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Freshwater Calanoida of Middle and South-Western Japan.

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With Plates XVIII—XXII.

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Our knowledge of the freshwater Calanoida of Japan, one of the subdivisions of the extensive order Copepoda, is far from complete, such as it is, our knowlege is entirely due to the works of BURCKHARDT ('13), KOKUBO ('14) and BREHM ('23). BURCKHARDT examined the plankton from Lake Biwa and Lake Tyûzenzi, and described two new species, *Diaptomus japonicus* and *Diaptomus pacificus*. KOKUBO reported a new species *Diaptomus nipponicus* from Lake Kasumigaura. BREHM noted *Pseudodiaptomus inopinus*, *Diaptomus japonicus*, *Diaptomus pacificus* and a new variety *Diaptomus pacificus* var. *yamanakaensis* in examining the plankton of eight lakes of middle Japan. Besides these, Prof. G.O. SARS states in a personal communication of December, 1926, that he examined plankton materials from some ponds in the vicinity of Tokyo which had been sent by Prof. ISHIKAWA about twenty-five years ago, and noted three new species of Calanoida under the provisional names of *Limnocalanus tenellus*, *Parapoppella typica* and *Diaptomus pussillus*. He also found *Diaptomus chaffanjoni* RICHARD among them.

In the present paper are described the following nine species of Calanoida found in the lakes and ponds of middle and south-western Japan :

1. *Limnocalanus sinensis* var. *tenellus* n.,
2. *Pseudodiaptomus japonicus* n. sp.,
3. *Pseudodiaptomus forbesi* POPPE et RICHARD,
4. *Diaptomus chaffanjoni* RICHARD,
5. *Diaptomus viduus* GURNEY,
6. *Diaptomus formosus* n. sp.,
7. *Diaptomus japonicus* BURCKHARDT,
8. *Diaptomus nipponicus* KOKUBO,
9. *Diaptomus pacificus* BURCKHARDT.

From the zoogeographical point of view, the first, second, third and sixth species are closely allied to the corresponding species distributed in southern China. *D. chaffanjoni* is a species recorded from Mongolia and Shanghai. *D. nipponicus* is related to *D. viduus* which has been known from Ceylon. *D. japonicus* is allied to the species found in Queensland, Ceylon and Shanghai. The last species is very closely allied to the European species *D. denticornis*.

I have much pleasure in tendering my thanks to Professors T. KAWAMURA and K. AKATSUKA for allowing me to examine their plankton materials from Kyûsyû and Sikoku.

Key to the Freshwater Genera and Species of the Calanoida of Japan

I. Inner rami of all swimming legs composed of three joints.
  1. Form of body very slender and elongated. Last legs biramous both in female and male. 1. gen. *Limnocalanus*. .....A single species : *L. sinensis* var. *tenellus*.
  2. Form of body very compact. Last pair of legs uniramous both in female and male. 2. gen. *Pseudodiaptomus*.
    i. All furcal setae of female very thick.....*P. japonicus*.
    ii. All furcal setae of female thin.....*P. forbesi*.

II. Inner rami of first swimming legs composed of two joints,

the same of second, third and fourth swimming legs composed of three joints. 3. gen. *Diaptomus.*

1. Antepenultimate joint of right anterior antenna of male with a hyaline lamella.
   - i. Ultimate joint of right antenna of male terminating in a hook-like projection curved anteriorly...*D. pacificus.*
   - ii. Without such a projection.
     - a. Antepenultimate joint of right antenna of male with a projection which is armed distally with coarse teeth.....*D. chaffanjoni.*
     - b. Antepenultimate joint of right antenna of male with a small hook at the distal end of the hyaline lamella.....*D. formosus.*
2. Antepenultimate joint of right antenna of male produced at the anterior end into a rod-like process, not bordered by a hyaline lamella.
   - i. Terminal process of antepenultimate joint extending beyond the ultimate joint of antenna .....*D. nipponicus.*
   - ii. Terminal process of antepenultimate joint extending to the middle of ultimate joint of antenna .....*D. japonicus.*
   - iii. Terminal process of antepenultimate joint extending to the middle of penultimate joint of antenna ..... *D. viduus.*

1. Limnocalanus sinensis var. tenellus n.

(Pl. XVIII, Figs. 1—8)

Body very slender. Cephalosome as long as first three thoracic segments combined. Lateral parts of last pedigerous segment not expanding. Furcal rami very slender, equalling in length the urosome, or 1/12 of body length. Anterior antennae of female very slender,

extending beyond the end of furcal rami. Last pair of legs in female (Figs. 3, 4) with an unguiform projection on second joint of outer rami, the projection being very slightly denticulate. Last pair of legs in male (Figs. 5—7) with outer rami two-jointed and asymmetric, that of left leg being longer, with two terminal spines on distal joint, one as long as the joint itself and the other very short; that of right leg with the distal joint quite short, carrying at the tip a spiniform process.

Colourless and pellucid.

Length of female: 1·6 mm., male: 1·5 mm.

Localities: This form occurs in river mouths or in brackish and freshwater lakes which are more or less connected with the sea, such as Lake Suigetu, Lake Mikata, Lake Suga, Lake Asamo, Lake Koyama, Lake Tôgô, Lake Sinzi, Lake Nasaka and Lake Kita.

Remarks: This is very closely allied to the *Limnocalanus sinensis* var. *dörii* BREHM ('09), found in the vicinity of Shanghai, but differs from it in having a more robust last pair of legs in the male. It also resembles *Limnocalanus sinensis* POPPE ('98) and *Sinocalanus mystrophorus* BURCKHARDT ('13) which are distributed in the same locus as above. *L. sinensis* POPPE is more robust in the form of the furcal rami, though the last pair of legs is more slender than in the present form. The unguiform projection occurring on the second joint of the outer ramus of the last leg of the female is more slightly denticulate in the present form compared with that of the other forms. *Sinocalanus mystrophorus* is characterized by the fact that the cephalosome is as long as the first four thoracic segments combined, while that of this form is only as long as the first three thoracic segments combined. G. O. SARS has noted this form under the provisional name of *Limnocalanus tenellus*.

2. **Pseudodiaptomus japonicus** n. sp.

(Pl. XVIII, Figs. 9—12; Pl. XIX, Figs. 13—18)

Body compact. Cephalosome and first thoracic segment coalescent

above, and last two thoracic segments coalescent above. Lateral parts of last pedigerous segments not expanding, bearing two rows of 5—6 fine spines (Figs. 14 and 15). Dorsal margins of second, third and fourth abdominal segments denticulate. All furcal setae very thick in female (Fig. 16). Last pair of legs of both female and male uni-ramose (Figs. 11—13). Two large ovisacs.

Body colourless and pellucid.

Localities: The present species occurs in brackish or freshwater lakes such as, Suigetu Lake, Suga Lake, Mikata Lake and Tôgô Lake during summer and autumn.

Remarks: This species is closely allied to *P. forbesi* POPPE et RICHARD ('90) and *P. inopinus* BURCKHARDT ('13) which are both found in the vicinity of Shanghai. G.O. SARS regarded this species as representing a new genus and noted under the provisional name of *Parapoppella typica.*

The main characteristics distinguishing this form from the other two are given in the table of the next page.

3. Pseudodiaptomus forbesi POPPE et RICHARD

(Pl. XIX, Figs. 19—20)

Schmackeria forbesi: POPPE, S.A. et RICHARD, J. 1890, *Mèm. Soc. Zool. Franc.*, T. 3. pp. 390—403. pl. X. Figs. 1—14.

Pseudodiaptomus forbesi: SCHMEIL, O., 1898, *Das Tierreich*, Lief. 6. p. 66. BURCKHARDT, G., 1913. *Zool. Jahrb.* Abt. F. Bd. 34. pp. 379—384. Taf. 11 und 12.

This species is closely allied to *P. inopinus* and *P. japonicus* as described in the next page.

This form has been found only in Sibayama Lake of Isikawa Prefecture.

P. forbesi	*P. inopinus*	*P. japonicus*
1. Length of body: 1·2–1·35 mm. in female, 1·2 mm. in male.	1·2 mm. in female, 1·1 mm. in male.	1·2–1·5 mm. in female, 1·2 mm. in male.
2. Caudal margin of lateral parts of 2nd and 3rd thoracic segments flat.	Those parts denticulate.	Similar to *P. forbesi*.
3. Lateral part of 5th thoracic segment bearing 5–6 fine spines.	3–4 thick spines.	Similar to *P. forbesi*.
4. All furcal setae both in female and male with the same thickness:	3, 4 and 5 furcal setae thicker than those of *P. forbesi* in female:	All furcal setae thicker than those of *P. inopinus* in female:

	l. (μ)	w. (μ)	l/w	l. (μ)	w. (μ)	l/w	l. (μ)	w. (μ)	l/w
Set. dors.	60	3	20	55	3	18	50	3	17
Set. f. 1.	180	8	25	157	6	26	130	10	13
Set. f. 2.	220	8	27	150	8	19	120	12	10
Set. f. 3.	240	9	27	150	27	5·5	145	30	4·8
Set. f. 4.	200	8	25	130	13	10	130	20	6·5
Set. f. 5.	145	7	21	92	8	12	110	12	9·5

5. Last pair of legs in the female: a. 1st basal joint bearing 4 rows of 3–7 spines. b. The inner edge of 1st joint of outer ramus bearing 3–4 long spines.	Only a row of two spines. Many fine spines.	Two rows of 7–9 spines. 2–3 short spines.
6. Last pair of legs in the male: a. 1st joint of outer ramus of right leg bearing a process as long as 2nd joint. b. Angle of concavity of 2nd joint of outer ramus of left leg 30°–40°.	The process $^3/_4$ as long as 2nd joint of outer ramus. More than 90°.	Similar to *P. forbesi*. Similar to *P. inopinus*.

4. Diaptomus chaffanjoni RICHARD

(Pl. XIX, Figs. 21—22; Pl. XX, Figs. 23—28)

Diaptomus chaffanjoni: RICHARD, J., 1897, *Bull. Mus. Paris*, Tome, 3. p. 131, figs. 1—5.——Schmeil, O., 1898, *Das Tierreich*, 6. Lief. p. 82——SARS. G.O., 1903, *Ann. Mus. zool. Acad. Sc. St. Petersburg*. vol. 8. p. 17. Tab. 2. figs. 1a—9.

Body robust. Lateral expansions of last pedigerous segment conspicuous and asymmetric in female, but expanding scarcely at all in male. Genital segment as long as the other two caudal segments combined. Anterior antennae of female extending beyond the distal end of furcal setae. Antepenultimate joint of right anterior antenna of male bearing a hyaline lamella which ends distally in coarse teeth (Fig. 28). Last pair of legs in female with a triangular projection on the hind face of first basal joint; inner ramus short, not surpassing the middle of first joint of outer ramus (Fig. 26). Last pair of legs of male with a hyaline lamella on the inner edge of second basal joint of right leg; inner ramus of right leg longer than first joint of outer ramus, that of left leg as long as first joint of outer ramus (Fig. 25).

Body colourless or greenish white.

Length of female: 1·8–20 mm., male: 1·7–1·8 mm.

Localities: This species has a wide range of distribution extending from Tôkyô to Kyûsyû, usually occurring in small ponds, such as ponds in the sites of the Tôkyô Imperial University, the Tôkyô Higher Normal School, the Ansyôzi temple in Yamasina, as well as in many ponds in the suburbs of Ôsaka, Sakai, Marugame and Kizuki.

Remarks: The conical protuberance on the back of the fourth thoracic segment of the female (Figs 23 and 24), noticed by RICHARD ('97), is very variable in size and form and is quite insignificant in winter individuals. The lateral spine of second joint of outer ramus of right leg of the male is shorter than the same described by RICHARD.

5. Diaptomus viduus GURNEY

(Pl. XX, Figs. 29—32; Pl. XXI, Fig. 34)

Diaptomus viduus: GURNEY R., 1916, *Proc. Zool. Soc.* 1916, Vol. I pp. 338—339. Figs. 11—14.

Body slender. Lateral expansions of last pedigerous segment large and more or less asymmetric. Genital segment shorter than other two caudal segments combined. Anterior antennae of the female slender and elongated, extending beyond furcal setae. Antepenultimate joint of the right anterior antenna of male produced anteriorly into a short process extending to the middle of penultimate joint (Fig. 36). Last pair of legs in female without any projection on first basal joint, inner ramus single-jointed and half as long as first joint of outer ramus (Fig. 34). Last pair of legs in male with two hyaline lamellae on the inner edge of second basal joint; inner ramus of right leg longer than first joint of outer ramus; inner ramus of left leg long, extending to the middle of second joint of outer ramus (Fig. 32).

Colour: greenish or bluish white.

Length of female: 1·5 mm., of male: 1·3—1·4 mm.

Localities: I have met with this form in ponds of almost all parts of Kyûsyû, though never found in other districts, exclusive of Simonoseki.

Remarks: The terminal process of the antepenultimate joint of the right anterior antenna of the male from Kyûsyû is straighter than that described by GURNEY from Ceylon, the hyaline process of the first joint of the outer ramus of the right last leg is smaller and the lateral spine of the second joint of the outer ramus is larger. GURNEY has reported only the male of this species.

6. Diaptomus formosus n. sp.

(Pl. XX, Fig. 33; Pl. XXI, Figs. 35—38)

Body rather robust. Right lateral expansion of last pedigerous

segment large, pointed and biangular, while the left one is small and rounded. Genital segment as long as other two caudal segments combined. Anterior antennae of female extending beyond furcal setae. Antepenultimate joint of the right anterior antenna of male with a hyaline lamella ending distally in a small hook (Fig. 36). Last pair of legs of female with a triangular projection on the hind face of first basal joint; inner ramus not extending beyond the middle of first joint of outer ramus (Fig. 37). Last pair of legs in male with a hyaline lamella on inner edge of first basal joint; inner ramus of right leg triangular in form, not extending beyond first joint of outer ramus, that of left leg as long as first joint of outer ramus (Fig. 38).

Colour: reddish orange or greenish white.

Length of female: 1·7–1·9 mm.; male: 1·6–1·7 mm.

Localities: The present species occurs in many ponds of the suburbs of Nagoya, Ôtu, Kyôto and Ôsaka.

Remarks: The present species is allied to *D. incongruens* POPPE ('88), which was recorded first from the vicinity of Shanghai; however, it is distinguished from the latter by the following characters:

a. The inner ramus of the last leg of the female does not exceed the middle of the first joint of the outer ramus, while that of *D. inocongruens* is as long as the first joint of the outer ramus.

b. The length of the first joint of the outer ramus of the last leg of the female measures $3\frac{1}{2}$ times of the breadth, while that of *D. incongruens* $2\frac{1}{2}$ times of the breadth.

c. The inner ramus of the right last leg of the male is very broad and triangular in shape, not extending beyond the first joint of the outer ramus, while that of *D. incongruens* is slender and is longer than the first joint of the outer ramus.

7. Diaptomus japonicus BURCKHARDT

(Pl. XXI, Figs. 39—43)

Diaptomus japonicus: BURCKHARDT, G., 1913, *Zool. Jahrb.* Abt. F. Bd. 34. pp. 394—395. Taf. 13.

Body slender. Lateral expansions of last pedigerous segment very small. Genital segment more than twice as long as other two caudal segments combined. Anterior antennae of female slender and elongated, extending far beyond furcal setae. Antepenultimate joint of right antenna of male produced at anterior end into a long projection, obtuse at tip and extending to the middle of ultimate joint (Fig. 41). Last pair of legs in female with a projection on hind face of first basal joint; inner ramus pointed at tip and $^3/_4$ as long as first joint of outer ramus (Fig. 42). Last pair of legs in male with a hyaline lamella on inner edge of middle part of second basal joint; inner ramus of right leg broad and curved, with three teeth on inner edge; that of left leg slender and pointed at tip, extending to the middle of second joint of outer ramus. (Fig. 43).

Colour of body: greenish or bluish white.

Length of female: 1·1–1·4 mm.; male: 1·0–1·2 mm.

Localities: This species occurs both in large lakes and in small ponds of clear water. Lake Biwa, Suigetu Lake, Suga Lake, Mikata Lake and Lake Kasumigaura are examples of the former. Ponds in the vicinities of Ôtu, Kyôtô, Udi, Ôsaka, Akasi and Takamatu are common habitats of the present species.

Remarks: This is closely allied to *D. sinensis* BURCKHARDT ('13) found in the vicinity of Shanghai and also to *D. lumholzi* recorded from Queensland and Ceylon. This seems to be the same species which has been noted by G.O. SARS under the provisional name of *D. pussillus*.

8. Diaptomus nipponicus KOKUBO

(Pl. XXI, Figs. 44—45, Pl. XXII, Figs. 47—49)

Diaptomus nipponicus: KOKUBO, S., 1914, *Suisangakuzassi.*

Body slender. Lateral expansions of last pedigerous segment small. Genital segment slender, longer than other two caudal segments combined. Anterior antennae of female elongated, surpassing furcal setae. Antepenultimate joint of right antenna of male produced anteriorly into a long process, obtuse at the tip and extending beyond ultimate joint. Last pair of legs of both female and male resemble those of *D. vidnus*, but thicker than the latter (Figs. 45 and 49).

Colour of body: greenish white.

Length of female: 1·6–1·8 mm., male: 1·4–1·5 mm.

Localities: Besides Lake Kasumigaura, reported by KOKUBO, I have met with this form in Mizoro Pond, Takara Pond, Ogura Lake, all in the vicinity of Kyoto, and also in the ponds of the suburbs of Ôsaka, Kôbe and Akasi.

9. Diaptomus pacificus BURCKHARDT

(Pl. XXI, Fig. 46, Pl. XXII, Figs. 50—53)

Diaptomus pacificus: BURCKHARDT, G., 1913, *Zool. Jahrb.* Abt. F. Bd. 34. pp. 408—409. Taf. 14.

Body rather robust. Lateral expansions of last pedigerous segment large and asymmetrical. Genital segment twice as long as other two caudal segments combined. Anterior antennae of female extending beyond furcal rami. Antepenultimate joint of right antenna of male bordered by a hyaline rim projecting at end to a triangular prominence; ultimate joint terminating in a hook-like anteriorly-curving projection (Fig. 46). Last pair of legs in female without any prominence

on first basal joint, inner ramus slender, as long as first joint of outer ramus (Fig. 53). Inner ramus of right last leg of male very short, measuring half as long as first joint of outer ramus ; lateral spine of second joint of outer ramus of right leg twice as long as the joint itself, inner ramus of left leg two-jointed, extending to the distal end of second joint of outer ramus (Fig. 52).

Colour of body : reddish orange or greenish white.

Length of female : 1·4–1·6 mm., male : 1·3–1·5 mm.

Localities : This species is found in clear mountain lakes such as Tyûzenzi Lake, Aoki Lake, Kizaki Lake, Yamanaka Lake, Kawaguti Lake, Lake Nisinoumi, Haruna Lake, Lake Onuma (Mt. Akagi), Lake Sinmiyo (Miyakezima), Sitaka Lake (Beppu), Lake Miike and Lake Ônami (Mt. Kirisima).

Remarks : This is very closely allied to the European species, *D. denticornis* WIERZEJSKI and also to *D. amblyodon* MARENZELLER.

LITERATURE CITED.

BREHM, V. 1909. Ueber die Mikrofauna chinesischer und südasiatischer Süsswasserbecken. *Arch. Hydrobiol.* Bd. 4.

BREHM, V. 1923. Beiträge zur Kenntnis der japanischen Süsswasserfauna. *Annot. zool. japonenses.* Vol. 10.

BURCKHARDT, G. 1913. Wissenschaftliche Ergebnisse einer Reise um die Erde von PERNOD und SCHRÖTER, III. Zooplankton aus ost- und süd-asiatischen Binnengewässer. *Zool. Jahrb.* Abt. F., Bd. 34.

DE GUERNE, J. et J. RICHARD. 1889. Revision des calanides d'eau douce. *Mèm. Soc. zool. Franc.* Tome 2.

GIESBRECHT, W. und O. SCHMEIL. 1898. *Das Tierreich.* 6. Lief.

GURNEY, R. 1907. On two new Entomostraca from Ceylon. *Spolia Zeylanica*, Vol. 4.

GURNEY, R. 1916. On some Freshwater Entomostraca from Ceylon. *Proc. Zool. Soc.* 1916. Vol. 1.

HERRICK, C.L. and C.H. TURNER. 1895. Synopsis of the Entomostraca of Minnesota.

KOKUBO, S. 1914. *Suisangakuzassi.*

POPPE, S.A. 1888. Diagnoses de deux espèces nouvelles du genere *Diaptomus* WESTWOOD. *Bul'et. Soc. zool. Franc.* T. 12.

POPPE, S.A. et J. RICHARD. 1890. Description du *Schmackeria forbesi* n. g. et n. sp. *Mèm. Soc. zool. Franc.* Tome 3.

RICHARD, J. 1897. Sur deux entomostracès d'eau douce recueillis par M. CHAFFANJON en Mongolie. *Bullet. Mus. Paris.* T. 2.

SARS, G. O. 1902. An Account of the Crustacea of Norway. Vol. 4.

SCHACHT, FR. W. 1898. The North American Centropagidae. *Bull. Illinois State Lab., Nat. Hist.*, Vol. 5.

TOLLINGER, M.A. 1911. Die geographische Verbreitung der Diaptomiden. *Zool. Jahrb.* Abt. F. System. Bd. 30.

EXPLANATION OF PLATES

Plate XVIII.

Figs. 1—8. *Limnocalanus sinensis* var. *tenellus*.

1. Dorsal view of female. ×50.
2. Dorsal view of male. ×50.
3. Last pair of legs of female. ×130.
4. Unguiform process of second joint of outer ramus of the last leg of female. ×310.
5. Last pair of legs of male. ×130.
6. Outer ramus of right last leg of male. ×310.
7. Outer ramus of left last leg of male. ×310.
8. Terminal segments of right anterior antenna of male. ×190.

Figs. 9—12. *Pseudodiaptomus joponicus*.

9. Dorsal view of female. ×50.
10. Dorsal view of male. ×50.
11. Last pair of legs of male. ×190.
12. Left last leg of male. ×190.

Plate XIX.

Figs. 13—18. *Pseudodiaptomus japonicus*.

13. Last pair of legs of female.
14. Lateral view of last pedigerous segment of female. ×130.
15. Dorsal view of last pedigerous segment of female. ×130.
16. Furca of female. ×190.
17. First swimming foot. ×190.
18. Terminal segments of right anterior antenna of male. ×190.

Figs. 19—20. *Pseudodiaptomus forbesi*.

19. Last leg of female. ×130.
20. Furca of female. ×130.

Figs. 21—22. *Diaptomus chaffanjoni*.

21. Dorsal view of female. ×50.
22. Dorsal view of male. ×50.

Plate XX.

Figs. 23—28. *Diaptomus chaffanjoni*.

23. Dorsal view of last two thoracic segments of female. ×50.
24. Lateral view of last two thoracic segments of female. ×50.
25. Last pair of legs of male. ×80.
26. Last pair of legs of female. ×130.

27. First swimming foot. ×190.

28. Antepenultimate joint of right anterior antenna of male. ×190.

Figs. 29—32. *Diaptomus viduus.*

29. Dorsal view of female. ×50.

30. Dorsal view of male. ×50.

31. Terminal joints of right anterior antenna of male. ×190.

32. Last pair of legs of male. ×190.

Fig. 33. *Diaptomus formosus.*

Dorsal view of male. ×50.

Plate XXI.

Fig. 34. *Diaptomus viduus*

Last pair of legs of female. ×80.

Figs. 35—38. *Diaptomus formosus.*

35. Dorsal view of female. ×50.

36. Antepenultimate joint of right anterior antenna of male. ×190.

37. Last pair of legs of female. ×130.

38. Last pair of legs of male. ×130.

Figs. 39—43. *Diaptomus japonicus.*

39. Dorsal view of female. ×50.

40. Dorsal view of male. ×50.

41. Terminal segments of right anterior antenna of male. ×240.

42. Last pair of legs of female. ×190.

43. Last pair of legs of male. ×190.

Figs. 44—45. *Diaptomus nipponicus.*

44. Terminal segments of right anterior antenna of male. ×190.

45. Last pair of legs of male. ×130.

Fig. 46. *Diaptomus pacificus.*

Terminal segments of right anterior antenna of male. ×190.

Plate XXII.

Fig. 47—49. *Diaptomus nipponicus.*

47. Dorsal view of female. ×50.

48. Dorsal view of male. ×50.

49. Last pair of legs of female. ×190.

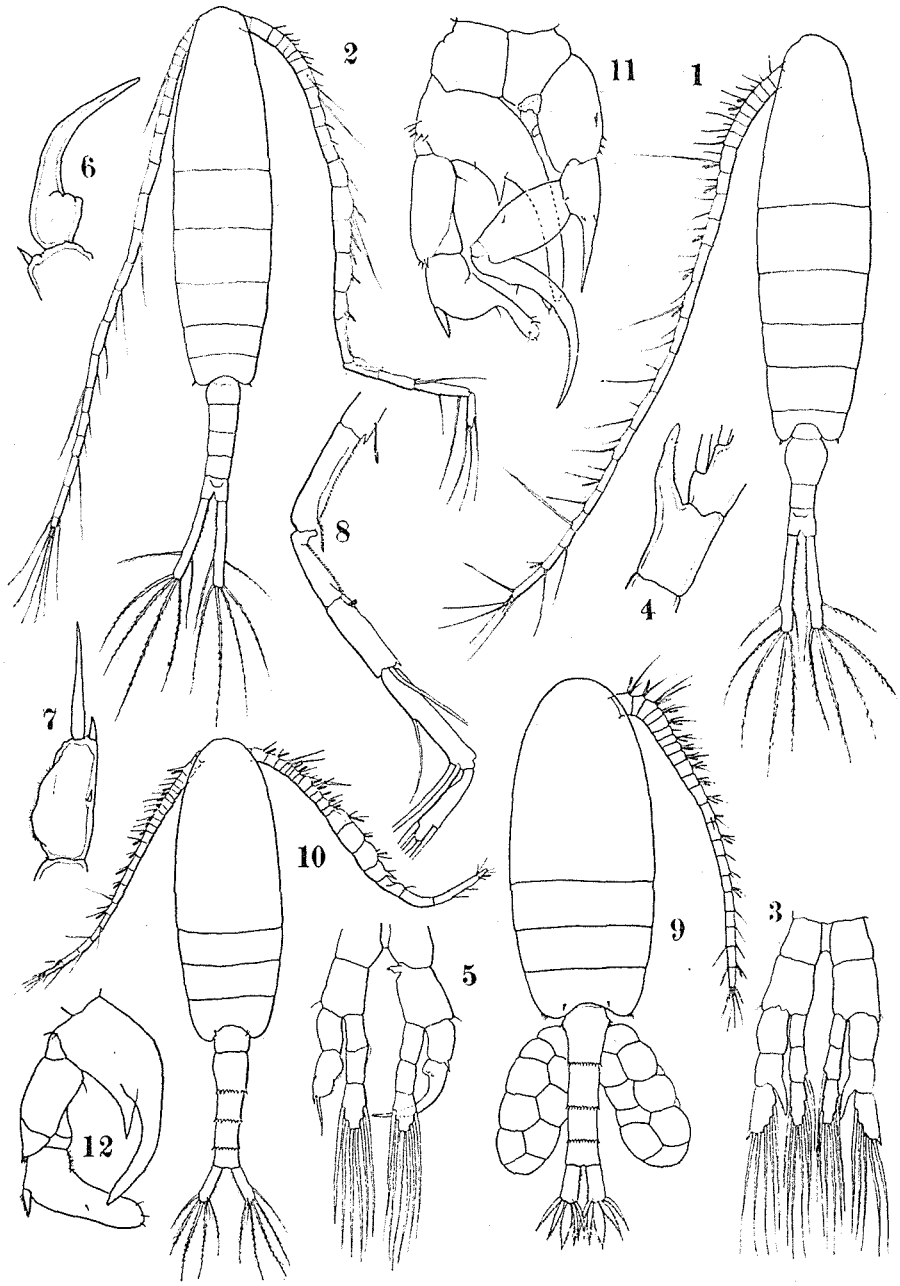
Figs. 50—53. *Diaptomus pacificus.*

50. Dorsal view of female. ×50.

51. Dorsal view of male. ×50.

52. Last pair of legs of male. ×190.

53. Last leg of female. ×190.



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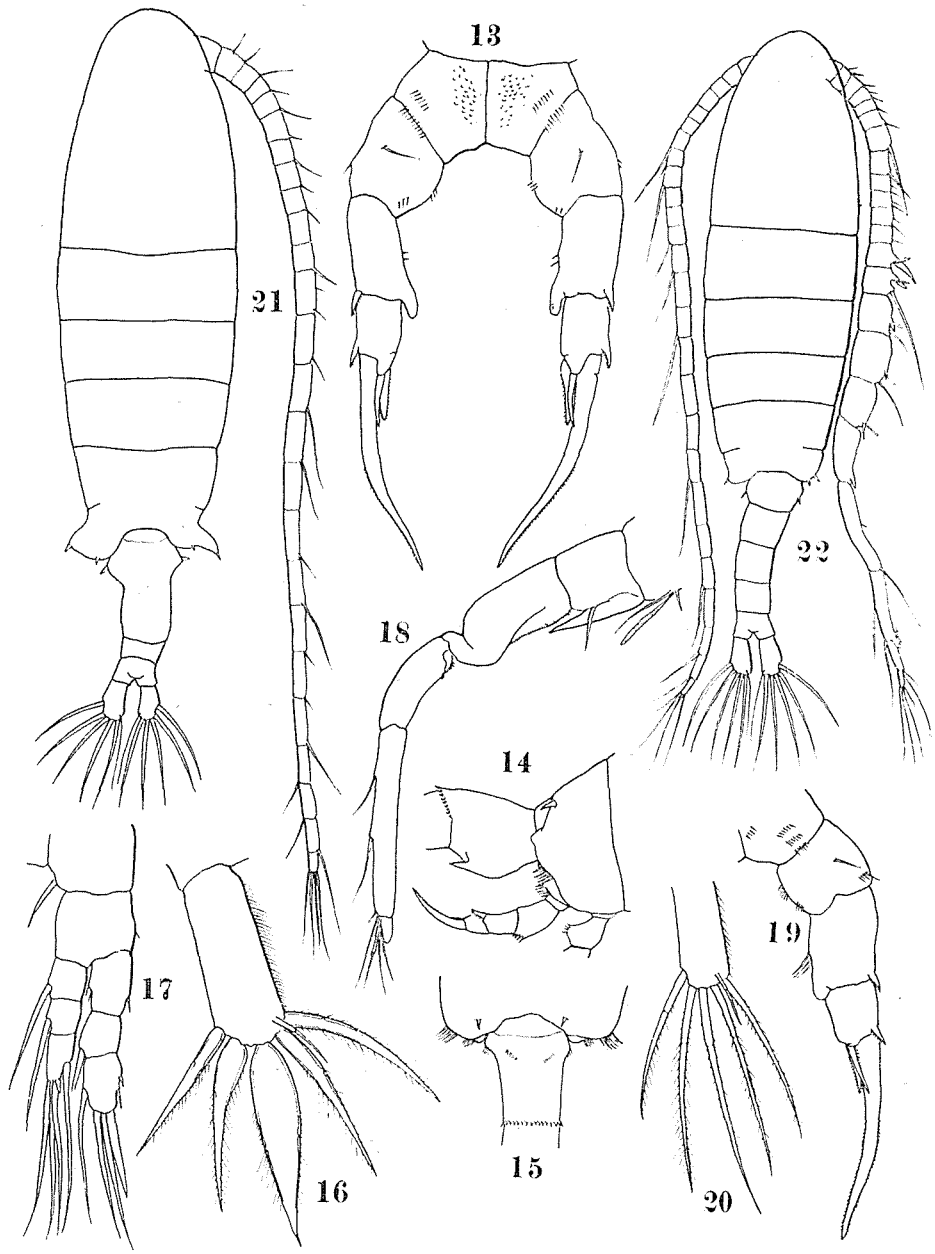
1—8. *Limnocalanus sinensis* var. *tenellus*; 9—12. *Pseudodiaptomus japonicus*.



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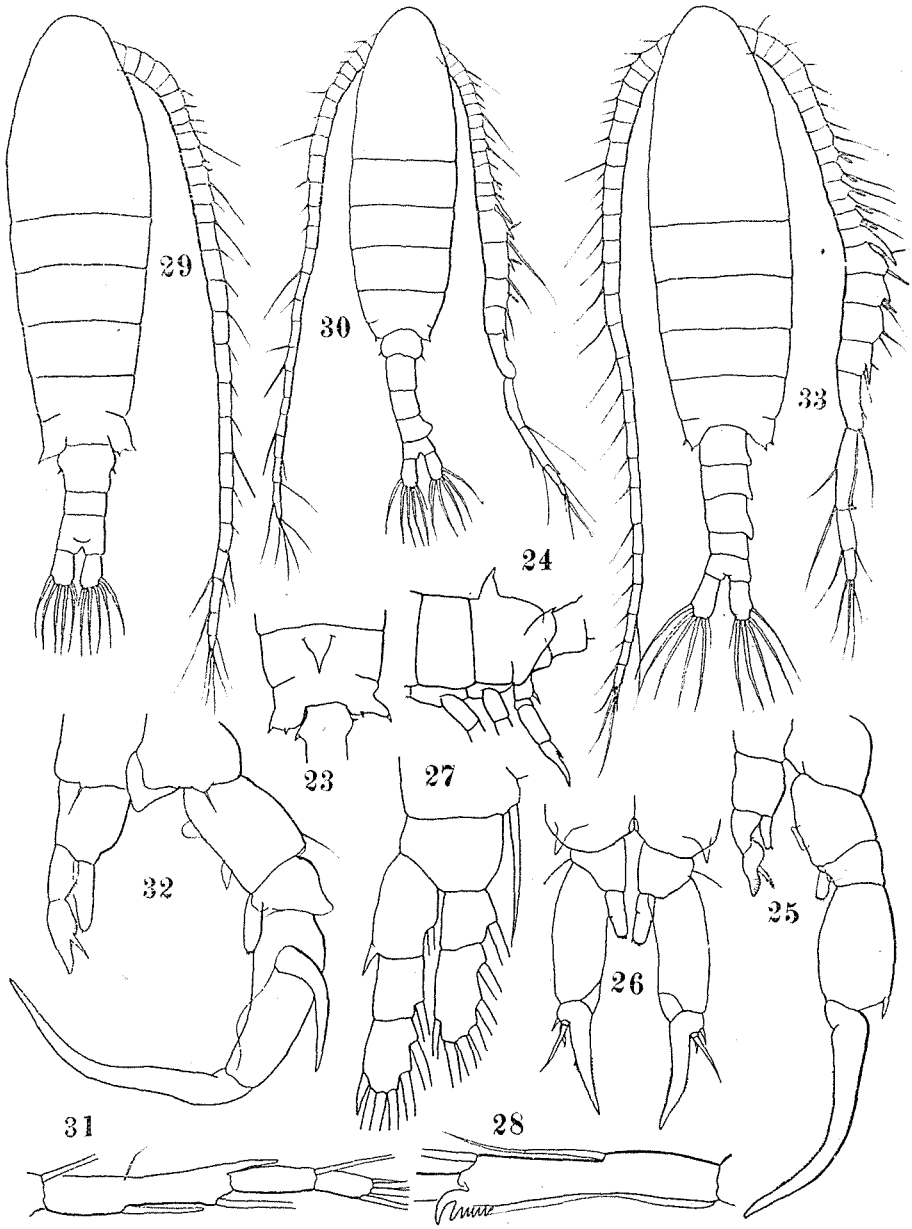
13—18. *Pseudodiaptomus japonicus*; 19—20. *Pseudodiaptomus forbesi*; 21—22. *Diaptomus chaffanjoni.*



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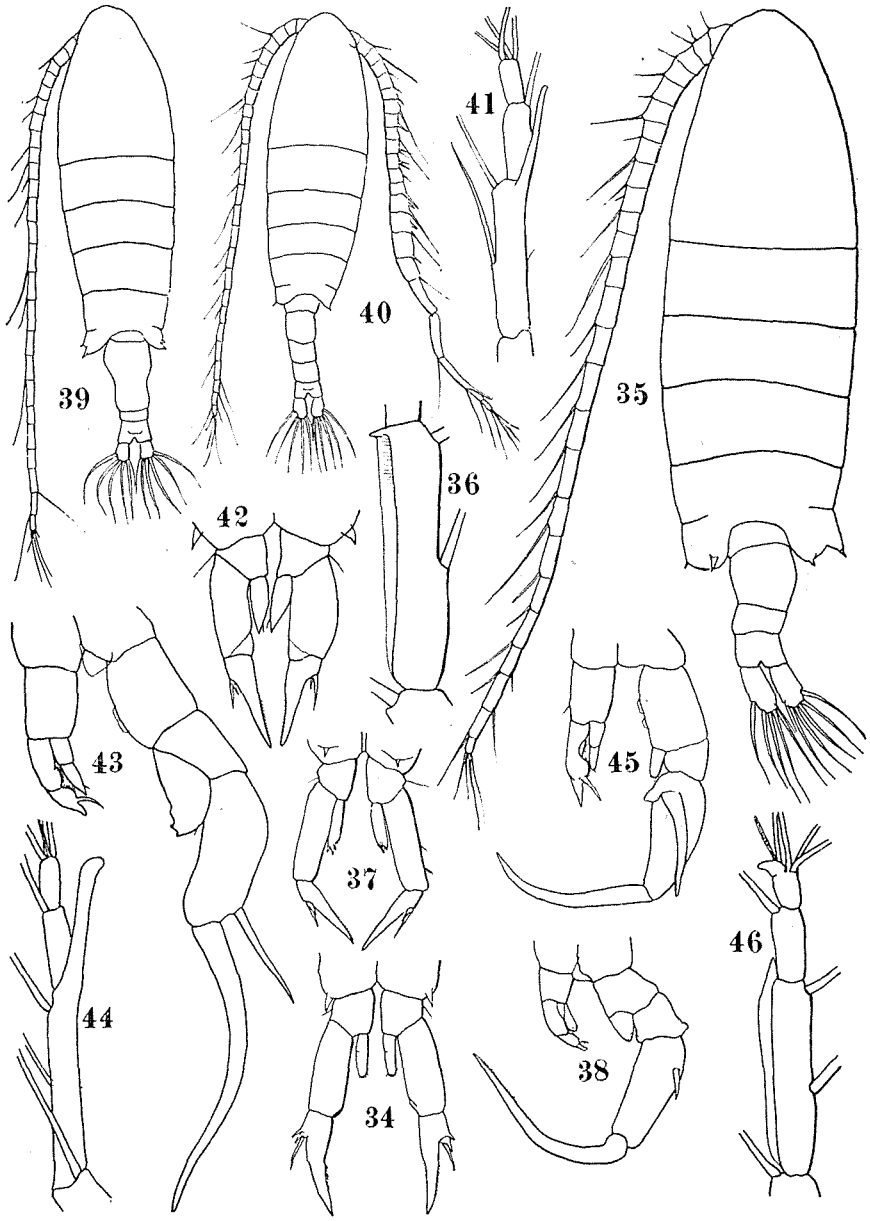
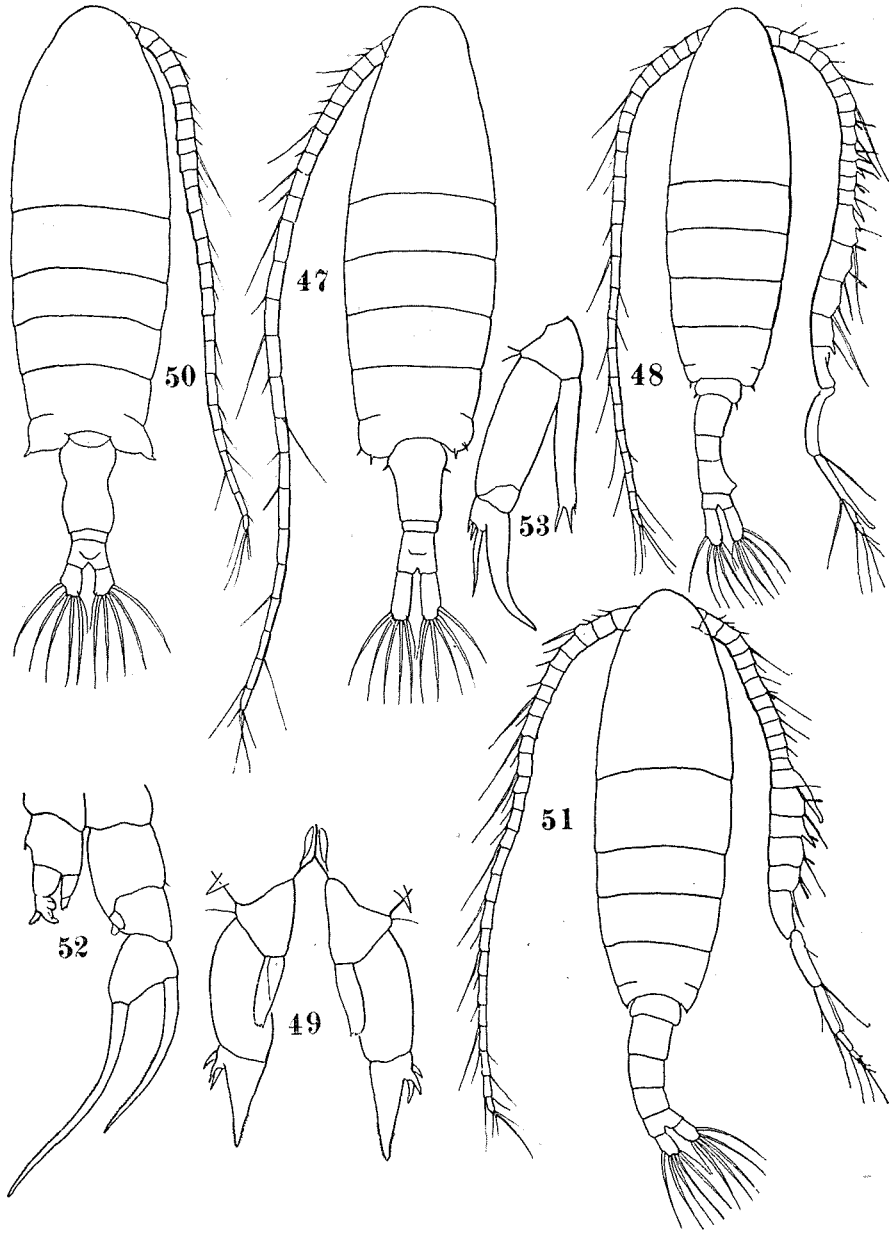
23—28. *Diaptomus chaffanjoni*; 29—32. *Diaptomus vidua*; 33. *Diaptomus formosus*



K. Kikuchi delin. Kikuchi: Freshwater Calanoida.

34. *Diaptomus viduus*; 35—38. *Diaptomus formosus*; 39—43. *Diaptomus japonicus*; 44—45. *Diaptomus nipponicus*; 46. *Diaptomus pacificus*.



K. Kikuchi delin. Kikuchi: Freshwater Calanoida.

47—49. *Diaptomus nipponicus*; 50—53. *Diaptomus pacificus*.