

Bipaliid Land Planarians from Nagasaki Prefecture and the Vicinity, Kyûshû, Japan: Color Photographs of Living Specimens and the Karyotypes

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By Kiyohiko YAMAMOTO (E-mail: junshin@educet.plala.or.jp),
 Masaharu KAWAKATSU (E-mail (Miss Miyuki Kawakatsu): DQA01524@nifty.ne.jp) and
 Gen-yu SASAKI (E-mail: gen-yu@mtc.biglobe.ne.jp)

Introduction

Kawakatsu, Sluys & Ogren (in preparation) is the latest paper on the taxonomy of bipaliid land planarian species from Japan based upon slides (serial sections) prepared by Kawakatsu during the past several years. The descriptions of 5 new species with morphological and taxonomic review of bipaliid species reported previously from Japan, Korea, Taiwan and China will be given in that paper.

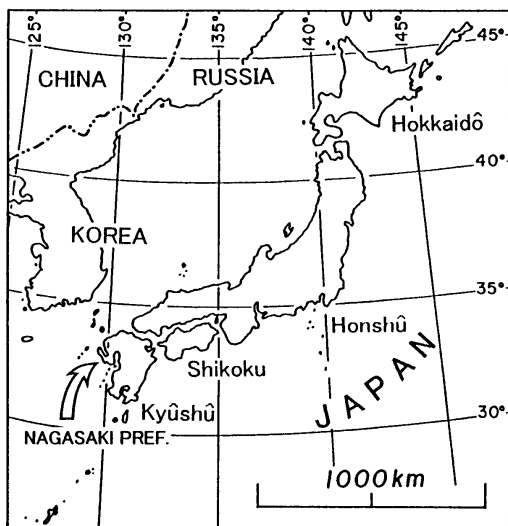


Fig. 1. The Japanese Islands: Location of Nagasaki Prefecture in Kyûshû .

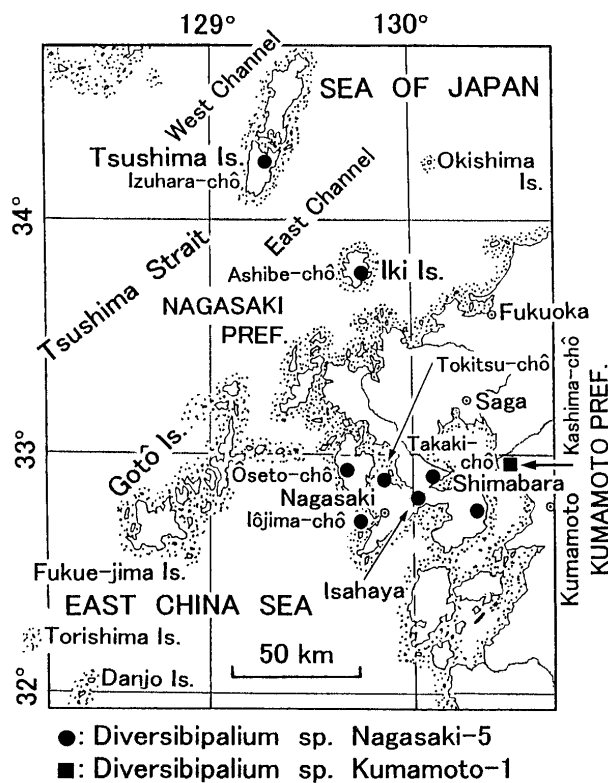


Fig. 3. Sketch map showing the known localities of 2 bipaliid species from Nagasaki Prefecture and the vicinity: *Diversibipalium* sp. Nagasaki-5 (●) and *Diversibipalium* sp. Kumamoto-1 (■) (after Yamamoto, 2002, modified).

In the course of this taxonomic study, Kawakatsu believed that the external morphological characters of Far Eastern and SE Asiatic bipaliid species (a shape of the head with auricles, coloration, patterns and stripes on the dorsal and/or ventral sides of the body, etc.) have very important taxonomic value.

In recent years, under the supervision of Kawakatsu, Yamamoto studied chromosomal analysis of bipaliid species collected in Nagasaki Prefecture and the vicinity (Yamamoto, 1996, 1999, 2000, 2002, 2003a, b; see also Kawakatsu, Yamamoto, Ogren & Takai, 2000; Yamamoto, Takai, Ogren & Kawakatsu, 2000, 2001; Fig. 1). Up to the present, he studied karyotypes of 9 bipaliid species. However, his samples have not been identified yet by the examination of serial sections except for 3 wide distributed species.

Yamamoto's serial papers cited above (2000, 2002, 2003a) include color photographs of living bipaliid species. However, an international reference of his papers in Japanese language is very difficult because those were published in series of a local bulletin of private high school in Nagasaki.

The purpose of the present web article is an open to the public of the reproduced color photographs of Yamamoto's bipaliid animals in the 'planarian.net' by Kawakatsu-&-Sasaki. In addition, a tentative taxonomic list of Yamamoto's bipaliid samples and their karyological data are also given.

Tentative Taxonomic List and the Karyology

Suborder Tricladida Lang, 1884
 Infraorder Terricola Hallez, 1892
 Family Bipaliidae von Graff, 1896
 Genus *Bipalium* Stimpson, 1857
 (Japanese name: Kôgai-biru Zoku)

- 1) *Bipalium nobile* Kawakatsu et Makino, 1982
 Japanese name: Ô-misuji-kôgai-biru
 Chromosome no.: $2x=10$, with a karyotype of $2m + 2m + m \& sm + 2sm + 2sm$.
- 2) *Bipalium kewense* Moseley, 1878
 Japanese name: Watari-kôgai-biru
 Chromosome no.: $2x=18$, with karyotypes of $2m + 2m + 2m + 2st + 2sm + 2sm + 2sm + 2sm + 2sm$; $2m + 2m + 2m + 2sm + m \& st + 2st + 2st + 2sm + 2sm$.
- Genus *Diversibipalium* Kawakatsu, Ogren, Froehlich et Sasaki, 2002*
 New Japanese name: Midôtei-kôgai-biru-Zoku
 * Note. Collective group to temporarily assign species inquirendae and nomina nuda.
- 3) *Diversibipalium multilineatum* (Makino et Shirasawa, 1983)
 Japanese name: Tasuji-kôgai-biru
 Chromosome no.: $2x=10$, with karyotypes of $2m + sm \& st + 2sm + 2sm + sm \& st$; $2m + 2sm + 2st + 2sm + 2sm$; $2m + sm \& st + 2st + 2st + sm \& st$.
- 4) *Diversibipalium* sp. Nagasaki-1
 Chromosome no.: $2x=10$, with a karyotype of $2m + 2m + 2m + 2m + 2sm$.
- 5) *Diversibipalium* sp. Nagasaki-2
 Chromosome no.: $2x=10$, with a karyotype of $2m + 2st + 2sm + 2m + m \& sm$.
- 6) *Diversibipalium* sp. Nagasaki-3
 Chromosome no.: $2x=10$, with a karyotype of $2m + 2m + m \& sm + 2m + 2m$.
- 7) *Diversibipalium* sp. Nagasaki-4
 Chromosome no.: $2x=10$, with a karyotype of $2m + m \& sm + 2sm + 2m + 2m$.

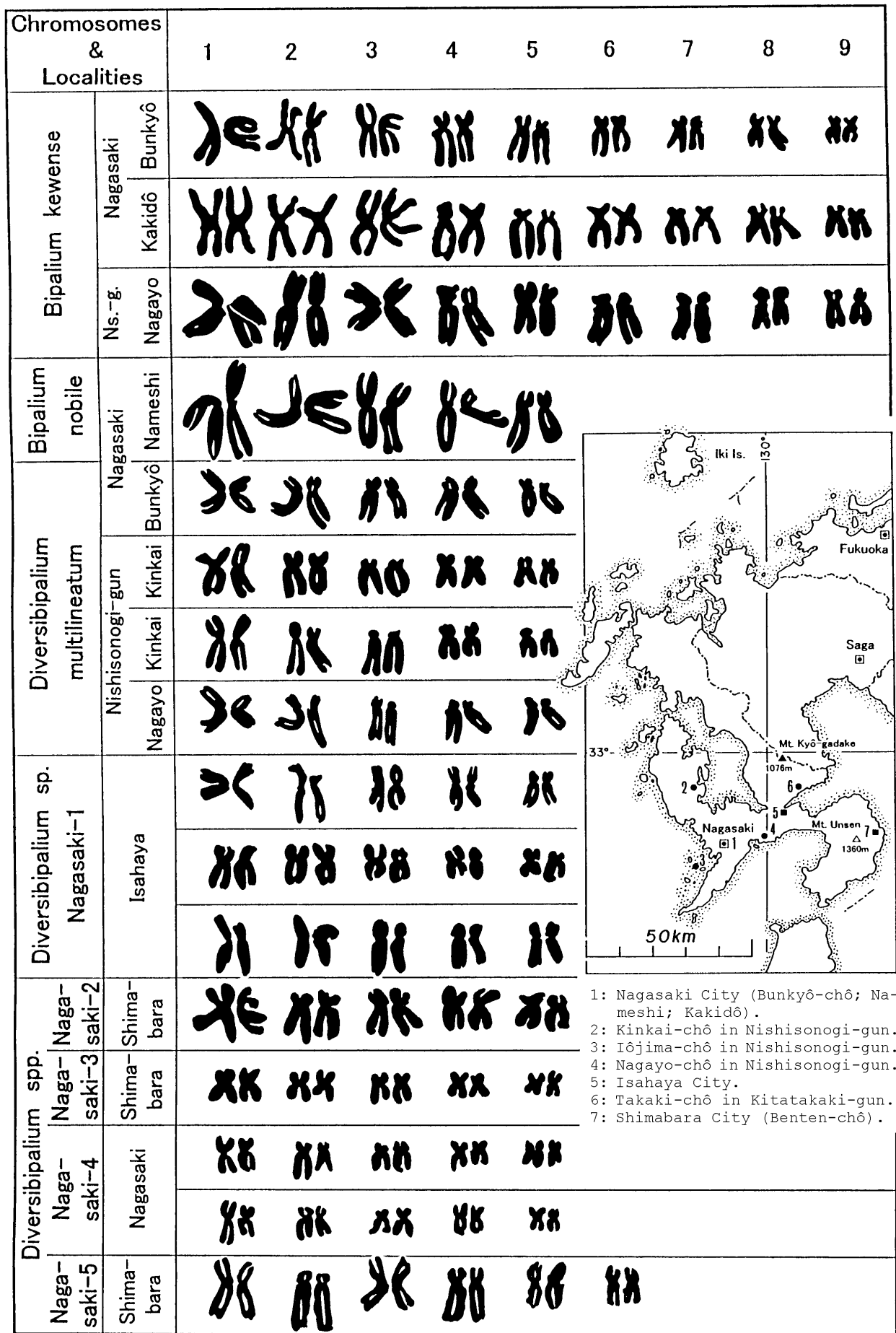


Fig. 2. Idiograms of 8 bipaliid species (2 *Bipalium* and 6 *Diversibipalium* species) from Nagasaki Prefecture. The right-side map shows the localities of animals (after Kawakatsu, Yamamoto, Ogren & Takai, 2000; Yamamoto, 2003a; modified).

- 8) *Diversibipalium* sp. Nagasaki-5
Chromosome no.: $2x=12$, with karyotypes of $2m + 2st + 2m + 2sm + 2m + 2m$; $2m + 2st + 2m + 2sm + 2m + 2m$.
- 9) *Diversibipalium* sp. Kumamoto-1.
Chromosome no.: $2x=10$, with a karyotype of $2m + 2sm + 2m + 2sm + 2sm$.

Idiograms of 9 species listed in this Section and their localities are shown in Figs. 2-4.

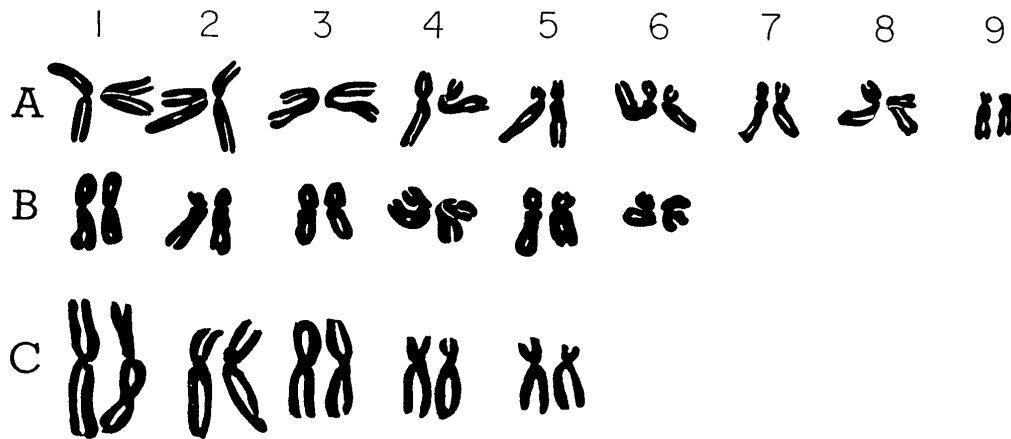


Fig. 4. Additional idiograms of *Bipalium kewense* (A) and *Diversibipalium* sp. Nagasaki-5 (B) from Tanabe City, Wakayama Prefecture, Honshu (after Kubota, Yamamoto & Kawakatsu, 2001). An idiogram of *Diversibipalium* sp. Kumamoto-1 (C) is also shown (after Yamamoto, 2000; slightly modified).

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- Yamamoto, K., 1996. Three land planarian species collected from 4 localities in Nagasaki Prefecture (*Bipalium nobile*, *Bipalium fuscatum*? and *Bipalium kewense*?), with special reference to their chromosomes. Junshin Chugakkô = Junshin Joshi Kôtôgakkô Kiyô, (23): 35-40 (+pls. 1 and 2). (In Japanese.)

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- Yamamoto, K., Takai, M., Ogren, R. E. & Kawakatsu, M., 2000. Chromosomes of bipaliid land planarians from the vicinities of Nagasaki in Kyûshû, Southern Japan. *IXth ISBT Programme & Abstracts (Barcelona, June 26-July 1, 2000)*: 57.
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Note. The following 2 web articles are also related to the present web article.

- Sasaki, G.-Y., Murayama, H. & Kawakatsu, M., 2001. A reprint edition of four English abstracts and a single text of land planarian papers published in the SHIBUKITSUBO (1998-2001). Web article only.
<http://planarian.net/lp/shibukitsubo/lp.html>
<http://planarian.net/lp/shibukitsubo/lp.pdf>
- Kawakatsu, M. & Sasaki, G.-Y., 2002. An electronic reproduction of the late Dr. T. Kaburaki's three color plates attached to his 1922 papers on Japanese marine, freshwater and land planarians (Plathelminthes, "Turbellaria", Tricladida), with a taxonomic commentary. Web article only.
<http://planarian.net/kswp/36/Kaburaki.pdf>

Fig. 5. (on pp. 6-9). Color photographs of living specimens of 9 bipaliid species from Nagasaki Prefecture and the vicinity.

- ① - ④ : *Bipalium nobile* Kawakatsu et Makino, 1982 (① and ②, dorsal; ③, dorsal and ventral; ④, dorsal).
 Loc. ① and ② : Iôjima-chô, Nishisonogi-gun; ③ and ④ : Nameshi, Nagasaki City.
- ⑤ - ⑦ : *Bipalium kewense* Moseley, 1878 (⑤ and ⑦, dorsal; ⑥, ventral). Loc. ⑤ and ⑥ : Bunkyô-chô, Nagasaki City; ⑦, Isahaya City.
- ⑧ - ⑭ : *Diversibipalium multilineatum* (Makino et Shirasawa, 1983) (⑧ - ⑩ and ⑬, dorsal; ⑪ - ⑫ and ⑭, ventral). Loc. ⑨ - ⑫ : Kinkai-chô, Nishisonogi-gun; ⑬ and ⑭ : Nagayo-chô, Nishisonogi-gun.
- ⑮ - ⑰ : *Diversibipalium* sp. Nagasaki-1 (⑮ and ⑰, dorsal; ⑱, ventral). Loc. ⑮ - ⑰ : Isahaya City.
- ⑱ - ⑳ : *Diversibipalium* sp. Nagasaki-2 (⑱ and ⑲, dorsal; ㉑ and ㉒, ventral). Loc. ⑱ - ㉒ : Shimabara City.
- ㉓ - ㉗ : *Diversibipalium* sp. Nagasaki-3 (㉓ - ㉖, dorsal; ㉗, ventral). Loc. ㉓ - ㉕ : Shimabara City; ㉖ and ㉗ : Nagasaki City.
- ㉘ - ㉚ : *Diversibipalium* sp. Nagasaki-4 (㉘ and ㉚, dorsal; ㉙, ventral). Loc. ㉘ - ㉚ : Nagasaki City.
- ㉛ - ㉞ : *Diversibipalium* sp. Nagasaki-5 (㉛ - ㉜ and ㉝, dorsal; ㉟ - ㊱, ventral). Loc. ㉛ - ㉝ : Kuro'nita, Takaki-chô, Kitataki-gun; ㉞ : Iôjima-chô, Nishisonogi-gun; ㉟ and ㊱ : Isahaya City; ㊲ and ㊳ : Benten-chô, Shimabara City.
- ㊴ and ㊵ : *Diversibipalium* sp. Kumamoto-1 (㊴, dorsal; ㊵, ventral). Loc. ㊴ and ㊵ : Kashima-chô, Kami-mashiki-gun, Kumamoto Prefecture.

Note. Many photographs of this web article were partly published in previous articles by Kawakatsu, Yamamoto, Ogren & Takai (2000, black-and-white photographs printed from negative color films) and Yamamoto (1999, 2000, 2002, 2003a, b). Color photographs were taken by Yamamoto. Printed photographs were edited by Kawakatsu and Sasaki.