

Volume 30
Issue 5 Review-Special Issue (Part 2)

Article 59

Key to the species of Paracalanidae Paracalanus occurring in the China Seas

Chang-tai Shih
National Taiwan Ocean University, ctshih@mail.ntou.edu.tw

Qing-Chao Chen
South China Sea Institute of Oceanology

Yang-Chi Lan
Fisheries Research Institute

Shih-Hui Hsiao
National Taipei University of Education

Chi-Yu Weng
Institute of Oceanography, National Taiwan University/Ocean Data Bank of the Ministry of National Science and Technology Council, Taiwan

Follow this and additional works at: <https://jmstt.ntou.edu.tw/journal>

 Part of the Fresh Water Studies Commons, Marine Biology Commons, Ocean Engineering Commons, Oceanography Commons, and the Other Oceanography and Atmospheric Sciences and Meteorology Commons

Recommended Citation

Shih, Chang-tai; Chen, Qing-Chao; Lan, Yang-Chi; Hsiao, Shih-Hui; and Weng, Chi-Yu (2022) "Key to the species of Paracalanidae Paracalanus occurring in the China Seas," *Journal of Marine Science and Technology*: Vol. 30: Iss. 5, Article 59.

DOI: 10.51400/2709-6998.2650

Available at: <https://jmstt.ntou.edu.tw/journal/vol30/iss5/59>

This Review-Taxonomic Index is brought to you for free and open access by Journal of Marine Science and Technology. It has been accepted for inclusion in Journal of Marine Science and Technology by an authorized editor of Journal of Marine Science and Technology.

REVIEW-TAXONOMIC INDEX

Key to the Species of Paracalanidae *Paracalanus* Occurring in the China Seas

Chang-tai Shih ^{a,*}, Qing-Chao Chen ^b, Yang-Chi Lan ^c, Shih-Hui Hsiao ^d, Chi-Yu Weng ^e

^a National Taiwan Ocean University, Taiwan

^b South China Sea Institute of Oceanology, China

^c Fisheries Research Institute, Taiwan

^d National Taipei University of Education, Taiwan

^e Institute of Oceanography, National Taiwan University/Ocean Data Bank of the Ministry of National Science and Technology Council, Taiwan

Paracalanus aculeatus(5a/11a/f), *denudatus*(5b/11b/f), *gracilis*(6a/f) (male unknown), *indicus*(4a/14a/f), *intermedius*(8a/14b/f), *nanus*(8b/12a/f), *parvus*(7a/13a/f), *serrulus*(4b/10a/f)

1a	Female	2
1b	Male	9
2a/1a	Leg 5 terminal segment, denticles or spinules present on or near distal margin.....	3
2b	Leg 5 terminal segment, no denticle or spine on or near distal margin.....	6
3a/2a	Leg 5 terminal segment, distal margin with a single denticle.....	4
3b	Leg 5 terminal segment, a horizontal row of denticles or spinules near distal margin.....	5
4a/3a	Leg 4 with spinules on coxa and endopod segments 2 and 3	<i>Paracalanus indicus</i>
4b	Leg 4 with spinules on endopod segment 2	<i>Paracalanus serrulus</i>
5a/3b	Leg 4 with spines on exopod segment 2 and endopod segments 2 and 3; spines on exopod segment 2 often transformed to columnar shaped; exopod segment 3 outer margin proximal to first outer spine strongly and densely toothed, with more than 15 teeth.....	<i>Paracalanus aculeatus</i>
5b	Leg 4 with spines on endopod segments 2 and 3 only; exopod segment 3 outer margin proximal to first outer spine weakly and loosely toothed, with less than 10 teeth.....	<i>Paracalanus denudatus</i>
6a/2b	Leg 5: inner terminal spine nearly twice as long as segment 2, segment 2 about twice as long as outer terminal spine.....	<i>Paracalanus gracilis</i>
6b	Leg 5: inner terminal spine nearly 1.5 times as long as segment 2, segment 2 more than 3 times as long as outer terminal spine.....	7
7a/6b	Leg 5: segment 2 more than 5 times as long as outer terminal spine; inner terminal spine more than 8 times as long as outer terminal spine	<i>Paracalanus parvus</i>
7b	Leg 5: segment 2 less than 4 times as long as outer terminal spine; inner terminal spine more than 6 times as long as outer terminal spine	8
8a/7b	Body length 0.80 mm. Leg 5: segment 1 subequal to segment 2 in length; inner terminal spine about 5 times as long as segment 2	<i>Paracalanus intermedius</i>
8b	Body length 0.50–0.65 mm. Leg 5: segment 1 nearly twice as long as segment 1; inner terminal spine about 4 times as long as segment 2	<i>Paracalanus nanus</i>
9a/1b	Right leg 5 3-segmented	10
9b	Right leg 5 2-segmented	12
10a/9a	Prosome 3 times as long as urosome. Right leg 5 segment 3: inner terminal spine about as long as the segment and 4 times as long as outer spine. Left leg 5 segment 5 with 2 terminal spine, inner terminal spine 0.3 times as long as segment 5 and 5 times as long as outer terminal spine	<i>Paracalanus serrulus</i>
10b	Prosome 2.4–2.7 times as long as urosome. Right leg 5 segment 3: inner terminal spine about 0.5–0.6 times of the segment and 6–8 times as long as outer spine. Left leg 5 segment 5 with single terminal spine.....	11

Available online 14 November 2022

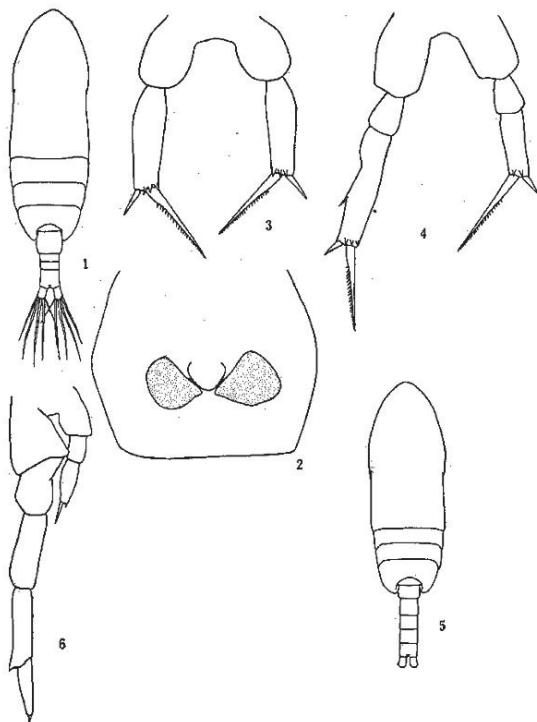
* Corresponding author.

E-mail address: ctshih@mail.ntou.edu.tw (C.-t. Shih).



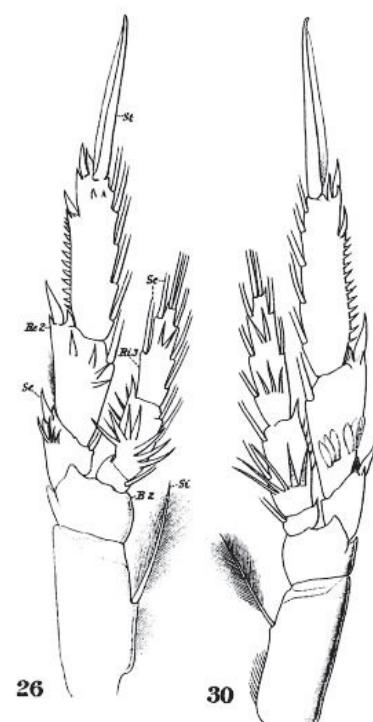
11a/10b	Prosome length less than 2.7 times width. Right leg 5: segment 3/inner terminal spine ratio 2.7, inner terminal spine 5 times length of outer terminal spine. Left leg 5 segment 3 four times length of terminal spine	<i>Paracalanus aculeatus</i>
11b	Prosome length less than 2.4 times width. Right leg 5: segment 3/inner terminal spine ratio 2.2, inner terminal spine 7.5 times length of outer terminal spine. Left leg 5 segment 5 six times length of terminal spine.....	<i>Paracalanus denudatus</i>
12a/9b	Right leg 5: segment 2 oblong. Body length 0.50–0.60 mm	<i>Paracalanus nanus</i>
12b	Right leg 5: segment 2 cylindrical. Body length usually longer than 0.70 mm.....	13
13a/12b	Anal somite longer than genital double-somite. Right leg 5: segment 2 as long as segment 1.....	<i>Paracalanus parvus</i>
13b	Anal somite shorter than genital double-somite. Right leg 5: segment 2 shorter than segment 1	14
14a/13b	Left leg 5: segment 4 without inner distal pointed process. Body length 0.74–1.40 mm	<i>Paracalanus indicus</i>
14b	Left leg 5: exopod segment 4 with an inner distal pointed process. Body length 0.78 mm.....	<i>Paracalanus intermedius</i>

Paracalanus aculeatus Giesbrecht, 1888 (Size: female, 0.78–1.36 mm; male, 0.71–1.36 mm)



Chen & Zhang

Paracalanus aculeatus Giesbrecht, 1888

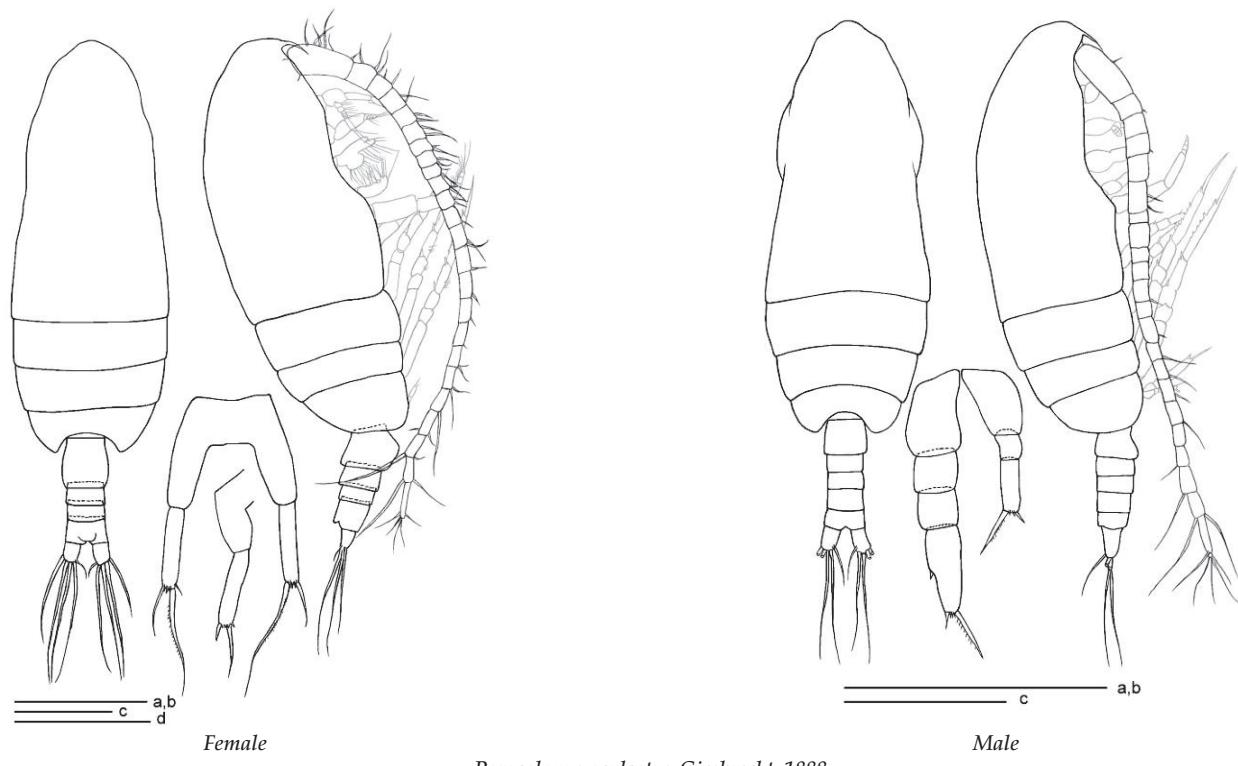


Giesbrecht

Chen & Zhang, 1965: pl. 9. *Paracalanus aculeatus* Giesbrecht, 1888, Female (from East China Sea). 1. habitus (dorsal); 2. genital double-somite (ventral); 3. leg 5 (posterior); 4. leg 5 (posterior, from another specimen). Male. 5. habitus (dorsal); 6. leg 5 1 (posterior).

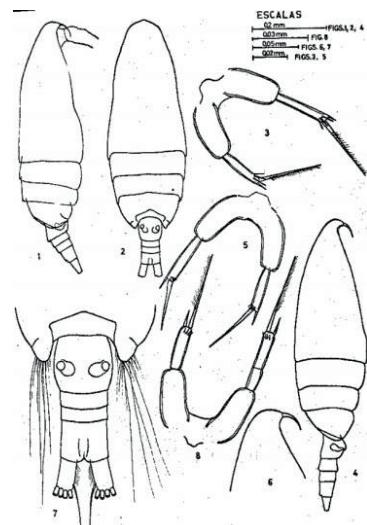
W. Giesbrecht, 1892: pl. 26. *Paracalanus aculeatus* Giesbrecht, 1888, Female. 26, leg 3 (posterior); 30, leg 4 (posterior view).

Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].

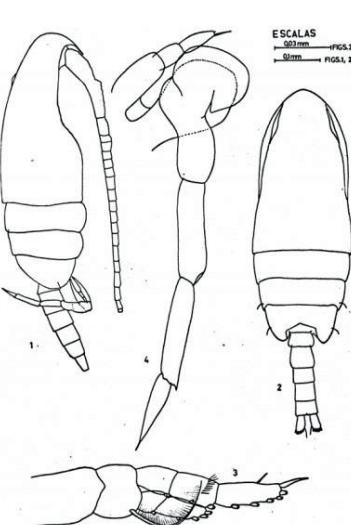
Paracalanus aculeatus Giesbrecht, 1888

Original. *Paracalanus aculeatus* Giesbrecht, 1888, female, 1.32 mm, Taiwan Strait: 24°47'N, 120°53'E (off Zhunan), habitus (dorsal/lateral), leg 5. Male, 1.02 mm, same locality, habitus, leg 5.

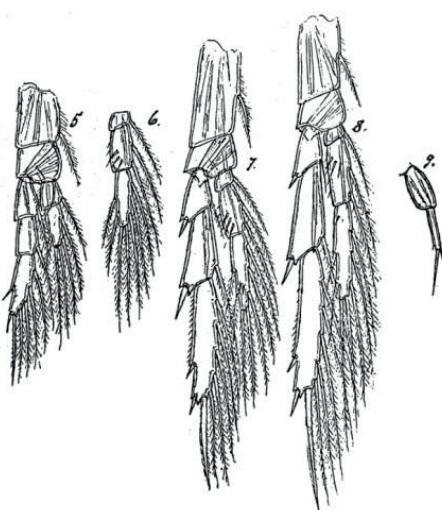
Paracalanus denudatus Sewell, 1929 (Size: female, 0.56–0.96 mm; male, 0.75 mm)



Pl.17 (Corral Estrada, 1970)



Pl.15 (Corral Estrada, 1970)



Sars, 1924

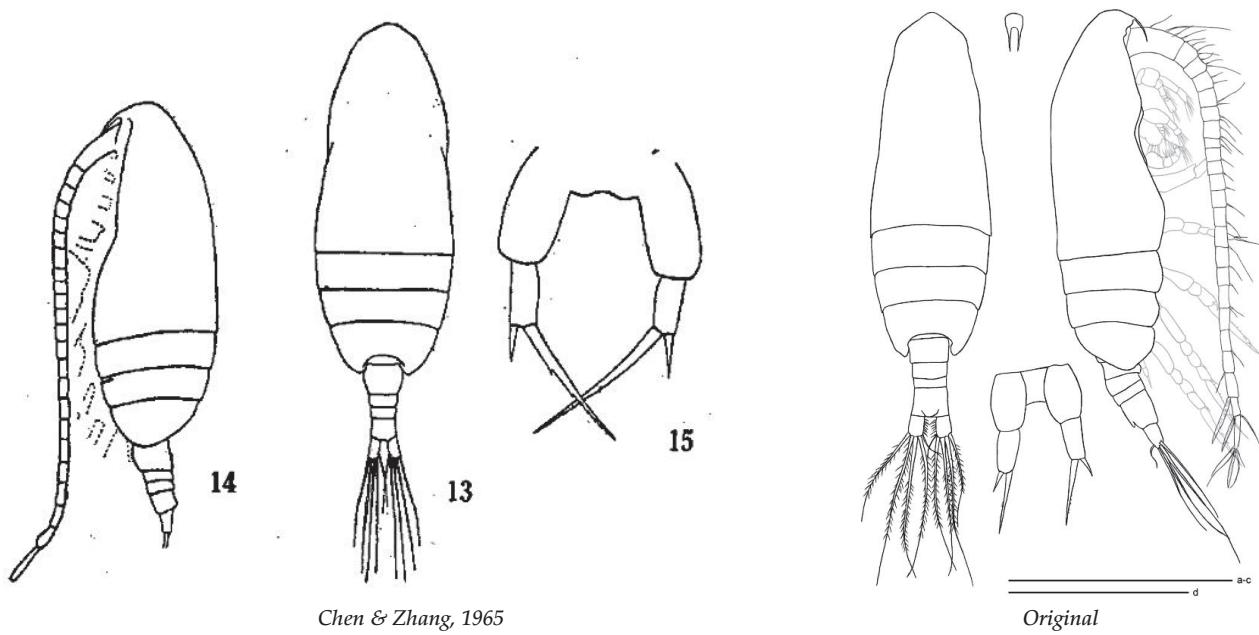
Paracalanus denudatus Sewell, 1929

Corral Estrada, 1970: pl. 17. *Paracalanus denudatus* Sewell, 1929, Female (from Canary Islands). 1/2. habitus (lateral/dorsal); 3. leg 5; 4. habitus (lateral, another specimen); 5. leg 5; 6. forehead (lateral, another specimen); 7. posterior prosome & urosome; 8. leg 5. Pl. 15. Male. 1/2. habitus (lateral/dorsal); 3. leg 2; 4. leg 5 (posterior).

Sars, 1924: pl. 6. *Paracalanus denudatus* Sewell, 1929, Female. 5–9. Legs 1–5 (posterior).

Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].

Paracalanus gracilis Chen & Zhang, 1965 (Size: female, 0.75–0.94 mm; male, unknown)

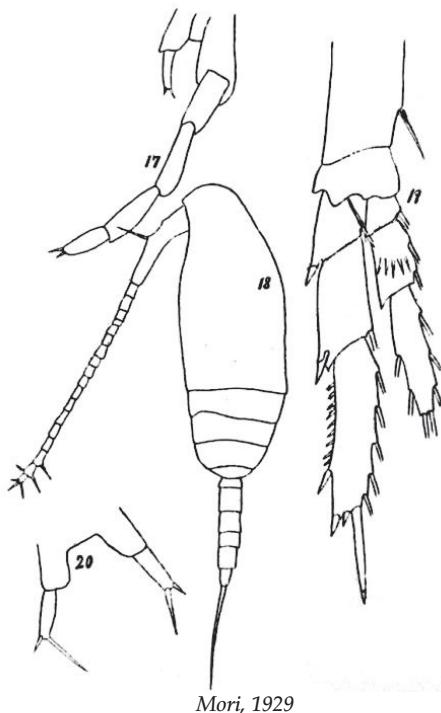


Chen & Zhang, 1965: pl. 9. *Paracalanus gracilis* Chen & Zhang, 1965, Female (from East China Sea). 13/14. habitus (dorsal/lateral); 15. leg 5 (posterior).

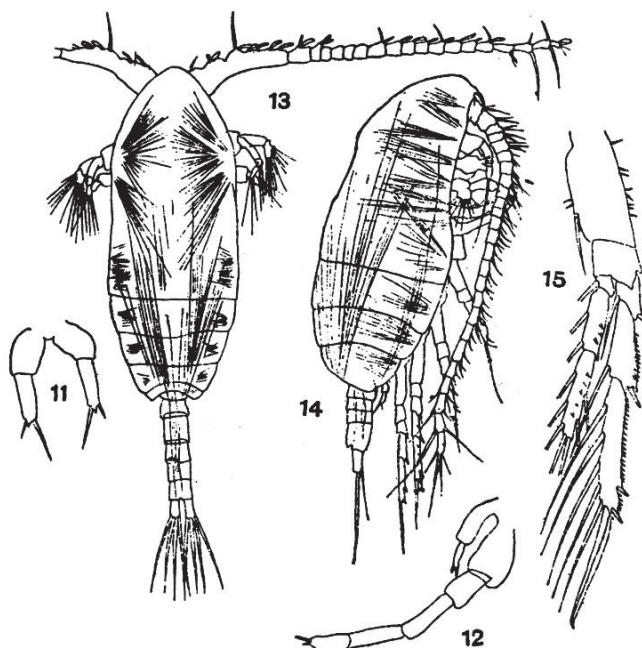
Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].

Original. *Paracalanus gracilis* Chen & Zhang, 1965, female, 0.94 mm, East of Taiwan: 24°18'N, 121°46'E, habitus (dorsal/lateral); rostrum; leg 5.

Paracalanus indicus Wolfenden, 1905 (Size: female, 0.70–1.30 mm; male, 0.74–1.40 mm)



Mori, 1929



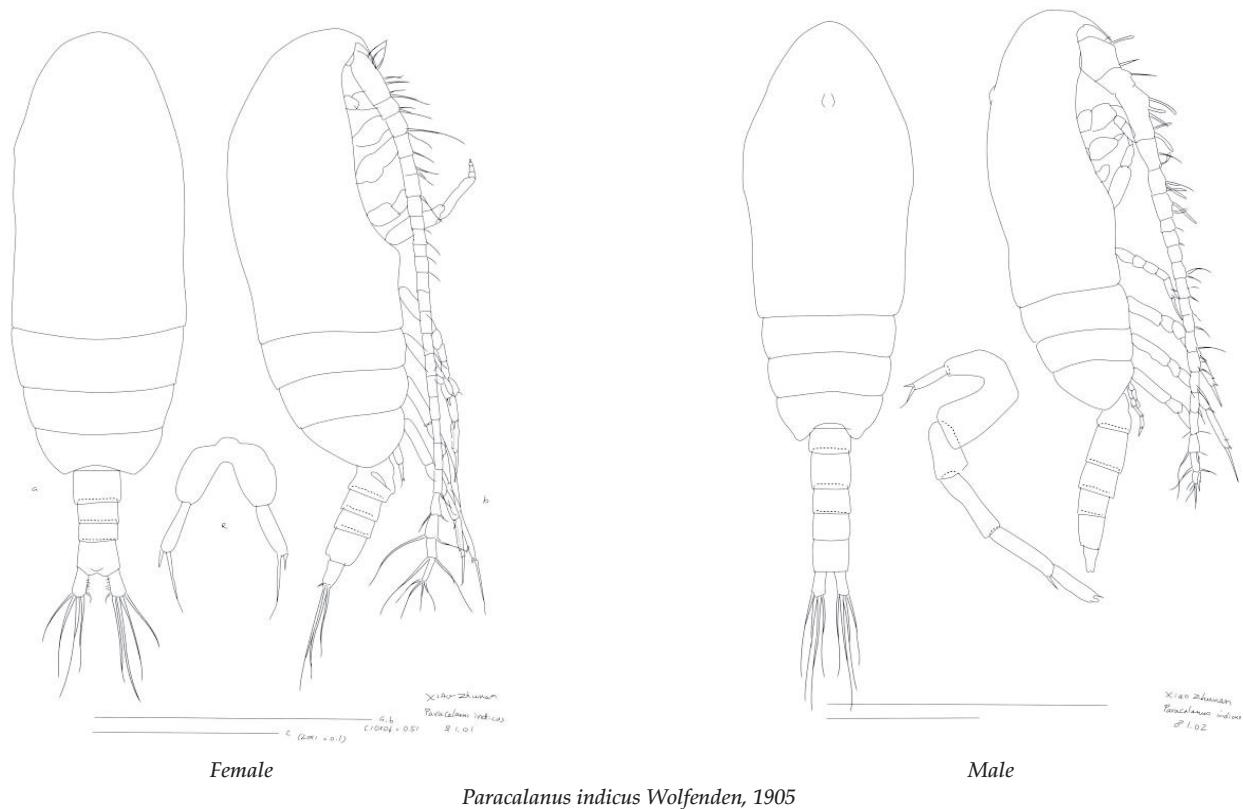
Mori, 1937

Paracalanus indicus Wolfenden, 1905

Mori, 1929: pl. 4. *Paracalanus indicus* Wolfenden, 1905, Female. 19. leg 4; 20. leg 5. Male. 17. leg 5; 18. habitus (lateral).

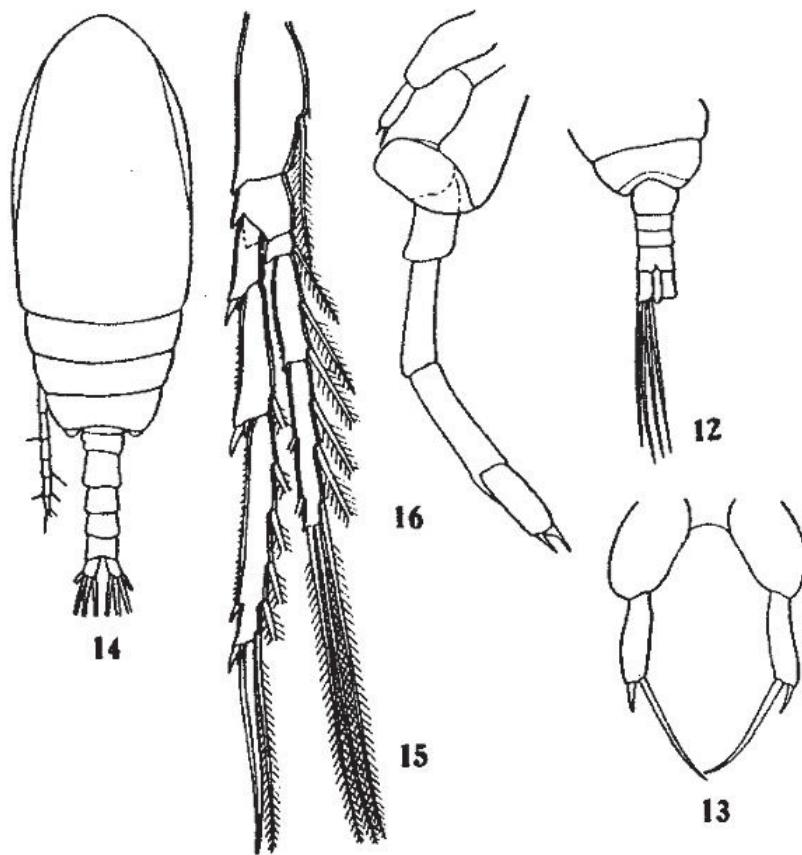
Mori, 1937: pl. 11. *Paracalanus indicus* Wolfenden, 1905, Female. 11. leg 5; 14. habitus (lateral). Male. 12, leg 5 (anterior); 13, habitus (dorsal); 15. leg 4.

Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].

Paracalanus indicus Wolfenden, 1905

Original. *Paracalanus indicus* Wolfenden, 1905. Female, 1.01 mm, Taiwan Strait: 22°40'N, 121°03'E, habitus (dorsal/lateral); male, 0.79mm, same locality. Habitus (dorsal/lateral); leg 5.

Paracalanus intermedius Shen & Bai, 1956 (Size: female, 0.88 mm; male, 0.78 mm)

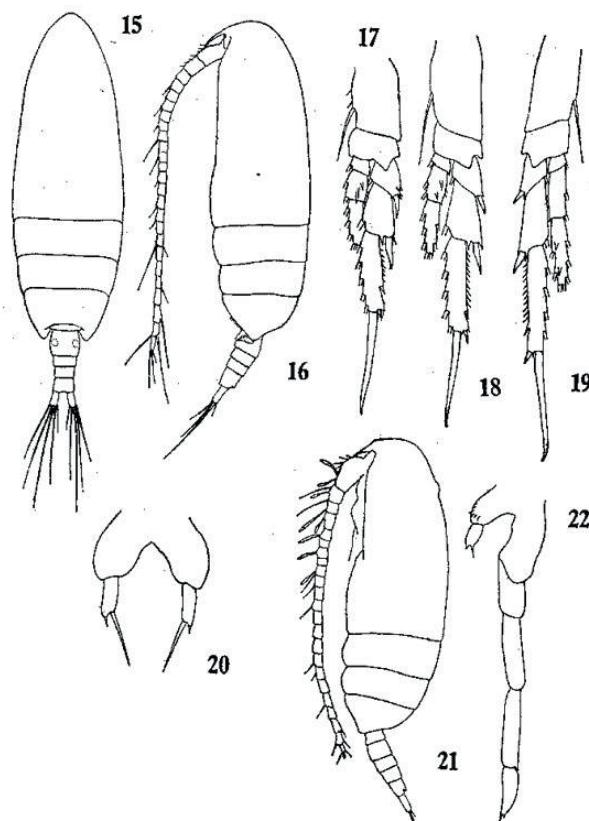


Paracalanus intermedius Shen & Bai, 1956

Shen & Bai, 1956: pl. 2. *Paracalanus intermedius* Shen & Bai, 1956, Female. (from Yellow Sea). 12. Posterior prosome and urosome (dorsal); 13. leg 5. Male. 14. habitus (dorsal); 15. leg 4; 16. leg 5 (anterior).

Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].

Paracalanus nanus G.O. Sars, 1907 (Size: female, 0.50–0.77 mm; male, 0.50–0.60 mm)

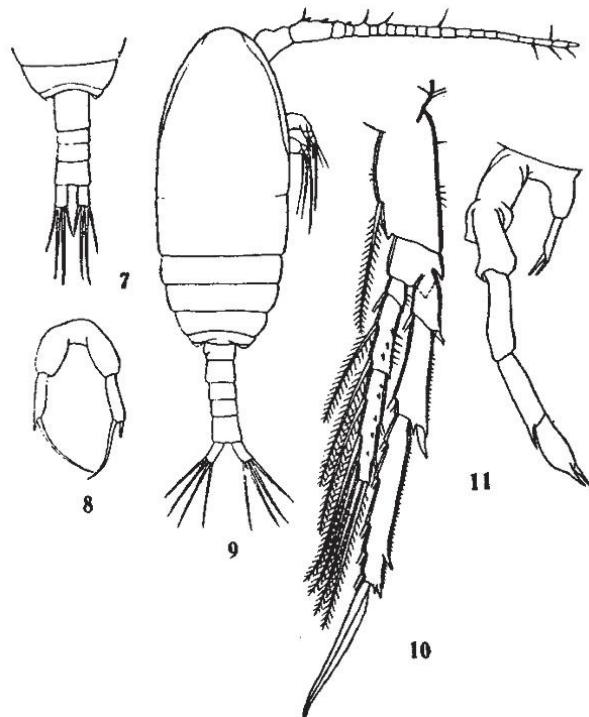


Paracalanus nanus G.O. Sars, 1907

Chen & Zhang, 1974: pl. 2. *Paracalanus nanus* G.O. Sars, 1907, Female (from South China Sea). 15/16. habitus (dorsal/lateral); 17. leg 2; 18. leg 3; 19. leg 4; 20. leg 5. Male. 21. habitus (lateral); 22. leg 5 (anterior).

Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].

Paracalanus parvus Claus, 1863 (Size: female, 0.63–1.30 mm; male, 0.50–1.40 mm)

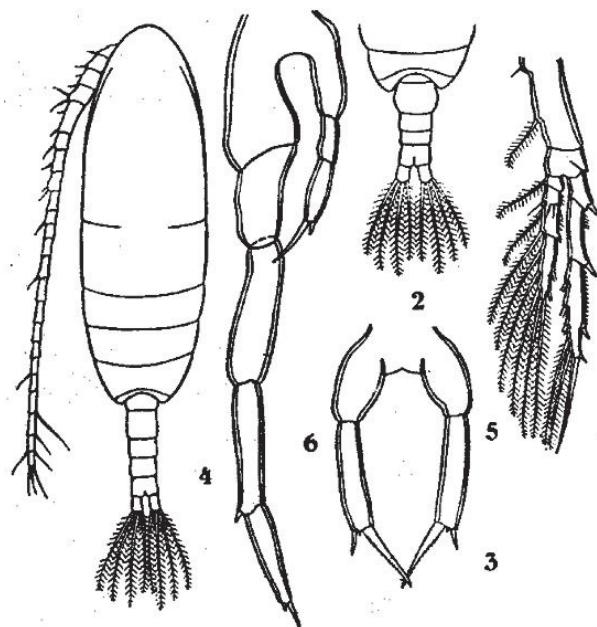


Paracalanus parvus Claus, 1863

Shen & Bai, 1956: pl. 2. *Paracalanus parvus* Claus, 1863, Female (from Yellow Sea). 7. urosome (dorsal); 8. leg 5. Male. 9. habitus (dorsal); 10. leg 4; 11. leg 5 (posterior).

Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].

Paracalanus serrulus Shen & Lee, 1963 (Size: female, 1.02–1.28 mm; male, 0.97–1.02 mm)



Paracalanus serrulus Shen & Lee, 1963

Shen & Lee, 1963: Figs. *Paracalanus serrulus* Shen & Lee, 1963, Female (from South China Sea). 2. urosome (dorsal); 3. leg 5. Male. 4. habitus (dorsal); 5. leg 4; 6. leg 5 (posterior).

Adapted from Razouls C., de Bovée F., Kouwenberg J. and Desreumaux N., 2005–2020. Diversity and Geographic Distribution of Marine Planktonic Copepods. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed May 07, 2021].