug. 26, 1933 (E. R. Tinkham; on dead leaves lining a small depression in woods). Length in millimeters: Entire body, 13.5; pronotum, 13.0; antennae. 5.2; hind femur, 7.3; width of shoulders, 6.0; of lateral lobes, 6.7; ovipositor, 2.0. Holotype deposited in the collection of the Lingnan Natural History Survey and Museum.

Entire body dark testaceous, devoid of pubescence but covered with a scurfy material which when removed reveals an irregular and shining surface with numerous large open pits varying in size and density. Head slightly exserted; surface scurfy and scabrous. Antennae 14-segmented, very slender, brownish-black with testaceous annuli at the segmental joints; inserted considerably below the eyes. Frontal costa widely and deeply sulcate between the antennae; in profile triangularly produced between the antennae with serrulate margins; from above appearing as diverging plates. Frontal costa not evident above or below the base of the produced costa, the median ocellus situated at the lower and the lateral ocelli at the upper base

and on a line slightly below the lower level of the eyes. Lower portions of the face rough and convex. Eyes comparatively small, subglobose. Vertex flat, more than twice the width of an eye, tridentate anteriorly with two dentate carinae contiguous to the inner margins of the eyes, a smaller median carinate denticle; the three with dentate-serrulate edges.

Pronotum gibbose, scurfy, with large open pits and rugae and with prominent cone-like swellings on the apical half of the pronotum. Humeral angles very prominent and overhanging the lateral lobes; their width about equal to that of the lateral lobes; their margin coarsely and irregularly dentate. Median carinae evident only on the frontal one-fourth, composed of a highly cristate tooth-like portion on the fore margin and a high moderately thick cristate portion bridging the depressed sulcate area between the prozona and the fore part of the shoulder; its edge round and smooth. Lateral carinae on the prozona with serrate edge, diverging caudally and decurving to the first sulcus. Caudal one-third of very high cristate bridge paralleled by two arched lateral carinae with serrate edges, the three forming an elevated portion on the front of the humeral lobes. Dorsum between the shoulders with a large open depression on each side of the median line bounded before and behind by irregularly raised rugae and with a short transverse ridge connecting the two depressions. Plane of the apical half of the pronotum slightly convex; two pairs of cone-like swellings centrally situated and a smaller dentate pair near the apex; the whole surface with large open pits, rugae and lesser dentate cones. Lateral lobes scurfy but highly polished underneath the scurf, the area below the shoulders shining black with a raised oblique line and closely placed open pits. Anterior lateral lobes smooth, shining black with the sulcated area between the two black areas and including the processes of the lateral lobes, light testaceous. Lateral lobes sublobate outwardly, slightly depressed, their margin finely serrulate, but the margin of the anterior lobes finely and irregularly dentate. Tegmina and wings absent. Abdomen hidden by the enormous metazona; the tip of the ovipositor reaching to the groove in the hind margin of the metazona. Dorsal valvulae with about 14 sharp teeth on the upper edge and with a sharp apical recurved tooth. Ventral valvulae with lower edge bearing about 10 small teeth and a sharp apical decurved one. Subgenital plate strong convex, its hind margin truncate and bearing a median triangularly pointed apex. Fore margin of the prosternite strongly flanged and deflexed to protect the mouth parts. Sternites broad with a few short scattered hairs.

Fore and mid femora with strongly bidenate upper and lower keels with serrate edges, the outer face with two rows of teeth and with additional scattered teeth. Fore and mid tibiae with serrate edges. Fore and middle legs dull reddish-brown with proximal,

median, and apical light testaceous annuli. Apical segment of tarsi with median testaceous bands; tarsal claws bidentate and testaceous. Hind femora very thick and broad. Outer and upper surfaces of the exterior pagina with the pinnae forming strong, oblique, subparallel ridges with dentate edges. Those centrally situated are most strongly developed, the two central ones on the outer surface raised into two conspicuous cone-like swellings with their surface covered with small denticles. Upper keel of hind femora flanged, minutely dentate, somewhat crenulate, with genicular and antegenicular processes strongly and angularly produced caudally with a pale smaller inwardly bent tooth placed in front of the antegenicular one. Hind tibiae dark brown with two clear testaceous annuli, and apex of same color. The tibiae expand slightly apically with margins weakly lamellated, the inner margin bearing 4-5 blunt teeth and the outer 6-7 teeth. Hind tarsi with testaceous annuli at base and apex; claws bidentate and testaceous.

Paratype.—♀, bearing same data as the holotype, but collected Aug. 25, 1933. Measurements in millimeters: Pronotum, 12.0; total length, 12.5; antennae broken; hind femur, 6.8; humeral width, 5.8; width of lateral lobes 6.1. Paratype in the author's collection.

Habitat.—A small excavated depression about four feet square, lined with fallen leaves and so situated on the steep north slope of a wooded gorge that the noon-day sun striking through an opening in the foliage overhead lights the area. It was unfortunate that the three females collected on the first day's search in 1933 were placed alive in a collecting can with some other Orthopterans, one of which later proved to be a female *Anobropsis tonkinensis* Rehn. This was the writer's first collecting trip in the Orient and he was unaware of the cannabalistic propensities of certain Oriental Orthoptera. He discovered, on arrival at camp that evening, that *Anobropsis* had devoured two specimens and partly destroyed the third. Determined to find other specimens, the writer spent the whole of the following day collecting, but only two specimens, the holotype and paratype, were discovered. Since that time careful search in October, 1934, and again in July and October, 1935, has failed to bring others to light. There is a possibility, since the microhabitat was so restricted, that the species may have become exterminated.

CYRTACANTHACRINAE

Podisma Latreille

The species of *Podisma* here described as new is the first from southern China. In an earlier paper in this journal, 15(2):211, I have removed *Podisma viridifemorata* (Caudell), described by that author as a *Catantops* in 1921, to the genus *Melanoplus* Stál. Tsai's *Podisma viridifemoratus* is a synonym of *Melanoplus viridifemoratus* (Caudell). *M. viridifemoratus* is most closely related to *M. okinawaensis* Shiraki described from the Okinawa Islands, Japan, in 1930. Bey-Bienko (1929 and 1931) has recorded *Podisma parvula* Ikonnikov and *P. frigida* (Boheman) from Manchuria and a number of other species from Korea. Several species of *Podisma* are found in the mountains of Fukien, Kiangsi and Chekiang, but at present I am not certain of their identity as none of the North China species is available for comparison.

The genus *Podisma* presents a remarkable example of montane geographical distribution. Being Palaearctic, most species of *Podisma* (like many species of the great Nearctic genus *Melanoplus*) are confined to isolated mountains and mountain ranges in the Northern Hemisphere. One species of *Podisma* is Neogeic; the remainder, about 35 known species, are Rontogeic. Europe has about twelve species, while most of the others are indigenous to the mountains of northeastern Asia. Japan has six species, Formosa seven, including three new species described by the writer (in press). Fewer species are known from China than one would expect. This is no doubt due to the limited collecting that has been done. Uvarov within recent years has described two new species from the high mountains of Assam, India.

It seems fitting to dedicate to Loh Fau Shan (also spelled Lofaoshan) the following species.

Podisma lofaoshana n. sp. n. sp. (pl. 17, fig. 2; pl. 18, fig. 3, 4)

In size nearest *Podisma formosanus* Shiraki but slightly smaller and differing in the following respects: Coloration of the dorsum dark olive brown and not fern green; pronotal sulci very shallow, the pronotum itself presenting a smooth rounded appearance; dorsum more coarsely and deeply punctured; prozona not inflated and in profile appearing slightly subsellate. The cerci are distinct from those of the Formosan, Japanese and central Chinese species, in being strongly recurved and bearing a large blunt tooth on the lower apical one-third.

Holotype.—♂, Kwangtung, S. China, Loh Fau Shan, alt 3800-4000 feet, Aug. 13, 1933 (E. R. Tinkham; in tall rank grass on the mountain top). Measurements in millimeters: Total length 25.5; pronotum 5.6; tegmina 4.3; hind femur 15.0; antennae about 12. Holotype deposited in the collection of the Lingnan Natural History Survey and Museum.

Head short and broad, eyes large, subglobose. Vertex narrow between the eyes and sloping onto the short fastigium which expands in front to be about the same width as length, with the lateral ocelli placed on the fronto-lateral prominences. Frontal costa with strong parallel ridges and only slightly sulcate. The median ocellus is placed below the base of the antennae.

Pronotum short, the dorsum rounded evenly into the lateral lobes, very slightly subsellate when seen in profile. Median carina evident; fore margin truncate and feebly rounded, the hind margin moderately rounded and feebly emarginate. Dorsum with the surface coarsely and irregularly punctate and somewhat rugose, with the sulci shallow, the first and the third dividing the pronotum into three equal parts. Lateral lobes shallow, their length considerably greater than their depth. Tegmina reticulate with fine cells, the apices reaching to the caudal edge of the second abdominal segment, the apical third covering a large tympanum.

Fore and middle legs incrassate; the apices of the hind femora surpassing the tip of the subgenital plate by the length of the knees. Hind tibiae with nine external moderately sized spines without an apical one and with eleven large spines including the apical one on the inner edge. Prosternal spine strong, acuminately pointed, the apex rounded.

Supra-anal plate about as broad as long, triangular, apex acute. Median furrow broad at the base, abruptly narrowing to the middle, and ending in a narrow rounded apex slightly beyond the middle of the plate (see pl. 18, fig. 4.). Apical one-third of plate with a flat broad disk bordered laterally by strong ridges. Cerci distinctly recurved with a large blunt tooth on the lower edge situated at the apical one-third (see pl. 18, fig. 3). Tip of the cercus just reaches to the parallel lateral ridges on the apical one-third of the supra-anal plate. Subgenital plate produced into a strong rounded apex.

Coloration.—Dorsum of head and pronotum and the tegmina dark olive brown, the abdomen dark olive brown in front but paling apically. Post-ocular stripe shining black, the upper edge not distinct from the dark olive brown of the dorsum, the lower border contrasting sharply with the light color of the under parts. Post-ocular stripe on the abdomen represented by four round black patches on segments three to six, each spot slightly smaller than the spot on the preceding segment. Lower surfaces of the body below the post-ocular stripe yellowish-green. Antennae testaceous at the base gradually changing to darg red brown at the tip. Fore and middle legs greenish-brown, in life clear foliage green. Hind femora clear foliage green with the lower internal edge dull red; the knees shining black with pale green antegenicular annuli. Hind tibiae glaucous with the extreme base, the spines to their base, and the calcariae, shining black. Tarsal segments light yellowish-green.

Paratypes.—10, with the same data as the holotype but collected as follows: 1♂, Aug. 4, 1933; 4♂, Aug. 13, 1♂, Aug. 15, 1♂, Aug. 23, 1♂, Aug. 25, 1933; 2♂, Oct. 13, 1934. Range in measurements in millimeters: Total length 23.0-25.5; pronotum 5.0-6.0; tegmen 3.5-4.2; hind femur 13.5-14.8; antennae about 11.5-13.5.

Paratypes in the collection of the Lingnan Natural History Survey and Museum and in the author's collection.

Allotype.—♀. Same data as for holotype but collected Aug. 12, 1933. Measurements in millimeters: total length 35.0; pronotum 7.3; tegmina 5.5; hind femur, 17.8; antennae about 12.5. Allotype in the collection of the Lingnan Natural History Survey and Museum.

Allotype agrees with the holotype except as follows: Size considerably larger; fastigium of the vertex more shallowly impressed than in the male; pronotum with the dorsal surface of the prozona smoother, not so deeply punctate or rugose as in the male; the metazona as in the male. Fore margin of the pronotum as in the male but with a slight notch in the center, the hind margin slightly more emarginate than in the male. Legs strong but not incrassate. Hind femora reaching to the tip of the ovipositor.

Supra-anal plate narrowly triangular with the apex bluntly rounded, not furrowed, narrow and flat on top, the edges strongly rounded into the sides. A transverse narrow groove completely crosses the plate at the basal two-fifths. Cerci short, broad at base, acuminate, narrowing abruptly to the subacute apex. Subgenital plate typical, flat and smoothly rounded into the sides, the posterior margin acuminately pointed with the attenuate apex lying between the ventral valvulae. Dorsal valvulae strong and wide, with the apex gently recurved into a subacute tooth, the dorsal margin with 6-7 irregularly placed notches. Ventral valvulae narrow, the lower margin irregular and with a roughly formed tooth below and near the apex.

Color of the dorsum similar to the holotype, but darker on the abdomen, the entire dorsal surface dark olive brown. Remainder of the body and the legs as in the holotype.

Paratypes.—7, collected as follows: 1♀, Aug. 10; 3♀, Aug. 15; 1♀, Aug. 23, 1933; 1♀, Nam Lau (monastery), elevation about 1100, Aug. 16, 1933 (in dense woods by mountain stream). 1♀, 6th instar nymph, Big Pool, elevation about 2800 ft., July 21, 1935. This nymph was found molting about 9 p.m. The habitat was a small clump of tall grass on the north slope of a densely wooded gorge.

Habitat.—All of the specimens collected in 1933 were taken in tall rank grass bordering dense shrubs and trees that grew at the source of a small mountain stream near the mountain peak. There the specimens mature about the first week in August. The specimens are found only after careful search as they are both active and secretive. The 1934 specimens were secured in tall grass near the highest point on the mountain. A search in October, 1935, failed to reveal any specimens. It may have been too late in the season,

although its common associate *Oxya tinkhami* Uvarov was quite abundant at that time. Aside from the typical habitat in the tall grass on the mountain top *Podisma lofaoshana* occurs only rarely in microhabitats in the cool dense and wet woods at somewhat lower elevations.

Range in measurements in millimeters: Total length, 32.4-37.0; pronotum 7.0-8.0; tegmina 4.8-6.0; hind femora, 16.7-19.4; antennae about 11.5-12.5. Paratypes in the collection of the Lingnan Natural History Survey and Museum, and that of the author.

GRYLLACRIDAE

GRYLLACRINAE

Nippancistroger Griffini

In 1914 Griffini formed the new subgenus *Nippancistroger*, the holotype being *Eremus testaceus* which had been described by Matsumura and Shiraki from Japan in 1908. Griffini also described the subspecies *N. testaceus Drouarti* and the variety *N. t. Matsumurae* both of which are from Japan. Karny (1929) considered *Nippancistroger* to be of generic rank; the genus is characterized by the single extremely long spur on the inner upper margin of the hind tibia. Karny stated that representatives of this genus would very possibly be found in China also. His assumption is now verified by the discovery of an interesting new species the description of which follows.

Nippancistroger sinensis n. sp. (pl. 17, fig. 1.)

I have been able to compare this species with Formosan and Japanese specimens in the Entomological Museum of the Government Research Institute in Taihoku. From these it differs in coloration, being uniformly testaceous except for the dorsum of the eighth and ninth abdominal segments which are piceous. All the Formosan and Japanese specimens have the entire dorsum of the abdomen piceous. The spination of the hind tibiae is also different. Japanese and Formosan specimens often have a smaller spine before the very large one and the outer upper margin bears six spines in addition to the apical one, whereas the Chinese species has only a single very large spur on the inner upper edge and five spines on the outer edge in addition to the apical one. The size is about the same.

Holotype.—♂, Kwangtung, S. China, Loh Fau Shan, Wa Shau T'oi (monastery), elevation about 600 feet, Aug. 15, 1933 (E. R. Tinkham; night collecting). Measurements in millimeters: Total length 12.0; pronotum 3.0; hind femur 7.0; hind tibia 6.5; antenna about 48.0. Holotype deposited in the Lingnan Natural History Survey and Museum collection.

Head testaceous; vertex strongly convex; the width of the front between the eyes about three times the width of the first antennal segment; width between the antennae about two times the width of the first antennal segment. Antennae long and slender, testaceous, with a fair coverage of very short golden brown hair. Eyes dark brown, sub-elliptical, subglobose, the cornea of each facet strongly convex. Maxillary palpi long and slender. Face with a sparse coverage of fine testaceous hair.

Pronotum truncate before and behind, the length slightly greater than the width; dorsum strongly convex and rounding into the shallow lateral lobes. Lateral lobes with the lower border straight and smoothly rounding into the anterior and posterior margins, the latter oblique. Meso- and metanotum each slightly less than one-half the length of the pronotum. First segment of the abdomen about the same length as the metanotum, segments two to seven narrower, segment eight broad and about one-half the length of the pronotum. Segment nine not quite so long as eight and, when viewed from above, the hind margin is long and straight with a very slight rounded swelling in the center.

Legs testaceous, covered with short golden hairs and with a scattering of longer ones especially on the edges. Procoxae with an acute strong spine. Fore and middle legs with the lower surface of the femora without spines. Fore tibiae with four pairs of large hairy spines plus a pair of small apical ones. Spination of the middle tibiae similar but less strongly developed. Tarsi four-segmented, the claws simple. Hind femora large and swollen at the base with the lower keel nearly straight. Inner edge of lower keel with seven small teeth, the last two before the apical one paired, the rest evenly spaced. Outer edge of lower keel with four small, almost evenly spaced teeth. Hind tibiae with one very long spur in the middle of the inner upper edge; its tip dark red brown; an additional hairy apical spine. Outer upper edge with five small spines increasing in length toward the apex, the first before and the second opposite the very large spur, the rest caudad with an additional apical spine. Tips of all spines dark. Under surface of the hind tibiae with a pair of small pre-apical appressed spines in addition to the calcariae.

Genitalia testaceous, subgenital plate much wider than long, the hind margin deeply excised thus forming two hairy rounded lobes, each lobe bearing on its outer edge a tiny pale stylus. Cerci long, hairy, acuminate with subacute tip. Claspers encircling the cerci, strongly converging inward with very strongly reflexed tips.

Coloration.—Uniformly testaceous with the dorsum of the eighth and ninth abdominal segments shining piceous and with dark apices to the tibial spines of the hind legs.

Habitat.—The unique male was taken at night in the woods surrounding the Wa Shau T'oi Monastery which lies in a densely wooded valley at the southwestern base of Loh Fau Shan. In habits *Nippancistroger sinensis* is very much like *Gryllacris*, the nymphs of which run about on the foliage of shrubs and small trees waving their extremely long antennae over the leaf surface in search of small insects which when discovered are quickly pounced upon and devoured. Like all Gryllacrids *Nippancistroger* is nocturnal and it probably possesses silk glands similar to those found in the genus *Gryllacris*.

TETTIGONIIDAE

MECONEMINAE

Xiphidiopsis Redtenbacher

It is strange that up until the present time only one species of *Xiphidiopsis*, namely *X. clavatus* Uvarov, should have been described from China, and that as late as 1933. In a recent paper the writer reported the closely related *Teratura? suzukii* Matsumura & Shiraki from China for the first time. Many species of *Xiphidiopsis* have been described from Malaya and the Netherland's East Indies and China undoubtedly possesses many species also. The writer believes that the species of *Xiphidiopsis* will eventually be found to be very restricted in their distribution, as in the case of *Gryllacris*. There are before me some eight Chinese species of or near *Xiphidiopsis* and it appears that practically every mountain range in southern China has its indigenous species. Loh Fau has several of which one is at present described as new.

Xiphidiopsis hastaticercus n. sp. (pl. 18, fig. 1, 2, & 6)

Distinguished from other species of *Xiphidiopsis* by its small size, abbreviated tegmina and wings, and by the singular appearance of the spear-headed cerci of the male. The inner basal area of the cerci is prolonged backward into a strong sharp tooth. The species is so named because of the spear-shaped form of the male cerci.

Holotype.—♂. Kwangtung, S. China, Loh Fau Shan, elevation 3800 ft., Oct. 13, 1934 (E. R. Tinkham; in tall mountain grass). Measurements in millimeters: Total length 8.0; pronotum, 3.0; tegmina, 2.7: hind femur, 7.0; cercus, 2.0; antennae, 34.0. Holotype in the collection of the Lingnan Natural History Survey and Museum.

Entire body and legs colored pale grass green in life, but fading to dull whitish green in alcoholic specimens. There is a pale narrow line on the lateral borders of the dorsum of the pronotum. The species is so small and delicate that the use of alcohol is essential to preserve it.

Size very small. Head with the cone-shaped process short, strongly acuminate with rounded apex which extends to about the basal one-third of the first antennal segment when directed forward. Top of the head slightly convex between the eyes. Eyes subsphaerical in outline protruding compresso-globose on the front margin but much flattened behind. Face short and broad, slightly concave. Maxillary palpi long, the end segment with truncate apex. Antennae very long, the basal segment very large, the second smaller, the third much smaller still, and the remainder very small and filiform.

Pronotum smooth, dorsum narrow, slightly convex above and smoothly and broadly rounded into the lateral lobed. Fore margin truncate, gently rounding into the anterior margins of the lateral lobes; hind margin strongly acute-angulate produced with the apex rounded off, the sides forming a straight line with the oblique posterior margin of the lateral lobes; the lower margin subparallel to the dorsal plane of the pronotum. Tegmina with their greatest exposed length slightly less than that of the pronotum; their apices broadly rounded. Surface of tegmina smooth and semi-transparent with only two principal stalk-like veins evident. Wings mere atrophied buds about one-third the length of the tegmina.

Fore and middle legs slender, the femora without spines. Fore tibiae with a large swelling at the base forming an open tympanum on both sides. The largest pair of tibial spines is located just beyond the tympanal membrane on the lower surface. Three pairs of spines, decreasing evenly in size, are situated at regular intervals beyond the first pair. Middle tibiae with two small pairs of spines situated close together at about the apical one-third. Hind femora moderately long, slender, spines wanting. Hind tibiae with about 25 to 26 alternately short and long teeth on the inner and outer edge; the teeth not arranged opposite each other in pairs but more or less irregularly placed. The tarsi are short.

Genitalia with very large spear-shaped cerci with the apical two-thirds of the upper edge straight, the outer surface flat, and the lower edge with a large prominent swelling near the base, the whole in lateral aspect giving the characteristic hastate appearance. Seen from above the apical two-thirds of the inner surface is flat and thin with a large attenuate tooth-like spur projecting inward and to the rear (see pl. 18, fig. 1 & 2). Subgenital area protuberant, lobate, with two minute hairy styli.

Paratypes.—3 ♀, data same as for the holotype. Range in millimeters: Total length not including cerci 8.0; pronotum 3.0-3.1; tegmina 2.8-3.0; hind femur 7.0-7.2, cerci 2.0. Paratypes in the collection of the Lingnan Natural History Survey and Museum and that of the author.

Allotype.—♀, same data as for the holotype. Closely similar in all respects to the type except in the genitalia. Ovipositor a strong gently recuved blade, acuminate beyond the large and bulbous base, with the tip acutely pointed. Measurement in millimeters: Total length to tip of ovipositor 15.0; pronotum 2.8; tegmina 2.7; ovipositor 5.1; antennae broken. Allotype in the collection of the Lingnan Natural History Survey and Museum.

Paratypes.—4 ♀, same data as for the holotype. Range in millimeters: Total length 14.0-15.0; pronotum 2.8-3.0; tegmina 2.5-2.8; hind femora 7.5; ovipositor 5.0-5.5.

Habitat.—A small patch of grass in a depression some four or five feet square on the open mountain side at an elevation of 3800 feet. The type locality was only a few feet in distance from that of *Podisma lofaoshana*. When the first specimen was discovered the writer thought it was a nymph since it was so diminutive. But as it was mid-October it seemed strange that it should be immature at a time when all other Orthopterans on the cold mountain top were mature. A careful glance at the tiny tegmina showed that it was an adult and an effort was made to secure a goodly series—those here recorded.

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華南廣東羅浮山之四種新直翅目昆蟲

丁謙著

(摘要)

作者先將羅浮山之形勢稍爲說明，後繼述四種新直翅目之昆虫。此四者即 *Hancockia kwangtungensis*, *Podisma lofaoshana* (蝗科)；*Nippancistroger sinensis* (Gryllacridae) 及 *Xiphidiopsis hastaticercus* (螽蟖科) 是也。所述各種，皆詳見於圖。惟一，三兩種其雌雄二性，特爲詳述。至於指定模式標本，別模式標本及較模式標本等記錄，及此四新種之習惟，皆可見文內。各模式標本，現保藏於廣州嶺南大學自然博物採集所。

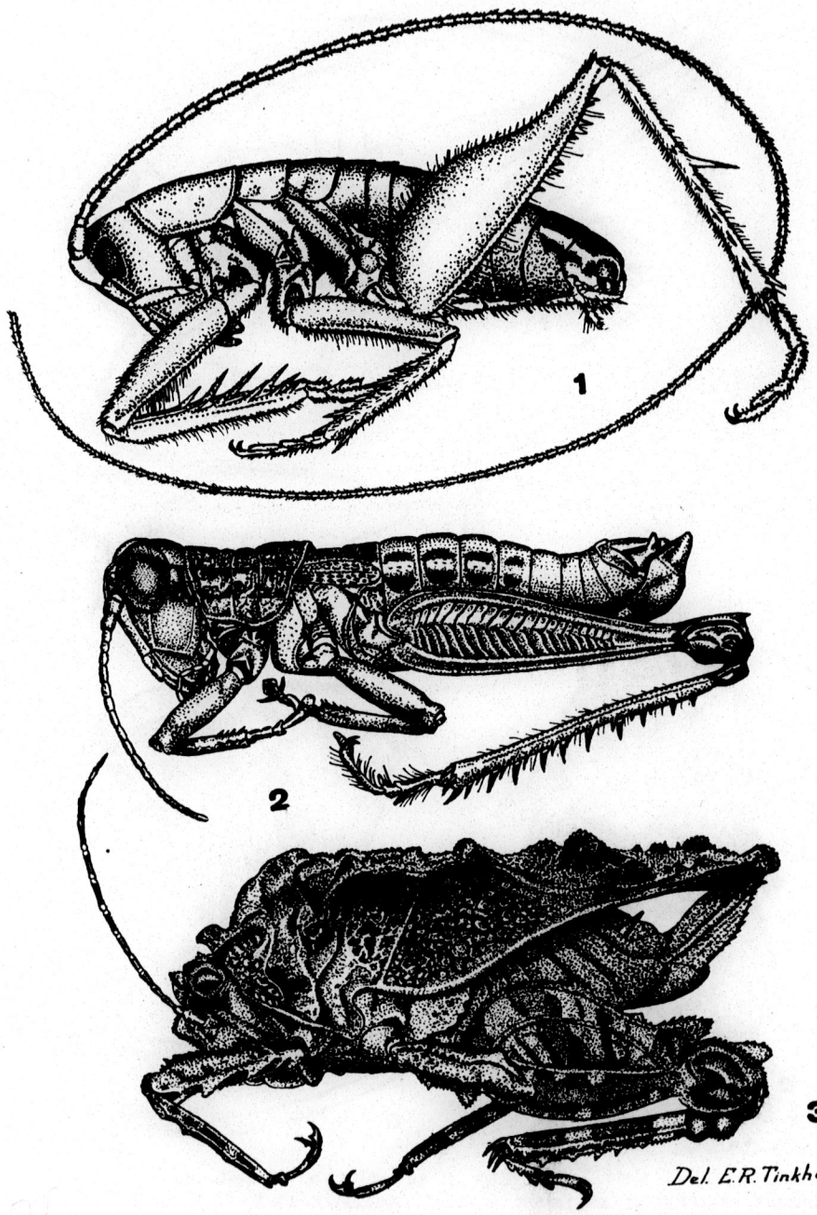
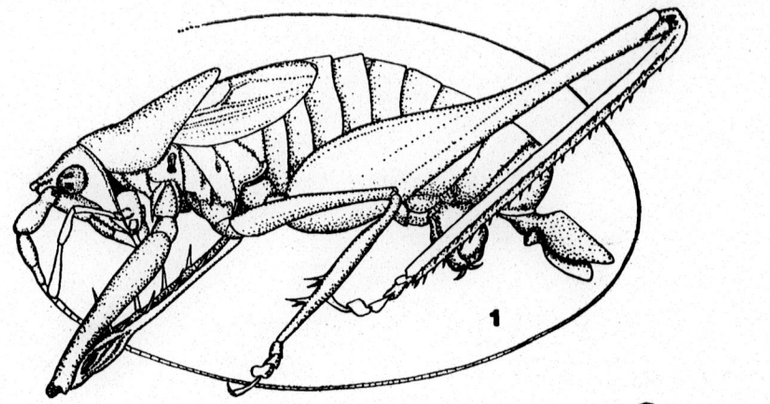
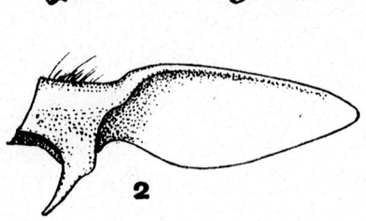
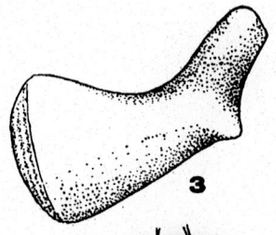
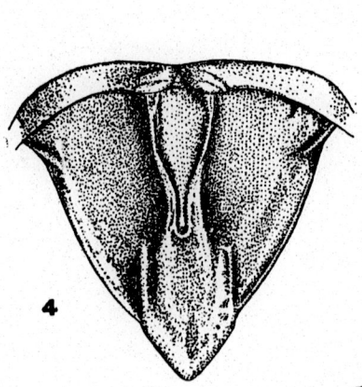


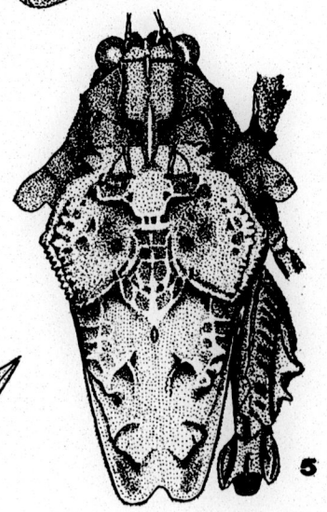
Fig. 1, *Nippancistroger sinensis* n. sp., holotype, male; fig. 2, *Podisma lofaoshana* n. sp., holotype, male; fig. 3, *Hancockia kwangtungensis* n. sp., holotype, female. All from Loh Fau Shan, Kwangtung.

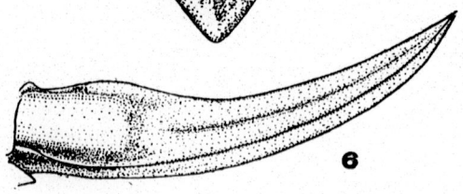












Del E.R. Tinkham

Fig. 1, *Xiphidiopsis hastaticercus* n. sp., lateral view holotype, male; fig. 2, internal view of right cercus, holotype, male; fig. 6, allotype, female, lateral view of ovipositor. Fig. 3, *Podisma lofaoshana* n. sp., holotype, male, lateral view of left cercus; fig. 4, dorsal view of supra-anal plate. Fig. 5, *Hancockia kwangtungensis* n. sp., holotype, female, dorsal view of pronotum. All from Loh Fau Shan, Kwangtung.

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UNRECORDED PLANTS FROM KWANGTUNG IV

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SEPARATE FROM

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3 3 0 3

0241

UNRECORDED PLANTS FROM KWANGTUNG IV

By E. D. Merrill

Administrator of Botanical Collections, Harvard University, Cambridge, Massachusetts.

The last paper in this series was published in 1934[1]. Like Part III the present paper is based chiefly on botanical collections made in various parts of Kwangtung, under the supervision of Prof. F. P. Metcalf of Lingnan University. The records are for the most part of previously described species not hitherto credited to Kwangtung, the additions including about 35 species, and representatives of the genera *Taxus*, *Cochlearia*, *Allospondias*, *Edgeworthia*, *Melissa*, *Dracocephalum*, *Lysionotus*, *Isanthera*, and *Parthenium* as groups new to Kwangtung. In a few cases species previously credited to Kwangtung have been included to clarify the synonomy, and in one case, *Macaranga sinensis*, an entry has been made excluding this species as Chinese. One new species, *Swertia platyphylla*, is described and figured.

TAXACEAE

Taxus Linnaeus

Taxus chinensis (Pilger) Rehd., Jour. Arnold Arb. 1: 51, 1919.

Taxus baccata Linn. subsp. *cuspidata* Zieb. & Zucc. var. *chinensis* Pilger, Pflanzenr. 18 (IV. 5): 112, 1903.

Taxus cuspidata Zieb. & Zucc. var. *chinensis* Rehd. & Wils. 2: 8, 1914.

Kwangtung: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20694*, November, 1932, fairly common, local name *Ye Kwoh Shu*. It is also represented by *C. L. Tso 20555*, *20463*, and *20763*, from Lok Chong, and *S. S. Sin 9020* from Yao Shan. Anhwei, Chekiang, Hupeh, Kansu, Kiangsi, Shensi, Szechwan, Kweichow, and Yunnan. The genus has apparently not previously been recorded from Kwangtung.

GRAMINEAE

Agropyron Gaertner

Agropyron semicostatum Nees ex Steud. Syn. Pl. Gram. p. 346, 1854; Hook. f. Fl. Brit. Ind. 7: 369, 1897.

Kwangtung: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20828*, November, 1932, in meadows. Also represented by *C. L. Tso 21624* from Lungchun on the Kwangtung-Kiangsi boundary. India to China (Yunnan, Szechwan, Kweichow, Kiangsi, and Shantung) and Japan.

[1] *Ling. Sci. Jour.* 13(1):15-52. *pl. 1-8.* 1934.

To Kang P'eng 2827 from the Suichow region is in part this species, in part *Agropyron ciliare* (Trin.) Franch. as reported by me in 1919.

Polytoca R. Brown

Polytoca digitata (Linn. f.) Druce, Rep. Bot. Exch. Club Brit. Isles 1916, p. 471, 1917, Henr., Meded. Rijks Herb. Leiden 67: 10, 1931.

Apluda digitata Linn. f. Suppl. p. 434, 1781.

Coix heteroclita Roxb. Fl. Ind., ed. 2, 3 : 572, 1832.

Polytoca bracteata R. Br., Benn. Pl. Jav. Rar. p. 20, *pl. 5*, 1838.

Polytoca heteroclita Munro ex Balansa Jour. Bot. Morot 4 :78, 1890, in syn.; Koord. Exkursions. Java 1 :99, 1911; Merr., Phil. Jour. Sci. (Bot.) 10 :288, 1915.

In adjusting the synonymy of this species Henrard records it from Indo-China, Siam, India, the Philippines, Java, and Madoera. He overlooked Druce's transfer of 1917 for *Polytoca digitata*, as did Koorders and myself the earlier transfer of Roxburgh's specific name. The species is not uncommon in Kwangtung Province and in Hainan, occurring also in Kwangsi.

CYPERACEAE

Carex Linnaeus

Carex nemostachys Steud. in Flora 29: 23, 1846, Syn. Cyp. p. 218, 1855; Akiyama in Jour. Fac. Sci. Hokkaido Univ. V Bot. 2: 190. *fig. 135*, 1932.

KWANGTUNG: Heung Shan, *To Kang P'eng 6257*, October 25, 1920; Wan Tong Shan, *Tsang Wai Tak & Wong Kam Chow 14798*, October 31, 1926; Naam Kwan Shan, *W. T. Tsang 20068*, April 3, 1932; Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20703*, November, 1932. India to southern and eastern China, including Hainan, northward to Japan.

COMMELINACEAE

Aneilema R. Brown

Aneilema bracteatum (C. B. Clarke) O. Ktz. Rev. Gen. Pl. p. 719, 1891.

Aneilma nudiflorum R. Br. var. *bracteata* C. B. Clarke in DC. Monog. Phan. 3 : 211, 1881.

Aneilema kuntzei C. B. Clarke ex O. Ktz. l.c. in syn.

KWANGTUNG: Kowchow, north gate, *Tsiang 2432*, May 23, 1929, in wet places. Hainan, Indo-China, and Siam.

Clarke based the variety on *Schomburgk 329* from Siam and his amplified description of *Aneilema kuntzei*, which Kuntze quotes, on this specimen and *Kuntze 3819* from Turong (=Tourane), Indo-China; a specimen of the latter is preserved in the herbarium of the New York Botanical Garden. The species also occurs in Hainan.

DIOSCOREACEAE

Dioscorea Linnaeus

Dioscorea simulans Prain & Burkill, Kew Bull. p. 427, 1931.

KWANGTUNG: Yang Shan and vicinity, south of Linchow, *Tsui 479*, July—Sept., 1932. A fruiting specimen. Previously known only from Kwangsi.

FAGACEAE

Castanea Linnaeus

Castanea seguinii Dode, Bull. Soc. Dendr. France p. 152. *fig. 1.* 1908; Rehd. & Wils., Sargent Pl. Wils. 3: 194, 1916.

Castanea henryi Merr., Ling. Sci. Jour. 7 : 301, 1931, non Rehd. & Wils.

KWANGTUNG: Lok Chong, *C. L. Tso 20712*, May 21, 1929, in thickets. Kiangsi, Hupeh, Honan, Anhwei, Chekiang, Shensi, Kweichow, Szechwan, and Yunnan.

These two specimens have the characteristic lepidulote leaves of Dode's species.

URTICACEAE

Boehmeria Jacquin

Boehmeria platanifolia Franch. & Savat. Enum. Pl. Jap. 1: 440, 1875, *nomen nudum;* Hand.-Maz. in Beih. Bot. Centralbl. 48(2): 297, 1931.

Centralbl. 48(2): 297, 1931.

Already recorded from Kwangtung by Handel-Mazetti. Also represented by *W. T. Tsang 20734*, Chong Uen Shan, near Kau Fung, Loh-ch'ang District, November, 1932. Japan to China (Szechwan, Yunnan, Hupeh, Chekiang).

Debregeasia Gaudichaud

Debregeasia squamata King in Hook. f. Fl. Brit. Ind. 5: 591, 1888; Ridl. Fl. Malay Penin. 3: 368, 1924; Gagnep. in Lecomte Fl. Gén. Indo-Chine 5: 868, 1929.

Debregeasia spiculifera Merr. in Phil. Jour. Sci. 21 : 341, 1922.

KWANGTUNG, Tung Koo Shan, Ta-pu District, *W. T. Tsang 21680*, September 8-29, 1932, fairly common in thickets. The species is new to China proper, having previously been collected in Hainan several times. We follow Gagnepain in this reduction of *D. spiculifera* Merr. Hainan, Indo-China, Malay Peninsula.

BASELLACEAE

Boussingaultia H.B.K.

Boussingaultia gracilis Miers, Jour. Bot. 2: 161. *pl. 18.* 1864, var. *pseudo-baselloides* Hauman Anal. Muc. Nac. Hist. Nat. Buenos Aires 33:356. 1925.

Boussingaultia baselloides sensu Hook. Bot. Mag. 64 : *pl. 3620*. 1837, et auct. plur, non H.B.K.

In illustrating what he supposed to be *Boussingaultia basselloides* H.B.K., Hooker was by no means certain that he had correctly identified the species. Dr. Haumann, on the basis of an examination of the original specimen in the Paris herbarium, has shown that *B. baselloides* H.B.K., type from Equador, is a species of restricted distribution, belonging in the section *Tandonia*, while what has been passing for this species is one that belongs in the section *Moquiniella* Haum. (*Euboussingaultia* Volkens) and is *B. gracilis* Miers. This species is widely distributed in nature in South America, and has been extensively introduced in other regions, notably the southern part of the United States, North and South Africa, Australia, New Zealand, Siam, and China. Hauman records the species from Swatow, Kwangtung Province. I have examined specimens from Kiangsu *Chiao 12915*, Sept. 1926, and Fukien, Foochow and vicinity *Tang Chang Chang 4729, 4944*, Aug. and Sept., 1926.

MENISPERMACEAE

Hypserpa Miers

Hypserpa nitida Miers, Hook. Kew Jour. 3: 258, 1851; Contrib. Bot. 3: 102, 1871; Diels in Pflanzenr. 46(IV-94): 210, 1910.

KWANGTUNG: Ta-pu District, Tai Mo Shan and Tong Koo Shan, *W. T. Tsang 21151, 21769*, July 11 and September 8-29, 1932, in thickets.

This is *Limacia cuspidata* Forbes & Hemsl. in Jour. Linn. Soc. Bot. 23: 28, 1886; Dunn & Tutcher in Kew Bull. Add. Ser. 10: 31, 1912, non Hook. f. & Th. in accordance with Diels' modern treatment of the group. It is known only from south-eastern China.

LAURACEAE

Litsea Lamarck

Litsea elongata (Wall.) Hook. f. Fl. Brit. Ind. 5: 165, 1886; Liou Laur. Chine Indoch. p. 195, 1933.

Daphnidium elongatum Nees, Wall. Pl. As. Rar. 2 : 63, 1831.
Tetranthera elongata Wall. List No. 2546, 1830, *nomen nudum*.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20893, 20947*, November, 1932. Also represented by *S. S. Sin 9157* from Yao Shan. India and Tibet, Indo-China and China (Yunnan, Szechwan, Kwangsi, Kweichow, Hupeh, and Chekiang).

Litsea acutivena Hayata Ic. Pl. Formos. 5: 163. *fig. 58-d*, 1915.

KWANGTUNG: Yam Na Shan, Mei District; *W. T. Tsang 21455*, common in thickets; local name *Mo Cha Shue*. Hong Kong, *Ford s. n.* det Liou (distributed as *Lindera bifaria* Benth.). Formosa.

This is doubtless *Daphnidicum bifarium* Benth. Fl. Hongk. 294. 1861 (non Nees) of which Bentham had a single pistllate specimen and thus the basis of the Kwangtung record of *Lindera bifaria* Benth., Forbes & Hemsl., Jour. Linn. Soc. Bot. 26: 386, 1891; Dunn & Tutcher, Kew Bull. Add. Ser. 10: 226, 1912.

Lindera Thunberg

Lindera nacusua (D. Don) comb. nov.

Laurus nacusua D. Don Prodr. Fl. Nepal p. 64, 1825.
Daphnidium bifarium, Nees, Wall. Pl. As. Rar. 2 : 63, 1831; Syst. Laur. p. 616, 1836.
Tetranthera bifaria Wall. List No. 2530, 1830, *nomen nudum*.
Lindera bifaria Benth. ex Hook. f. Fl. Brit. Ind. 5 : 184, 1886; Liou Laur. Chine Indoch. p. 130, 1933.
Benzoin nacusua O. Ktz. Rev. Gen. Pl. p. 569, 1891; Chun Contr. Biol. Lab. Sci. Soc. China 1(5) : 44, 1925.
Benzoin bifarium Chun op. cit. p. 44.

KWANGTUNG: Naam Kwan Shan, Tseng-cheng District, *W. T. Tsang 20089*, April 3, 1932, on slopes, locally known as *Ta Shek Ngaan Shu*; Wong Ni Ten, Yao Shan, *S. S. Sin 9331*, April 14, 1930. India to Burma and Indo-China, and in China Yunnan, Kwangsi (*Steward & Cheo 844*), and Kwangtung

Neolitsea (Bentham) Merrill

Neolitsea confertifolia (Hemsl.) comb. nov.

Litsea confertifolia Hemsl., Jour. Linn. Soc. Bot. 26 : 379, *pl. 7*, 1891.
Actinodaphne confertifolia Gamble, Sargent Pl. Wils. 2 : 74. 1914; Chun in Contr. Biol. Lab. Sci. Soc. China 1(5) : 54, 1925; Liou Laur. Chine Indoch. p. 157, 1933.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20917*, November 1932, in thickets in swampy places. Hupeh, Szechwan.

Hemsley's description is definitely that of a *Neolitsea* in its 6 stamens. Liou, on the basis of an examination of *Wilson 4425*, says some flowers have 6 perianth lobes and 9 stamens (*Actinodaphne*); and others 5 perianth lobes and 6 stamens (*Neolitsea*). He retains the species in *Actinodaphne* as an intermediate between the two genera.

Actinodaphne Nees

Actinodaphne rotundifolia (Wall.) comb. nov.

Laurus rotundifolia Wall. List No. 2591, 1830, *nomen nudum*.
Iozoste rotundifolia Nees, Wall. Pl. As. Rar. 2 : 63, 1831.
Tetranthera rotundifolia Wall. ex Nees l.c. in syn.
Iozoste rotundifolia Nees var. *oblongifolia* Nees in Hook. & Arn. Bot. Beechy Voy. p. 209, 1836.

Camellia integrifolia Choisy, Mém. Soc. Phys. Hist. Nat. Genève 14 : 148, 1855.

Litsea chinensis Blume Bijdr. p. 565, 1825; Forbes & Hemsl., Jour. Linn. Soc. Bot. 26 : 379, 1891; Dunn & Tutch., Kew Bull., Add. Ser., 10 : 225, 1912, non Lam.

Iozoste chinensis Blume Mus. Bot. Lugd.-Bat. 1 : 413, 1851.

Actinodaphne chinensis Nees Syst. Laur. p. 600, 1836; Benth. Fl. Hongk. p. 293, 1861; Meissn., DC. Prodr. 15(1) : 211, 1864; Liou Laur. Chine Indoch. p. 159, 1933.

Under the provisions of the International Code, Blume's specific name for this common southeastern China species is invalid. Wallich's rather inappropriate specific name *rotundifolia* is adopted as the earliest valid one. Meissner cites Blume's original binomial as *Laurus chinensis;* Blume did not so publish it.

CRUCIFERAE

Cochlearia Linnaeus

Cochlearia paradoxa (Hance) O. E. Schulz, Notizbl. Bot. Gart. Berlin 8: 546, 1923.

Cardamine paradoxa Hance, Jour. Bot. 6 : 111, 1868; Hook. Ic. 13 : 66, *pl. 1285,* 1879; Oliv. in Hook. Ic. 19 : *pl. 1818,* 1889.

KWANGTUNG: West River, *Hance.* With this disposition of Hance's species the genus *Cochleara* is to be added to the Kwangtung flora.

SAXIFRAGACEAE

Astilbe Hamilton

Astilbe austrosinensis Hand.-Maz. Symb. Sin. 7: 414, 1931; Beih. Bot. Centralbl. 48(2) : 312, 1931.

Already recorded from Kwangtung by Handel-Mazzetti l.c. Also represented by *W. T. Tsang 20705* from Chong Uen Shan, near Kau Fung, Loh-ch'ang District, November, 1932, in meadows. Hunan, Kiangsi, Anhwei, and Kwangsi.

The Kwangtung specimens referred by Chun to *Astilbe davidii* Henry (Sunyatsenia 1 : 237, 1934) should be compared here; I have seen none of the cited material.

ROSACEAE

Rubus Linnaeus

Rubus paykouangensis Lév., Fedde Repert. 4 : 333, 1907; Bull. Acad. Géogr. Bot. 20. Mém. 19. 1909; Focke, Bibl. Bot. 17(72) : 110, 1910; Metcalf, Ling. Sci. Jour. 11 : 7, 1932.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20791,* November, 1932, on open slopes. Fukien, Kiangsi, Kweichow, and Yunnan.

LEGUMINOSAE

Lespedeza L. C. Richard

Lespedeza davidii Franch. in Nouv. Arch. Mus. Hist. Nat. Paris II 5 : 246, *pl. 13,* 1883 (Pl. David. 1 : 94).

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20786,* November, 1932, on open slopes. Also represented by *S. S. Sin 11155* from Yao-shan, November, 1930. Kiangsi, Kweichow.

Desmodium Desvaux

Desmodium floribundum (D. Don) Sweet Hort. Brit., ed. 2, p. 150, 1830; G. Don Gen. Syst. 2 : 297, 1832.

Hedysarum floribundum D. Don Prodr. Fl. Nepal. p. 244, 1824.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20721,* November 1932. India to China (Yunnan, Hupeh).

Indigofera Linnaeus

Indigofera amblyantha Craib, Notes Bot. Gard. Edinb. 8 : 47, 1913; Rehd., Jour. Arnold Arb. 7 : 161, 1926.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh-ch'ang District, *W. T. Tsang 20746,* November, 1932, in meadows. Honan, Shensi, Kansu, Szechwan, Hupeh, and Chekiang.

Vigna Savi

Vigna vexillata (Linn.) Benth., Mart. Fl. Bras. 15(1) : 194, *pl. 50, fig. 1,* 1859; Baker, Hook. f. Fl. Brit. Ind. 2 : 206, 1876; Hand.-Maz. Beih. Bot. Centralbl. 52B : 160, 1934.

Phaseolus vexillatus Linn. Sp. Pl. p. 1017, 1753.

KWANGTUNG: Naam Chi Shan, *Tsang Wai Tak 8729,* October, 1921, at the margins of rice fields. Pantropic. Handel-Mazzetti has already recorded this species from Kwangtung.

OXALIDACEAE

Oxalis Linnaeus

Oxalis griffithii Edgw. & Hook. f. in Hook. f. Fl. Brit. Ind. 1 : 436, 1874; Knuth, Pflanzenr. 95 (IV. 130) : 234, 1930.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20727,* November 1932, in thickets and meadows. India to Chittagong, Japan, and Formosa; in China known from Yunnan, Kweichow, Kiangsi, Szechwan, and Shensi. It seems to be very doubtful that *Oxalis hupehensis* Knuth (*Wilson 264* from Hupeh) is specifically distinct from *O. griffithii.*

0245

EUPHORBIACEAE

Macaranga Thouars

MACARANGA SINENSIS (Baill.) Muell.-Arg. in DC. Prodr. 15(2): 1001. 1866, Gagnep., Bull. Soc. Bot. France 69: 705, 1914.

This species, which Pax & Hoffmann, Pflanzenrich 63 (IV. 147. VII): 338, 1914, state apparently came from Kwangtung Province, should be erased from the Chinese list. Baillon in publishing *Adenoceras sinensis* as a nomen nudem in 1858, indicated no locality. Gagnepain's examination of Baillon's type, a specimen collected by Callery, shows that it is clearly labeled Luzon; other synonyms are *Mappa sinensis* Muell.-Arg., *Tanarius sinensis* O. Ktz., and *Macaranga dipterocarpifolia* Merr. The species is widely distributed in the Philippines and occurs also in Formosa and in Botel Tobago; it has never been collected in China.

ANACARDIACEAE

Allospondias (Pierre) Stapf

Allospondias lakonensis (Pierre) Stapf, Hook. Ic. 27: *pl. 2667*, 1900.

Spondias? lakonensis Pierre, Fl. Forest. Cochinch. *pl. 375*, 1898. Lecomte Fl. Gén. Indo-Chine 2: 29, 1908.

Poupartia chinensis Merr., Phil. Jour. Sci. 15: 245, 1919; Mattick, Notizbl. Bot. Gart. Berlin 12:683, 1935 (1936).

Spondias chinensis Metcalf, Jour. Arnold Arb. 12: 270, 1931.

FUKIEN: Foochow, *H. H. Chung 2708*, *3066*, *4055*, near houses, planted. KWANGTUNG: Honam Island, *Levine 2153*. HAINAN: Fan Ta, *McClure 9135*, *Tsang 16071*, *17121*, *How 70705*, *70998*, *Lau 168*, *285*, *1654*; Tongking, Phu Ho, *Petelot 3028*, col. *Pasquier*.

In his treatment of the Anacardiaceae of Indo-China, Lecomte followed Pierre, but neglected to note the very characteristic fruits chiefly on the characters of which Stapf raised to generic rank Pierre's section *Allospondias*. Pierre did not describe the fruit. Lecomte apparently made no critical examination of it. He overlooked Stapf's genus as did I when I described what is manifestly the same species from Kwangtung material as *Poupartia chinensis*, and as did Metcalf when he transferred the latter to *Spondias*. The species occurs in China, I believe, only as an introduced and cultivated one, the fruits being edible; it may, however, be native in Hainan, the field notes being indecisive.

Mattick[2] in his recent paper recognized eight species of this genus, including *Poupartia axillaris* (Roxb.) King & Prain (*Spondias axillaris* Roxb.) and *P. chinensis* Merr. in China. He overlooked *Spondias chinensis* Metcalf and *Allospondias lakonensis* (Pierre) Stapf. *Allospondias* seems clearly to be distinguished from *Spondias* by its peculiar fruit characters.

[2] Mattick, F. Die Gattung *Poupartia* Commerson. Notizbl. Bot. Gart. Berlin 12:678-684, 1935 (1936).

CELASTRACEAE

Euonymus Linnaeus

Euonymus myriantha Hemsl., Kew Bull. p. 210, 1893.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20716*, *20936*, November and December, 1932, fairly common. Also represented by *S. S. Sin 11827* from Yao Shan, December, 1930. Hupeh, Kweichow, Szechwan.

TILIACEAE

Triumfetta Linnaeus

Triumfetta suffruticosa Blume, Bijdr. p. 113, 1825.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20755*, November, 1923, abundant on slopes and in meadows. Sumatra, Java, and Borneo to the Solomon Islands.

Grewia Linnaeus

Grewia henryi Burret, Notizbl. Bot. Gart. Berlin 9: 675, 1926.

KWANGTUNG: Tung Koo Shan, Ta-pu District, *W. T. Tsang 21701*, September 8-29, 1932, fairly common in thickets. Yunnan. Kwangsi.

ACTINIDIACEAE

Actinidia Lindley

Actinidia lanceolata Dunn, Jour. Linn. Soc. Bot. 38: 356, 1908.

KWANGTUNG: Tai Mo Shan, Ta-pu District, *W. T. Tsang 21222*, July 18, 1932, local name *Au T'ang*. Fukien, Chekiang, Kiangsi.

I have not seen Dunn's type, and the Kwangtung specimen above cited is in fruit. I refer here *Ching 1595*, *1714*, *2582* from Chekiang, and *Tsiang 10635* from Kiangsi, although their leaves have 5 or 6 pairs of lateral nerves rather than 4 or 5 as in Dunn's type.

THEACEAE

Adinandra Jack

Adinandra chingii Metcalf, Ling. Sci. Jour. 11: 19, 1932.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20920*, November, 1932, in thickets on slopes, fairly common. Chekiang, Kiangsi (*Tsiang 10353*).

Adinandra macrosepala Metcalf, Ling. Sci. Jour. 11: 18, 1932.

KWANGTUNG: Yam Na Shan, Mei (Kaying) District, *W. T. Tsang 21387*, August 4-31, 1932, in thickets. Fukien, Chekiang.

THYMELAEACEAE

Edgeworthia Meisner

Edgeworthia chrysantha Lindl., Jour. Hort. Soc. London 1: 148, 1846; Nakai, Jour. Arnold Arb. 5: 82, 1924.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20653*, November, 1932, fairly common, bark used to make paper, the local name *Sut Fa Pi*. Possibly planted, as the field note also reads "in garden". The flowers are very young. Kiangsi, Hupeh, Kiangsu, Chekiang, Szechwan, and Yunnan.

SYMPLOCACEAE

Symplocos Jacquin

Symplocos puncto-marginata A. Chev. ex Guillaum., Bull. Soc. Bot. France 79: 174, 1932, Lecomte Fl. Gén. Indo-Chine 3:1004, 1933.

KWANGTUNG: Tai Mo Shan, Ta-pu District, *W. T. Tsang 21029, 21297*, June 26 and July 25, 1932, fairly common in thickets. Kwangsi (*Steward & Cheo 771, 865*), Indo-China.

A species resembling *S. adenophylla* Wall. characterized particularly by the two rows of rather conspicuous glands along the upper side of the petioles.

OLEACEAE

Olea Linnaeus

Olea brachiata (Lour.) Merr. ex Groff, Ding & Groff, Lingnaam Agr. Rev. 2: 127, 1925; Ling. Sci. Jour. 5: 147, 1927, Trans. Am. Philos. Soc. II 24(2): 307, 1935.

Tetrapilus brachiatus Lour. Fl. Cochinch. p. 425, 1790.

Olea maritima Wall. List No. 2813, 1831, *nomen nudum;* G. Don Gen. Syst. 4: 49, 1837.

KWANGTUNG: Tai Mo Shan, Ta-pu District, *W. T. Tsang 21016*, in thickets. Hainan, Yunnan, Indo-China, and the Malay Peninsula.

GENTIANACEAE

Swertia Linnaeus

Swertia playtyphylla sp. nov. (see fig. 1)

Herba robusta ut videtur annua, saltem 1.5 m. alta, glabra, caulibus teretibus, circiter 7 mm. diametro, sursum cavis, 7 mm. diametro; foliis oblongo-ovatis, chartaceis, sessilibus, oppositis, usque ad 14 cm. longis et 6 cm. latis, perspicue acuminatis, 5-nerviis; inflorescentiis in axillis superioribus terminalibusque, axillaribus racemosis, 10 cm. longis, paucifloris, terminalibus multo majoribus, laxis, saltem 35 cm. longis; floribus 5-meris, magnis, albidis,

pedicellis 2-5 cm. longis; sepalis oblongis, usque ad 5 mm. longis; corollae tubo brevi, haud foveolato, lobis oblongis, subacutis vel obtusis 1.7 cm. longis, 5.5 mm. latis, supra medio perspicue bimaculatis, in partibus superioribus plerumque consperse subatro-maculatis, circiter 10-nerviis, in partibus superioribus reticulatis; capsulis oblongo-ovoideis, 2 cm. longis.

KWANGTUNG Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20664*, November 2-30, 1932, scattered in wet places, fairly common, locally known as *Chan Kat Yat*.

A species characterized by its large size and its unusually large leaves. In its non-foveolate corolla tubes and its bimaculate petals, it approaches *Swertia bimaculata* Hook. f. & Th. but differs remarkably from that species in its vegetative characters and its large flowers.

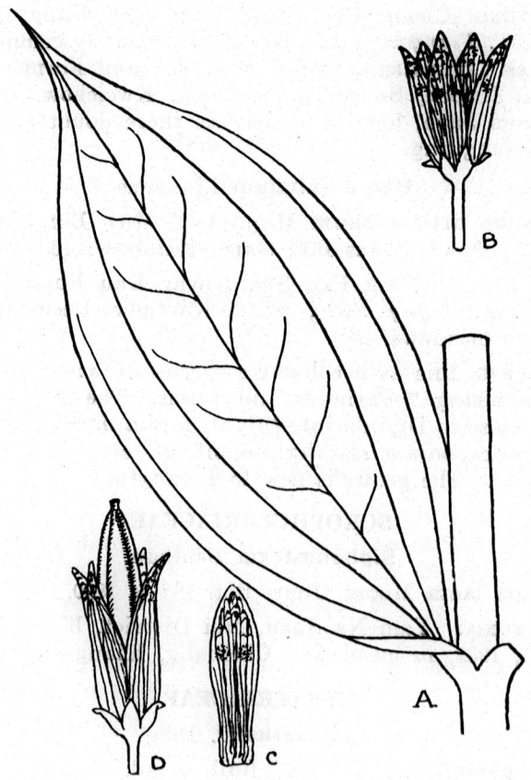

Fig. 1. *Swertia platyphylla* n. sp. A, a leaf; B, a flower; C, a petal; D, a capsule.

VERBENACEAE

Clerodendrum Linnaeus

Clerodendrum foetidum Bunge, Mém. Sav. Etr. Acad. Sci. St. Pétersb. 2: 126, 1833 (Enum. Pl. Chin. Bor. 52); Pei, Mem. Sci. Soc. China 1(3): 138, 1932.

KWANGTUNG: Tai Mo Shan, Ta-pu District, *W. T. Tsang 21253*, July 22, 1932, local name *Yeun Tau Fung*. Widely distributed in China, and previously recorded from Kwangtung by Pei on the basis of *Levine 804* from Teng Wu Shan, there apparently cultivated.

LABIATAE

Melissa Linnaeus

Melissa parviflora Benth., Wall. Pl. As. Rar. 1: 65, 1830, Lab. Gen. Sp. p. 394, 1832-36; Hook. f. Fl. Brit. Ind. 4: 651, 1885; Dunn, Notes. Bot. Gard. Edinb. 6: 160, 1915.

KWANGTUNG Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20810*, November 2--30, fairly common in damp or wet places. Himalayan region to Japan and Formosa, in China occurring in Hupeh, Szechwan, Kwangsi, Kweichow, and Yunnan. Recorded from Java, but its occurrence there doubtful. The genus is new to Kwangtung.

Dracocephalum Linnaeus

Dracocephalum urticaefolium Miq., Ann. Mus. Bot. Lugd.-Bat. 2: 109, 1865; Dunn, Notes Bot. Gard. Edinb. 6: 169, 1915.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20820*, *20958*, November-December, 1932, on slopes and in meadows.

Dunn treats this as a collective species of wide distribution in China, recognizing 7 varieties and forms. The Kwangtung form seems to be close to Dunn's var. *typica*, forma *normalis*, to which he reduces *Dracocephalum simplex* Vanoit, *D. esquirolii* Lév. and *D. pinfaense* Lév. The genus is new to Kwangtung.

SCROPHULARIACEAE

Siphonostegia Bentham

Siphonostegia laeta Moore, Jour. Bot. 18: 5, 1880.

KWANGTUNG: Yam Na Shan, Mei District, *W. T. Tsang 21553*, August 4-31, 1932, in meadows. Chekiang, Kiangsi and Anhwei.

GESNERIACEAE

Lysionotus D. Don

Lysionotus pauciflorus Maxim., Bull. Acad. Sci. St. Pétersb. 9: 534, 1875 (Mél. Biol. 9: 366); C. B. Clarke, DC. Monog. Phan. 5: 599, 1883.

KWANGTUNG: Yen Wong Chi, Yao-shan, *S. S. Sin 9266*, April 20, 1930, alt. about 500 m. Japan to Chekiang, Kiangsi, Szechwan, and Kweichow. The genus is new to Kwangtung.

Isanthera Nees

Isanthera discolor Maxim., Bull. Acad. Sci. St. Pétersb. 19: 538, 1874 (Mél. Biolog. 9: 372); C. B. Clarke, DC. Monog. Phan. 5: 192, 1883.

KWANGTUNG: Yam Na Shan, Mei District, *W. T. Tsang 21459*, August 4-31, 1932, in thickets, fairly common. Riu Kiu Islands, Formosa, and the Philippines. The genus is new to China.

RUBIACEAE

Tarenna Gaertner

Tarenna pubinervis Hutch., Sargent Pl. Wils. 3: 410, 1916.

KWANGTUNG Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20760*, November, 1932, in thickets. Also represented by *Merrill s. n.*, from Loh Fau Shan, August 20, 1917. Yunnan.

Mycetia Reinwardt

Mycetia oligodonta Merr., Ling. Sci. Jour. 11: 56, 1932.

KWANGTUNG: Yam Na Shan, Mei District, *W. T. Tsang 21365*, August 4-31, 1932, fairly common. Hainan.

Leptodermis Wallich

Leptodermis ovata H. Winkl. Repert. 18: 162, 1922.

KWANGTUNG: Liu District, Sa Mo Ling, *C. O. Levine 3335*, October 18, 1918, flowers pale red. This is the type collection of the species; it is known only from Kwangtung.

CAPRIFOLIACEAE

Sambucus Linnaeus

Sambucus sieboldiana Blume ex Miquel Ann. Mus. Bot. Lugd.-Bat. 2:265, 1866, in syn.; Graebn. Bot. Jahrb. 29:584, 1901.

Sambucus racemosa Linn. var. *sieboldiana* Miq. l.c.

KWANGTUNG: near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20973*, Dec. 1-28, 1932, fairly common in dry thickets. Japan and Korea to Szechwan and Yunnan.

The identification is by Prof. Rehder. The specimens are sterile; the large winter buds are characteristic. This is an interesting southern extension of range of a northern species; new to Kwangtung.

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Viburnum Linnaeus

Viburnum cylindricum Ham. ex D. Don Prodr. Fl. Nepal p. 142, 1825; Rehder, Sargent Pl. Wils. 1: 110, 1911.

Viburnum coriaceum Blume, Bijdr. p. 656, 1826.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20856, 20940*, November, December, 1932, in thickets; also represented by *S. S. Sin 11748* from Yao-shan, December 10, 1930. India to Sumatra and Java, and China (Yunnan, Szechwan, Hupeh, Kweichow).

CAMPANULACEAE

Lobelia Linnaeus

Lobelia erecta Hook. f. & Th. Jour. Linn. Soc. Bot. 2: 28, 1858; C. B. Clarke in Hook. f. Fl. Brit. Ind. 3: 426, 1881.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20999*, December, 1932, on steep slopes. India (Sikkim) to China (Yunnan, Kweichow).

COMPOSITAE

Erigeron Linnaeus

Erigeron canadensis Linn. Sp. Pl. p. 863, 1753; Hook. f. Fl. Brit. Ind. 3: 254, 1881.

KWANGTUNG: Chong Uen Shan, near Kau Fung, Loh Ch'ang District, *W. T. Tsang 20774*, November, 1932, fairly common in meadows. Probably *Tsang 20406* from Naam Kwan Shan represents the same species. Widely distributed in America, Europe, and Asia, probably native of North America.

Microglossa de Candolle

Microglossa pyrifolia (Lam.) O. Ktz. Rev. Gen. Pl. 3:353, 1891; Hand.-Maz. Symb. Sin. 7: 1094, 1936.

Conyza pyrifolia Lam. Encycl. 2: 89, 1786.
Conyza volubilis Wall. List. No. 3057, 1831, *nomen*.
Microglossa volubilis DC. Prodr. 5 320, 1836.
Conyza prolifera Blume Bijdr. 896, 1825, non Lam.
Blumea conyzoides Lév. & Van. Repert., n. sp., 7: 22, 1909.
Conyza syringaefolia Meyen & Walp. Nova Acta Acad. Leop.-Carol. Nat. Cur. 19: Suppl. 1: 263, 1843; Hemsl. Jour. Linn. Soc. Bot. 23: 420, 1888.

This species is rather common in Kwangtung and extends from tropical Africa and India to China and Japan through Malaysia to the Philippines and New Guinea. This record has been prepared for two reasons, first to call attention again to the oldest name, the type of *Conyza pyrifolia* Lam. being from Java, and second the reduction of *Conyza syringaefolia* Meyen & Walp., type from Kwangtung. Hemsley admitted the latter as a valid species of

Conyza, calling attention to the fact that the description agreed rather closely with the characters of *Microgolossa volubilis* DC. The reduction has been verified by Dr. Mattfeld who kindly examined the Meyen & Walpers type in the Berlin herbarium, finding it to represent *Microglossa volubilis* DC.=*M. pyrifolia* (Lam.) O. Ktz. Dr. Gagnepain failed to locate Lamarck's type under either *Conyza* or *Microglossa* in the Paris herbarium and suggested that the specimen might be at Geneva. Here Dr. Hochreutiner failed to locate it under *Conyza*, *Microglossa*, and *Senecio*, but suggests that it might be under *Senecio* in some herbarium because he located a specimen of *Microglossa volubilis* from the Ventenat herbarium with the note "in *Senecio* in Herb. Commerson." Lamarck's description, however, is definite, and clearly applies to the species currently known as *Microglossa volubilis* DC.

Parthenium Linnaeus

Parthenium hysterophorus Linn. Sp. Pl. p. 988, 1753; DC. Prodr. 5: 532, 1836; Gagnep. in Lecomte Fl. Gén. Indo-Chine 3: 589, *fig. 62, 19-23*, 1924.

KWANGTUNG: Tung Koo Shan, Ta-pu District, *W. T. Tsang 21593*, September 8-29, 1932, fairly common in open dry sandy places along roads. Widely distributed in North and South America, now naturalized in various parts of the Old World. The genus is new to Kwangtung.

未有記錄之廣東植物(四)

E. D. Merrill 著

(摘 要)

是文上篇，曾分三次在本雜誌發表。文中所述之品種，在廣東省，仍未有記錄。此文所述者凡三十五種。其中九屬，爲首次發現於廣東之記載。內有一品種 (*Macaranga sinensis* (Baill.) Muell.-Arg.) 曾發現於台灣等處，故曾擬括於廣東發現之記錄中。但在中國境內，對此標本，仍未能採得。惟有一新種 *Swertia platyphylla* (龍膽科) 產於樂昌縣。此新種較其相似之品種較大，且葉尤殊大，此其特徵也。揆此新種之異於相似之品種 (*S. bimaculata* Hook. f. & Th.) 者，因其枝葉等之不同也。

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LIFE HISTORY NOTES ON RHAGADOTARSUS KRAEPELINI BREDDIN (HEMIPTERA: GERRIDAE) IN CANTON

By William E. Hoffmann

Lingnan Natural History Survey and Museum, Lingnan University.

SEPARATE FROM

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0253

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0254

LIFE HISTORY NOTES ON RHAGADOTARSUS KRAEPELINI BREDDIN (HEMIPTERA: GERRIDAE) IN CANTON[1]

By William E. Hoffmann

Lingnan Natural History Survey and Museum, Lingnan University.

Rhagadotarsus kraepelini Breddin 1905

1905. *Rhagadotarsus kraepelini* Bredd., Mitt. Naturhist. Mus. Hamburg, 22 :137, fig. 12-14 (described from Java).

1910. *Nacebus dux* Dist., Ann. & Mag. Nat. Hist., Ser. 8, 5 :153 (recorded from Calcutta and Lower Burma).

1910. *Nacebus dux* Dist., Fauna Brit. Ind., Rhyn. 5 :166, fig. 90.

1918. *Nacebus dux* Paiva, Rec. Ind. Mus. 14 :26 (recorded from Upper Burma).

1918. *Rhagadotarsus kraepelini* Bergr., Phil. Jour. Sci § D, 13 :122 (placed *N. dux* in synonymy; recorded the species from Luzon, P.I.).

1922. *Rhagadotarsus kraepelini* Esaki, Trans. Nat. Hist. Soc. Formosa 12 :55 (recorded from Formosa).

1925. *Rhagadotarsus kraepelini* Esaki, Phil. Jour. Sci. 26(1) :60, pl. 1, fig. 13-17 (habitat; excellent figure of apterous adult♂).

1926. *Rhagadotarsus kraepelini* Esaki, Ann. Mus. Nat. Hung. 24 :182 (list).

1928. *Rhagadotarsus kraepelini* Dover, Treubia 10 :69 (list).

1929. *Rhagadotarsus kraepelini* Esaki, Ann. & Mag. Nat. Hist., Ser. 10, 4 :418.

1930. *Rhagadotarsus kraepelini* Hoffmann, Ling. Sci. Jour. 9(3) :321 (biol.; recorded from Canton).

1930. *Rhagadotarsus kraepelini* Esaki, Jour. Fed. Malay States Mus. 16 :16, fig. 2 (alate ♂ described and figured from Singapore).

1931. *Rhagadotarsus kraepelini* China, Ann. & Mag. Nat. Hist., Ser. 10, 8(46) :407 (general remarks).

1933. *Rhagadotarsus kraepelini* Hoffmann, Ling. Sci. Jour. 12 suppl. : 248 (list.).

1933. *Rhagadotarsus kraepelini* Lundblad, Archiv. f. Hydrobiol. Suppl. —Bd. 12 :412, text fig. 132, pl. 11 (structure).

Distribution.—Burma (Upper and Lower), China (including Hainan Island), Formosa, India, Java, Philippines (Luzon), Straits Settlements.

Habits and Behavior.—This species inhabits pools, ponds, and the quieter portions of streams. It shows a preference for environments which have some shade and appears to be more abundant in ponds where there is an abundant supply of algae. The fish ponds with a very dark green color, the kind which the fish growers say

[1] Contribution from the Lingnan Natural History Survey and Museum.

(and rightly) are ideal for fish culture, are the ones in which this bug is found most abundantly. This water-strider is found at sea level and also as high as 1478 meters. In the Canton area it is frequently found in the same microhabitat as *Mesovelia*, *Velia*, *Microvelia*, *Hydrometra*, and the gerrids *Limnogonus fossarum* (Fabr.), *L. parvulus* (Stal), and *Gerris paludum* Fabr. Elsewhere in the Oriental Region I have found it more or less associated with *Ventidius*, *Rheumatogonus*, *Strongylovelia*, and occasionally *Rhagovelia*. This bug seems quite independent of vegetation although a few individuals may be found among emergent vegetation that is not too dense. The larger schools (the species is decidedly gregarious) are usually in open water. This may be near the bank, however, especially if it is steep and somewhat overhanging. The bugs are very active, moving from place to place by rapid and erratic jumps. Usually they dart a distance of an inch or so with occasional much larger jumps. When disturbed they jump both faster and farther and are not at all easy to capture. These insects have a peculiar habit, as pointed out by the writer in 1930, of pushing small bits of floating material, frequently a small piece of stem or twig, which they manipulate with their front legs much as a swimmer may propel a plank through the water by holding one end with his hands while paddling with his feet. The front legs are not used in swimming. Frequently the striders will be seen to compete with each other for the privilege of propelling a twig.

Overwintering.—This species apparently spends the winter in the adult stage in the latitude of Canton. The young stages may be found from spring to fall (until December in 1925), always in company with the adults.

Mating.—Mating has been observed at various times during the day but more commonly in the late afternoon. The mating periods seem to be short and frequently a mating pair is disturbed by the interference of a third individual.

Preoviposition Period.—Very little data is available. See paragraph following.

Oviposition and Incubation.—Practically no information is at hand on these points. On Aug. 30, 1925 I placed two adults and two fifth instar nymphs in a small glass aquarium expecting to isolate a mating pair when and if mating were observed. The two nymphs molted to adults the following day. A nymph appeared on Sept. 26 and another on Oct. 4, at which time the experiment was discontinued. One adult died on Sept. 23, another on Oct. 1, and a third on Oct. 3. No effort was made to locate the eggs from which the nymphs hatched, but if I recall correctly the aquarium contained no vegetation whatever for these insects do not normally require a support and I was not trying to secure eggs at that time.

It was planned to rear the species in some numbers the following spring, but this plan was not carried out. Lundblad (1933) has pointed out that the structure of the egg-laying apparatus would suggest that the eggs are placed into some material, probably plant material. Unfortunately the age of the two adults in the above experiment was not known, nor was the sex noted, but there is a fifty-fifty chance that the eggs were laid by one of the bugs which became adult on Aug. 31. My reason for believing this is that judging from other gerrids the incubation period at that time of the year would probably be not more than a week. It is not likely that the adults brought in from the field would wait for an interval of three weeks for egg-laying, unless of course they too had only recently become adults. There is an indication then that the preoviposition and the incubation period together are under four weeks and this is what would be expected.

Fecundity.—No information obtained, in fact, no eggs naturally laid were secured. Recently some specimens were collected and one female dissected and found to contain seven eggs. The specimen did not have the appearance of being gravid.

Hatching.—The hatching process has not been observed.

Number of Instars.—There are five nymphal stages; the duration of the several stadia is indicated below for four specimens.

REARING NUMBER	DURATION FIRST STADIUM	DURATION SECOND STADIUM	DURATION THIRD STADIUM	DURATION FOURTH STADIUM	DURATION FIFTH STADIUM	TOTAL DAYS	MATURITY DATE OF
5-611	6	5	5	13	7	31	Sept. 26
5-612	6	5	6	9	9	32	Sept. 21
5-614	5	6	6	6	13	54	Nov. 19
5-886	8	6	14	7	6	31	Sept. 27

Molting.—Molting takes place on the surface of the water much the same as in other gerrids. No attention is paid to a support of any kind.

Sexual Maturity.—No attempt was made to ascertain how soon after becoming adult mating took place.

Longevity.—Suitable aquaria were not available for longevity studies, in fact the rearing work was carried on largely in battery jars and in a few cases jelly glasses were used. Even aquaria, however, would not be suitable for longevity studies unless they could be so equipped as to keep the water in motion.

Number of Generations.—There are probably five or six generations a year.

Food Habits.—These bugs feed upon various insects such as marooned water insects, and practically any kind of terrestrial

insects which fall into the water. In the laboratory the bugs did very well indeed on flies and leafhoppers. There is a possibility that these insects eat minute crustaceans and their habit of pushing some object around may be for the purpose of locating such organisms.

Enemies.—Except while molting, at which time they might be attacked by other water-striders or by backswimmers, this species is probably quite free from enemies. Furthermore, molting takes place rather rapidly so that there is not much opportunity even at this time for possible enemies to attack them.

Rearing Methods

The insects were reared in battery jars, specimen jars, and even in jelly glasses with cloth or screen covers. Tap water was used and this had to be changed frequently because of the scum which formed on the surface. The insects in natural habitats normally spend much time in cleaning themselves for it is only by doing this that they can keep from breaking through the surface film of the water. They cannot keep themselves clean, however, if there is too much scum on the water, in which case they become waterlogged, silk, and drown. The insects were transferred from the rearing jar to an empty jar, and then transferred back to their original jar when the same had been cleaned and filled with fresh water. Transferring was accomplished by so placing the jars that the bugs would jump from the one into the other. Flies and leafhoppers were the insects most used as food. These insects were excellent for this purpose for they remain on the surface film and can be easily removed. Their small size reduced to a minimum the polution of the water. The flies and leafhoppers were killed or maimed before being placed in the rearing jar. The bugs were fed once daily. The water was changed at least once a day, oftener if considerable scum formed. There was considerable mortality among the rearings, and this apparently was due to the excessive scum. Larger containers would have been better, but they were not available

Description of Stages

The Egg.—As mentioned above, naturally laid eggs were not secured. A female which was dissected was found to contain seven eggs. They are .79 mm. to .91 mm. in length and .22 mm. in greatest diameter which is in the center. The eggs are somewhat bean-shaped, roundly pointed at each end, pale flesh colored and shining.

The Nymphs (*pl. 21*).—The younger nymphs are pale with brown markings on the head, thorax, and abdomen as shown in the figures. The antennae, except at their bases, and the legs, except coxae, trochanters and bases of femora, are brown and a little shining, the excepted areas are pale. In the fourth and fifth instars the

pale areas have become dark orange, the longitudinal central area pale to buff, the brown areas now darker. Beneath, all nymphs largely pale. The measurements of the nymphs are given in table 1.

TABLE 1

Measurements, in millimeters, of the several nymphal stages of Rhagadotarsus kraepelini

	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE
Width, across eyes	.32	.37	.53	.62	.75
Width (greatest), pronotum	.33	.42	.46	.55	.62
Width (greatest), mesonotum	.42	.51	.66	.77	.82
Width (greatest), abdomen	.28	.44	.44	.65	.66
Length (median), head	.15	.18	.24	33	.38
Length, antenna	.33	.43	.53	.73	.99
Length, anterior margin of pronotum to apex of abdomen	.79	.93	1.37	1.66	1.99
Length, intermediate femur	.55	.77	1.15	1.77	2.26
Length, intermediate tibia	.46	—	.91	1.30	1.77
Length, intermediate tarsus	.42	—	.73	1.02	1.19
Length, posterior femur	.33	.46	.71	1.11	1.64
Length, posterior tibia	.26	.33	.47	.68	.88
Length, posterior tarsus	.18	.22	.26	.35	.37

The Adult (*pl. 22*).—Breddin's original description of the apterous form is adequate and there is no need to repeat the description here. Esaki (1930) described and figured the alate male from Singapore. Our specimen is also a male and fits Esaki's description except in one minor detail, namely, the membrane extends considerably beyond the apex of abdomen instead of "exactly reaching the apex of abdomen." There is also a winged female in our collection but it cannot be found at the present. The membrane has been torn off so that it does not quite reach the apex of abdomen. I believe our winged specimens were collected in West Java, in 1929, by the present writer. Unfortunately my notes on this species were mislaid during my absence from Lingnan University in 1930-31.

Summary

Rhagadotarsus kraepelini is a widely distributed water-strider in the Oriental Region and is very common in Kwangtung Province. Its life history was worked out in Canton in 1925 by the present writer. There are five nymphal stages; the time required for nymphal development varies according to temperature. In our rearings specimens which became adults toward the end of September required thirty-one and thirty-two days for nymphal development while fifty-four days were required for a nymph which reached maturity on November 19. The insects were reared

in battery jars. Their food consisted primarily of flies and leafhoppers. They were fed daily and the water in the rearing jars was changed at least once daily. There was a high mortality among the laboratory specimens. The immature stages are described and all of them except the egg are figured.

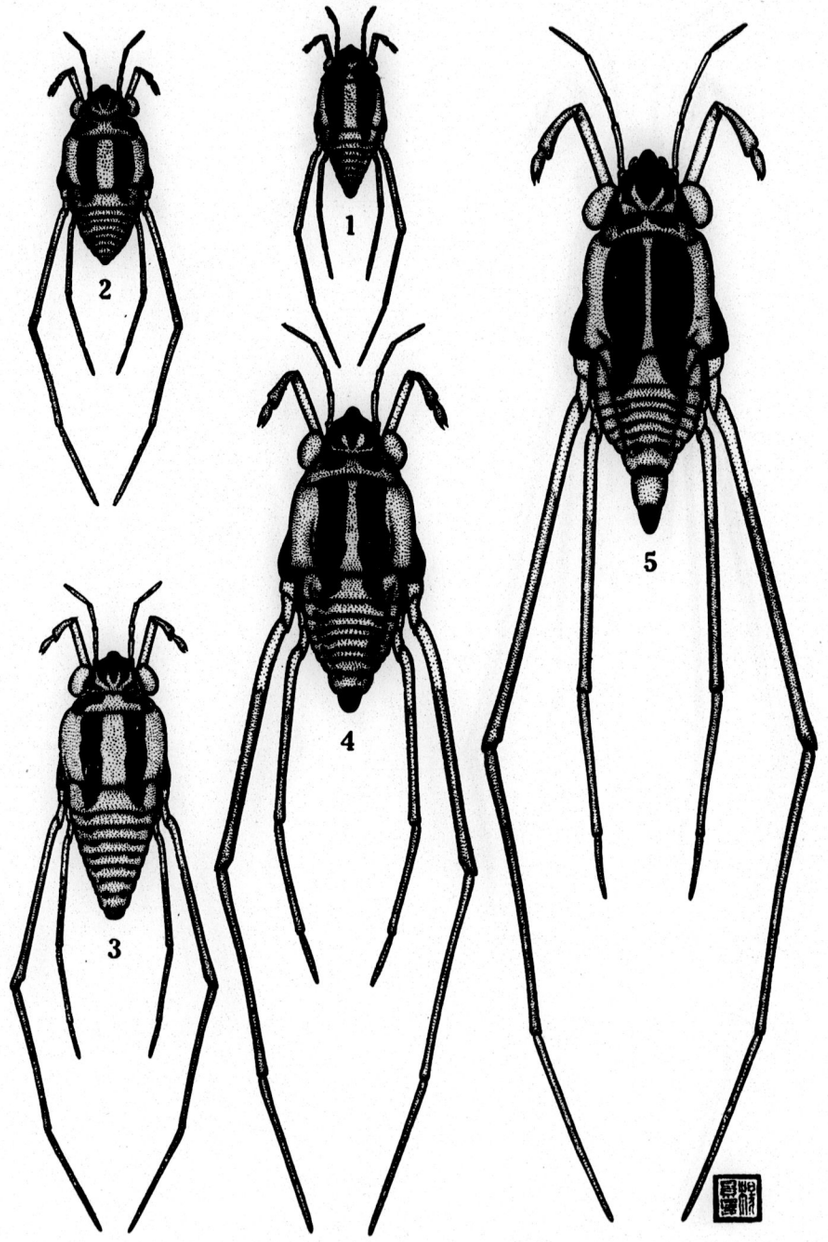
廣州 *Khagadotarsus kraepelini* Breddin 之生活史

(半目翅，水黽科)

賀 輔 民 著

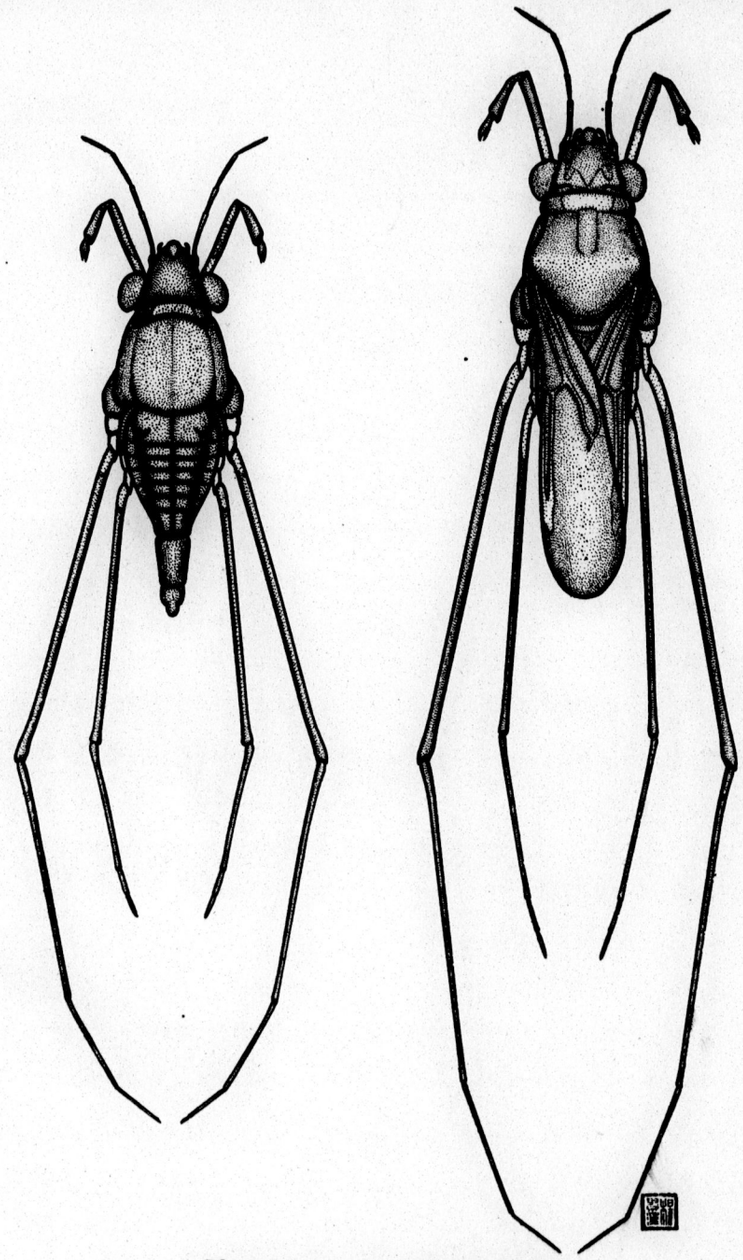
(摘 要)

此水黽廣佈於東亞各地及盛產於華南一帶。其生活史，作者經已詳細研究之矣。若虫期之長短，常視氣候而異，有由卅一至五十四天者。每當氣候温暖之際，各期僅需一星期而已。此虫棲於池沼，活潑異常，不易採捕。對此虫之各期，文中敘述頗詳。除卵外，所述各期及此虫之有翅而罕可見者皆見於圖。



Rhagadotarsus kraepelini Breddin

Figures 1—5 represent nymphal instars one to five, respectively. Fig. 5 represents a male. The drawings are to scale and are roughly 20 times natural size.



Rhagadotarsus kraepelini Breddin

Figure on left, apterous male, about 16 times natural size. Figure on right, winged male, about 17 times natural size.

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TINGITIDAE FROM HAINAN ISLAND (HEMIPTERA)

By C. J. Drake and M. E. Poor
Iowa State College, Ames, Iowa, U. S. A.

SEPARATE FROM
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TINGITIDAE FROM HAINAN ISLAND (HEMIPTERA)

By C. J. Drake and M. E. Poor
Iowa State College, Ames, Iowa, U. S. A.

The present paper is based upon a small collection of lace bugs, Tingitidae, collected on Hainan Island during the summer of 1935 by Mr. J. Linsley Gressitt.[1] This collection of 42 specimens is represented by nine species, five of which are described below as new to science. The types are in the Drake collection.

Hainan Island is one of the most interesting island possessions of the Chinese Republic. It is situated in the South China Sea just off the coast of Kwangtung, China. Very little is known of the peculiar and most interesting fauna of this island.

Phatnoma costalis Distant

Phatnoma costalis Distant, Ann. Soc. Ent. Belg. LIII, 1909, p. 113; Distant, Fauna Brit. Ind., Rhynch., V, 1910, p. 102, fig. 49.

Ta Han, 1 male, June 22, 1935. This specimen agrees fairly well with the original description and figure of the type from Myitta, Tenasserim, India. The concavity between the two lateral angulations of the paranota is a little more rounded than in Distant's figure. *P. takasago* Takeya from Formosa is a very closely related species.

Cysteochila consanguiensis (Distant)

Bredenbachius consanguiensis Distant, Ann. Soc. Ent. Belg., LIII, 1909, p. 118; Distant, Fauna Brit. Ind., Rhynch., V, 1910, p. 119.

Cysteochila consanguiensis Bergroth, Rev. Russe, Ent., XVII, 1917, p. 104.

Six specimens: Nodoa, July 10; Ta Hian, June 14; Ta Han, June 22; Fan Heang, June 20, 1935.

Perissonemia assamensis (Distant)

Teleonemia assamensis Distant, Ann. Soc. Ent. Belg., XLVII, 1903, p. 49; Distant, Fauna Brit. Ind., Rhynch., II, 1904, p. 143.

Ta Han, 7 examples, June 22, 1935. Horisha, Formosa, 1 female, Dec. 1913, collected by F. Muir. The type of this species, collected in Margherita, Assam, India, is figured by Distant in the Fauna of British India.

The genus *Perissonemia* Drake and Poor was founded for *torquata* D. & P. from the Philippine Islands. It is most closely allied to the genus *Teleonemia* Costa and differs from it in having

[1] For information concerning localities in Hainan Island at which specimens were collected, see paper by J. Linsley Gressitt in this issue of the *Lingnan Science Journal*.—Editor.

a very strongly raised and prominent collum, more slender antennae, deeply depressed anterior portion of pronotum behind the collum and differently formed paranota.

Perissonemia gressitti sp. nov.

Antennae moderately long, rather densely pilose, dark ferrugineous; segment I moderately stout, about two and one-half times as long as II, the latter short, obconical; III slightly more than twice as long as IV, the latter rather long. Rostrum reaching almost to middle coxae. Head brown, ridged between the eyes, the spines short. Eyes transverse, reddish.

Pronotum strongly convex above, brown, closely pitted, strongly narrowed anteriorly, deeply impressed behind collum, tricarinate; median carina slightly more raised in front; lateral sharply defined but less elevated, faintly converging in front and behind. Paranota represented by a narrow ridge in front and a short ridge on hind portion of humeri; collum strongly elevated, reticulate. Elytra constricted beyond the middle, brown, veinlets at apex of discoidal and most of sutural areas black-fuscous; subcostal area mostly biseriate, triseriate opposite apex of discoidal area; discoidal area reaching beyond middle of elytra, widest near middle, there five areolae deep. Wings longer than abdomen, infuscate.

Length, 3.50 mm.; width, 1.00 mm.

Holotype (male): Nodoa, May 31, 1935. This species belongs to the subgenus *Ulonemia* D. & P. and is not easily confused with other members of the genus. The paranota and head are very distinguishing characters. The genus *Perissonemia* D. & P. has been treated elsewhere by the writers. A number of species described by Distant from India as *Teleonemia* Costa should be transferred to *Perissonemia* and placed in the subgenus *Ulonemia* D. & P.

Trachypeplus chinensis, sp. nov.

Allied to *T. malloti* Drake and Poor, but readily separated from it by the smaller hood, darker color, narrower costal area and the raised portion of nervure separating discoidal and subcostal areas.

Small, yellowish-brown, variegated with small fuscous spots. Hood very small, faintly produced forward in front. Head dark brown, the spines very short. Pronotum strongly transversely convex, coarsely pitted, sharply tricarinate, the lateral carinae parallel and slightly less elevated. Paranota broad, reflexed back on pronotum, at humeri raised and not touching pronotum. Antennae rather short; segment I short, considerably stouter and nearly twice as long as II, both dark brown; III yellowish-brown, enlarged and brownish at apex, nearly three times as long as IV. Sternal laminae yellowish-brown, the channel deep and narrow. Rostrum yellowish-brown, black at apex, reaching almost to hind coxae. Body beneath dark brown. Costal area uniseriate, some of

the transverse nervelets blackish; subcostal area biseriate. Nervure forming boundary between subcostal and discoidal areas strongly and roundly arched just behind the middle, there blackish, impressed between elevation and apex of discoidal area.

Length, 2.76 mm.; width, 1.00 mm.

Holotype (male) *allotype* (female): Liamui, July 31, 1935. *Paratypes*: Numerous specimens, Nodoa, Ta Han, Vo Lau, Liamui, and Dome Mt., Hainan Is.; 2 examples from Hong Kong, China, collected by Koebele and one by C. Baker in the U. S. National Museum.

This species and *malloti* D. & P. differ from the genotype of *Trachypeplus* Horvath in not having the outer margins of costal area and paranota armed with spines. In certain ways they resemble members of the genus *Physatocheila* Fieber. *Teleonemia marginata* Distant from Assam probably belongs to the genus *Trachypeplus* Horv. rather than to *Physatocheila* as stated elsewhere.

Compseuta tessellata sp. nov.

Form and general appearance very similar to *C. lefroyi* Distant from India, but readily separated from it by pronotal carinae, paranota and shape of discoidal area. Head and eyes black. Calli deeply impressed, black. Collum strongly raised, reticulate, truncate in front. Pronotum strongly convex, very coarsely pitted, strongly narrowed anteriorly. Paranota very narrow, ridge-like, slightly wider and lighter in front. Median carina more strongly raised in front, becoming entirely obsolete behind on triangular process; lateral carinae fairly distinct, divaricating behind. Costal area almost entirely uniseriate, with few extra cells in widest part; discoidal area extending a little beyond middle of elytra, the apical portion of outer boundary considerably bowed and extending into subcostal area. In female discoidal area larger and the outer boundary much more bowed near apex than in male. Elytra with transverse fascia and other markings of both elytra and pronotum much darker in the male.

Length, (male) 3.52 mm., (female) 3.81 mm.; width, (male) 1.60 mm., (female) 1.80 mm.

Holotype (male) and *allotype* (female): Ta Hian, June 17, 1935. In *C. lefroyi* the lateral carinae are much more elevated and the median carina extends to apex of triangular process.

Jannaeus togularis sp. nov.

Size and coloration very similar to *J. cuneatus* Dist. Antennae yellowish-brown, rather long, indistinctly pilose; segment I very short, slightly stouter and slightly longer than II, both pale brown, III about two and one-half times as long as IV. Bucculae yellowish-brown, lighter behind, reticulate, closed in front, long, becoming

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slightly narrower posteriorly. Rostrum brown, black at apex, extending to base of abdomen; rostral channel deep on meso- and metasternum; sternal laminae foliaceous, testaceous. Body brown beneath. Legs testaceous, the tips of tarsi embrowned.

Pronotum moderately convex, brown on disk, usually covered with whitish exudation; carinae very strongly foliaceous, testaceous; lateral carinae very long, slightly arched above, the areolae very large and hyaline; median carina very long, more strongly elevated, arising at apex of hood and extending to tip of triangular process, sinuate above, almost entirely uniseriate, sometimes two or three areolae divided in highest part, areolae in front connected with hind portion of hood; posterior process extremely long, triangular in form, the apex extending beyond the middle of elytra. Hood very high, narrow, very strongly compressed laterally, extending considerably in front of head, its length and height subequal, the eyes visible from above. Paranota very broad, strongly reflexed, the outer margin of reflexed portion turned up so as to appear carina-like and situated near the lateral carinae; tightly pinched so as to appear ridged-like at humeral angles, in front and behind humeral angles longitudinally impressed and somewhat trough-like in appearance. Elytra strongly overlapping, broadest in front of middle; costal area broad, biseriate, with a broad, transverse infuscate band in front of middle, the rest of the areolae hyaline; subcostal area narrower, biseriate; discoidal area very long, about two-thirds the length of elytra, with four areolae in widest part, strongly impressed, the nervure forming boundary sharply raised; sutural area considerably embrowned, the apical portion more widely reticulate and infuscate. The sides of hood and carinae with a few long hairs.

Length, 3.52 mm.; width, 1.6 mm.

Holotype (male): Ta Han, July 4, 1935. *Allotype* (female): Dome Mt., July 13, 1935. Two male *paratypes*: Nodoa, May 31, and Ta Han, July 4.

This species and the new form described below are very distinct from any described species. It seems better for the moment to place them in the genus *Jannaeus* Distant rather than to erect a new genus for them. The hood of the new form below is very different from *J. cuneatus* Dist. or *togularis* n. sp.

Jannaeus mirus sp. nov.

Hood rather small, projecting as far forward as head, impressed in front so as to make the front margin concave, posterior portion subglobose. Carinae strongly foliaceous, clothed with numerous long fine hairs, the median slightly higher and sinuate, the lateral faintly bowed outward at middle and very slightly converging posteriorly. Pronotum strongly convex, covered with whitish exudation; triangular process long, pointed, testaceous. Paranota

very strongly reflexed, the outer margin turned up and extending above lateral carinae, in front strongly impressed longitudinally so as to form a trough-like impression, the hind portion convex above and with the hind margin turned under. Osteolar canal raised, long, projecting upward.

Legs short, rather stout, testaceous, a broad band beyond the middle of femora and all tarsi reddish-brown. Body beneath brownish-black. Sternal laminae and rostrum similar to *togularis*. Elytra with a transverse band near the middle and a curved fascia a little before the apex dark brown; costal area mostly biseriate; discoidal area strongly impressed, reaching considerably beyond middle of elytra. Wings longer than abdomen, infuscate. Antennae rather long, slender; segment I short, slightly stouter and longer than II, both brown; III long, slender, testaceous, two and one-half times as long as IV, the latter brown and fusiform.

Length, 3.95 mm.; width, 1.80 mm.

Holotype (male): Ta Han, June 23, 1935. The hood and paranota are very distinctive characters.

The writers have one female specimen of *J. cuneatus* Dist. from India, which does not agree very closely with Distant's figure of the type. It is slightly more elongate, the elytra a little more constricted beyond the middle, and the shape of the hood and median carina more closely resemble Takeya's figure of *J. altimitratus*.

Stephanitis typica Distant

Cadamustus typicus Distant, Fauna Brit. Ind., Rhynch., II, 1904, p. 132, fig. 95; *Stephanitis typicus* Distant, *ibid*, V, 1910, p. 108.

Ta Han, June 22 and 24, 1935, 3 examples. The specimens are slightly larger than examples at hand from Java and the Philippines. Mr. W. E. China of the British Museum kindly compared one of the Hainan specimens with Distant's type.

海南島之花編蟲科
(半翅目)

C. J. Drake, M. E. Poor 著

(摘要)

文中所述之花編虫凡九種，分隸七屬。鑑定爲新種者有採自那大之 *Perissonemia gressitti*, 那大及其他等處之 *Trachypeplus chinensis*, *Ta Hian* 之 *Compseuta tessellata*，及 *Ta Han* 之 *Jannaeus togularis* 與 *J. mirus* 五種。所述各種乃於民國廿四年由嘉氏 (J. Linsley Gressitt) 所採得者。對於嘉氏採集所經過各處地名之記載，可參閱嘉氏在本期發表之大作。

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SHORTER ARTICLES AND SCIENTIFIC NOTES

A Common Tussock-Moth, Porthesia (Euproctis) scintillans Wlk., in Canton (Lepidoptera: Lymantriidae)

By Y. C. Ng (Ng Yuk Chau, 吳玉洲)

SEPARATE FROM
LINGNAN SCIENCE JOURNAL
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SHORTER ARTICLES AND SCIENTIFIC NOTES

A Common Tussock-Moth, Porthesia (Euproctis) scintillans Wlk., in Canton (Lepidoptera: Lymantriidae).—*Porthesia scintillans* Wlk. is also known as *Euproctis scintillans*, a name extensively used by certain writers especially in the past. This species differs from other species of *Euproctis* in that vein 5 on the hind wing is wanting. *P. scintillans* is found in Canton and vicinity most of the year. Although it is not an extremely serious pest of any one particular crop, it is a quite important economic species on account of its being a general feeder.

Food Plants.—In Canton, caterpillars of *P. scintillans* have been collected on *Averrhoa carambola* L. (楊桃), *Canarium album* Raeusch (白橄), *Capsicum annum* L. (牛角椒), *Crotalaria retusa* L. (大眼蓝), *Dracontomelon sinense* Stapf. (人面樹), and *Ricinus communis* L. (蓖蔴). This species feeds chiefly on the leaves of the above-mentioned plants. But in the Malay Peninsula *P. scintillans* has been known as a rather serious pest of castor (*Ricinus communis* L.) and also attacks cabbage, okra, rubber flowers, vanilla, dadap, cowpea, soybeans, *Aleurites*, *Pithecolobium*, *Eugenia*, *Sesbania*, and damages the growing shoots and leaves of cotton. In Assam mangoes, various species of Hibiscus, Sunn hemp, linseed, castor and *Cassia fistula* are injured.

Distribution.—Beside China, *P. scintillans* has been recorded from Assam, Burma, Ceylon, Dutch East Indies, India, Malay Peninsula, Philippines, and Taiwan.

Life History.—In Canton and vicinity, caterpillars of different instars have been collected during most of the year. In May the caterpillars reach maturity in about 15 to 20 days. Pupation occurs inside the thin, hairy, pale brownish cocoons. The pupal stage lasts about five days. Adults which emerged on May 20 laid eggs on May

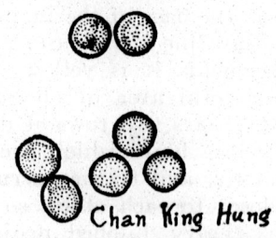

Fig. 1. *Porthesia scintillans*, eggs; greatly enlarged.

24. The eggs are laid in masses and covered with pale brownish hairs. In the laboratory the longevity of the adults is only four days. In October and November the duration of the pupal stage varies from 6 to 10 days, while in December and January the

duration of the pupal stage is about 12 days. In Assam it has a larval period of two weeks, and a pupal period of four days. In the Malay Archipelago the incubation period is about six days; it requires about a month to complete its larval development, and the pupal stage lasts about 8 days.

Eggs.—The egg is yellowish, smooth, and round. On the average it is .65 mm. in diameter. The eggs are deposited in masses and covered with pale brownish hairs. The eggs are not entirely glued together, however, even in the same mass. They are more or less separated by pale brownish hairs. The number of eggs varies in different masses. The smallest mass found in the laboratory contained 26 eggs.

Caterpillars.—The full-grown smoky black and yellow, hairy, caterpillars are from 20 to 25 mm. long. The body bears tufted setae; the head is brown. Most of the thorax, the lateral areas of the first seven abdominal segments, and also the venter, is smoky black. The venter is striated with reddish-yellow especially in the abdominal segments. The subspiracular area and the 9th abdominal

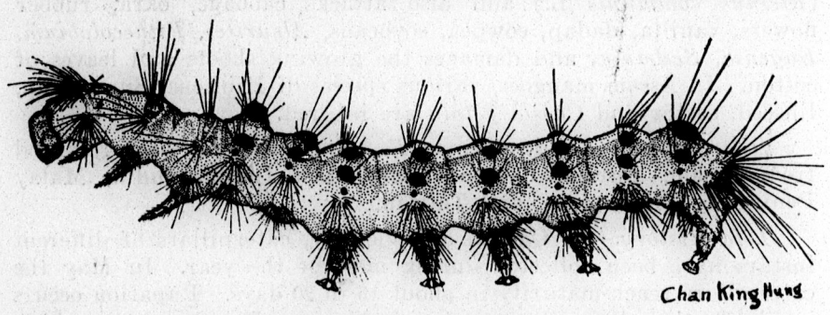

Fig. 2. *Porthesia scintillans*, caterpillar; about x 3.3.

segment are yellow. The thoracic legs are dark; the prolegs are dark except an area near the base of the inner side which is reddish-yellow. The dorsal median line is very conspicuous; from the third to eighth abdominal segments it is yellow and in its center is a fine reddish line. The lateral area of abdominal segments, except on the last two segments, bears two rows of dark tufted setae which are mixed with small white hairs which are arranged in clusters. On abdominal segments 1,2, and 8, the verrucae nearest the dorsal side of the body are closer to each other, so that they appear like three conspicuous black, hairy, bilobed projections which are also intermingled with minute short white hairs which are arranged in clusters. The tufted setae occurring below the abdominal spiracles, those on the ninth abdominal segment, and those on a level with the spiracles of the thorax are all reddish-yellow. In the spiracular areas of the prothorax there is a pair of tufted hairs situated on

conspicuous red tubercles. Two circular eversible mediodorsal glands, .64 mm. in diameter, are found on abdominal segments 6 and 7.

Chrysalis.—The chrysalis is about 8 mm. long, and is brown. Setae which are rather long and coarse and which are very easy to see, are present around the scars of the larval verrucae. The cephalic end is broadly rounded while the caudal end is somewhat pointed. The eye-pieces are quite conspicuous. The maxillae and legs are short. The metathoracic legs reach the caudal margin of

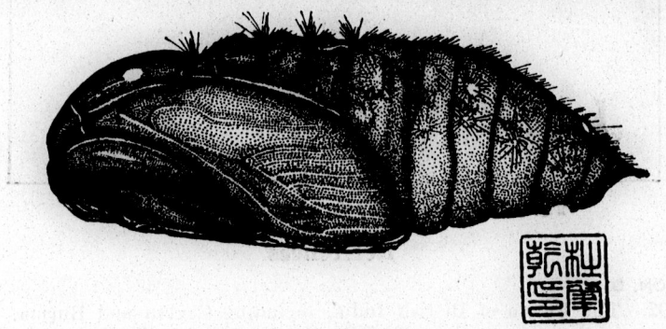

Fig. 3. *Porthesia scintillans*, pupa; about x 6.3.

the wings. The antennae, which do not extend beyond the mesothoracic legs, are broad and conspicuous. The wings reach the cephalic margin of the fourth abdominal segment. The cremaster is smooth and longer than broad; it bears a group of cremastral setae which are about half the length of the cremaster and are curved at tips.

Adult.—The reared specimens measure from 20 to 30 mm. across the wings when spread. The head is pale yellow; the thorax is

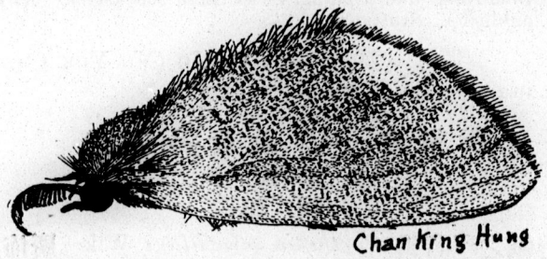

Fig. 4. *Porthesia scintillans*, adult, male; about x 6.

smoky brown. The abdomen is smoky black, and with the anal tuft orange colored. The forewing is also pale brown, irrorated with dark scales, except three yellowish spots in the outer margin. The costa is usually pale, but in some specimens bright yellow. In the middle of forewing there are two obscure irregular pale lines roughly parallel with the outer margin. The hind wing is pale

yellow with the basal portion very pale. The adults are attracted to lights.

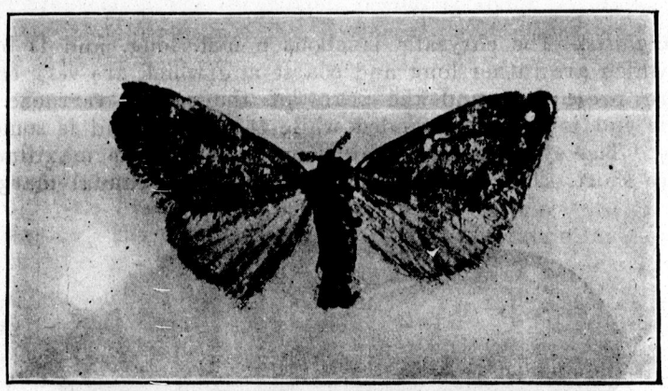

Fig. 5. *Porthesia scintillans*, a lult female.; about x 2.

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Y. C. NG (NG YUK CHAU, 吳玉洲)

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廣州之一普通黃褐毒蛾

吳玉洲 著

(摘 要)

此毒蛾之學名爲 *Porthesia scintillans* Wlk.，廣佈於東亞各地。查此品種雖非爲某特種農作物之重要害虫，然其食料，乃數種有經濟價值之植物，故亦一有經濟價值之害虫也。在廣州一帶，終年發見。於每歲五月時，幼虫期約十五至廿天，而蛹期則約五天。在試驗室內，成虫壽長僅數日而已。嚴冬之際，其生命史長約倍於夏季。文中對此毒蛾之各期，論述甚詳；及各見於圖。

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By E. R. Tinkham

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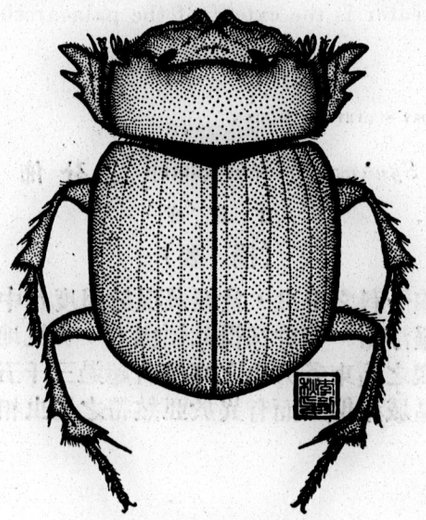

Fig. 1. *Synapsis tridens* Sharp.

pronotum for which character the insect apparently received its name. The species was described from Assam, India, in 1856. G. J. Arrow in the Fauna of British India, Coleoptera, Lamellicornia, Part III Coprinae, 1931, p. 81 gives the distribution of the insect as follows: "Bengal: Berhampore (E. T. Atkinson). Assam: Manipur (W. Doherty). Burma: Ghecu, Karen Hills 3900-4200 ft. (L. Fea, Mar.)." An illustration of the beetle is given on plate VII, fig. 8 of this book. Further distributional records for China are given by A. Boucomont, List of the Coprophagous Coleoptera of China, *Ling. Sci. Jour.* 7: 759-794, p. 762. These are: "China: Tsiku (R. P. Dubenard); Lutsz Kiang (R. P. Genestier); Tali, Yunnan." Hence this specimen is apparently the first to be taken east of Yunnan. That this species known previously from Assam,

Burma, Bengal and Yunnan should now be taken on the top of one of Kwangtung's higher mountains is rather surprising. Its discovery affords additional evidence that the fauna found on the summits of the Kwangtung mountains and mountain ranges above 3500 feet in elevation is closely related or similar to that found in western China in the provinces of Yunnan, Szechwan and the adjacent areas of upper Burma and Assam. In other words, the higher mountain ranges in Kwangtung, which lies within the Oriental Faunal Region, have on their peaks isolated islands of insect life representing the palaearctic fauna.

From careful observations the author believes 3500 feet to represent the altitude where the greatest change between Oriental and Palaearctic fauna takes place. The greater the altitude above this point the greater is the extent of the palaearctic fauna.

E. R. Tinkham

Lingnan Natural History Survey and Museum

Synapsis tridens Sharp 之分佈

丁 謙 著

(摘 要)

此種金龜子科之甲虫，曾經發現於印度及中國之雲南；而作者於廣東之羅浮山，亦曾採得此類標本。發見地之高度約三千八百尺。由此觀之廣東各大山之高度若超過三千五百尺者，其昆虫相必與較北區域相似，而有異於亞熱帶之昆虫相。

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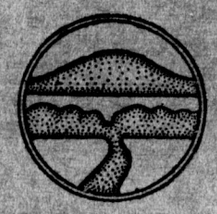
SHORTER ARTICLES AND SCIENTIFIC NOTES

The Occurrence of Limnometra gigas China (Hemiptera: Gerridae) in Hainan Island with Description of the Apterous Form

By William E. Hoffmann



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Ent. Soc. 20(5) :218-220, 1925.

Fig. 1 *Limnometra gigas* China

The Occurrence of Limnometra gigas China (Hemiptera: Gerridae) in Hainan Island with Description of the Apterous Form.—*Limnometra gigas* China was described in 1925[1] from Tongking, Indo-China from a unique, a winged male. So far as I am aware there has been no further published record of this giant water-strider which is by all odds the largest strider known to science During July, 1929 the present writer collected in Hainan Island several specimens of a very large water-strider which upon subsequent examination appeared to be *L. gigas*. Two specimens (one apterous, the other winged) were set aside at that time for drawing and later study but pressure of other work has long delayed the preparation of a short note on this species. The specimens, except the two used for the illustrations, were stored away in 1929 with other unmounted material and are not accessible at the present. This paper, accordingly, is based on a winged male (fig. 1 and pl. 24) which is compared with China's description and an apterous male (pl. 23, fig. 4) which is briefly characterized. A winged nymph of an unknown species of water-strider which was collected in association with *L. gigas* is also figured (pl. 23, fig. 3). (Figure 2 on plate 23 is the ventral tip of a female but it is apparently not *L. gigas*. The specimen from which the drawing (and block) was made seven years ago cannot be located now. It may possibly be the species represented by figure 3.) Although the winged male before me differs in some respects, notably in leg measurements, from Mr. China's specimen I believe it represents the same species. Mr. China's description follows.

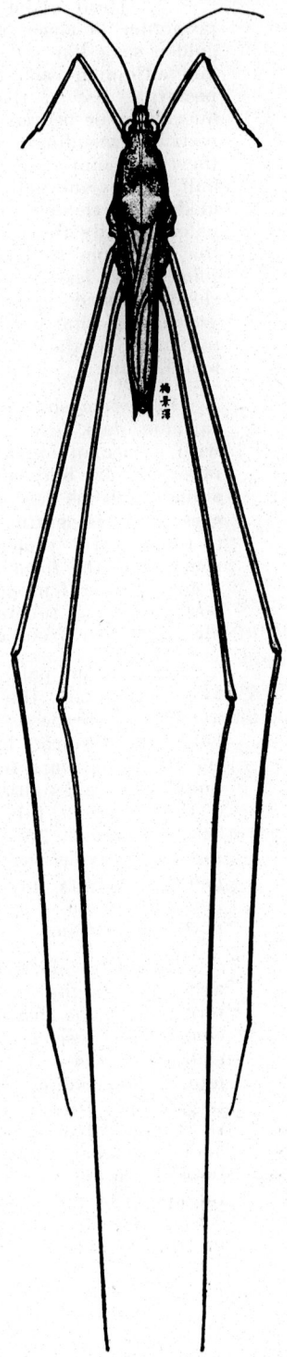


Fig. 1 *Limnometra gigas* China

[1] China, W. E. : A Giant Water-strider from Tonkin (Hemiptera, Gerridae). *Bull. Brooklyn Ent. Soc.* 20(5) :218-220, 1925.

♂. Head about one-third longer than the anterior lobe of the pronotum (3 mm.), above dark fuscous to black covered with a fine golden scale-like pubescence, the occipital lobes, a large spot in front and adjoining each eye, a median broad longitudinal vitta and the posterior disc of the vertex obscurely fulvous; below including the bucculae pale ochraceous covered with a rather long white pubescence; rostrum extending onto the base of the mesosternum, pale ochraceous the third joint reaching the hind margin of the prosternum its apical half fulvous and glabrous, the apical joint black and shining; antennae moderately slender, fuscous, dark at the extreme base of the first joint, paler apically the basal joint as long as from the anterior margin of the pronotum to midway between the humeral prominences, second joint rather less than two-thirds the length of the first and much more slender, third joint about three-quarters the length of the first (remaining joint accidentally broken off and lost but was about equal in length to the third and very slender), length of joints: 5.8, 3.4 and 4.5 mm.

Pronotum slightly more than twice as long as wide, not medianly carinate, dark fuscous covered with a fine golden scale-like pubescence, with a median longitudinal line which is yellow and distinct on the anterior lobe but fulvous and obscure on the posterior lobe, also a sinuate fulvous fascia on each side of the anterior lobe behind the eyes which is continued along the lateral margin of the posterior lobe to the humeral prominence; the posterior margin of the pronotum rounded to the form of a parabola of base 5 mm. and median length 4 mm., humeral prominences very distinctly elevated and shining, two obscure shining tubercles on a level with the humeral prominences and placed further from each other than from the latter.

Prosternum pale ochraceous covered between the acetabula with long white hairs, the outer sides of the acetabula fuscous. Mesosternum pale ochraceous covered with a fine white pubescence, the sides below the posterior lobe of the pronotum including the outer sides of the acetabula, dark fuscous with a median longitudinal band of silvery pubescence, a longitudinal area immediately below the humeral angle of the pronotum, fulvous and a short line at the base of the acetabular suture fuscous. Metanotum with the metaphragma pale ochraceous, the sides fulvous with a dark fuscous lateral fascia including a narrow band of silvery pubescence, the outer sides of acetabula fuscous; anterior margin of metaphragma in the middle with a minute brownish pore (*omphalium*).

Hemelytra dark fuscous reaching to the middle of the sixth abdominal tergite. Abdomen above bright orange red with the sixth tergite and the greater part of the middle of each segment of the connexivum fuscous; below angular but not carinate medianly, pale ochraceous the connexivum flavous and bordered interiorly along the lateral longitudinal impressions with fuscous; spines of the sixth tergite dark fuscous extending well beyond the apex of the abdomen, their apices divergent, the posterior margin of the sixth ventrite more or less semi-circularly emarginate between the lateral spines. Legs fuscous the anterior trochanters, the bases of the anterior femora, and the apices of the middle and hind femora flavous; the hind tibiae pale ochraceous except towards their bases; anterior tarsal claws unequal in length, middle femora unarmed.

Measurements: Length from apex of head to tip of abdomen 34 mm. (the spines of the 6th abdominal segment extend 0.75 mm. beyond the tip of the abdomen), from apex of head to posterior margin of prnotum 14 mm. Breadth across humeral angles of pronotum 5 mm., across middle acetabula 7.2 mm. Anterior femur 10.2 mm., tibia 9.2 mm., tarsus 3 mm. Middle femur 42 mm., tibia 40.2 mm., tarsus 10.2 mm. Hind femur 44 mm., tibia 64 mm., tarsus missing.

Winged Male.—The Hainan specimen agrees with the color description as given by Mr. China. There are some differences in measurements between the Hainan and the Indo-China specimens and I fail to note the disparity in the length of the anterior tarsal claws that is mentioned by Mr. China. The apical antennal segment and the posterior tarsus were missing in the Indo-China specimen. These are present in our specimen and measure 4.76 and 3.1 mm., respectively. The Indo-China specimen is two millimeters longer than the Hainan specimen but its legs are somewhat shorter, the intermediate ones being 92.4 mm. against 95.5 mm. and the posterior one (excluding tarsus) 108 mm. as compared with 112.8 mm. (also excluding tarsus). The first three segments of the antennae measure 13.7 mm. in the Indo-China specimen and 15.01 mm. in the Hainan specimen.

Apterous Male.—The chief differences, other than the absence of wings, between the apterous and winged forms is that the apterous one is larger, darker (especially on the upper side of abdomen), and the spines of the sixth tergite do not extend so much beyond the apex of the abdomen. The coloration of the head and pronotum is much the same as in the winged form. The pronotum has dull orange in place of the humeral prominences and the tubercles located between the humeral prominences are barely noticeable. The top of the abdomen is prominently rounded, quite dark. There is a touch of orange on the outer margin of connexivum at the sutures. A bit of obscure orange is also present on the basal genital segment. Beneath the abdomen is obscurely carinate. The measurements, in millimeters, are as follows: Length along median line, 36; length of head, 3; length of anterior lobe of pronotum, 2.5; length of posterior lobe of pronotum, 8.5; distance from apex of head to posterior margin of pronotum, 14; width, across eyes, 4; width across humeral angles of pronotum, 4; The femora, tibiae, and tarsi of the anterior, intermediate, and posterior legs measure as follows: 11,10,2.7; 52,47,11; 52,78.4,3.6. The antennal segments are 6.81, 4.08, 4.90, and 4.76 mm. To facilitate comparison between these measurements and those for the Indo-China and Hainan winged forms the measurements for all three specimens are given in table 1.

TABLE 1

Measurements, in millimenters, of Limnometra gigas from Indo-China and from Hainan Island

	INDO-CHINA WINGED MALE	HAINAN WINGED MALE	HAINAN APTEROUS MALE
Length, apex of head to apex of abdomen	34	32	36
Length of head		3	3.1
Length of anterior lobe of pronotum	3	2.1	2.5
Distance from apex of head to posterior margin of pronotum	14	13	14
Length of front femora, tibiae, and tarsi	10.2,9.2,3	10,9,3	11,10,2.7
Length of middle femora, tibiae, and tarsi	42,40.2,10.2	45,40,10 5	52,47,11
Length of hind femora, tibiae, and tarsi	44,64,—	45,67.8,3.1	52,78.4,3.6
Width, head across eyes		4	4
Width, across humeral angles	5	4.5	4
Antennal segments I to IV	5.8,3.4,4.5,—	6.2,3.7,5,4.7	6.8,4,4.9.4.7

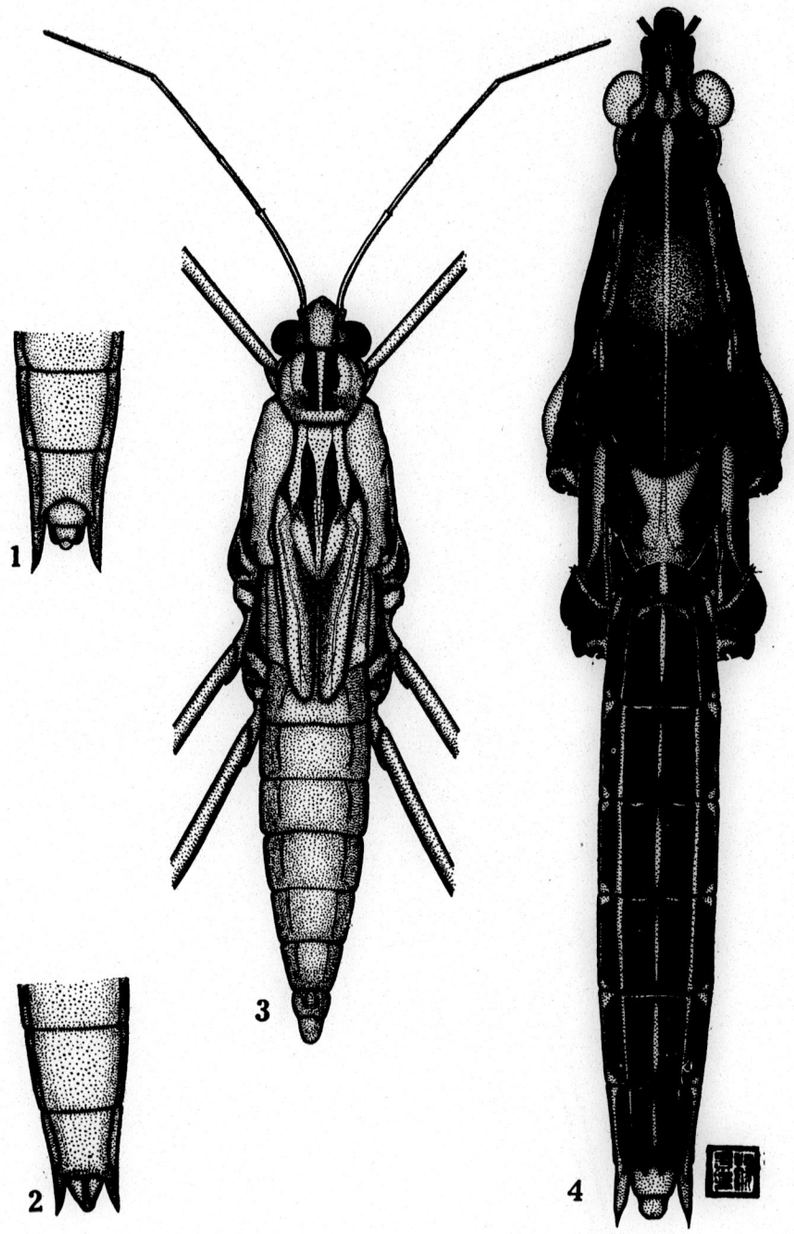
Habitat.—The Hainan specimens were collected in a small stream on a mountain (Lin Fa Shan) near No-doa in the interior of the island. The stream was not running a great deal of water at the time of our visit but there was evidence that at times it becomes a raging torrent. The descent was steep and below the numerous waterfalls there were large pools. It was in one of these that *L. gigas* was found.

大水黽之發現於海南島，及其無翅型之紀載

賀輔民著

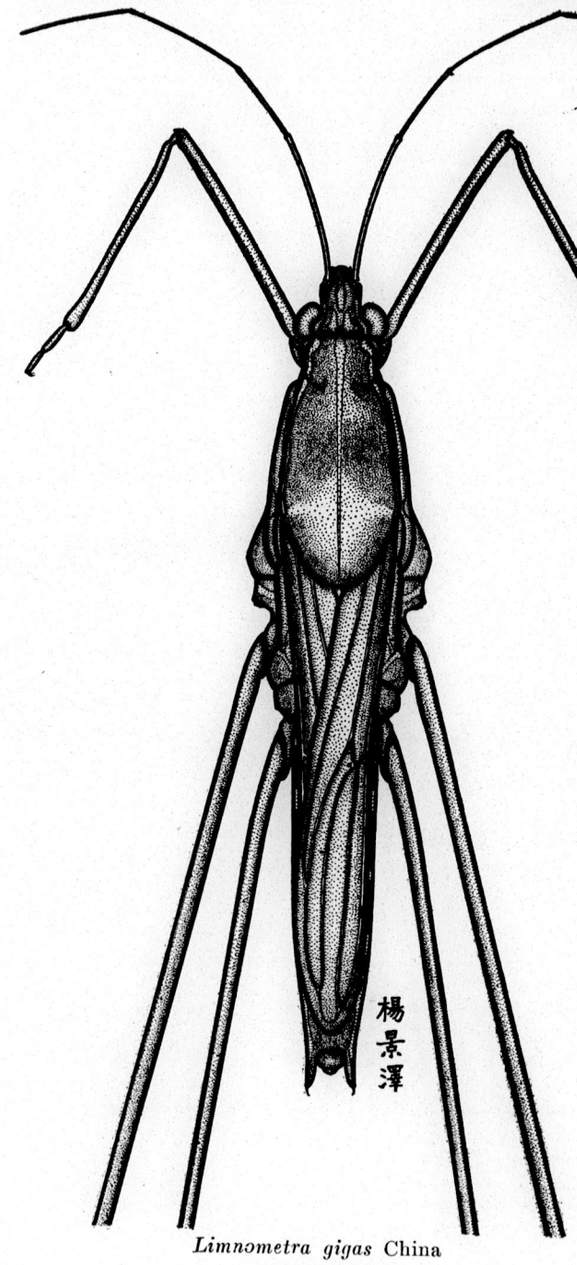
(摘要)

此大水黽之學名爲 *Limnometra gigas* China, 其雄性之有翅型採自東京。文中所述之雄性無翅型，乃作者於民國十八年七月，採自海南島內地近山之溪中。此品種乃水黽中之最大者。雄性之無翅型，長約一又八份之三英寸，如連後足合算則五寸有奇。圖中所載之有翅與無翅兩型之標本，皆採自海南島。



Limnometra gigas China and an unidentified species

Fig. 1, ventral tip of male; fig. 2, ventral tip of female of an unidentified species, possibly the adult of the species represented in figure 3; fig. 3, winged nymph of a gerrid associated with *L. gigas*; fig. 4, apterous male of *L. gigas*.



Limnometra gigas China
Winged male

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THE RED-TAIL FISH, TANICHTHYS ALBONUBES LIN

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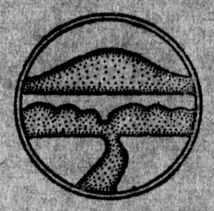
Chekiang Provincial Fisheries Experiment Station,
Tinghai, Chekiang.



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CANTON, CHINA

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(CONTINUATION OF LINGNAAM AGRICULTURAL REVIEW)

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0294

THE RED-TAIL FISH, TANICHTHYS ALBONUBES LIN

By T. P. CHEN

Chekiang Provincial Fisheries Experiment Station, Tinghai, Chekiang.

The red-tail fish, *Tanichthys albonubes* Lin, occurs in the mountain streams of White Cloud Mountain, Canton, and, up to the date of writing, has not been found elsewhere. It was first found and named by Lin Shu-yen in 1932. Attracted by the beautiful color markings and the daintiness of the fish, I was one of the first to put them in an aquarium. They soon proved themselves an ideal aquarium fish, and their popularity spread in a very short time. So many of them were taken out of the streams of the White Cloud by fish fanciers, that the Fisheries Experiment Station at Canton advised the White Cloud Forest Keepers to post a sign forbidding further fishing in order to conserve the species.

It is a small aquarium fish. The full grown female (fig. 1) measures about 30 mm. (a little less than 1¼ inches); the male fish (fig. 2) is slightly smaller, measuring about 25 mm. It is almost impossible to describe the coloration of the fish, because it varies so much with the mood of the fish. Undisturbed and under favorable conditions, the ground color is gray; a band of silver and sapphire blue colors runs along the lateral line from the eye to the base of the caudal, where a large black spot is present; from the anal fin region to the tip of the caudal, there is a patch of red, which gives

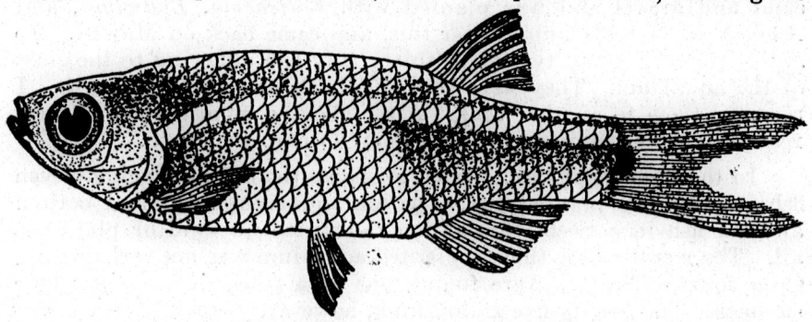

Fig. 1. *Tanichthys albonubes* Lin., female. About x 3.4.

the red-tail fish its name; the dorsal fin is red and the anal fin is greenish, the tips of both being dusted with white or gray. The coloration is the same in both sexes, but more intense in the male. When frightened, undernourished, or under other unfavorable conditions, the colors of the fish become dull and much lighter. The half grown fish are darker colored and really more beautiful than the adults.

The red-tail fish is quite hardy, and can stand a great deal of abuse and crowding. I have seen about a dozen of the fish confined in a two-gallon aquarium and doing quite well for over a month. It thrives practically on any kind of food, and can stand long periods of starvation. It is not a shy fish. When food is being introduced, it comes up to the surface to feed and even nibbles at your finger. It does not molest other fish, and is a good citizen in a community tank. It is not known how long the red-tail fish can live. I have a few of them that are over two years old and in very good condition.

The first time that the red-tail fish spawned in an aquarium was entirely incidental. In April, 1932, I secured four of the fish and placed them in a six-gallon aquarium, which had a bottom of coarse

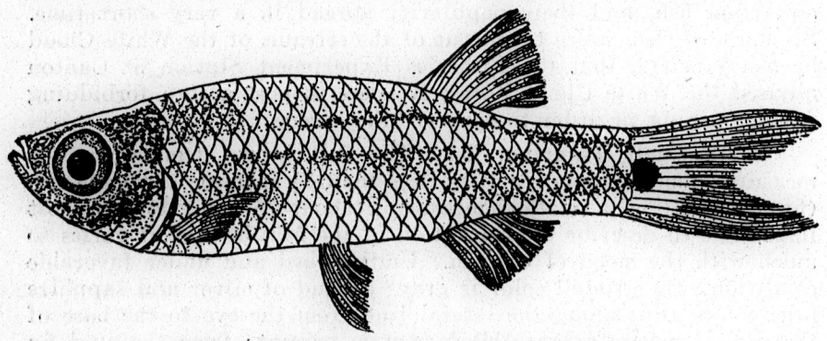

Fig. 2. *Tanichthys albonubes* Lin., male. About x 3.4.

sand and gravel and was planted with *Valisneria*, *Ludwigia*, and *Anacharis*. I left Canton after this, and came back on May 21. To my surprise, I found twenty to thirty tiny fish adhering to the glass of the aquarium. They were very small, about 3 mm. in length. I removed them to another tank. After about a month, four of them remained alive, having grown to about 15 mm. in length.

In the summer of 1934, I tried to spawn the fish by placing eleven fish in a thickly planted twelve gallon aquarium with sand bottom and six fish in a twenty-five-gallon tank with no sand or plants at all. The result in the thickly planted aquarium was not satisfactory. Only four or five fry were found, one at a time, during the whole summer. The twenty-five-gallon tank, however, yielded fifteen young fish that grew to maturity.

During all the spawnings previously mentioned, the eggs were never observed. Because young fish were found in a tank without any plants, it was believed that the eggs were not adhesive. In March, 1935, I brought four red-tail fish to Tinghai with the purpose of observing their spawning habit. They were placed in an eight-gallon aquarium, which was well planted and had a fine sand bottom. Several Petri dishes, each containing a bunch of willow

moss (*Fontinalis*), were placed in the aquarium in order to collect the eggs.

During the ensuing time, the fish were fed with live foods, and soon distended bellies became noticeable in the females. On June 5, with an air temperature of 75°F. and water temperature 74°F, the fish were observed to spawn. The spawning act was most interesting. The male fish, with all its colors intensified and all the fins expanded, quivering with excitement, made darting trips between the female and the bunch of willow moss. Its purpose, apparently, was to entice the female to spawn in the mass of plants. When the female fish entered the moss, the male followed immediately, wound itself around the female in an embrace, and the spawning act was completed. Spawning took place every morning, and each fish would repeat the spawning act twenty or thirty times before it finally calmed down. When the Petri dishes were taken out and the plants removed, usually four or five eggs were found at the bottom. Probably, only one egg was ejected each time, and many of the spawning acts must have been unsuccessful. The spawning in the aquarium continued all through the summer and fall. They were observed to be spawning as late as October 24, when the temperature was about 74°F. In their native habitat, therefore, where the winter is short, the spawning season of the red-tail fish is probably from April to October

The eggs taken from the Petri dish, probably an hour old, are transparent, non-adhesive, and heavier than water. They are extremely small, measuring about 1.2 mm. in diameter. Examined under the microscope, they appear to possess a wide perivitelline space. A great number of the eggs are sterile, and die after a few hours. At a temperature between 72° and 76°F. the development of the fertilized eggs is very rapid and typical of the eggs of the fish of the carp family. The blastodisc, situated at the animal pole of the egg, is of considerable size and contains protoplasm of granular appearance. It undergoes the first cleavage, dividing the disc into two equal parts, in about 50 minutes after fertilization (fig. 3). The different stages of 4-, 8-, 16-, and 32-blastomeres and finally the blastula stage are reached at intervals of about 35 to 50 minutes (fig. 3, B, C, and D). The blastulation period is very short, and gastrulation begins almost immediately after the blastula stage, through a process of epiboly by which a germ skin is gradually formed covering the whole yolk or the vegetable pole (fig. 3, E and F). As soon as the germ skin completely covers the vitellus (fig. 3, G), which takes place about 13 hours after fertilization, the embryonic rudiments are formed as a thickening of the cells at the end where the germ disc is originally located. About 24 hours after fertilization, an embryo with rudiments of eyes, ears, and notochord is formed (fig. 3, H). When the embryo is provided with well developed eyes, ears, back-bone, and tail, it is ready to hatch (fig. 3, I).

The incubation period of the eggs of the red-tail fish is 48 hours or less. The young fish, when first hatched, is about 2.5 mm. in length (fig. 4, A). Its small size and transparency make it very difficult to find in a large aquarium. It lies quietly at the bottom of the container, and does not move unless disturbed. During this period, active circulation is going on in the body, the yolk sac is being absorbed, and the intestines, fins, etc., are being formed (fig. 4, B). At a temperature of about 85°F., the young fish begins to

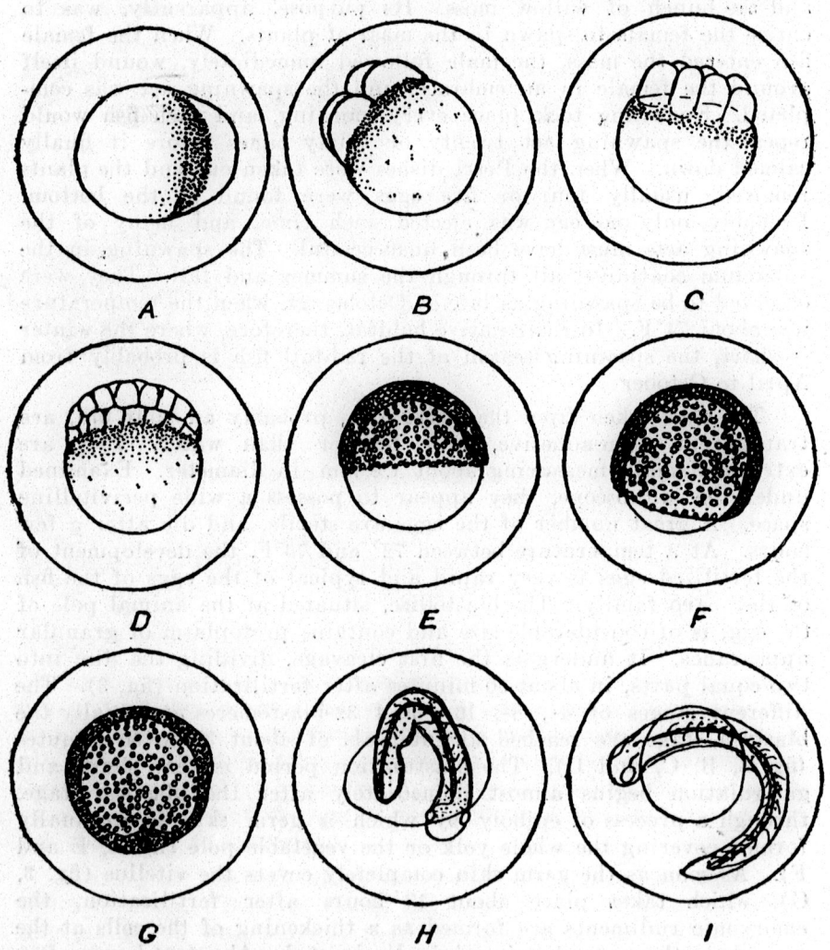

Fig. 3. Development of *Tanichthys albonubes* Lin. A, 50 minutes after fertilization. B, 90 minutes after fertilization. C, 2½ hours after fertilization. D, 3 hours after fertilization. E, 7 hours after fertilization. F, 10½ hours after fertilization. G, 13⅓ hours after fertilization. H, 24 hours after fertilization. I, 32 hours after fertilization

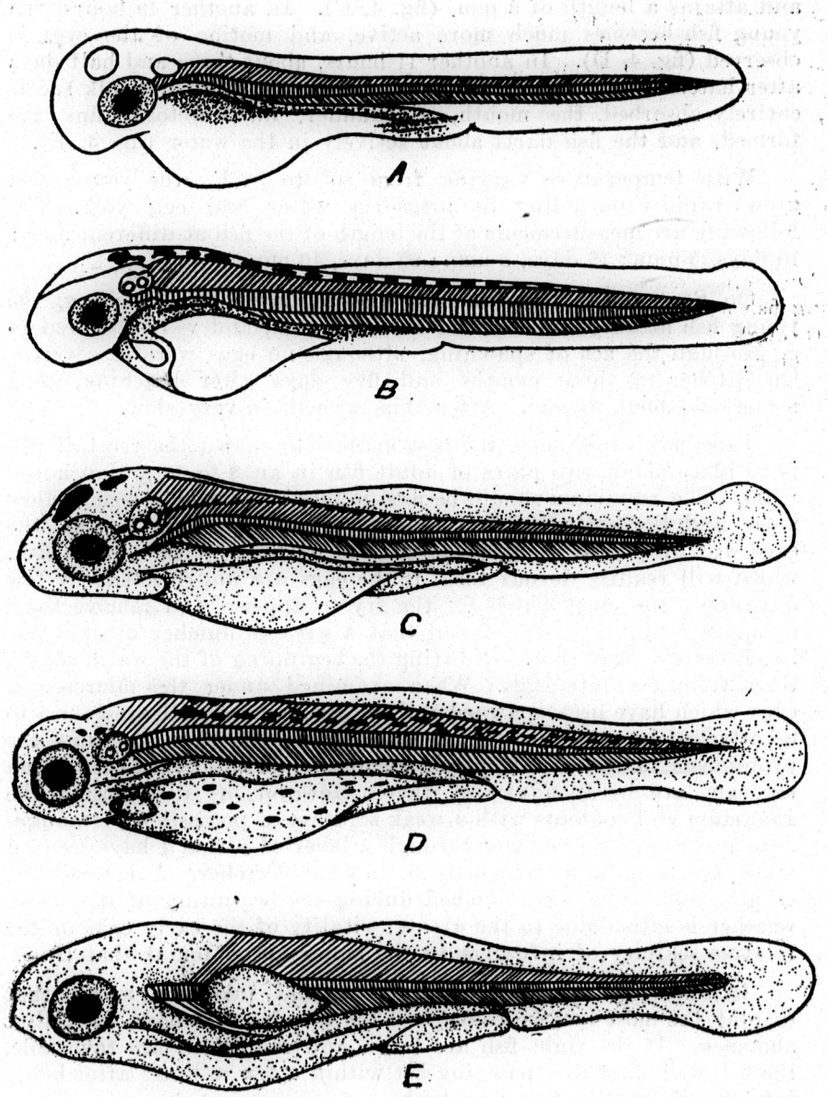

Fig. 4. Fry of *Tanichthys albonubes* Lin. About x 32.5. A, 12 hours after hatching. B, 28 hours after hatching. C, 56 hours after hatching. D, 75 hours after hatching. E, 86 hours after hatching.

attach itself to the sides of the container 56 hours after hatching, and attains a length of 3 mm. (fig. 4, C). In another 19 hours, the young fish becomes much more active, and motion of the eyes is observed (fig. 4, D). In another 11 hours, about three and half days after hatching, the fish attains a length of 3.25 mm., the yolk sac is entirely absorbed, the mouth, air-bladder, and pectoral fins are formed, and the fish darts about actively in the water (fig. 4, E).

With temperature varying from 80° to 88°F., the young fish grows rapidly on a diet of infusoria water and egg yolk. The following are measurements of the length of the fish at different ages: 10 days, 5 mm.; 16 days, 8 mm.; 20 days, 10 mm.

On September 1, two months and 23 days after hatching, the young fish attained a length of about 20 mm., and were observed to go through the act of spawning, although no eggs were discovered. On October 12, three months and five days after hatching, they measured about 22 mm. After this, growth is very slow.

From my experience, the best method to spawn the red-tail fish is to place about two pairs of adult fish in an 8 to 10 gallon aquarium. The aquarium should be well planted, preferably with willow moss, and the bottom should be covered with pebbles, so that the eggs will drop into the grooves and out of reach of the parent fish, which will readily devour them if the eggs are unprotected. A few days later one must watch for the fry to appear, and remove them to another tank. I have found that a greater number of eggs are hatched from eggs spawned during the beginning of the warm season than from the late eggs. When examined under the microscope, eggs which have been spawned in late summer and fall are found to be attacked by some infusoria, which enter the eggs, consume the protoplasm, and leave only the membrane. This occurs even when the eggs are in an advanced stage. However, by disinfecting the aquarium and contents with a weak solution of potassium permanganate and filtering the water through a layer of cotton I have secured some fry from eggs spawned as late as October. I believe the greater number of eggs hatched during the beginning of the warm weather is either due to the greater vitality of the early eggs or the relative scarcity of infusoria in the aquarium water at that time.

In selecting the parent fish, one should take the males that display the most intense colors and the females that have the fullest abdomen. If the right fish are taken and conditions are favorable, the fish will start the spawning act within a few minutes after being introduced into the breeding tank.

Being a tropical fish, the red-tail fish will not stand long exposure (say, for about a week) to temperature below 50°F. The young fish are more sensitive to cold, and usually succumb more quickly than the adults.

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白雲山之紅尾魚

陳同白著

(摘要)

紅尾魚又名鄧魚，產於白雲山黃婆洞之溪澗中，他處尚無發見。民二十一年林書顏與鄧錦暉同在白雲山採習標本，鄧君捕得此魚，林君鑑定爲新種，遂名之曰鄧魚，藉作紀念。

紅尾魚雌者長約三十公厘，雄者畧小。體銀灰色，側線間有碧色一條，尾際及脊鰭均紅色。雄魚色澤較雌者爲鮮明。因其美麗嬌小，馴善易養，故粵港兩地有水族箱者幾無不蓄養數尾。

民二十一年及二十三年著者發見紅尾魚在水族中生殖，但未發見其卵。二十四年著者由粵帶紅尾魚至浙，設法使其繁殖，對於其產卵習慣及發生狀況始得明瞭。

紅尾魚於五六月間，氣温約華氏七十五度時，開始產卵。雄魚以體抱繞雌魚而射精。卵直徑僅一·二公厘，透明，無粘着性，沉於水底，卵之發生甚速，四十八小時內即孵化。稚魚長僅二·五公厘，三四日後卵囊消失，即能活潑游泳。

紅尾魚繁殖方法，可放置雌雄數對於水草盛生之水族箱中。箱底鋪細石或粗沙。箱中水草及沙石宜用葯劑消毒，水亦宜濾過。如佈置適宜，温度亦合，則生殖現　即時可見。

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CATALOGUE OF CHINESE SIPHONAPTERA

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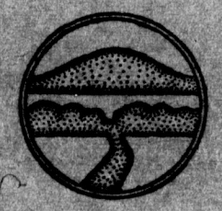

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Division of Entomology and Economic Zoology, University of Minnesota, U.S.A., and Division of Entomology, National University of Chekiang.

Family **PULICIDAE** Taschenberg

Taschenberg, 1880, Die Flöhe, p. 62.

Subfamily **CERATOPHYLLINAE** Dampf

Dampf, 1908, Schrift. Physik.-ökonom. Gesellsch. Königsberg i. Pr., IL, p. 19.

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=*Ceratophyllus* Curtis, 1832, Brit. Ent., IX, p. 417 (partim).
Genotype : *D. montanus* (Baker) 1895.

D. mandarinus (Jordan & Rothschild) 1911

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China : Shensi (Yu-lin-fu).

Genus **Amphalius** Jordan 1933

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Genotype : *A. runatus* (Jord. & Roths.) 1923.

A. runatus (Jordan & Rothschild) 1923

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Jordan, 1933, Novit. Zoolog., XXXIX, p. 74.
Hosts : *Ochotona dahurica, Ochotona alpina*.
China : Manchuria (town), Mongolia (Urga).
Transbaicalia.

A. clarus (Jordan & Rothschild) 1922

Jord. & Roths., 1922, Ectop., I, p. 276, ♂♀ (*Ceratophyllus*).
Jordan, 1933, Novit. Zoolog., XXXIX, p. 74.
Host : *Ochotona curzoniae*.
China : Tibet (Tingri).

Genus **Oropsylla** Wagner & Joff 1926

Wagner & Joff, 1926, Revue Microbiol. Epidémiol., V, p. 86.
Wagner, 1927, Konowia, VI, p. 103.
Ewing, 1929, Man. Ext. Parasites, p. 169.
Wagner, 1929, Comptes Rend. 4-ième Congr. Organ. acad. russ., II, p. 117.
Wagner, 1929, Konowia, VIII, p. 313.
Jordan, 1933, Novit. Zoolog., XXXIX, p. 73.
=*Ceratophyllus* Curtis, 1832, Brit. Ent., IX, p. 417 (partim).
Genotype : *O. silantiewi* (Wagner) 1898.

O. silantiewi silantiewi (Wagner) 1898

Wagner, 1898, Horae Soc. Ent. Ross., XXXI, p. 574 ♂♀ (*Ceratophyllus*).
Wagner & Joff, 1926, Revue Microbiol. Epidémiol., V, p. 86.
Joff, 1927, Revue Microbiol. Epidémiol., VI, p. 212.
Joff, 1927, Revue Microbiol. Epidémiol., VI, p. 317.
Host : *Marmota bobac.*
China : Manchuria.
Siberia, Southeastern Russia, Europe, Himalaya (on *Marmota bobac, Marmota sibirica*).

O. silantiewi crassus (Jordan & Rothschild) 1911

Wagner, 1930, Kat. palaeark. Aphanipt., p. 12.
=*crassus* Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 374, ♀ (*Ceratophyllus*).
Host : *Marmota robusta.*
China : Kansu (Old Tau-chow).

O. sinensis Liu 1935

Liu, 1935, Peking Nat. Hist. Bull., 9, p. 273, ♀.
Host : Wild mammal.
China : Szechwan (Suifu).

O. elana Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 160, ♀.
Hosts : *Citellus monogolicus?, Cricetulus campbelli.*
China : Manchuria (Bank of Sungari River opposite Harbin and Anda Steppe near Harbin).

Genus **Citellophilus** Wagner 1934

Wagner, 1934, Konowia, XIII, p. 260-261.
=*Ceratophyllus* Curtis, 1832, Brit. Ent., IX, p. 417 (partim).
Genotype : *C. tesquorum* (Wagner) 1898

C. tesquorum (Wagner) 1898

Wagner, 1898, Horae Soc. Ent. Ross., XXXI, p. 564 (*Ceratophyllus*).
Wagner & Joff, 1926, Revue Microbiol. Epidémiol., V, p. 65 (*Ceratophyllus*).
Wagner, 1927, Bestimmungstabellen der Insekten, p. 99 (*Ceratophyllus*).
Joff, 1927, Comptes Rendus du Premier Congr. Antipest. de l'URSS., p. 213 (*Ceratophyllus*).
Wagner, 1929, Comptes Rendus 4-ième Congr. Organ. acad. russ., II, p. 111 (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 260-261.
=(?) *dubius* Wagner, 1898. Horae Soc. Ent. Ross., XXXI, p. 563 (*Ceratophyllus*).
Europe, South and East Russia (on *Citellus pygmaeus*).

C. tesquorum mongolicus (Jordan & Rothschild) 1911

Jord. & Roths., 1911, Proc. Zool Soc. London, 1911, p. 379 ♂♀ (*Ceratophyllus mongolicus*).
Wagner & Joff, 1926, Revue Microbiol. Epidémiol., V, p. 65 (*Ceratophyllus*).
Joff, 1927, Comptes Rendus du Premier Congr. Antipest. de l'URSS., p. 213 (*Ceratophyllus*).

Wagner, 1929, Comptes Rendus 4-ième Congr. Organ. acad. russ., II, p. 115 (*Ceratophyllus*).
=(?) *famulus* Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 380, ♀ (*Ceratophyllus*), on *Marmota robusta* from Old Tau-chow, Kansu, China.
=*tesquorum* Wagner, 1927, Matér. Commis. étude Republ. Auton. Soviét Social Jakoute Livr., XVI, p. 2 (*Ceratophyllus*).
Hosts : *Citellus dahuricus mongolicus.*
China : Shensi (Yu-lin-fu), Mongolia.
East Siberia (on *Urocitellus eversmanni*).

C. tesquorum sungaris (Jordan) 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 155, ♂ (*Ceratophyllus*).
Hosts : *Cricentulus arenarius,* burrows of *Citellus mongolicus?*, abandoned burrows of *Spermiphilus* or *Zapus.*
China : Manchuria (Ta-lin, Chendjatien, Tungliao and Sungari River opposite Harbin).

C. dolabris (Jordan & Rothschild) 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 371, ♂♀. (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 261.
Hosts : *Marmota robusta.*
China : Kansu (Old-Tau-chow).

Genus **Callopsylla** Wagner 1934

Wagner, 1934, Konowia, XIII, p. 262.
Genotype : *C. lagomys* (Wagner) 1898.

C. kozlovi (Wagner) 1929

Wagner, 1929, Ann. Mus. Zoolog. Acad. Sci. URSS., XXX, p. 23, ♂ (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 263 (genus to be determined).
Wagner, 1935, Konowia, XIV, p. 219.
Host : *Microtus* sp.
China : East Tibet (Fl. Huan-che).

Genus **Ceratophyllus** (s. str.)

Curtis, 1832, Brit. Ent., IX, p. 417.
Wagner, 1898, Horae Soc. Ent. Ross. XXXI, p. 557.
Fox, 1925, Inst. Disease Man, p. 125, 137.
Wagner, 1927, Konowia, VI, p. 101-113.
Ewing, 1929, Man. Ext. Parasites, p. 169, 170.
Jordan, 1933, Novit. Zoolog., XXXIX, p. 75 (s. str.).
Wagner, 1934, Konowia, XIII, p. 260-263 (s. str.).
=*Pulex* Linnaeus, 1758, Syst. Nat., ed. X, p. 641 (partim). Taschenberg, 1880, Die Flöhe, p. 64 (partim).
=*Trichopsylla* Verrall, 1901, List Brit. Dipt., I, ed. 2, p. 7.
Genotype : *C. hirundinis* Samouelle 1819.

C. sinicus Jordan 1932

Jordan, 1932. Novit. Zoolog., XXXVIII, p. 276, ♀.
Host : *Ochotona cansa.*
China : Szechwan (Wu-chi).

C. (?) kaznakovi Wagner 1929

Wagner, 1929. Ann. Mus. Zool. Acad. Sci. URSS., XXX, p. 22, ♂♀ (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 262 (actual egnus to be determined).
Hosts : *Putorius* sp., *Mustela* sp.
China : East Tibet (Fl. I-tchu, Fl. Dza-tchu and Kam).

C. (?) sparsilis Jordan & Rothschild 1922

Jord. & Roths., 1922, Ectop., I, p. 281, ♀ (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 262 (actual genus to be determined).
Host : *Ochotona curzoniae*.
China : Tibet (Tingri).

C. (?) phaeopis Jordan & Rothschild 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 384, ♀ (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 262 (actual genus to be determined).
Host : *Sciurotamias davidianus consobrinus*.
China : Szechwan (S. E. Ta-tsien-lu).

C. (?) euteles Jordan & Rothschild 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 382, ♀ (*Ceratophyllus*).
Wagner, 1930, Kat. palaearkt. Aphanipt., p. 16 (*Myoxopsylla*?).
Jordan, 1932, Novit. Zoolog., XXXVIII, p. 277, ♂ (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 263 (actual genus to be determined).
Hosts : *Sciurotamias davidianus, Tamiops swinhoei, Dremomys pernyi griselda, Callasciurus erythraeus gloveri, Ochotona cansa.*
China : Szechwan (Ta-tsien-lu, Mi-hola, Mu-li, Wu-chi, Omi-shan to Liang-fing-kang), Yunnan (Yunning).

Genus **Nosopsyllus** Jordan 1933

Jordan, 1933, Novit. Zoolog., XXXIX, p. 76.
Wagner & Argyropulo, 1934, Zeitschr. Parasitenkunde, 7, p. 217.
Wagner, 1934, Konowia, XIII, p. 261.
=*Ceratophyllus* Curtis, 1832, Brit. Ent., IX, p. 417 (partim).
Genotype : *N. fasciatus* (Bosc) 1801.

N. fasciatus (Bosc) 1801

Bosc d'Antic, 1801, Bull. Sci. Soc. Phil., III, p. 156 (*Pulex*).
Latreille, 1805, Hist. Nat. Ins., XIV, p. 412 (*Pulex*).
Curtis, 1832, Brit. Ent., IX, p. 417 (*Ceratophyllus*).
Kolenati, 1863, Horae Soc. Ent. Ross., II, p. 34 (*Ctenopsyllus*).
Taschenberg, 1880, Die Flöhe, p. 69 (*Pulex*).
Wagner, 1898, Horae Soc. Ent. Ross., XXXI, p. 559 (*Ceratophyllus*).
Verrall, 1901, List Brit. Dipt., I, ed. 2, p. 7 (*Trichopsylla*).
Kohaut, 1903, Allattani Közlemények, II, p. 42 (*Ceratophyllus*).
Tiraboschi, 1904, Arch. Parasitol., VIII, p. 262 (*Ceratophyllus*).
Oudemans, 1909, Zool. Anzeiger, XXXIV, p. 734 (*Ceratophyllus*).
Fox, 1910, The Rat and its Relation to Publ. Health, p. 136 (*Ceratophyllus*).
Rothschild, 1910, Bull. Ent. Res., I, p. 94 (*Ceratophyllus*).

Bacot, 1911, Jour. Hygiene, Plague Suppl., III, p. 449 (*Ceratophyllus*).
Rothschild, 1911, Ent. Mon. Mag. (2), XXII, p. 113 (*Ceratophyllus*).
Russell, 1913, The Flea, p. 102, 111 (*Ceratophyllus*).
Patton & Cragg, 1913, Textb. Med. Ent., p. 456 (*Ceratophyllus*).
Fox, 1914, U. S. Pub. Health Serv. Hyg. Lab. Bull. 97, fig. 1, 30 (*Ceratophyllus*).
Rothschild, 1915, Ent. Mon. Mag., (3) I, p. 73 (*Ceratophyllus*).
Bishopp, 1915, U. S. D. A. Bull. 248, p. 13 (*Ceratophyllus*).
Braun & Seifert, 1915, Tier. Parasit. Mens., p. 421 (*Ceratophyllus*).
Fantham, Stephen & Theobald, 1916, Animal Parasit. Man., p. 547 (*Ceratophyllus*).
Jord. & Roths., 1921, Ectop., I, p. 178 (*Ceratophyllus*).
Bishopp, 1921, Sanitary Ent., p. 364 (*Ceratophyllus*).
Brumpt, 1922, Préc. Parasit., p. 828 (*Ceratophyllus*).
Herms, 1923, Med. Vet. Ent., p. 331 (*Ceratophyllus*).
Fox, 1925, Ins. Disease Man, p. 138 (*Ceratophyllus*).
Wagner, 1927, Bestimmungstabellen der Insekten, p. 99 (*Ceratophyllus*).
Hegner, Root & Augustine, 1929, Anim. Parasit., p. 593 (*Ceratophyllus*).
Ewing, 1929, Man. Ext. Parasites, p. 170 (*Ceratophyllus*).
Kishida, 1932, *in* Uchida's Icon. Ins. Japonicum, p. 3 (*Ceratophyllus*).
Jordan, 1933, Novit. Zoolog., XXXIX, p. 76.
=*furoris* Dale, 1878, The History of Glanwilles Wooton in the County of Dorset, including its Zoology and Botany, London, p. 291. (*Pulex*).
=*californicus* Baker, 1904, Proc. U. S. Nat. Mus., XXVII, p. 395 (*Ceratophyllus*).
=*canadensis* Baker, 1904, Proc. U. S. Nat. Mus., XXVII, p. 407 (*Ceratophyllus*).
=*oculatus* Baker, 1904, Proc. U. S. Nat. Mus., XXVII, p. 396 (*Ceratophyllus*).
Hosts : rat, mice.
China : Shanghai, Soochow.
Cosmopolitan (on *Mus musculus, Epimys norvegicus, Rattus rattus rufescens, Rattus losea, Cracidura murina, Cricetus frumentarius, Canis lagopus,* Murinae).

Subgenus **Gerbillophilus** Wagner 1934

Wagner, 1934, Konowia, XIII, p. 261-262.
Subgenotype : *N.* (*G.*) *henleyi* Rothschild 1904.

N. (G.) laeviceps (Wagner) 1908

Wagner, 1908, Mitt. kaukasisch. Mus., IV, p. 195 (*Ceratophyllus*).
Joff, 1927, Comptes Rend. du Premier Congr. Antipest. de l'URSS., p. 213 (*Ceratophyllus*).
Wagner, 1927, Bestimmungstabellen der Insekten, p. 195 (*Ceratophyllus*).
Wagner, 1934, Konowia, XIII, p. 261.
=*consor* Rothschild, 1913, Ann. & Mag. Nat. Hist., (8) XII, p. 543 (*Ceratophyllus*)
South and East Russia, North Caucasus, Transcaspien, West Turkestan (on Gerbillinae).

N. (G.) laeviceps ellobii Wagner 1933

Wagner, 1933, Konowia, XII, p. 212. (*Nosopsyllus*).
=*laeviceps mongolicus* Wagner, 1929. Ann. Mus. Zool. Acad. Sci. URSS., XXX, p. 539 ♂♀ (*Ceratophyllus*).

Host : *Ellobius tancrei.*
China ; Mongolia (Orok-nor-see).

Genus **Monopsyllus** Kolenati 1857

Kolenati, 1857, Wien. Ent. Monschr., V. 1, p. 65.
Jordan, 1933, Novit. Zoolog., XXXIX, p. 78.
Wagner & Argyropulo, 1934, Zeitschr. Parasit., 7, p. 217-232.
Wagner, 1934, Konowia, XIII, p. 262.
=*Ceratophyllus* Curtis, 1832, Brit. Ent., IX, p. 417 (partim).
Genotype : *M. sciurorum* (Schrank) 1803.

M. anisus (Rothschild) 1907

Rothschild, 1907, Novit. Zoolog., XIV, p. 332, ♂ (*Ceratophyllus*).
Jordan, 1929, Novit. Zoolog., XXXV, p. 164, ♂♀ (*Ceratophyllus*).
Kishida, 1932, *in* Uchida's Icon. Ins. Japonicum, p. 3 (*Ceratophyllus*).
Jordan, 1933, Novit. Zoolog., XXXIX, p. 78.
Wagner, 1934, Konowia, XIII, p. 262.
Host : rat.
China : Peiping, Hsuchowfu, Manchuria.
Japan, North America (on *Rattus*).

Genus **Paraceras** Wagner 1916

Wagner, 1916, Arbeit. Mus. Taurisch. Gub. Zemstvo, 1914 Jahr., p. 4.
Wagner, 1927, Konowia, VI, p. 111.
Ewing, 1929, Man. Ext. Parasit., p. 169.
Jordan, 1932, Novit. Zoolog., XXXVIII, p. 267.
Wagner, 1934, Konowia, XIII, p. 263.
=*Pulex* Linnaeus, 1758, Syst. Nat., ed. X, p. 614 (partim).
=*Ceratophyllus* Curtis, 1832, Brit. Ent., IX, p. 417 (partim).
Genotype : *P. melis* (Curtis) 1832.

P. crispus (Jordan & Rothschild) 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 365, ♂♀ (*Ceratophyllus*).
Wagner, 1916, Arbeit. Mus. Taurisch. Gub. Zemstvo, 1914, Jahr., p. 5.
Host : *Sciurotamias davidianus.*
China : Szechwan (Ta-tsien-lu and Omi-shan).

Genus **Ophthalmopsylla** Wagner & Joff 1926

Joff, 1927, Ann. Mus. Zool. Acad. Sci. URSS., XXVIII, p. 421.
1927, Wagner, Konowia, VI, p. 113.
Ewing, 1929, Man. Ext. Parasites, p. 169.
=*Ceratophyllus* Curtis, 1832, Brit. Ent. IX, p. 417 (partim).
=Subgenus *Ophthalmopsylla,* Wagner & Joff, 1926, Revue Microbiol. Epidémiol., V, p. 71.
Genotype : *O. volgensis* Wagner & Joff 1926.

O. praefectus (Jordan & Rothschild) 1915

Jord. & Roths., 1915, Ectop., I, p. 5 (*Ceratophyllus*).
Transbaicalia, Turkestan (on *Apodemus tscherga, Microtus mongolicus*).

O. praefectus pernix Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 163, ♂♀.
Hosts : *Alactaga mongolica,* burrows of *Ochotona dahurica.*
China : Mongolia (Sungei Valley near Urga).
Transbaicalia.

O. kukuschkini Joff 1927

Joff, 1927, Ann. Mus. Zool. Acad. Sci. URSS., XXVIII, p. 423, ♂.
Jordan, 1929, Novit. Zoolog., XXXV, p. 155, ♂♀.
Hosts : *Cricetulus griseus fumatus,* burrows of *Citellus mongolicus*?
China : South Manchuria (sand dunes near Chendjatien).
Transbaicalia (on *Citellus dahuricus*).

O. jettmari Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 156, ♂♀.
Hosts : *Cricetulus* sp., nests of *Cricetulus griseus fumatus,* burrows of *Citellus mongolicus*?
China : South Manchuria (sand dunes near Chendjatien).

O. kiritschenkoi Wagner 1929

Wagner, 1929, Ann. Mus. Zool. Acad. Sci. URSS, XXX, p. 546, ♀.
Host : unknown rodent.
China : Mongolia (Orok-nor-see).

Genus **Paradoxopsyllus** Miyajima & Koidsumi 1909

Miyajima & Koidsumi, 1909, J. Bact., Japan, 1909, p. 40.
Wagner, 1927, Konowia, VI, p. 112.
Ewing, 1929, Man. Ext. Parasites, p. 170.
=*Ceratophyllus* Curtis, 1832. Brit. Ent., IX, p. 417 (partim).
Genotype : *P. curvispinus* Miyaj. & Koids. 1909.

P. curvispinus Miyajima & Koidsumi 1909

Miyajima & Koidsumi, 1909, J. Bact., Japan, 1909, p. 40.
Rothschild, 1913, Ann. & Mag. Nat. Hist., (8) XII, p. 541 (*Ceratophyllus*).
Kishida, 1932, *in* Uchida's Icon. Ins. Japonicum, p. 4.
=*subcaecatus* Rothschild, 1912, *in* Clark & Sowerby's Through Shen-Kan, p. 194, ♂♀ (*Ceratophyllus*).
Host : *Mus confucianus luticolor.*
China : Shensi (Yen-an-fu).
Japan, Turkestan (on *Meriones tamaricinus,* rat).

P. custodis Jordan 1932

Jordan, 1932, Novit. Zoolog., XXXVIII, p. 279, ♂♀.
Host : *Anteliomys custos.*
China : Szechwan (Mu-li, Wu-chi).

P. conveniens Wagner 1929

Wagner, 1929, Ann. Mus. Zool. Acad. Sci. URSS., XXX, p. 536, ♀.
Host : *Ellobius tancrei.*
China : Mongolia (Orok-nor-see).

Genus **Geusiabia** Jordan 1932

Jordan, 1932, Novit. Zoolog., XXXVIII, p. 280.
Genotype : *G. torosa* Jord. 1932.

G. torosa Jordan 1932

Jordan, 1932, Novit. Zoolog., XXXVIII, p. 281, ♂♀.
Host : *Ochotona cansa.*
China : Szechwan (Wu-chi).

Genus **Frontopsylla** Wagner & Joff 1926

Wagner & Joff, 1926, Revue Microbiol. Epidémiol., V, p. 84.
Joff, 1927, Ann. Mus. Zool. Acad. Sci. URSS., XXVIII, p. 417.
Wagner, 1927, Konowia, VI, p. 103.
Ewing, 1929, Man. Ext. Parasites, p. 170.
=*Ceratophyllus* Curtis, 1832, Brit. Ent., IX, p. 417 (partim).
Genotype : *F. elatus* (Jord. & Roths.) 1915.

F. elatus (Jordan & Rothschild) 1915

Jord. & Roths., 1915, Ectop., I, p .9, ♂ (*Ceratophyllus*).
Joff, 1927, Ann. Mus. Zool. Acad. Sci. URSS., XXVIII, p. 418.
Jordan, 1929, Novit. Zoolog., XXXV, p. 160.
Turkestan, Siberia, Armenia (on *Apodemus tscherga, Crocidura ilensis, Stenocranius slovzovi, Microtus arvalis, Microtus nivalis*).

F. elatus botis Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 160, ♂♀.
Host : rat.
China : South Manchuria (Charithun near Nungkiang).

F. luculentus (Jordan & Rothschild) 1923

Jord. & Roths., 1923, Ectop., I, p. 299, ♂♀ (*Ceratophyllus*).
Joff, 1927, Ann. Mus. Zool. Acad. Sci. URSS., XXVIII, p. 421.
Host : *Ochotona dahurica.*
China : Manchuria (town).
Transbaicalia (on *Cricetulus furunculus*).

F. luculentus parilis Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 163, ♂♀.
Hosts : *Ochotona dahurica, Microtus economus, Alactaga mongolica, Arctomys bobac* (burrows), *Spermophilus* (burrows).
China : Mongolia (Sungei Valley near Urga).

F. wagneri Joff 1927

Joff, 1927, Ann. Mus. Zool. Acad. Sci. URSS., XXVIII, p. 418, ♂♀.
Host : *Ochotona dahurica.*
China : Mongolia (Urga).
Tranbaicalia (on *Alactaga mongolica, Citellus dahuricus, Microtus mongolicus, Stenocranius raddei*).

F. hetera Wagner 1932

Wagner, 1932, Konowia, XI, p. 276, ♀.
Host : *Ellobius tancrei.*
China : Mongolia (Fl. Hangai).

F. spadix (Jordan & Rothschild) 1921

Jord. & Roths., 1921, Ectop., I, p. 174, ♀ (*Ceratophyllus*).
Jordan, 1932, Novit. Zoolog., XXXVIII, p. 278, ♂.
Hosts : *Aopdemus silvaticus latorum.*
China : Yunnan (Nguluko).
Burma (no host given).

F. spadix cansa Jordan 1932

Jordan, 1932, Novit. Zoolog., XXXVIII, p. 278, ♂♀.
Hosts : *Ochotona thibetana, Ochotona cansa.*
China : Szechwan (Ku-lu, Wu-chi).

Genus **Amphipsylla** Wagner 1908

Wagner, 1908, Mitt. kaukasisch. Mus., IV, p. 196.
Wagner, 1912, Revue Russe Entom., XII, p. 574.
Jord. & Roths., 1913, Zoologist, (4) XVII, p. 401.
Jord. & Roths., 1915, Ectop., I, p. 12.
Fox, 1925, Ins. Disease Man, p. 125.
Wagner, 1927, Ann. Mus. Zoolog. Acad. Sci. URSS., XXVIII, p. 451.
Ewing, 1929, Man. Ext. Parasites, p. 169.
Genotype : *A. schelkovnikovi* Wagner 1908.

A. tuta Wagner 1929

Wagner, 1929, Ann. Mus. Zoolog. Acad. Sci. URSS., XXX, p. 33, ♂♀.
Host : *Microtus* sp.
China : Tibet (Fl. Huanche).

A. aspalacis Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 161, ♂♀.
Host : *Myotalpa aspalax?*
China : Manchuria (Sansin, Lahassu).

A. casis Jordan & Rothschild 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 385, ♂♀.
Jord. & Roths., 1913, Zoologist, (4) XVII, p. 405.
Host : *Myospalax fontanieri.*
China : Shensi (Yu-lin-fu).

A. mitis Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 164, ♀.
=*primaris botis* Jordan, 1929, Novit. Zoolog., XXXV, p. 182, ♂ (*Amphipsylla*).
Host : *Microtus economus.*
China : Mongolia (Urga).
Transbaicalia (on *Microtus* sp.).

A. vinogradovi Joff 1927

Joff, 1927, Ann. Mus. Zoolog. Acad. Sci. URSS., XXVIII, p. 425, ♂♀.
Host : *Cricetulus furunculus.*
China : Manchuria (Sansin).
Transbaicalia (on *Cricetulus furunculus, Stenocranius raddei, Urocitellus eversmanni*).

Subfamily **Neopsyllinae** Oudemans

Oudemans, 1909, Entom. Berichten intgegeven door de Nederlandsche Entom. Vereeniging, Nr. 47, p. 323.
Wagner, 1927, Ann. Mus. Zoolog. Acad. Sci. URSS., XXVIII, p. 454.

Genus **Neopsylla** Wagner 1902

Wagner, 1902, Horae Soc. Ent. Ross., XXXVI, p. 138.
Dampf, 1910, Zoolog. Jahr., Suppl., XII, p. 648.
Rothschild, 1915, Ectop., I, p. 30.
Fox, 1925, Ins. Disease Man, p. 128.
Wagner & Joff, 1926, Revue Microbiol. Epidémiol., V, p. 77.
Wagner, 1927, Ann. Mus. Zoolog. Acad. Sci. URSS., XXVIII, p. 449.
Ewing, 1929, Man. Ext. Parasites, p. 174.
Genotype: *N. bidentatiformis* (Wagner) 1893.

N. bidentatiformis (Wagner) 1893

Wagner, 1893, Horae Soc. Ent. Ross., XXVII, p. 351, ♂♀ (*Typhlopsylla*).
Wagner, 1902, Horae Soc. Ent. Ross., XXXVI, p. 143 (partim).
Rothschild, 1913, Ann. & Mag. Nat. Hist., (8) XII, p. 541.
Wagner & Joff, 1926, Rev. Microbiol. Epidémiol., V, p. 80.
Hosts: *Ochotona dahurica, Cricetulus furunculus, Cricetulus griseus.*
China: Manchuria.
Transbaicalia, Crimea (on *Epimys norvegicus, Stenocranius raddei, Ochotona dahurica, Cricetulus furunculus, Cricetulus griseus, Citellus* sp., *Plecotus auritus*).

N. anoma Rothschild 1912

Rothschild, 1912, *in* Clark & Sowerby's Through Shen-Kan, p. 198, ♂♀.
Host: *Myospalax consus.*
China: Shensi (Yu-lin-fu).

N. aliena Jordan & Rothschild 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 388, ♂♀.
Host: *Myospalax fontanieri.*
China: Shensi (Yu-lin-fu).

N. compar Jordan & Rothschild 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 387, ♀.
Host: *Dignus sowerbyi.*
China: Shensi (Yu-lin-fu).

N. stevensi Rothschild 1915

Rothschild, 1915, Ectop., I, p. 38, ♂.
Jordan, 1932, Novit. Zoolog., XXXVIII, p. 284, ♀.
Hosts: *Rattus griseipectus, Anteliomys custos.*
China: Szechwan (Mu-li, I-tze).
Nepal-Sikkim frontier (on *Epimys fulvescens*).

N. specialis Jordan 1932

Jordan, 1932, Novit. Zoolog., XXXVIII, p. 284, ♂.
Host: Apodemus agrarius.
China: Yunnan (Nguluko, Yung-ning).

N. honora Jordan 1932

Jordan, 1932, Novit. Zoolog., XXXVIII, p. 285, ♂.
Host: *Eothenomys proditor.*
China: Yunnan (Nguluko).

Subfamily **Ctenopsyllinae** Wagner

Wagner, 1927, Ann. Mus. Zoolog. Acad. Sci. URSS., XXVIII, p. 454.

Genus **Stenoponia** Jordan & Rothschild

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 391.
Fox, 1925, Ins. Disease Man, p. 127.
Wagner, 1927, Ann. Mus. Zoolog. Acad. Sci. URSS., XXVIII, p. 448.
Ewing, 1929, Man. Ext. Parasites, p. 173.
Genotype: *S. tripectinata* (Tirab.) 1903.

S. coelestis Jordan & Rothschild 1911

Jord. & Roths., 1911, Proc. Zool. Soc. London, 1911, p. 391, ♀.
Host: *Sciurotamias davidianus.*
China: Szechwan (Ta-tsien-lu).

Genus **Palaeopsylla** Wagner 1902

Wagner, 1902, Horae Soc. Ent. Ross., XXXVI, p. 137.
Dampf, 1908, Schrift. Physik-ökonom. Gesellsch. Königsberg i. Pr., IL, p. 34.
Dampf, 1910, Zoolog. Jahr., Suppl., XII, p. 619.
Rothschild, 1915, Ent. Mon. Mag., (3) I, p. 81.
Fox, 1925, Ins. Disease Man, p. 128.
Ewing, 1929, Man. Ext. Parasites, p. 174.
=*Typhlopsylla* Tasch., 1880, Die Flöhe (partim).
Genotype: *P. similis* Dampf 1910.

P. remota Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 41, ♀.
Host: mole.
China: Szechwan (Chungking).

Genus **Ctenopsyllus** Kolenati 1863

Kolenati, 1863, Horae Soc. Ent. Ross., II, p. 37.
Dampf, 1908, Schrift. Physik-ökonom. Gesellsch. Königsberg i. Pr., IL, p. 35.
Wagner, 1927, Konowia, VI, p. 287.
=*Typhlopsylla* Taschenberg, 1880, Die Flöhe, p. 70 (partim).
=*Ctenopsylla* Wagner, 1893, Horae Soc. Ent. Ross., XXVII, p. 350.
Wagner, 1902, Horae Soc. Ent. Ross., XXXVI, p. 149.
=*Ctenophthalmus* Oudemans, 1909, Novit. Zoolog., XVI, p. 155.
=*Leptopsylla* Jord. & Roths., 1911, Novit. Zoolog., XVIII, p. 80.
Rothschild, 1915, Ent. Mon. Mag., (3) I, p. 82.
Rothschild, 1915, Novit. Zoolog., XXII, p. 307.
Fox, 1925, Ins. Disease Man, p. 127, 140.
Ewing, 1929, Man. Ext. Parasites, p. 174, 175.
Sugimoto, 1933, Trans. Nat. Hist. Soc. Formosa, XXIII, p. 130.
Genotype: *C. segnis* (Schönch.) 1811.

C. segnis (Schöncherr) 1811

Schöncherr, 1811, Kongl. Vetenskaps. Akad. Nya Handlingar XXXII, p. 98 (*Pulex*).

Wahlgren, 1907, Entomologisk Tidskrift, XXVIII, p. 88 (*Ctenophthalmus*).
Oudemans, 1909, Ent. Bericht. uitgegeven door de Nederland. Ent. Vereeniging, Nr. 45, p. 279 (*Ctenophthalmus*).
Wagner, 1927, Bestimmungstabellen der Insekten, Moskau-Leningrad, p. 102.
Wagner, 1934, Konowia, XIII, p. 253.
=*musculi* Dugès, 1832, Ann. Sci., (1) XXVII, p 163 (*Pulex*).
Bouché, 1835, Nova Acta Phys.-med. Acad. Caes. Leop. Carol., XVII, 1, p. 518 (*Pulex*).
Taschenberg, 1880, Die Flöhe, p. 92 (*Typhlopsylla*).
Wagner, 1902, Horae Soc. Ent. Ross., XXXVI, p. 150 (*Ctenopsylla*).
Kohaut, 1903, Allattani Közlemények, II, p. 58 (*Ctenopsylla*).
Rothschild, 1906, Jour. Hygiene, VI, p. 483 (*Ctenopsylla*).
Shipley, 1908, Jour. Econ. Biol., III, p. 69 (*Ctenopsylla*).
Rothschild, 1910, Bull. Ent. Res., I, p. 97 (*Ctenopsylla*).
Patton & Cragg, 1913, Textb. Med. Ent., p 458 (*Ctenopsylla*).
Russell, 1913, The Flea, p. 103, 112. (*Leptopsylla*).
Bacot, 1914, Jour. Hygiene, Plague Suppl., III, p. 449 (*Leptopsylla*).
Fox, 1914, U. S. Pub. Health Serv. Hyg. Lab. Bull. No. 97, fig. 26, 54 (*Ctenopsylla*).
Rothschild, 1915, Ent. Mon. Mag., (3) I, p. 82 (*Leptopsylla*).
Jord. & Roths., 1920, Ectop., I, p. 112 (*Leptopsylla*).
Ravis, 1920, Human Parasit., p. 571 (*Leptopsylla*).
Brumpt, 1922, Préc. Parasit., p. 828 (*Leptopsylla*).
Herms, 1923, Med. Vet. Ent., p. 329 (*Ctenopsylla*).
Fox, 1925, Ins. Disease Man, p. 140 (*Leptopsylla*).
Patton, 1929, Insects, etc. pt. I, Medical, p. 529 (*Leptopsylla*).
Hegner, Root & Augustine, 1929, Anim. Parasit., p. 593 (*Leptopsylla*).
Ewing, 1929, Man. Ext. Parasites, p. 175 (*Leptosylla*).
Kishida, 1932, *in* Uchida's Icon. Ins. Japonicum, p. 4 (*Leptopsylla*).
Sugimoto, 1933, Trans. Nat. Hist. Soc. Formosa, XXIII, p. 131 (*Leptopsylla*).
=*muris* Curtis, 1832, Brit. Ent., IX, p. 417 (*Ceratophyllus*).
=*quadridentatus* Kolenati, 1859, Jahresber. d. Mährischen Gesellsch. z. Beförd. d. Naturk., p. 65 (*Ctenophthalmus*).
Kolenati, 1863, Horae Soc. Ent. Ross., II, p. 37.
=*mexicana* Baker, 1896, Can. Ent., XXVII, p. 85 (*Typhlopsylla*).
Baker, 1904, Proc. U. S. Nat. Mus. XXVII, p. 430.
Hosts : House rats and mice.
China : Canton, Shanghai, Hangchow, etc.
Cosmopolitan (on *Mus musculus, Epimys, Rattus rattus, Sorex araneus tetragonurus, Crocidura leucodon, Apodemus sylvaticus sylvaticus, Eliomys quercinus*).

Genus **Pectinoctenus** Wagner 1929

Wagner, 1929, Ann. Mus. Zoolog. Acad. Sci. URSS., XXX, p. 30.
Genotype : *P. pectiniceps* (Wagner) 1893.

P. adalis Jordan 1929

Jordan, 1929, Novit. Zoolog., XXXV, p. 162, ♂.
Host : rat.
China : Manchuria (Charithun near Nunkiang).

(*To be continued in next issue*)

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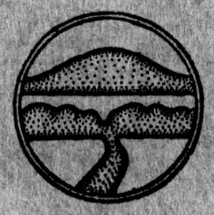
TWO NEW SPECIES OF PILEA (URTICACEAE) AND NEW RECORDS FOR KWANGTUNG

By Franklin P. Metcalf

Curator of Herbarium, Lingnan Natural History Survey and Museum, Lingnan University.



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TWO NEW SPECIES OF PILEA (URTICACEAE) AND NEW RECORDS FOR KWANGTUNG[1]

By Franklin P. Metcalf

Curator of Herbarium, Lingnan Natural History Survey and Museum, Lingnan University.

Pilea Tsiangiana sp. nov.

Planta monoecia?, erecta ad 30 cm. alta, caulis striatis, appresso-pubescentibus; foliis membranaceis, ovatis, 9-12 cm. longis et 3.5-4.5 latis, apicibus acuminatis, basi rotundatis, 3-nerviis, marginibus crenatis, utrinque cystolithis linearibus irregulariter dispositis instructis; petiolo 2-3 cm. longo: inflorescentiis axillaribus, tenuibus cymosis; floribus numerosis, calycis segmentis 4, ovatis.

Monoecious? herb with erect minutely appressed pubescent, striated stems (about 30 cm. high); leaves opposite, pale green, ovate, (9-12 cm. long and 3.5-4.5 wide) acuminate, base rotund to broadly obtuse, margin crenate, prominently 3-nerved with numerous sub-horizontal cross veins; cystoliths abundant above and below; petiole from 2 to 3 cm. long, slender and striated; inflorescence axillary, loosely cymose; bracts of inflorescence small about 1 mm. long, ovate. Flowers white, small, bracts 4, minute, sepals usually 4, ovate, enclosing what appear to be 8 staminodes[2].

Hainan: Growing in a big ravine, Nga Ping Shan, Tan-hsien (Tam-chau) [district], *LU 16429* (*W. T. Tsang*), Third Hainan Expedition, Sept. 23, 1927, holotype, distributed as *Pilea* sp.

This species does not seem to resemble closely any known species of *Pilea*. It is characterized by the 3-nerved ovate leaves with crenate margin, the abundant cystoliths on both surfaces, and filiform lax axillary cymose inflorescences.

P. crateraforma sp. nov.

Planta monoecia? erecta, ad 20 cm. alta, caulis striatis, glabris; foliis membranaceis, ovatis (2-3 cm. longis et 1-1.3 cm. latis), apicibus acutis, basi rotundatis vel obtusis, 3-nerviis, marginibus crenatis,

[1] Contribution from the Lingnan Natural History Survey and Museum, Lingnan University, Canton, China.

[2] Hooker f., in his description of the genus *Pilea* (Fl. Brit. India 5 :551), reports the ♂ flowers as having 2-4 sepals, 2-4 stamens and an oblong pistillode, and the ♀ flowers with usually 3 sepals, rarely 4 (small, unequal) and minute staminodes. In this plant there are at any rate eight organs enclosed within the sepals. This plant is definitely a *Pilea*, however, and is so distinct from all other species of the genus known to me that I do not hesitate to describe it as a new species.

supra cystolithis linearibus irregulariter dispositis instructis, subtus craterformo-punctatis; petiolo ad 1.2 cm. longo. Inflorescentiis ♂, axillaribus, sesselis vel pedunculatis; floribus flavis (ex Tsang), paucis; bracteis minutis, sepalis minutis, staminibus 3.

Small weak monoecious? herb (up to 20 cm.) with glabrous opposite leaves and striated stems. Leaves small, olive-green, ovate (2-3 cm. long and 1.0-1.3 mm. wide), apex acute, base rotund to obtuse, 3-nerved with 3 pairs of secondary nerves; the 3 prominent nerves on the lower surface are raised and as they approach the petiole become somewhat flattened; on the upper surface these 3 veins are distinctly grooved; the secondary veins are inconspicuous on both surfaces; margin crenate, and with numerous short linear cystoliths above, and with minute and abundant crater-like holes beneath; petioles filiform (up to 1.2 cm.). ♂ Inflorescence axillary, sessile or pedunculate, flowers yellow (ex Tsang), few; bracts and sepals minute, stamens 3.

KWANGTUNG: Rocky wet place, Sam Kok Shan, Ts'ung-hwa (Ts'ung-fa) and Lung-men (Lung-moon) districts, *W. T. Tsang 20575*, May 26, 1932, flowers yellow, distributed as *Pilea Swinglei* Merr.

In the arrangement and shape of the leaves and also the presence of numerous cystoliths on the upper surface, it resembles *P. pepliodes* H. & A. but the new species lacks the irregular dark angular spots found especially on the lower surface of *P. pepliodes*.

In the crater-like impressions on the lower surface it resembles both *P. Swinglei* and *P. peltata* Hance. In *P. Swinglei*, however, the craters are smaller and not so prominent, and reddish or brownish dots are also found intermixed; the leaf margin of *P. Swinglei* is also more serrate and not typically crenate as in the new species. In *P. peltata* the leaves are distinctly peltate and much larger.

New Records for Kwangtung

Pilea japonica (Maxim.) Handel-Mazzetti, Sym. Sin. 7:141 (1929).

Achudemia japonica Maxim., in Mél. Biol. 9:627 (1876); Wright in Forbes & Hemsley, Enum. Chin. Plts., etc. Jour. Linn. Soc. 26:480 (1899).

HAINAN: *Henry 8745* (Wright *l.c.* and Hand.-Mazz. *l.c.*). This species though reported from Hainan by Wright and Handel-Mazzetti has apparently been overlooked in the enumerations by Merrill and Chun.

P. lomatogamma Handel-Mazzetti, Sym. Sin. 7:135 (1829).

P. oxydon? Wright, in Forbes & Hemsley *op. cit.*, p. 477, *non* Weddell.

KWANGTUNG: Mandse-schan, *Meil 415*, syntype (Hand.-Mazz. *l.c.* and photo Botanical Institute, Sun Yatsen University). New to Kwangtung, previously known from Kiangsi.

P. microphylla (Linnaeus) Lierbm., in Vidensk. Selsk. Skr. 5(2): 302 (1851); Hand.-Mazz., Sym. Sin. 7:141 (1929); Gagnepain, in Lecomte Fl-Gen. Indo-Chine 5(8):885 (1929).

Parietaria microphylla Linnaeus, Sp. Pl., ed. 2, 1492 (1763).

Pilea muscosa Lindley, Collect. Bot. pl. 4(1821); Dunn and Tutcher, Fl. Kw. & Hk. 248 (1912).

HAINAN: No-doa, *LU 15520* (*W. T. Tsang*). Reported previously from Hong Kong, Macao and Kwangtung proper, but this is apparently the first record for Hainan.

P. monogolica Weddell, in DC. Prodr. 16(1): 135 (1869); Wright, in Forbes & Hemsley *op. cit.* p. 476; Hand.-Mazz., Sym. Sin. 7:124 (1929).

P. pumila Maxim., in Mél. Biol. 9:631; F. & H. 26:477 (1929), *non* (L.) A. Gray.

KWANGTUNG: Pan Koh Shan near Kau Fung, *W. T. Tsang 20869* and Yaoshan, *S. S. Sin 11165*. These two specimens were distributed as *P. pumila* A. Gray *sensu lat*, but I believe they belong here, as they seem to fit the description and key of Handel-Mazzetti (*l.c.*). Specimens at Botanical Institute, Sun Yatsen University (*Y. Tsiang 7412* from Kweichow and Maire, no number [*SYS 43540*] from Yunnan) determined as this species by Handel-Mazzetti, seem to agree in all essentials. This has not been previously reported from Kwangtung.

P. Wightii Weddell, in DC. Prodr. 16(1):125 (1869); Dunn & Tutcher, Fl. Kw. & Hk. 240 (1917); Hand.-Mazz., Sym. Sin. 7:141 (1929).

KWANGTUNG: Fan Shiu Shan, near Fan Shiu Au, Wung-yuen District, *S. K. Lau 2603*, Oct. 7-30, 1933.

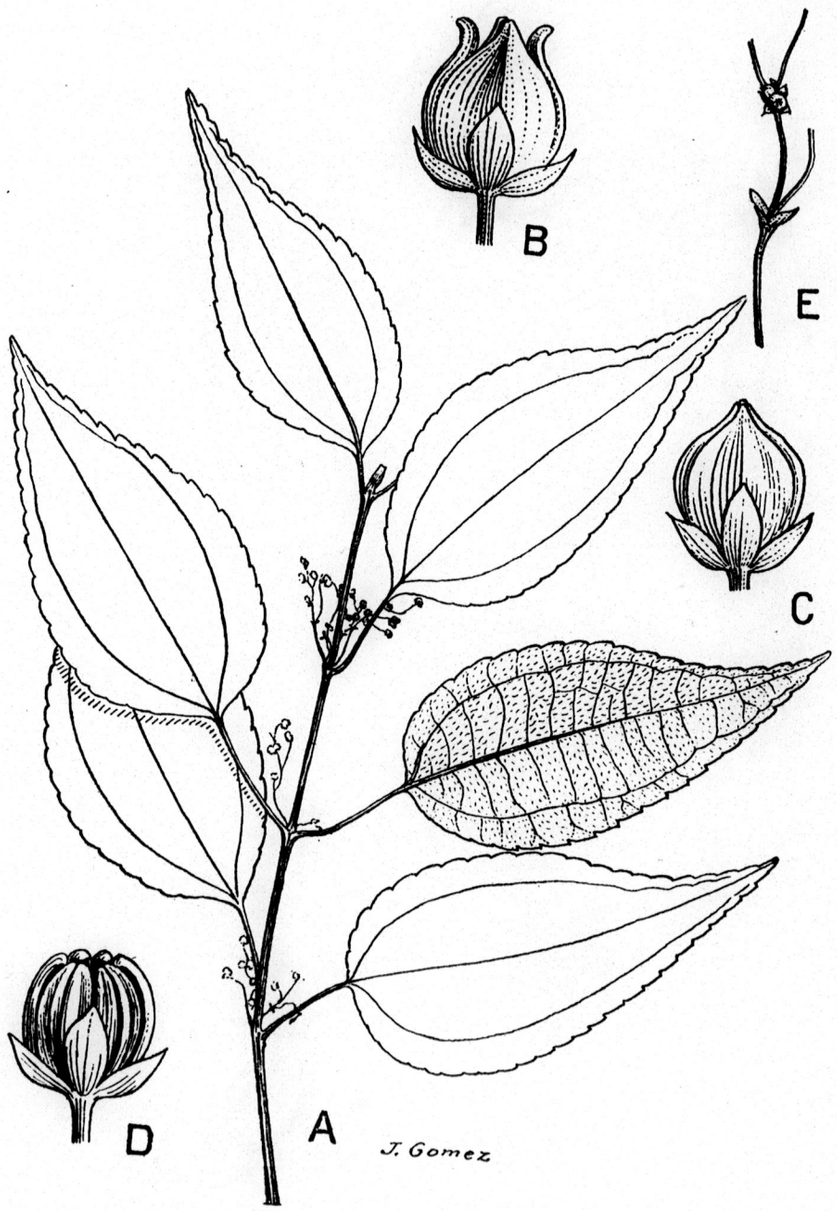
This apparently is the first authentic record for Kwangtung. One specimen previously distributed as this species, namely *CCC 1612* (*Levine & Kwok*) from Loh Fau Shan represents *P. symmeria* Weddell and another sheet determined as this species, namely *LU 17921* (*Tsang & Fung*) from Hainan appears somewhat different and does not match in every particular the original description, but may be a form of this species. This has been previously known only from Hong Kong (D. & T.).

美豆屬(蕁麻科)之記錄及其兩新種之誌述

麥克福著

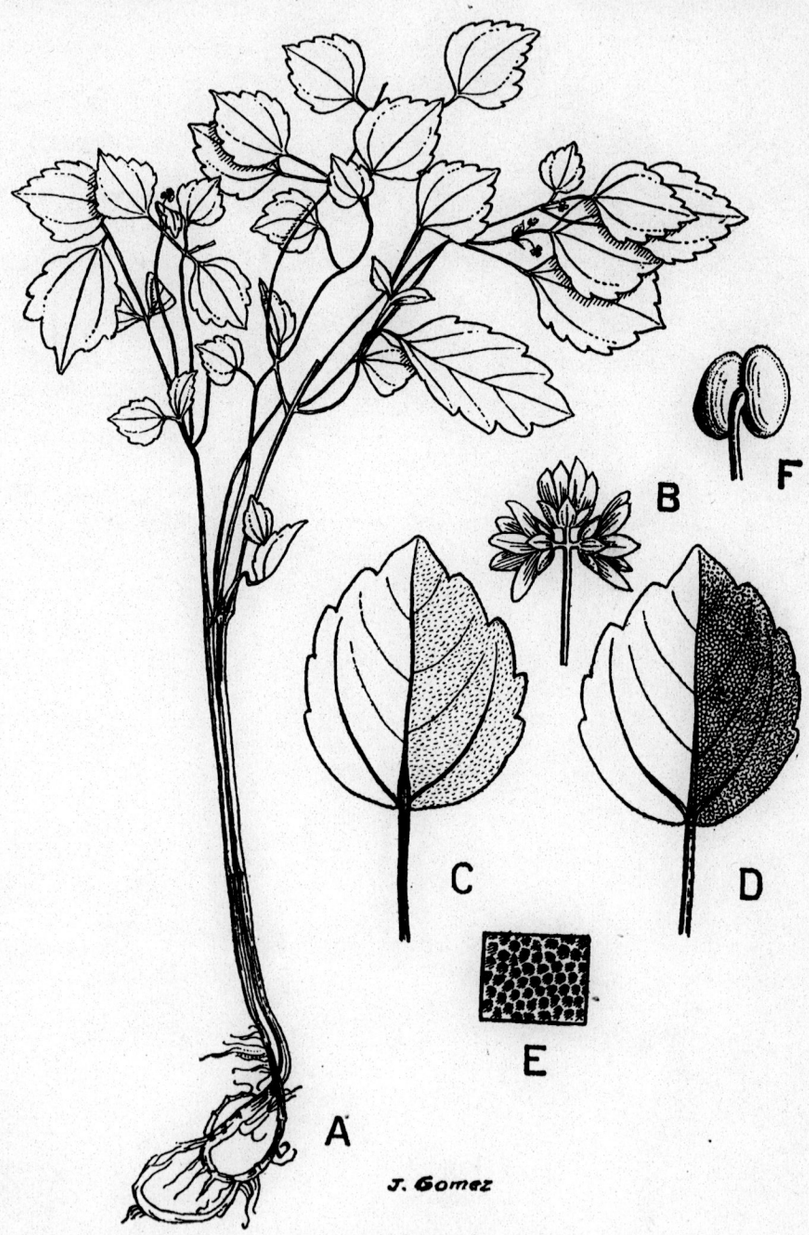
(提要)

Pilea Tsiangiana(蔣氏美豆)爲海南島之新種；而 *Pilea crateraforma* 則然廣東從化，龍門縣間三角山之新種。後者在葉之特質上，與 *P. peploides* H. & A. 相似；而其葉底表面有甚多如火山噴口之形痕，此則又與 *P. Swinglei* Merr. 及 *P. peltata* Hance 相似。美豆屬其他五種之分佈，皆有記錄之。



Pilea Tsangiana sp. nov.

A, branch with inflorescence; B, flower, partly open showing bracts and sepals; C, flower closed; D, flower with sepals removed to show contents; E, portion of inflorescence, to show bracts. A, ½ nat. size; B-D, ×14; E, ×2.



Pilea crateraforma sp. nov.

A, entire plant; B, inflorescence; C, single leaf, upper surface with cystoliths; D, single leaf, lower surface showing crater-like cavities; E, detail of same; F, single stamen. A, $\frac{5}{8}$ nat. size; B, ×12; C-D, ×$2\frac{1}{3}$; E, many times nat. size; F, ×12.



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TWO NEW SPECIES OF BAMBUSA FROM SOUTHEASTERN CHINA (GRAMINEAE)

By F. A. McClure

Curator of Economic Botany, Lingnan Natural History Survey and Museum, Lingnan University, Canton.

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0323

TWO NEW SPECIES OF BAMBUSA FROM SOUTHEASTERN CHINA (GRAMINEAE)[1]

By F. A. McClure

Curator of Economic Botany, Lingnan Natural History Survey and Museum, Lingnan University, Canton.

Bambusa Schreb.

Bambusa cerosissima sp. nov.

Culmi erecti vel suberecti, usque ad 15 m. alti et 5 cm. diametro, glaucissimi, cacuminibus longe pendentibus; *internodiis* usque ad 60 cm. et ultra longis, glabris, pariete 3.5-4 mm. et ultra crasso; *ramis* fasciculatis, glabris, glaucis; *ramulis* saepissime e nodis ramorum basalibus orientibus; *vaginis culmorum* quam internodiis brevioribus, duris, glaucissimis, patulo-pubescentibus, apicem truncatum; *laminis vaginarum* reflexis, ovato-lanceolatis, marginibus involutis, supra obscure scabris; *auriculis* e basi laminae excurrentibus, longis, angustis, scabris, *setis in ore* longis, tenuibus, nitidis, stramineis, obscure scabris; *ligula* quam basi laminae latiore, brevissima, scabra, apice recte vel convexa, margine pectinata vel longe fimbriata; *vaginis foliorum* glabris, versus apicem carinatis; *auriculis* et *setis in ore* plerumque conspicua evolutis, interdum haud evolutis, glabris vel obscure scabris, fragilibus, fugacibus; *lamina foliorum* lineari-lanceolata, acuminata, in speciminibus nostris usque ad 20 cm. longis et 2 cm. latis, subtus glabra, supra prope costam sparse scabris, venis secondariis utrinque 5-7; *ramulis* floriferis aphyllis; *pseudospiculis* paucis; *floribus* ventricosis; *rachillae segmentis* brevibus, glabris, non induratis, fistulosis, facile disarticulatis; *lemmatibus* late ovatis, obtusis, apiculatis, basi haud convolutis, nitidis, glabris versus apicem plus minusve carinatis; *paleis* lemmatibus subaequalibus, glabris, venis haud manifestis, apice obtusis vel truncatis, carinis curvatis, glabris; *lodiculis* 3, subaequalibus, plus minusve opacis, dorso hispidulis, apice ciliatis; *ovario* versus apicem hispido; stylo 1-2 mm. longo; *stigmatibus* 3, sparse plumosa; *fructu* immaturo pericarpio supra indurato tecto, in sicco subtriqueto.

A bamboo of caespitose habit, *rhizome* sympodial,[2] *culms* erect or suberect, up to 15 m. tall and 5 cm. in diameter, very conspicuously glaucous when young, the tips long pendent; *internodes* up to 60 cm. and more in length, glabrous, the walls 3.5-4 mm. or more in thickness; *branches* fasciculate subequal, glabrous, glaucous when

[1] Contribution from the Lingnan Natural History Survey and Museum.

[2] For an explanation of this term as applied to bamboo growth, see the writer's paper entitled Some observations on the bamboos of Kwangtung, *Lingnaam Agri. Rev.* 3 : 40-47, *9 fig.*, 1925.

young; secondary branches arising for the most part from the basal nodes of the branches; *culm sheaths* much shorter than the internodes, hard, receding from the culm at the shoulders, at first very glaucous, spreading-pubescent throughout; *sheath blade* dark, more or less strongly reflexed, ovate-lanceolate, the margin involute, the upper surface obscurely strigose, especially toward the base, sometimes almost glabrous, the lower glabrous or obscurely scabrous; *auricles* excurrent from the base of the sheath blade, long, narrow, scabrous; *oral setae* numerous, long, slender, shining, straw-colored, obscurely scabrous; *ligule* about 3-4 times as wide as the base of the sheath blade, very short, scabrous, the apex straight or convex, the margin pectinate to long-fimbriate; *leaf sheath* glabrous, keeled toward the apex; the *auricles* and *oral setae* usually prominent sometimes scarcely developed, glabrous or obscurely scabrous, fragile and fugaceous; *leaf blades* linear-lanceolate, acuminate, up to 20 cm. long and 2 cm. wide in our specimens, the lower surface glabrous or sparsely pubescent and glabrescent, the upper scabrous along the midrib; secondary veins 5-7 on each side; the *floriferous branchlets* leafless; *pseudospikelets*[3] few; *florets* ventricose; the *rachilla segments* short, glabrous, not indurate, fistulose, readily disarticulating, *lemmas* broadly ovate, obtuse, apiculate, shining, glabrous, barely convolute at the base, more or less distinctly keeled toward the apex, *paleas* about equaling the lemmas, glabrous, the nerves obscure, the apex obtuse or truncate, the keels divergent in the middle curved, glabrous; *lodicules* 3, subequal, more or less opaque, hispidulous on the back, the apex ciliate, *ovary* hispid toward the apex; style 1-2 mm. long; *stigmas* 3, sparsely plumose, immature *fruit* covered above with an indurate pericarp, subtriquetrous when dry.

KWANGTUNG: Near Fei-loi Monastery, Ts'ing-yuen Dist., *LU 13313* (*McClure*) (TYPE); P'an-yu Dist., (living plants introduced from the type clump and cultivated in the Lingnan University Bamboo Garden) *LU 13976* (*McClure*), *LU 19527* and *19558* (*H. Fung*).

Only one vernacular name, Taan Chuk (單竹) (Cantonese) has been recorded for this bamboo.

The specific name assigned alludes to the very copious white powdery bloom of wax with which the culms and sheaths are covered when in the young state.

The plants of this bamboo were in a very weak and stunted condition when discovered (March 1925) growing in a wild or semi-wild state near the Fei-loi Monastery. The flowering material was scant and in a poor condition, and the plants lacked culm sheaths. Living specimens were transplanted to the Lingnan University

[3] For an explanation of the term pseudospikelet, and the type of inflorescence which it represents, see the writer's paper entitled The inflorescence in *Schizostachyum* Nees, *Jour. Wash. Acad. Sci.* 24:541-548, 1934.

Bamboo Garden and have now reached their mature state. This bamboo proves to be quite closely related to the following cultivated species and may possibly represent its wild prototype.

Bambusa Chungii sp. nov.

Arbustum caespitosum; *rhizomate* sympodiale; *culmi* erecti vel suberecti, usque ad 18 m. alti et 5 cm. diametro, insigniter glauci; *internodiis* usque ad 1 m. et ultra longis, glabris, pariete 3-5 mm. crasso, *nodiis* setis fulvis retrorsis dense instructis, glabrescentibus; *ramis* glabris, glaucis; *ramulis* saepissime e nodis ramorum basalibus orientibus; *vaginis culmorum* elongatis, quam

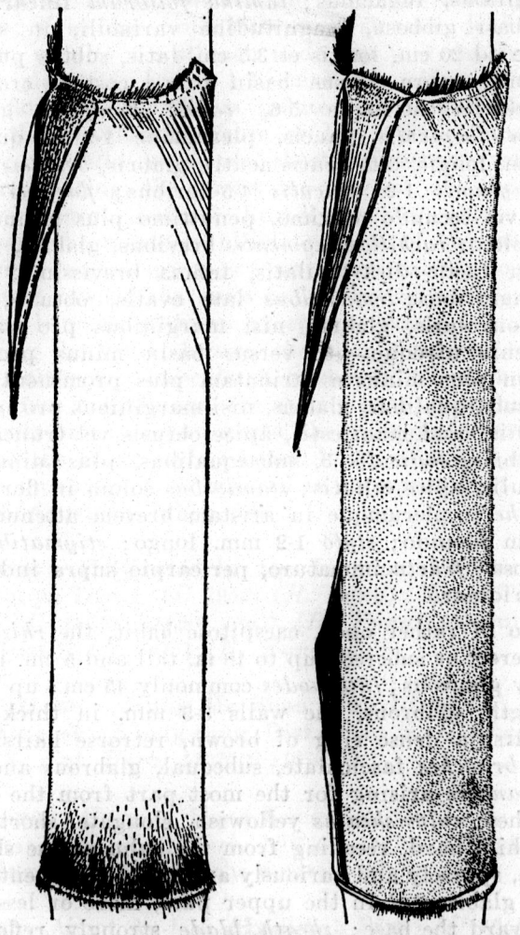


Fig. 1. Culm sheaths of *B. Chungii* sp. nov. (left) and *B. cerossisima* sp. nov. The fringe of hairs on the culm node should show more prominently in the left figure.

internodiis brevioribus, tenuibus, duris, primo glaucis, sparse et varie appresso-pubescentibus, versus apicem truncatum glabrescentibus, versus basin plerumque plus minusve persistenter pubescentibus; *laminis vaginarum* valde reflexis, ovato-lanceolatis, marginibus involutis, supra plus minusve strigosis, subtus glabris vel obscure scabris, *auriculis* e basi laminae exurrentibus, angustis, scabris; *setis in ore* longis, tenuibus, nitidis, stramineis, obscure scabris, *ligula* quam basi laminae latiore, brevissima, scabra, apice recta vel convexa, margine pectinata vel longe fimbriata; *vaginis foliorum* glabris, versus apicem carinatis, *auriculis* et *setis in ore* plerumque conspicua evolutis, interdum haud evolutis, glabris vel obscure scabris, fragilibus, fugacibus; *lamina foliorum* lineari-lanceolata, acuminata, basi gibbosa, magnitudine variabili, in speciminibus nostris usque ad 20 cm. longis et 3.5 cm. latis, subtus pubescentibus, glabrescentibus, supra versus basin prope costam crasse scabris, venis secundariis utrinque 5-6, *ramis floriferis* gracilissimis, aphyllis; *pseudospiculis* paucis, plerumque 1-2 in quoque nodo, usque ad 2 cm. longis, late ovatis acutis, glabris, *bracteis* 1-2, parvis, gemmiferis; *glumis* 1-2, *spiculis* 4-5-floribus; *floribus* ventricosis, flore infimo vel secundo maximo, penultimo plus minusve reducto, supremo obsoleto; *rachillae segmentis* brevibus, glabris, non induratis, fistulosis, facile disarticulatis, infima brevissima, sequentibus gradatim longioribus; *lemmatibus* late ovatis, obtusis, apiculatis, basi haud convolutis, glabris, nisi marginibus pro parte minute ciliolatis, venis utroque 4-6, versus basin minus prominentibus, versus apicem plus minusve carinatam plus prominentibus; *paleis* lemmatibus subaequalibus, glabris, nisi marginibus pro parte minute ciliolatis, venis haud manifestis, apice obtusis vel truncatis, carinis curvatis, glabris; *lodiculis* 3, subaequalibus, plus minusve opacis, dorso hispidulis, apice ciliatis; *staminibus* solum in floribus infimis exsertis; *antheris* plerumque in aristam brevem attenuatis; *ovario* versus apicem hispido; *stylo* 1-2 mm. longo; *stigmatibus* 3 vel 2, sparse plumosa; *fructu* immaturo, pericarpio supra indurato tecto, in sicco subtriquetro.

A bamboo of rather open, caespitose habit, the *rhizome* sympodial;[2] *culms* erect or suberect, up to 18 m. tall and 5 cm. in diameter, conspicuously glaucous; *internodes* commonly 45 cm., up to 1 m. and more in length, glabrous, the walls 3-5 mm. in thickness; *nodes* bearing at first a dense ring of brown, retrorse hairs, afterward glabrescent; *branches* fasciculate, subequal, glabrous and glaucous; *secondary branches* arising for the most part from the basal nodes of the branches; *culm sheaths* yellowish, elongate, shorter than the internodes, thin, hard, receding from the culm at the shoulders, at first glaucous, sparsely and variously appressed-pubescent, ultimately more or less glabrescent in the upper part, more or less persistent-pubescent toward the base; *sheath blade* strongly reflexed, ovate-lanceolate, the margin involute, the upper surface more or less densely strigose, the lower glabrous or obscurely scabrous;

auricles excurrent from the base of the sheath blade, long, narrow, scabrous; *oral setae* long, slender, shining, straw colored, obscurely scabrous; *ligule* much wider than the base of the sheath blade, very short, scabrous, the apex straight or convex, the margin pectinate or long-fimbriate; *leaf sheath* glabrous, keeled toward the apex; *auricles* and *oral setae* usually prominently developed, sometimes scarcely developed, glabrous or obscurely scabrous, fragile and fugaceous; *leaf blades* linear-lanceolate, acuminate, the base inequilateral, of variable size, up to 20 cm. long and 3.5 cm. wide in our specimens, the lower surface at first pubescent, afterward glabrescent, the upper surface coarsely scabrous along the midrib toward the base, the secondary veins 5-6 on each side; *flowering branchlets* very slender, leafless; *pseudospikelets*[3] few, usually 1-2 at each node, up to 2 cm. long, broadly ovate, acute, glabrous; *bracts* 1-2, small gemmiferous; *glumes* 1-2; *spikelets* 4-5-flowered, the *florets* inflated, the lowest or the second one largest, the penultimate more or less reduced, the uppermost rudimentary; *rachilla segments* short, glabrous, soft, fistulose, readily disarticulating, the lowest one shortest, the succeeding ones progressively longer; *lemmas* broadly ovate, obtuse, apiculate, glabrous except the minutely ciliolate parts of the margins, veins 4-6 on each side, less conspicuous toward the scarcely convolute base, more prominent toward the more or less keeled apex; *paleas* about as long as the lemmas, glabrous except the minutely ciliolate parts of the margins, the veins obscure, the apex obtuse or truncate, the keels curved, glabrous; *lodicules* 3, subequal, more or less opaque, the dorsal surface hispidulous, the apex ciliate; stamens exserted in the lower florets only; *anthers* acute, the apex quite variable; *ovary* hispid toward the apex; *style* 1-2 mm. long; *stigmas* 3 or 2 sparsely plumose; the *immature fruit* covered in its upper part with a hard pericarp, subtriquetrous when dry.

KWANGTUNG: Cultivated in the Lingnan University Bamboo Garden, (P'an-yu Dist.), *LU 19527* (*H. Fung*); Naam T'aan, (Lung-men Dist.), *LU 18649*, *18650*, *18651* (*H. Fung*) all cult.; Lo Uen, (Meu-ming Dist.), *LU 19754* (*H. Fung*) cult.

HAINAN ISLAND: Hung Mo Shan (Tan Dist.) *LU 17906* (*Tsang & Fung*); Ka-chek (Kiung-tung Dist.), *A. S. Hitchcock 19603* (4 sheets: *U. S. Nat. Herb. 1107069-1107072*).

HONG KONG: Cult. in Hong Kong Bot. Gard., *A. S. Hitchcock 19673* (2 sheets: *U. S. Nat. Herb. 1107106*, *1107107*) (departs from the type in having the culm sheaths entirely glabrous).

KWANGSI: About Au-tsai (Hwai-tsih Dist.) *LU 13413* (*McClure*) 3 sheets, cult., TYPE, *LU 19114* (*McClure*) cult., Yung-hui (Tsang-wu Dist.) *LU 13621* (*McClure*) sheaths only.

Of the specimens cited, only *LU 13413* has flowers as well as leaves and culm sheaths. The other specimens cited all have culm sheaths, which are very distinctive. With the exception of *A. S. Hitchcock 19603* and *19673*, the specimens cited are all in the herbarium of the Lingnan Natural History Survey and Museum.

Bambusa Chungii bears a rather striking superficial resemblance to *Bambusa dolichomerithalla* Hayata, in the mature state, in its general habit and in certain vegetative characters such as the long, thin-walled internodes, the single-ringed nodes and the slender branches. From this species, however, the former is readily distinguished by the character of its culm sheaths, especially in the broad, truncate apex, the reflexed habit of the sheath blades, by their thicker, firmer texture, the narrower, involute shape, the prominently strigose upper surface, and by the long, narrow, scabrous auricles. Furthermore, the young culms of the former species are much more conspicuously glaucous, the culm walls are somewhat thinner, the comparable internodes are longer, the nodes are more prominent, being marked by a thicker ring of cork and a dense fringe of brown hairs left by the base of the culm sheath. This is a magnificent plant of stately habit and proportions, growing in clumps which, in maturity, reach a height of 18 meters, with the lower third free of branches and exhibiting, to fine advantage, the striking ornamental aspect of the white-powdery culms. It has long been a favorite in the eyes of Chinese plant lovers, and is very popular as a horticultural subject in the gardens of southeastern China. It is very tender, however, and the area of its culture is rather limited. Apparently it has not been collected in a flowering condition before.

The following are some of the Cantonese vernacular names generally used for this bamboo:

Fan Taan Chuk (粉單竹) Powdery Single (-noded)[4] Bamboo; Paak Fan Taan Chuk (白粉單竹) White Powdery Single (-noded) Bamboo; Taan Chuk (單竹) Single (-noded) Bamboo.

The following are used locally for cultivated forms:

Ko Tsit Taan Chuk (高節單竹) Prominent Joint[5] Single (-noded) Bamboo; Haak Tsit Taan Chuk (黑節單竹) Black Joint Single (-noded) Bamboo; Chue T'ai Chuk (豬蹄竹) Pig's Foot (literally Pig's Leg) Bamboo and Sheung Mei Taan Chuk (雙眉單竹) Double Eyebrow Single (-noded) Bamboo.

[4] The word "-noded" is added in the belief that the term "Taan" is applied in allusion to the character of the nodes.

[5] The term "joint" as used here is synonymous with "node".

The following table will provide a ready means of distinguishing the two species by their vegetative characters.

CHARACTERS	BAMBUSA CEROSISSIMA	BAMBUSA CHUNGII
Leaves	smaller and thinner, entirely glabrous	larger and coarser, lower surface pubescent at first
Culm tips	long pendent	slightly drooping
Young culms and sheaths	very thickly covered with white waxy bloom	less thickly covered with bloom
Culm sheaths	with a wider band of corky tissue at the base; pubescence lighter in color, dispersed throughout the sheath and very persistent	with a narrower band of corky tissue at the base; pubescence dark, chiefly confined to the basal part of the sheath, and less persistent
Sheath blade	very dark in color and almost glabrous on upper surface	light yellowish green; densely strigose on upper surface
Internodes of culms	average longer	average shorter

While not of great importance commercially, this bamboo has some industrial value. Besides the type locality, it is cultivated on a commercial scale in Tseng-ch'eng Dist., and its culms are sold by weight to be used in splitting thongs to be made into woven ware of various sorts. The culms are said to be used sometimes as floats to lighten rafts of heavy logs when these are to be navigated in shallow water. They are also employed to a limited extent locally as a substitute for the culms of *Schizostachyum* spp. in the making of rims for steaming trays and sifters. The pith, which persists as a thin lining on the inner surface of the culm walls, is used in eye medicine, while scrapings from the outer surface of the culm are used to make a cooling tea (凉茶). These are also considered to impart a certain virtue when added to water for the bath. Although no evidence is available as to the nectar production of this plant, bees were observed to be visiting the flowers at the time when the collection was made at Au Tsai, in April, 1925. Perhaps the most outstanding value of this bamboo is to be appreciated from the aesthetic point of view.

It seems uniquely appropriate to dedicate this very distinct Chinese species to an accomplished scholar, who combines with his fine appreciation of China's own rich cultural heritage an abiding enthusiasm for the achievements of Western thought and research.

The specific name is given in honor of Dr. W. K. Chung (鍾榮光), President of Lingnan University, who has done much to encourage the pursuit of scientific research in China.

As a result of the traditional methods of collection, study and description of the bamboos, the way of the student of this group is strewn with innumerable pitfalls and stumbling blocks. Thanks to the unusual opportunities which have been afforded the writer by the encouragement of his work on this group at Lingnan University and at the Grass Herbarium of the United States Department of Agriculture, a modest beginning has been made toward the goal of placing the study of the bamboos on a more scientific basis. The main lines of the program have been discussed elsewhere. The point to be emphasized here is the importance of the assistance that has been rendered through encouragement and financial aid from various sources.

I am indebted, first of all, to the Trustees and the Directors of Lingnan University for their wholehearted support from the inception of the work. This has taken the form, chiefly, of the granting of leave from other duties for the time required for travel and study. To the Bureau of Plant Industry, United States Department of Agriculture, I am indebted for my first opportunity to travel somewhat extensively in China, during the years 1924 to 1927, for the purpose of studying bamboos in the living state and in their natural surroundings. To the China Foundation for the Promotion of Education and Culture, I am obligated for the first special grant-in-aid for this project. The Rockefeller Foundation has lent more or less continuous financial support to various aspects of the work since 1930. The Metropolitan Institute Museum of Nanking, through the cooperation of the Director, and of Prof. R. C. Ching, then Botanist of that Institution, afforded substantial assistance, during the early stages of the work, through the donation of herbarium specimens and living plants of bamboos from central China for the collection at Lingnan University. The facilities lent by various Western herbaria where types and type collections of Oriental bamboos are deposited have been of incalculable value.

To the late Dr. A. S. Hitchcock, I am indebted for the invitation to make use of his unique agrostological library and the splendid facilities of the Grass Herbarium of the United States Department of Agriculture. Professor John H. Schaffner, of Ohio State University, has afforded, through his interest in problems of comparative morphology and phylogeny, much stimulation and encouragement. And for countless opportunities of discussing, *ad libitum*, various aspects of many problems as they have arisen, I am incalculably indebted to Mrs. Agnes Chase, Senior Agrostologist of the United States Department of Agriculture.

中國東南山白竹屬(鳳凰竹屬)之兩新種

莫古禮著

(摘 要)

本文敘述華竹之兩新種。白粉單竹，學名 *Bambusa Chungii* 特題獻與嶺南大學校長鍾榮光博士。該種遍植于中國亞熱帶之區，供華飾與工業之用。苟以膚淺方法觀之，則此種亟似 *B. dolichomerithalla* Hayata (青皮單竹)，曾常與之互混。然此種確異於後者，蓋其縮小葉 (culm sheath blades) 回折，桿節較顯突，節間較長，少堅直性，且新桿上佈滿臘狀粉物。單竹，學名 *B. cerosissima* 之新桿與籜(culm sheath) 上，盡爲白臘狀粉物所遮蓋，即如其名所指。其桿尖下垂，縮小葉黝黑平滑，且有堅固淡色軟毛層，廣佈於籜上。此乃本種之以異于 *B. Chungii* 者也。

Explanation of Plate 28

Bambusa Chungii sp. nov.

Drawings based on the type.

Fig. 1. Sheath, dorsal view, ×.5. (Taken from about the 15th node of a mature culm. Having been pressed, the sheath blade does not show the involute margins natural to it.)

Fig. 2. Sheath, ventral view of apex, ×.5.

Fig. 3. Base of culm, and the sympodial rhizome, ×.5.

Fig. 4. Culm node, showing type of branching, ×.5.

Fig. 5. Cross section of culm, ×.5.

Fig. 6. An inflorescence, ×1.5.

Fig. 7. Diagram of arrangement of parts of inflorescence from gross dissection. Main axis shaded, subsidiary axis unshaded. Note that each branch consists of a pseudospikelet beginning in the axil of a bract. The bract is followed by a prophyll (pr.) one or two gemmiferous bracts (g.b.), and one or two empty glumes (e.g.) which mark the beginning of the spikelet proper. The lemma and palea of each floret except the terminal, tabescent one, are shown enclosing a sign indicating the presence of both androeceum and gynaeceum. The relative size of the various parts is exaggerated for the sake of convenience.

Fig. 8. A floret, ×5.

Fig. 9. Tip of lemma, enlarged.

Fig. 10. Tip of palea, enlarged.

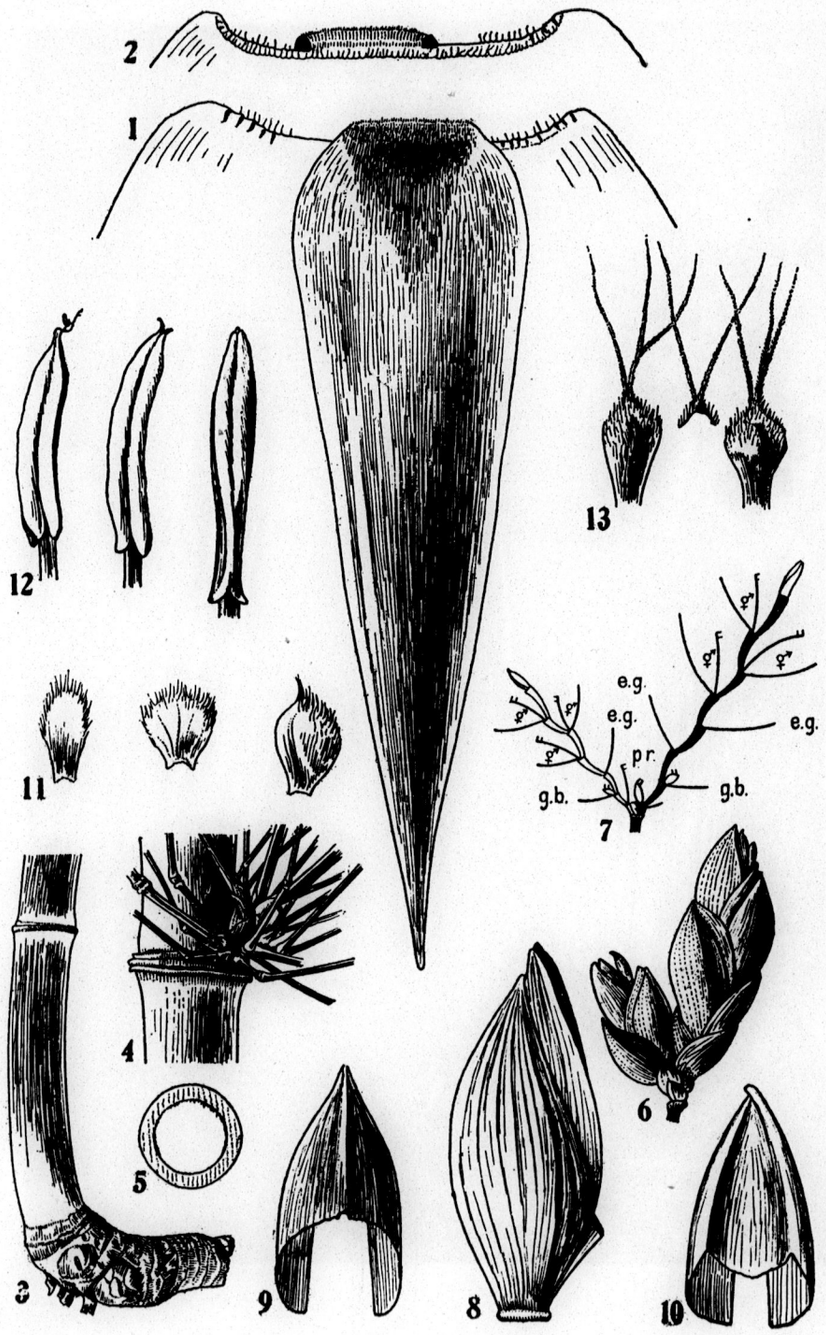
Fig. 11. Lodicules, ×5.

Fig. 12. Stamens, showing variation in tip, ×5. Being from a penultimate floret, these had short filaments and were not exserted.

Fig. 13. Pistils, showing variation in the stigmas. ×5.

Explanation of Plate 29

Photograph showing the habit of *Bambusa Chungii* sp. nov. as grown under cultivation at Au Tsai (Hwai-tsih Dist.), Kwangsi.





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