

KAWAKATSU-&-SASAKI's WEBPAGES ON PLANARIANS, SAPPORO AND TÔKYÔ. No. 36. Jan. 31, 2002.
 (A continuation from the 'Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô), Japan': Nos. 1-34, for 1970-2000; ISSN 0917-4362.)

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

Last update: January 31, 2002
<http://planarian.net/kswp/36/kaburaki.pdf>

By Masaharu KAWAKATSU (E-mail (Miss Miyuki Kawakatsu): DQA01524@nifty.ne.jp) and
 Gen-yu SASAKI (E-mail: gen-yu@mtc.biglobe.ne.jp)

Introduction

In 1922, the late Dr. Tokio Kaburaki published three descriptive papers on Japanese marine, freshwater and land planarians. They are as follows:

1. Kaburaki, T., 1922 b. On some Japanese Tricladida Maricola, with a note on the classification of the group. Jour. Coll. Sci., Imp. Univ. Tokyo, 44, Art. 3: 1-54 + Pl. I (a lithographic print in monochrome).
2. Kaburaki, T. 1922 a. On some Japanese freshwater triclads; with a note on the parallelism in their distribution in Europe and Japan. Jour. Coll. Sci., Imp. Univ. Tokyo, 44, Art. 2: 1-71 + Pl. I (a lithographic print in color).
3. Kaburaki, T., 1922 c. On the terrestrial planarians from Japanese territories. Jour. Coll. Sci., Imp. Univ. Tokyo, 44, Art. 4: 1-54 + Pl. I (a lithographic print in color).

The above-cited trilogy stands as a fundamental monograph of Japanese triclad turbellarians (cf. Kawakatsu, 1991). Although the contents of each article in that trilogy are classical and include many errors from a modern taxonomic viewpoint, Kaburaki's (1922 a-c) monograph has an abiding value for the taxonomic study of this animal group.

The purpose of this web article is to provide an electronic reproduction of 3 color plates of Kaburaki's (loc. cit.) trilogy, together with appropriate corrections and additions of scientific names of planarians shown in the plate figures. Additional lists and taxonomic notes for triclad species now known in Japan will also be given.

Taxonomic Categories Higher than Family-group Names

- Phylum **PLATHELMINTHES** Schneider, 1873
 (=PLATYHELMINTHES Claus, 1887)
 Class **"TURBELLARIA"** Ehrenberg, 1831
 Order **SERIATA** Bresslau, 1933
 Suborder **TRICLADIDA** Lang, 1884
 Infraorder **Maricola** Hallez, 1892
 Infraorder **Paludicola** Hallez, 1892
 Infraorder **Terricola** Hallez, 1892

Note. The taxon “Turbellaria” has been shown to be a paraphyletic group (Ehlers, 1985). Cf. Sluys & Kawakatsu, 1995.

References

- Bresslau, E., 1933. Turbellaria. In: Kükenthal, W. & T. Krumbach (eds.), Handbuch der Zoologie, Bd. 2 (1 Häfte). Vermes Amera. Pp. 52-293. Walter de Gruyter & Co., Berlin u. Leipzig.
- Claus, C., 1887. Lehrbuch der Zoologie. Bd. 4. Auflage, N. G. Elwert'sche Verlagsbuchhandlung, Marburg u. Leipzig. Cited from Ehlers & Soppot-Ehlers, 1995.
- Ehlers, U., 1985. Das Phylogenetische System der Plathelminthes. Pp. 1-317. Gustav Fischer Verlag, Stuttgart & New York.
- Ehlers, U. & Soppot-Ehlers, B., 1995. Plathelminthes or Platyhelminthes? Hydrobiologia, 305: 1-2.
- Ehrenberg, C. G., 1831. Animalia Evertebrata Exclusis Insectis Percensuit Dr. C. G. Ehrenberg. In: Hemprich, F. G. & C. G. Ehrenberg (eds.), Symbolae Physicae. Vol. 4, Series Prima cum Tabularum Decade Prima. Officina Academica, Berolini. (Without pagination.)
- Hallez, P., 1892. Catalogue des Turbellariés (Rhabdocoelides, Triclades et Polyclades) du Nord de la France & de la Côte Boulonnaise. II. Révision des Triclades. Rev. Biol. Nord France. 4: 338-350.
- Kawakatsu, M., 1991. History of the study of Turbellaria in Japan. Hydrobiologia, 227: 389-398.
- Lang, A., 1884. Die Polycladen (Seeplanarien) des Golfes von Neapel und der Angrenzenden Meeresabschnitte. In: Fauna und Flora des Golfes von Neapel und der angrenzenden Meeresabschnitte. Zool. Stat. Neapel, Monographie XI. Pp. i-ix + 1-688 + pls. 1-39. Wilhelm Engelmann, Leipzig.
- Schneider, A., 1873. Untersuchungen über Plathelminthen. Jahresber. Oberhess. Ges. Natur. und Heilkunde Giessen, 14: 1-76. Cited from Ehlers & Soppot-Ehlers, 1995.
- Sluys, R. & Kawakatsu, M., 1995. See the next section Maricola.

I. MARICOLA: Marine Planarians

A List of Known Species from Japan*

*Only a concise synonymy and the type locality for each species will be given in this section.

Superfamily **Bdellouroidea** Diesing, 1862
Family **Uteriporidae** Böhmig, 1906
Subfamily **Uteriporinae** Böhmig, 1906
Genus ***Micaplana*** Katô, 1937

***Micaplana misae* Katô, 1937**

Micaplana misae n. sp.: Katô, 1937: 28-32, figs. 1-3; pl. 3, figs. 1-5. Loc. “Dredging from a depth of about 20 meters off Susaki, Idu.” (=Susaki, Shimoda City, Izu Peninsula, Shizuoka Pref., Tôkai Region, Honshû.)

Subfamily **Ectoplaninae** Bresslau, 1933
Genus ***Paucumara*** Sluys, 1989

***Paucumara trigonocephala* (Ijima et Kaburaki, 1916)**

Procerodes trigonocephala n. sp.: Ijima & Kaburaki, 1916: 154-156, figs. 3-4. Loc. “Oginohama Port, Rikuzen Province.” (=Ogihama, Ishinomaki City, Miyagi Pref., Tôhoku Region, Honshû); “Itsukushima, Prov. Aki.” (=Itsukushima Island, Hiroshima Pref., Chûgoku Region, Honshû.)

Stummeria trigonocephala: Kaburaki, 1922b: 3-5; 23, fig. 2; 32, fig. 5; pl. I, figs. 2, 4-5.

Cf. Sluys & Ball, 1988; Sluys, 1989; Kawakatsu, Nunomura & Suzuki, 1989; Sluys & Kawakatsu, 1995, 2000.

Genus ***Ectoplana*** Kaburaki, 1917

***Ectoplana limuli* (Ijima et Kaburaki, 1916)**

Procerodes limuli n. sp.: Ijima & Kaburaki, 1916: 156-157, fig. 5. Loc. of a host horseshoe crab, *Limulus longispina*. "Ajino, Prov. Bizen." (= The Inland Sea of Japan, Ajino, Kurashiki City, Okayama Pref., Chûgoku Region, Honshû.)

Ectoplana limuli: Kaburaki, 1917: 325-327. Loc. "Yobimatsu, Province Bizen." (=Yobimatsu-chô, Kurashiki City, Okayama Pref., Chûgoku Region, Honshû.)

Ectoplana limuli: Kaburaki, 1922b: 5-6; 24, fig. 3; 33, fig. 6; pl. I, figs. 3, 6-8. Loc. "Ajino and Yobimatsu, Prov. Bizen." See above.

Cf. Kawakatsu, Oki, Tamura & Sekiguchi, 1988; Kawakatsu & Sekiguchi, 1988; Kawakatsu, Sekiguchi, Miyazaki & Makioka, 1989; Sluys, 1989.

Genus ***Procerodella* Sluys, 1989**

***Procerodella asahinai* (Katô, 1943)**

Procerodes asahinai n. sp.: Katô, 1943: 1-6; pl., figs. 1-5. Loc. "The brackish water lake, Yûdonuma, situated on the coast on Tokachi Province, Hokkaidô." (=Lake Yûdonuma, Toyokoro-chô, Nakagawa-gun, Tokachi, Hokkaidô.)

Cf. Sluys, 1989; Kawakatsu, Nunomura & Suzuki, 1989.

***Procerodella japonica* (Katô, 1955)**

Procerodes japonica n. sp.: Katô, 1955: 21-23, figs. 1-2. Loc. "The muddy beach of Lake Hôjôzu-gata in Toyama Pref." (=Lake Hôjôzu-gata, Shin'minato City in Toyama Pref., Hokuriku District, Chûbu Region, Honshû.)

Cf. Sluys, 1989; Kawakatsu, Nunomura & Suzuki, 1989.

Genus ***Mioplana* Katô, 1931**

***Mioplana trifasciata* Katô, 1931**

Mioplana trifasciata n. sp.: Katô, 1931: 363-366, figs. 1-3. Loc. "...the coast of the Arakawa, about 20[2!] miles distant from the estuary but still within the limits of the tidal action." (The vicinities of Akabane and Shimura, the middle part of the Arakawa River, near Kawaguchi City, the NE of Tôkyô.)

Cf. Sluys, 1989.

Note. See also color photos in the Gen-yu's Files.

<http://www.ct.sakura.ne.jp/~gen-yu/2000/mioplana.html>

The locality of the animal is the Tamagawa River, lower, Ôta-ku, Tôkyô (Sept. 3, 2000).

Superfamily **Procerodoidea** Diesing, 1862

Family **Procerodidae** Diesing, 1862

Genus ***Procerodes*** Girard, 1850

***Procerodes lacteus* Ijima et Kaburaki, 1916**

Procerodes lactea n. sp.: Ijima & Kaburaki, 1916: 153-154, figs 1-2. Loc. "The beach between Yukanki and Melaya in Saghalin." (= The correct Russian place names are uncertain; Sakhalin, Russia.)

Procerodes lactea: Kaburaki, 1922b: 2-3, 22, fig. 1; 31, fig. 4; pl. I, fig. 1.

Procerodes lacteus: Kawakatsu, Nunomura & Suzuki, 1989: 42.

Cf. Sluys, 1989; Kawakatsu, Nunomura & Suzuki, 1989; Kawakatsu & Sluys, 1995.

Explanation of Plate I (Kaburaki, 1922b)

See the first color plate at the end of this web article.

In this explanation, the latest scientific name is used for each species. According to the original author, a sketch figure of Fig. 1 was drawn by the late Professor Isao Ijima.

Fig. 1. *Procerodes lacteus* Ijima et Kaburaki, 1916. Outline of a living specimen (ca. ×17).

Fig. 2. *Paucumara trigonocephala* (Ijima et Kaburaki, 1916). Dorsal view of a living specimen (×10).

Fig. 3. *Ectoplana limuli* (Ijima et Kaburaki, 1916). Dorsal view of a living specimen (×6).

Fig. 4. *Paucumala trigonocephala*, cross section of the eye ($\times 900$). Fig. 5. Do. Cross section of the body at the level of the opening part of the oviducts into the vagina ($\times 250$).
 Fig. 6. *Ectoplana limuli*, a schematic figure of the head showing nervous system ($\times 150$). Fig. 7. Do. Cross section of the copulatory apparatus at the level of the genital pore ($\times 150$). Fig. 8. Do. Horizontal section of the copulatory apparatus ($\times 300$).

Abbreviations. New terms are shown in parentheses.

br, brain; e, eye; g, gut (=intestine); gl, gland; gp, genital pore; gv, genital vestibulum (=female and common genital antra); l, lens; m, mouth; n, nucleus; N^{\prime} - $N^{\prime\prime}$, sensory nerves arising from the brain; na, anterior longitudinal nerve trunk; nc, transverse nerve; nm, marginal nerve; no, optic nerve; nt, longitudinal nerve trunk; nx, brain commissure; o, ovary; od, oviduct (=ovovitelline duct); rc, retina cell; rs, receptaculum seminis or uterus (=copulatory bursa); si, 'Substanzinsel'; tu, tuba (=seminal receptacle); v, vagina; vd, vas deferens (=sperm duct).

References (Maricola)

- Böhmig, L., 1906. Tricladenstudien. I. Tricladida Maricola. Zeitschr. Wiss. Zool., 81: 344-504 + pls. 12-19.
 Bresslau, E., 1933. See 'Taxonomic Categories...'
 Diesing, K. M., 1862. Revision der Turbellarien. Abt.: Dendrocoelen. Sitz. Kaiser. Akad. Wiss., Math.-Naturwiss. Classe, Wien, 44, I. Abt., (6-10) (for 1861): 485-578.
 Girard, C., 1850. Several new species of marine Planariae of the coast of Massachusetts. Proc. Boston Soc. Nat. Hist., 3: 251-252.
 Ijima, I. & Kaburaki, T., 1916. Preliminary descriptions of some Japanese Triclads. Annot. Zool. Japon., 9: 153-171.
 Kaburaki, T., 1917. Notizen über japanische Tricladen. Annot. Zool. Japon., 9: 325-333.
 Kaburaki, T., 1922b. See 'Introduction'.
 Katô, K., 1931. A new triclad Turbellarian. Proc. Imp. Acad., Tôkyô, 7 (9): 363-366.
 Katô, K., 1937. A new marine Triclad from Japan. Annot. Zool. Japon., 16: 28-32 + pl. 3.
 Katô, K., 1943. A new Triclad from Northern Japan. Bull. Biogeogr. Soc. Japan, 13 (1): 1-6 + pl.
 Katô, K., 1955. A new brackish-water Turbellaria from Japan. Bull. Biogeogr. Soc. Japan, 16-19: 21-24.
 Kawakatsu, M., Nunomura, N. & Suzuki, H., 1989. Corrections and emendations of specific names of several Japanese species of Turbellarians (Acoela, Tricladida-Maricola, Polycladida-Cotylea, and Temnocephalida-Scutariellidata) and Nemertinea (Enopla-Hoploneurtea-Monostylifera). Bull. Fuji Women's College, (27), II: 41-51.
 Kawakatsu, M., Oki, I., Tamura, S. & Sekiguchi, K., 1988. Karyological and taxonomic studies of ectoparasitic marine triclads collected from the four extant species of horseshoe crabs. Fortsch. Zool., 36: 117-121.
 Kawakatsu, M. & Sekiguchi, K., 1988. Redescriptions of *Ectoplana limuli* (Ijima et Kaburaki, 1916) and *Ectoplana undata* Sluys, 1983 (Turbellaria, Tricladida, Maricola), collected from the three extant species of Asian horseshoe crabs. Jôbu Jour. Manag. Inform. Sci., (5): 57-94.
 Kawakatsu, M., Sekiguchi, K., Miyazaki, K. & Makioka, T., 1989. The egg-capsules of ectoparasitic marine triclads collected from the four extant species of horseshoe crabs. Bull. Dept. Manag. Inform. Sci., Jôbu Univ., (1): 15-29 (+ pls. 1-6).
 Sluys, R., 1989. A Monograph of the Marine Tricladida. Pp. i-xii + 1-463 (pls. 1-12). A.A. Balkema, Rotterdam & Brookfield.
 Sluys, R. & Ball, I. R., 1988. A synopsis of the marine triclads of Australia and New Zealand (Platyhelminthes: Tricladida: Maricola). Invert. Taxonomy, 2: 915-959.
 Sluys, R. & Kawakatsu, M., 1995. Taxon names of the Tricladida Maricola (Platyhelminthes): Additions and emendations. Bull. Zoöl. Mus., Univ. Amsterdam, 14 (10): 153-160.
 Sluys, R. & Kawakatsu, M., 2000. New, southernmost record of *Paucumara trigonocephala* (Platyhelminthes, Tricladida, Maricola) from Queensland, with documentation of earlier records from Japan. Queensland Naturalist, 38 (1-3): 24-30.*

*In "References" on page 30, a confusion occurred for the arrangement and citation of 3 papers. Their correct citations are given below.

KAWAKATSU, M. (1998) Platyhelminthes: Turbellaria; Nemertinea: Enopla: Hoplonemertea: Monostylifera: Prosorhochm-

idae. In: Environmental Agency of the Prime Minister's Office (ed.), Invertebrates III", Chapt. 42 and 43 (Other than Marine Species). The Research Center of Natural Environment, Tôkyô. Pp. 19-24. [in Japanese]
KAWAKATSU, M., NUNOMURA, N. & SUZUKI, H. (1989) See the 'References' in this section.
SLUYS, R. & BALL, I. R. (1988) See the 'References' in this section.

II. PALUDICOLA: Freshwater Planarians

A List of Known Species from Japan Described in Kaburaki's 1922 (a) Paper*

*Only a concise synonymy and the type locality for each species will be given in this section. Two species from Sakhalin are also included.

For the other species of Japanese freshwater planarians, see the following web articles in the Gen-yu's Files.

- Japanese freshwater planarians in color (Dr. M. Kawakatsu)
http://www2u.biglobe.ne.jp/~gen-yu/plaj_list_e.html
(Japanese Version is also available.)
- Planarians found in tanks for tropical fishes in Japan.
http://www2u.biglobe.ne.jp/~gen-yu/tankpala_e.html
(Japanese Version is also available.)

Family **Dugesidae Ball, 1974**
Genus ***Dugesia* Girard, 1850**

***Dugesia japonica* Ichikawa et Kawakatsu, 1964**

Planaria gonoc[e]phala: Ijima & Kaburaki, 1916: 160-162, figs. 12-13. Spelling error. Loc. "Various parts of Hondo." (=Honshû.)

Planaria gonocephala: Kaburaki, 1922a: 12-17; pl. I, figs. 3-6.

Note. Ijima & Kaburaki (loc. cit., p. 162) wrote: "This species, which is also known from Europe and North America, is commonest and the most widely distributed freshwater planarian in Japan". Kaburaki (loc. cit., p. 12) also gave nearly the same mention.

"*Planaria gonocephala*" mentioned by the above-cited authors is a misidentification of *Dugesia japonica*, which is distributed widely in the Far East. Numerous papers on *Dugesia japonica* have been published in various *journals*. Cf. Kawakatsu, Oki & Tamura, 1995; Tamura, Oki & Kawakatsu, 1995.

Dugesia gonocephala (Dugès, 1830) is a different species distributed in Europe and Africa (cf. Ichikawa & Kawakatsu, 1964; Kenk, 1974; Kawakatsu, Oki, Tamura & Sugino, 1976).

North American dugesiid species (mentioned by Ijima & Kaburaki, 1916) are identified as *Girardia tigrina* (Girard, 1850) now known as a cosmopolitan species (cf. Kenk, 1974, 1989; Kawakatsu, Tamura, Takai, Yamamoto, Ueno & Oki, 1993).

Species Inquirendae

***Planaria badia* Stimpson, 1857**

Planaria badia n. sp.: Stimpson, 1857: 30. "Hab. In fossis insulae "Loo Choo."" (=Okinawa Island in the Ryûkyû Islands.)

***Planaria cinerea* Stimpson, 1857**

Planaria cinerea n. sp.: Stimpson, 1857: 30. "Hab. in fossis insulae "Ousima", Japoniae Australis." (=Amami-Ôshima Island in the Satsunan Islands.)

Planaria cinerea: Kaburaki, 1922a: 1.

Note. Kaburaki (1922a: 1) wrote: "... the species described by Stimpson (75) under the name of *Planaria badia* from Loo Choo and *Pl. cinerea* from Ohshima — both species stand in conjunction with *Pl. gonocephala* and have not been considered in this paper because of their decidedly meagre descriptions."

In Okinawa Island and Amani-Ôshima Island in the Southwest Islands of Japan, 2 *Dugesia* species are distributed. They are: *Dugesia japonica* Ichikawa et Kawakatsu, 1964, and *Dugesia ryukyuensis* Kawakatsu, 1976. Cf. Kawakatsu, Oki, Tamura, Takai, Timoshkin & Porfirjeva, 1993; Kawakatsu, Oki & Tamura, 1995; Tamura, Oki & Kawakatsu, 1995).

Family **Planariidae Stimpson, 1857**
Genus ***Phagocata* Leidy, 1847**

***Phagocata vivida* (Ijima et Kaburaki, 1916)**

Planaria vivida n. sp.: Ijima & Kaburaki, 1916: 163-165, figs. 16-17. Loc. "Nikko; Usui mountains; hilly district in province Rikuchu, Mutsu, Iwashiro, etc." (=Nikkô, Tochigi Pref. and Usui Pass, Gunma Pref., Kantô Region; Aomori, Iwate and Fukushima Prefs., Tôhoku Region, Honshû.)

Planaria vivida: Kaburaki, 1922a: 21-31, figs. 8-9; pl. I, figs. 9-11.

Phagocata vivida: Okugawa, 1939: 156, 158.

Note. *Phagocata vivida* is common in cold-water habitats in mountainous and hilly regions in Japan; in Northern Japan it occurs in lowland areas. The principal papers on this species are: Kawakatsu, Teshirogi & Ishida, 1982; Kawakatsu, Timoshkin, Porfirjeva & Takai, 1994, 1995; Sluys, Kawakatsu & Timoshkin, 2001.

***Phagocata papillifera* (Ijima et Kaburaki, 1916)**

Planaria papillifera n. sp.: Ijima & Kaburaki, 1916: 162-163, figs. 14-15. Loc. "The species was first discovered in November, 1889, by Professor Shishido in an old unused well in Tokyo (Ichigaya Ward)." (=Ichigaya, Shinjuku-ku, Tôkyô, Kantô Region, Honshû.) Cocoons were also collected from the type locality.

Planaria papillifera: Kaburaki, 1922a: 17-21, figs. 6-7; pl. I, figs. 7-8.

Phagocata papillifera: Katô, 1943: 16. Cf. Kawakatsu, 1983.

Note. In 1964, the second locality of *Phagocata papillifera* was discovered: a driven well at Toyo'oka-chô, Mitsukaidô City, Ibraki Pref., Kantô Region, Honshû.

Cf. Kawakatsu, Sugino, Oki, Tamura & Horikoshi, 1984; Kawakatsu, 1991.

Species Inquirenda

***Phagocata coarctata* (Arndt, 1920)?**

Planaria pellucida n. sp.: Ijima & Kaburaki, 1916: 165-167, fig. 18. Loc. "Toyohara (Vladimirofka), Saghalin." (=Yuzhno Sakhalinsk, Sakhalin, Russia.)

Planaria pellucida: Kaburaki, 1922a: 31-32.

Note. Kenk (1974: 50) considered "*Planaria pellucida*" is possibly identical with *Phagocata coarctata*. The present taxonomic knowledge of *Ph. coarctata* is poor.

Genus ***Polycelis* Ehrenberg, 1831**
Subgenus ***Polycelis* Ehrenberg, 1831**

***Polycelis (Polycelis) sapporo* (Ijima et Kaburaki, 1916)**

Sorocelis sapporo n. sp.: Ijima & Kaburaki, 1916: 166-167, figs. 19-20. Loc. "The clear brook flowing through the grounds of Sapporo Agricultural College in Hokkaidô." (=The campus of Hokkaido University, Kita-ku, Sapporo, Hokkaidô.)

Sorocelis sapporo: Kaburaki, 1922a: 32-39, figs. 10-11; pl. I, fig. 12.

Sorocelis (presumably a *Polycelis*): Hyman, 1934: 11.

Polycelis (Polycelis) sapporo: Kenk, 1953: 172.

Cf. Kawakatsu, Yanagita, Teshirogi & Ichikawa, 1974; Kawakatsu & Timoshkin, 1998. See also Kawakatsu, Oki, Tamura, Yamamoto, Nishino, Timoshkin, Kuznedelov & Sluys, 1996.

Genus ***Seidlia* Zabusov, 1911**

***Seidlia auriculata* (Ijima et Kaburaki, 1916)**

Polycelis auriculata n. sp.: Ijima & Kaburaki, 1916: 167-169, figs. 21-22. Loc. "Nikko; Mt. Iwate in Prov. Rikuchu; Towada Lake in Prov. Mutsu; Ozawa in Prov. Ugo; Mt. Bantai in Prov. Iwashiro." (=Nikkô, Tochigi Pref., Kantô Region; Mt. Iwate-san, Iwate Pref., Lake Towada-ko in Aomori (and Akita) Prefs., and Mt. Bantai-san in Fukushima Pref., Tôhoku Region, Honshû.)

Polycelis auriculata: Kaburaki, 1922a: 39-43, figs. 12-13; pl. I, figs. 13-14.

Polycelis (Seidlia) auriculata: Kenk, 1953: 172.

Seidlia auriculata: Kawakatsu & Mitchell, 1998: 103.

Cf. Kawakatsu, Teshirogi & Ishida, 1980; Kawakatsu, Yamada, Murayama & Naoki, 1991; Kawakatsu & Mitchell, 1998. See also Kawakatsu, Oki, Tamura, Yamamoto, Nishino, Timoshkin, Kuznedelov & Sluys, 1996.

***Seidlia schmidtii* (Zabusov, 1916)**

Rjabuschinskya schmidtii n. sp.: Zabusov, 1916: 273-286, figs. 1-5. Loc. Lake of Kamchatka.

Polycelis karafto n. sp.: Ijima & Kaburaki, 1916: 169-171, figs. 23-24. Loc. "Toyohara (Vladimirofka), Saghalin." (=Yuzhno Sakhalinsk.) "Korsakoff, Saghalin." (=Korsakov, Sakhalin, Russia.)

Polycelis ijimai n. sp.: Kaburaki, 1917: 327-331, figs. 1-2. Loc. "... in einem Bächlein, welches in dem Shikotsuko See, Hokkaido." (=Lake Shikotsu-ko, Ishikari, Hokkaidô.)

Polycelis ijimai: Kaburaki, 1922a: 43-47, fig. 14; pl. I, fig. 15.

Polycelis karafto: Kaburaki, 1922a: 47-49, pl. I, fig. 16.

Seidlia schmidtii: Zabusova, 1936: 163-166.

Cf. Kawakatsu, 1964; Kawakatsu & Yamada, 1966; Kawakatsu & Timoshkin, 1998. See also Kawakatsu & Mitchell, 1998; Kawakatsu, Oki, Tamura, Yamamoto, Nishino, Timoshkin, Kuznedelov & Sluys, 1996.

Family **Dendrocoelidae Hallez, 1892**

Subfamily **Dendrocoelinae Hallez, 1892**

Genus ***Bdellocephala* de Man, 1875**

***Bdellocephala annandalei* Ijima et Kaburaki, 1916**

Bdellocephala annandalei n. sp.: Ijima & Kaburaki, 1916: 157-159, figs. 6-8. Loc. "Lake Biwa, on muddy bottom at a depth of 30-45 fathoms." (=Lake Biwa-ko, Shiga Pref., Kinki Region, Honshû.)

Bdellocephala annandalei: Kaburaki, 1922a: 3-8, figs. 1-2; pl. I, fig. 1.

Cf. Oki, Tamura, Nishino, Takai, Kuznedelov, Timoshkin & Kawakatsu, 1998; Kawakatsu, Sluys, Timoshkin, Naumova, Nishino & Takai, 2001. See also Kawakatsu, Oki, Tamura, Yamamoto, Nishino, Timoshkin, Kuznedelov & Sluys, 1996.

***Bdellocephala brunnea* Ijima et Kaburaki, 1916**

Bdellocephala brunnea n. sp.: Ijima & Kaburaki, 1916: 159-160, figs. 9-11. Loc. "Yamada and Kanazuchi in Prov. Rikuzen, Koiwai in Prov. Rikuchu and Inawashiro in Prov. Iwashiro." (=Yamada in Sendai City and Kanazuchi (?) in Miyagi Pref.; Koiwai Farm, Shizukuishi-chô, Iwate-gun, Iwate Pref.; Lake Inawashiro-ko, Fukushima Pref., Tôhoku Region, Honshû.)

Bdellocephala brunnea: Kaburaki, 1922a: 8-12, figs. 3-4; pl. I, fig. 2. A new locality, Kyôto, Kinki Region, Honshû, was added.

Cf. Teshirogi, Sasaki & Kawakatsu, 1981; Kawakatsu, Sluys, Timoshkin, Naumova, Nishino & Takai, 2001. See also Kawakatsu, Oki, Tamura, Yamamoto, Nishino, Timoshkin, Kuznedelov & Sluys, 1996.

Explanation of Plate I (Kaburaki, 1922a)

See the second color plate at the end of this web article.

In this explanation, the latest scientific name is used for each species. According to the original author, figures with asterisk marks were drawn by the late Professor Ijima.

Fig. 1. *Bdellocephala annandalei* Ijima et Kaburaki, 1916. (Natural size).

Fig. 2.* *Bdellocephala brunnea* Ijima et Kaburaki, 1916. (ca. natural size).

Fig. 3.* *Dugesia japonica* Ichikawa et Kawakatsu, 1964. ($\times 2.5$). Fig. 4.* Do. ($\times 2.5$). Fig. 5.* Do. Stationary animal ($\times 3$). Fig. 6.* Do. ($\times 3$).

Fig. 7.* *Phagocata papillifera* (Ijima et Kaburaki, 1916). (ca. natural size). Fig. 8. Do. ($\times 5$).

Fig. 9.* *Phagocata vivida* (Ijima et Kaburaki, 1916). ($\times 4$). Fig. 10.* Do. ($\times 3$). Fig. 11.* Do. ($\times 3$).

Fig. 12. *Polycelis (Polycelis) sapporo* (Ijima et Kaburaki, 1916). ($\times 4$).

Fig. 13.* *Seidlia auriculata* (Ijima et Kaburaki, 1916). ($\times 5$). Fig. 14.* Do. ($\times 3$).

Fig. 15. *Seidlia schmidtii* (Zabusov, 1916). ($\times 4$). Fig. 16. Do. ($\times 5$).

References (Paludicola)

- Arndt, W., 1920. Untersuchungen an Bachtricliden: Ein Beitrag zur Kenntnis der Paludicolen Korsikas, Rumäniens und Sibiriens, 2 pages. Breslau.
- Ball, I. R., 1974. A contribution to the phylogeny and biogeography of the freshwater triclads (Platyhelminthes: Turbellaria). In: Riser, N. W. & M. P. Morse (eds.), Libbie H. Hyman Memorial Volume — Biology of the Turbellaria, pp. 339-401. McGraw-Hill Book Co., New York, etc.
- Dugès, A., 1830. Aperçu de quelques observations nouvelles sur les Planaires et plusieurs genres voisins. Ann. Sci. Natur., 21: 72-91 + pl. 2.
- Ehrenberg, C. G., 1831. See 'Taxonomic Categories....'
- Girard, C., 1850. A brief account of the fresh water species of planariae inhabiting the United States. Proc. Boston Soc. Nat. Hist., 3: 264-265.
- Hallez, P., 1892. See 'Taxonomic Categories....'
- Hyman, L. H., 1934. Report on triclad Turbellaria from Indian Tibet. Mem. Conn. Acad., 10, Art. II: 5-12 + pls. I-II.
- Ichikawa, A. & Kawakatsu, M., 1964. A new freshwater planarian, *Dugesia japonica*, commonly but erroneously known as *Dugesia goonocephala* (Dugès). Annot. Zool. Japon., 37: 185-194.
- Ijima, I. & Kaburaki, T., 1916. See 'Maricola.'
- Kaburaki, T., 1917. See 'Maricola.'
- Kaburaki, T., 1922a. See 'Introduction.'
- Katô, K., 1943. On Japanese freshwater planarians. Botany & Zoology, Tôkyô, 11 (8): 628-630. (In Japanese.) Cf. Kawakatsu (1983).
- Kawakatsu, M., 1964. Studies on the taxonomy and morphology of the Japanese freshwater planarian, *Polycelis schmidti* (Zabusov). Annot. Zool. Japon., 37: 174-184.
- Kawakatsu, M., 1983. A commentary on the late Dr. K. Katô's 1943 paper in Japanese including the original description of *Dugesia izuensis* (Turbellaria, Tricladida, Paludicola), with its republication. Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô), (9): 1-8.
- Kawakatsu, M., 1991. Entry in the Japanese Red Data Book of Endangered Species. In: Environmental Agency of the Prime Minister's Office (ed.), The Japanese Endangered Species, Invertebrates Other than Insects, pp. 232, 241, 249, 259. The Research Center of Wild Animals and Plants in Japan, Tôkyô. (In Japanese.)
- Kawakatsu, M. & Mitchell, R. W., 1998. Redescription of a North American freshwater Planarian, *Seidlia remota* (Smith, 1988), with taxonomic notes on *Seidlia* and *Polycelis* species from the Far East and Central Asia (Turbellaria, Seriata, Tricladida, Paludicola). Bull. Fuji Women's College, (36), II: 95-110.
- Kawakatsu, M., Oki, I. & Tamura, S., 1995. Taxonomy and geographical distribution of *Dugesia japonica* and *D. ryukyensis* in the Far East. Hydrobiologia, 305: 55-61.
- Kawakatsu, M., Oki, I., Tamura, S. & Sugino, H., 1976. Studies on the morphology, karyology and taxonomy of the Japanese freshwater planarian *Dugesia japonica* Ichikawa et Kawakatsu, with a description of a new subspecies, *Dugesia japonica ryukyensis* subsp. nov. Bull. Fuji Women's College, (14), II: 81-126.
- Kawakatsu, M., Oki, I., Tamura, S., Takai, M., Timoshkin, O. A. & Porfirjeva, N. A., 1993. Preprint of papers given at the Seventh International Symposium on the Turbellaria, June 17-22, 1993, Åbo, Finland. Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô), Japan, (25): 1-20.
- Kawakatsu, M., Oki, I., Tamura, S., Takai, M., Yamamoto, K., Nishino, M., Timoshkin, O. A., Kuznedelov, K. D. & Sluys, R., 1996. Preprint of papers given at the Eighth International Symposium of the Biology of the Turbellaria, Brisbane, Australia, August 19-23, 1996. Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô), Japan, (27): 1-16.
- Kawakatsu, M., Sluys, R., Timoshkin, O. A., Naumova, T. V., Nishino, M. & Takai, M., 2001. Redescription of Japanese *Bdellocephala annandalei* from Lake Biwa-ko with comparative redescription of the Far Eastern and Kamchatkan *Bdellocephala* species (Tricladida, Paludicola). Belg. Jour. Zool., 131 (Supplement 1): 205-211.
- Kawakatsu, M., Sugino, H., Oki, I., Tamura, S. & Horikoshi, I., 1984. Redescription of *Phagocata papillifera* (Ijima et Kaburaki, 1916), a subterranean planarian from Central Japan, with a comparative description of karyotypes of this species and another Japanese subterranean species *Phagocata suginoi* Kawakatsu, 1974 (Turbellaria, Tricladida, Paludicola). Bull. Fuji Women's College, (22), II: 79-104.
- Kawakatsu, M., Tamura, S., Takai, M., Yamamoto, K., Ueno, R. & Oki, I., 1993. The first record of occurrence of a naturalized population of *Dugesia tigrina* (Girard, 1850) at Nagasaki, Kyûshû, Japan (Turbellaria, Tricladida, Paludicola). Bull. Biogeogr. Soc. Jap., 48: 28-34.

- Kawakatsu, M., Teshirogi, W. & Ishida, S., 1980. Morphological variation of the copulatory apparatus of a freshwater planarian, *Polycelis (Seidlia) auriculata* Ijima et Kaburaki, collected from five localities in the Tôhoku Region, Honshû, Japan. *Sci. Rep. Hirosaki Univ.*, 27 (2): 130-146.
- Kawakatsu, M., Teshirogi, W. & Ishida, S., 1982. Morphology of *Phagocata vivida* (Ijima et Kaburaki, 1916) with supernumerary eyes collected from Mt. Iwaki-san in Aomori Prefecture, Tôhoku Region, Honshû, Japan. *Sci. Rep. Hirosaki Univ.*, 29: 30-46.
- Kawakatsu, M. & Timoshkin, O. A., 1998. The geographical distribution of *Polycelis (Polycelis) sapporo* and *Seidlia schmidti* in the Far East. *Hydrobiologia*, 383: 307-313.
- Kawakatsu, M., Timoshkin, O. A., Porfirjeva, N. A. & Takai, M., 1994. Taxonomic notes on *Phagocata vivida* (Ijima et Kaburaki, 1916) from South Korea and Primorskiy, Russia (Turbellaria: Tricladida: Paludicola). *Bull. Biogeogr. Soc. Japan*, 49: 1-12.
- Kawakatsu, M., Timoshkin, O. A., Porfirjeva, N. A. & Takai, M., 1995. Geographical distribution of *Phagocata vivida* in the Far East. *Hydrobiologia*, 305: 63-70.
- Kawakatsu, M. & Yamada, T., 1966. Additional studies on the morphology of *Polycelis schmidti* (Zabusov), with remarks on distribution. *Bull. Biogeogr. Soc. Japan*, 24: 1-8.
- Kawakatsu, M., Yamada, T., Murayama, H. & Naoki, Y., 1991. Geographical distribution of *Polycelis (Seidlia) auriculata* in Japan. *Hydrobiologia*, 227: 355-363.
- Kawakatsu, M., Yanagita, Y., Teshirogi, W. & Ichikawa, A., 1974. Studies on the taxonomy and morphology of the Japanese freshwater planarian, *Polycelis sapporo* (Ijima et Kaburaki). *Annot. Zool. Japon.*, 47: 239-260.
- Kenk, R., 1953. The fresh-water Triclad (Turbellaria) of Alaska. *Proc. U. S. Nat. Mus.*, 103 (3322) : 163-186 + pls. 6-8.
- Kenk, R., 1974. Index of the genera and species of the freshwater Triclad (Turbellaria) of the world. *Smith. Contrib. Zool.*, (183): i-ii + 1-90.
- Kenk, R., 1989. Revised list of the North American freshwater planarians (Platyhelminthes: Tricladida: Paludicola). *Smith. Contrib. Zool.*, (476): i-iii + 1-10.
- Leidy, J., 1847. Description and anatomy of a new and curious sub-genus of *Planaria*. *Proc. Acad. Nat. Sci. Philad.*, 3: 248-251.
- Man, J. G. de, 1875. Eerste bijdrage tot de Kennis der nederlandsche Zoetwater-Turbellarien, benevens eene beschrijving van nieuwe soorten. *Tijdschr. Nederl. Dierkund. Vereen.*, 1: 108-122 + pls. III-V.
- Oki, I., Tamura, S., Nishino, M., Takai, M., Kuznedelov, K. D., Timoshkin, O. A. & Kawakatsu, M., 1998. Chromosomes of *Phagocata kawakatsui* and *Bdellocephala annandalei* from Lake Biwa-ko in Honshû, Central Japan. *Hydrobiologia*, 383: 315-320.
- Okugawa, K. I., 1939. Probursalia (Tricladida-Paludicola) of Manchoukuo. *Annot. Zool. Japon.*, 18: 155-165 + pl. 7.
- Sluys, R., Kawakatsu, M. & Timoshkin, O. A., 2001. Taxonomic redescription of *Phagocata sibirica* and comparison with *Phagocata vivida* (Tricladida, Paludicola). *Belg. Jour. Zool. (Supplement 1)*: 193-199.
- Stimpson, W., 1857. Prodromus descriptionis animalium evertibratorum quae in expeditione ad Oceanum Pacificum septentrionalem a Republica Federata missa, Johanne Rodgers duce, observavit et descripsit, I: Turbellaria Dendrocoela. *Proc. Acad. Nat. Sci. Philad.*, 9: 19-31.
- Tamura, S., Oki, I. & Kawakatsu, M., 1995. A review of chromosomal variation in *Dugesia japonica* and *D. ryukyensis* in the Far East. *Hydrobiologia*, 305: 79-84.
- Teshirogi, W., Sasaki, S.-I. & Kawakatsu, M., 1981. Freshwater planarians from Lake Usoriyama-ko and its lake-side area, the Shimokita Peninsula, in North Japan. *Sci. Rep. Hirosaki Univ.*, 28 (2): 84-96.
- Zabusov, I. P. (=Sabussow, H.; Zabussoff, H.), 1911. Izsliedovaniia po morfologii i sistematikie planarii ozera Baikala, I: Rod *Soroceles* Grube. *Trudy Obshch. Estestvoisp. Imper. Kazan. Univ.*, 43 (4): 1-422 + 1-8 + 1-2 + pls. I-XI. (In Russian, with German summary.)
- Zabusov, I. P., 1916. *Rjabuschinskya schmidti* n. g. n. sp., novyi vid i rod Tricladida Paludicola iz' Kamchatki. *Russ. Zool. Zhur.*, Saratov, 1: 273-286. (In Russian, with French summary.)
- Zabusova, Z. I. (=Sabussow, Z.; Sabussowa, Z.; Zabusova-Zhdanova, Z. I.), 1936. Planarii Kamchatki. *Trudy Obshch. Estestvoisp. Kazanskom Univ.*, 54 (4): 141-174. (In Russian, with French summary.)

III. TERRICOLA: Land Planarians

A List of Known Species from Japan Described in Kaburaki's 1922 (c) Paper, with additional bipaliid species reported after the 1980s*

*Only a concise synonymy and the type locality for each species will be given in this section. Cf. Ogren & Kawakatsu, 1987, 1988a, b, 1991; Ogren, Kawakatsu & Froehlich, 1997, 1998; Kawakatsu, Ogren & Froehlich, 1998). Two species from Taiwan are also included.

In recent years, the taxonomic revision of the family Bipaliidae — approximately 160 species are now known — based upon genital anatomy is now in progress. The family now consists of 3 genera: *Bipalium* Stimpson, 1857 (ca. 133 species), *Novibipalium* Kawakatsu, Ogren et Froehlich, 1998 (4 species), and *Humberium* Ogren et Sluys, 2001 (23 species).

There are many uncertain species originally described on the basis of external features alone and assigned to the genus *Bipalium* s. lat. Such species should be classified under a new collective group. In this web article, these uncertain species found in Japan are tentatively placed in 'A New Collective Group': *Bipalium?*

Family **Bipaliidae Stimpson, 1857**

Genus ***Bipalium* Stimpson, 1857**

***Bipalium fuscatum* Stimpson, 1857**

Bipalium fuscatum n. sp.: Stimpson, 1857: 31. "Hab. prope urbem Japonicam "Simoda" sub folis putridis." (= Shimoda City, Izu Peninsula, Shizuoka Pref., Chûbu Region, Honshû.)

Placocephalus fuscatus (in part): Kaburaki, 1922c: 34-38, figs. 17-18; pl. I, figs. 17-19. Loc. "Common in Japanese territories."

Bipalium fuscatum: Kawakatsu, Ogren & Froehlich, 1998: 84-85, figs. 1-2. Redescription.

Note. Kaburaki's (1922c) redescription of "*Placocephalus fuscatus*" includes descriptions of 2 species, i.e., *Bipalium fuscatum* Stimpson, 1857, and *Novibipalium falsifuscatum* Kawakatsu, Ogren et Froehlich, 1998.

Cf. Kawakatsu, 1991; Kawakatsu, Ogren & Froehlich, 1998.

***Bipalium fuscolineatum* Kaburaki, 1922**

Bipalium fuscolineatum n. sp.: Kaburaki, 1922c: 19-22, fig. 9; pl. I, figs. 4-5. Loc. "Nikko." (=Nikkô City, Tochigi Pref., Kantô Region, Honshû.)

***Bipalium glaucum* (Kaburaki, 1922)**

Placocephalus glaucus n. sp.: Kaburaki, 1922c: 38-41, figs. 20-21; pl. I, figs. 20-21. Loc. "Yoshino." (=Yoshino-chô, Yoshino-gun, Nara Pref., Kinki Region, Honshû.)

Bipalium glaucum: Kawakatsu, 1987: 1.

***Bipalium hilgendorfi* (von Graff, 1899)**

Perocephalus hilgendorfi n. sp.: von Graff, 1899: 224, fig. 70; 238, fig. 82; 415; taf. X, figs. 31-33; taf. XLIII, figs. 7-8. Loc. "Yeddo, Japan." (=Tôkyô, Kantô Region, Honshû.)

Bipalium hilgendorfi: Kaburaki, 1922c: 22-26, figs. 10-11; pl. I, fig. 6. Loc. "Takao, near Tokyo." (=Takao, Hachiôji City, Tôkyô.)

Bipalium hilgendorfi: Kawakatsu & Kawakatsu, 1991: 7-23, figs. 1-7. Redescription. Loc. Sapporo, Hokkaidô.

***Bipalium kewense* Moseley, 1878**

Bipalium kewense n. sp.: Moseley, 1878: 238-239. Loc. "...the various hothouses at Kew Gardens." (=Royal Botanical Gardens, Kew, England, U. K.)

Placocephalus virgatus: Kaburaki, 1922c: 42-43, fig. 22; pl. I, fig. 18. Loc. "Taihoku, Formosa." (=Taipei, Taiwan.) Cf. Winsor, 1983: 80, table 3.

Note. For the morphology and genital anatomy of *B. kewense*, see Winsor, 1983; Kawakatsu, 1985.

***Bipalium kisoense* Kaburaki, 1922**

Bipalium kisoensis n. sp.: Kaburaki, 1922c: 16-19, figs. 7-8; pl. I, figs. 7-8. Loc. "Kiso." (=Kiso district, Nagano Pref., Chûbu Region, Honshû.)

Bipalium kisoense: Kawakatsu, 1987: 2.

***Bipalium monolineatum* Kaburaki, 1922**

Bipalium monolineatum n. sp.: Kaburaki, 1922c: 27-30, figs. 13-14; pl. I, fig. 14. Loc. “Chionin, a Buddhist temple, in Kyoto, and also at Mt. Hiyei.” (=The precincts of the Chion-in Temple, the eastern part of Kyôto City, and Mt. Hi’ei-zan located in the NE of the City, Kyôto Pref., Kinki Region, Honshû.)

***Bipalium nobile* Kawakatsu et Makino, 1982**

Bipalium nobile n. sp.: Kawakatsu, Makino & Shirasawa, 1982: 236-261, figs. 1-9. Loc. Kitanomaru Park, Chiyoda-ku, Tôkyô, Kantô Region, Honshû.

Cf. Kawakatsu, Murayama, Yamamoto & Yoneyama, 1998; Murayama & Kawakatsu, 1999; Kawakatsu, Ogren, Froehlich & Murayama, 2001. See also the following web article.
<http://www.ct.sakura.ne.jp/~gen-yu/lp/shibukitsubo/lp.html>

***Bipalium ochroleucum* Kaburaki, 1922**

Bipalium ochroleucum n. sp.: Kaburaki, 1922c: 13-16, figs. 5-6; pl. I, fig. 13. Loc. “Nara.” (=Nara City, Nara Pref., Kinki Region, Honshû.)

A New Collective Group (genus)*

*The description of this ‘new collective group’ with a list of species will be given in an appropriate taxonomic paper by Kawakatsu, Ogren, Froehlich & Sasaki (Ms.). In this section, a ‘new collective group’ is tentatively shown as “*Bipalium?*.”

***Bipalium?* *fulvum* (Kaburaki, 1922)**

Perocephalus fulvus n. sp.: Kaburaki, 1922c: 7-8; pl. I, fig. 3. Loc. “Nikko.” (=Nikkô, Tochigi Pref., Kantô Region, Honshû.)

Bipalium fulvum: Kawakatsu, 1987: 1.

***Bipalium?* *fuscocephalum* Kaburaki, 1922**

Bipalium fuscocephalum n. sp.: Kaburaki, 1922c: 26, fig. 12; pl. I, fig. 7. Loc. “Innai in Prov. Ugo.” (=In’nai City, Akita Pref., Tôhoku Region, Honshû.)

***Bipalium?* *maculatum* Stimpson, 1857 Species inquirenda**

Bipalium maculatum n. sp.: Stimpson, 1857: 31. “Hab. ad insulam “Ousima;” sub folis et lignis putridis in humidis sub folis.” (=Amami-Ôshima Island, the Satsunan Islands.)

Bipalium macuratum: Kaburaki, 1922c: 31.

***Bipalium?* *multilineatum* Makino et Shirasawa, 1983**

Bipalium multilineatum n. sp.: Makino & Shirasawa, 1983: 69-83, figs. 1B, 4A-B, 5A-D. Loc. Hino City and Tôkyô; Narashino City, Chiba Pref., Kantô Region, Honshû.

Cf. Kawakatsu, Murayama, Yamamoto & Yoneyama, 1998; Murayama & Kawakatsu, 1999; Kawakatsu, Ogren, Froehlich & Murayama, 2000; Yamamoto, Takai, Ogren & Kawakatsu, 2001; Kubota, Yamamoto & Kawakatsu, 2001. See also the web article cited in the paragraph of *Bipalium nobile*.

Note. Since the genital anatomy of this species is not known, its taxonomic position is uncertain.

***Bipalium?* *ruteofulvum* Kaburaki, 1922**

Bipalium ruteofulvum n. sp.: Kaburaki, 1922c: 12-13, fig. 4; pl. I, fig. 10. Loc. “Taihoku in Formosa.” (=Taipei, Taiwan.)

***Bipalium?* *trilineatum* Stimpson, 1857 Species inquirenda**

Bipalium trilineatum n. sp.: Stimpson, 1857: 31. “Hab. in collibus insulae “Jesso;” inter folia putrida.” (=Hakodate, Hokkaidô.)

Bipalium trilineatum: Kaburaki, 1922c: 33-34, fig. 16; pl. I, fig. 16. Loc. “Mt. Hanaoka, near Kumamoto, in Prov. Higo.” (=Kumamoto City, Kumamoto Pref., Kyûshû.)

Note. The taxonomic position of this species inquirenda was discussed by Kawakatsu (cf. Kawakatsu, Makino & Shirasawa, 1982: 256-257). He concluded as follows:

“In conclusion, it must be emphasized that Stimpson’s *B. trilineatum* cannot be identified at present from his description alone. Unless sexually mature specimens conforming to his description are collected from the vicinity of the type-locality and redescribed, the confirmation of this species inquirenda is impossible....”

***Bipalium?* *virgatum* Stimpson, 1857 Species inquirenda**

Bipalium virgatum n. sp.: Stimpson, 1857: 30-31. “Hab. ad insulam “Loo Choo;” inter lapillos et folia patrida.” (=Okinawa Island, the Ryûkyû Islands.)

[nec] *Placocephalus virgatus*: Kaburaki, 1922c.

Note. See *Bipalium kewense* Moseley, 1878.

Genus *Novibipalium* Kawakatsu, Ogren et Froehlich, 1988

***Novibipalium falsifuscatum* Kawakatsu, Ogren et Froehlich, 1998**

Placocephalus fuscatus (in part): Kaburaki, 1922c: 34-38, fig. 19. Loc. Japan.

Novibipalium falsifuscatum n. sp.: Kawakatsu, Ogren et Froehlich, 1998: 86-87, fig. 4. Loc. Central Japan.

Note. See *Bipalium fuscatum* Stimpson, 1857. Cf. Kawakatsu, 1991; Kawakatsu, Ogren & Froehlich, 1998.

***Novibipalium trifuscostriatum* (Kaburaki, 1922)**

Bipalium trifuscostriatum n. sp.: Kaburaki, 1922c: 31-33, fig. 15; pl. I, fig. 15. Loc. "Sakata, Prov. Ohmi, and the Mii Temple in Ôtsu." (=Sakata-gun? or Sakamoto? and the precincts of the Mî-dera Temple, Ôtsu City, Shiga Pref., Kinki Region, Honshû.)

Bipalium trifuscostriatum: Kawakatsu, 1991: 39-50, figs. 1-4. Redescription. Loc. Suma-ku, Kôbe City, Hyôgo Pref., Kinki Region, Honshû.

Novibipalium trifuscostriatum: Kawakatsu, Ogren & Froehlich, 1998: 88-89.

Note. Kaburaki's (1922c) original description of "*B. trifuscostriatum*" was given for non-sexual specimens; its external appearance is, however, described well. Kawakatsu's (1991) redescription is based upon newly identified sexual specimens collected from a different locality. The distance between Kaburaki's (op. cit.) type locality and the new locality is less than 75 km.

***Novibipalium venosum* (Kaburaki, 1922)**

Bipalium venosum n. sp.: Kaburaki, 1922c: 8-12, figs. 2-3; pl. I, fig. 12. Loc. "The Mii Temple in Ôtsu." See *Novibipalium trifuscostriatum*.

Novibipalium venosum: Kawakatsu, Ogren & Froehlich, 1998: 89.

Note. New samples were not examined.

Family **Rhynchodemidae von Graff, 1896**

Subfamily **Rhynchodeminae Corrêa, 1947**

Genus ***Platydemus* von Graff, 1896**

***Platydemus manokwari* de Beauchamp, 1962**

Platydemus manokwari n. sp.: de Beauchamp, 1962: 609-615, fig. 1. Loc. Station de Manokwari, Irian Jaya, New Guinea, Indonesia.

Platydemus manokwari: Kawakatsu, Oki, Tamura, Itô, Nagai, Ogura, Shimabukuro, Ichinohe, Katsumata & Kaneda, 1993: 5-14, figs. 1-6. Loc. The Ryûkyû Islands.

Platydemus manokwari: Kawakatsu, Okochi, Sato, Ohbayashi, Kitagawa & Totani, 1999: 2-5, figs. 1A, 2J-K. Loc. Chichijima Island in the Ogasawara Islands.

Note. For the other data (taxonomy, ecology and karyology) on this species, see 'References' of the above-cited articles.

Genus ***Rhynchodemus* Leidy, 1851**

***Rhynchodemus ijimai* Kaburaki, 1922**

Rhynchodemus ijimai n. sp.: Kaburaki, 1922c: 43-46, fig. 23; pl. I, figs. 19-20. Loc. "Nikko and its vicinity." (=Nikkô City, Tochigi Pref., Kantô Region, Honshû.)

Subfamily **Microplaninae Pantin, 1953**

Genus ***Microplana* Vejdovský, 1890**

***Microplana? ruteocephala* Kaburaki, 1922** Species inquirenda

Microplana ruteocephala n. sp.: Kaburaki, 1922c: 46-47; pl. I, figs. 21-23. Loc. "Nikko." (=Nikkô City, Tochigi Pref., Kantô Region, Honshû.)

Note. No record of occurrence of this species during the past 80 years; its taxonomy is uncertain.

Family **Geoplanidae Stimpson, 1857**
Subfamily **Caenoplaninae Ogren et Kawakatsu, 1991**
Genus ***Artioposthia* von Graff, 1896**

***Artioposthia japonica* Kaburaki, 1922**

Artioposthia japonica n. sp.: Kaburaki, 1922c: 3-7, fig. 1; pl. I, fig. 2. Loc. "Nikko, at Itaya in Prov. Iwashiro and in the neighborhoods of Tokyo and Kyoto." (=Nikkô City, Tochigi Pref., Kantô Region; Itaya in Yonezawa City, Yamagata Pref., Tôhoku Region; Tôkyô, Kantô Region; Kyôto, Kinki Region, Honshû).

Note. Redescription of this species based on new materials is necessary.

Genus ***Australopacifica* Ogren et Kawakatsu, 1991**

***Australopacifica bimaculata* (Kaburaki, 1922)** Species inquirenda

Geoplana bimaculata n. sp.: Kaburaki, 1922c: 2-3; pl. I, fig. 1. Loc. "Nikko." See foregoing species.

Note. No sexual specimen has been studied taxonomically.

***Australopacifica lapidicola* (Stimpson, 1857)** Species inquirenda

Geoplana lapidicola n. sp.: Stimpson, 1857: 30. "Hab. ad insulam "Loo Choo," sub lapillis in sylvis." (=Okinawa Island in the Ryûkyû Islands.)

Note. No sexual specimen has been studied taxonomically.

Explanation of Plate I (Kaburaki, 1922c)

See the third color plate at the end of this web article.

In this explanation, the latest scientific name is used for each species. According to the original author, sketch figures with asterisk marks were drawn by the late Professor Ijima.

- Fig. 1.* *Australopacifica bimaculata* (Kaburaki, 1922). Dorsal view of a living specimen ($\times 2.5$).
Fig. 2.* *Artioposthia japonica* Kaburaki, 1922. Dorsal view of a living specimen ($\times 1.5$).
Fig. 3.* *Bipalium? fulvum* (Kaburaki, 1922). Dorsal view of a living specimen ($\times 5$).
Fig. 4. *Bipalium fuscolineatum* Kaburaki, 1922. Dorsal view of a creeping specimen (ca. $\times 2$). Fig. 5. Do. (ca. $\times 3$).
Fig. 6. *Bipalium hilgendorfi* (von Graff, 1899). Dorsal view of a living specimen (nearly natural size).
Fig. 7. *Bipalium? fuscocephalum* Kaburaki, 1922. Dorsal view of a living specimen ($\times 2$).
Fig. 8.* *Bipalium fuscum* Stimpson, 1857, or *Novibipalium falsifuscum* Kawakatsu, Ogren et Froehlich, 1998. Dorsal view of a living specimen (natural size). Fig. 9.* Do. Ventral view.
Fig. 10. *Bipalium? ruteofulvum* Kaburaki, 1922. Dorsal view of the preserved specimen (natural size).
Fig. 11. *Bipalium kisoense* Kaburaki, 1922. Dorsal view of the preserved specimen (natural size).
Fig. 12. *Novibipalium venosum* (Kaburaki, 1922). Dorsal view of a creeping specimen (natural size).
Fig. 13. *Bipalium ochroleucum* Kaburaki, 1922. Dorsal view of the preserved specimen ($\times 1.2$).
Fig. 14. *Bipalium monolineatum* Kaburaki, 1922. Dorsal view of a living specimen (ca. $\times 2$).
Fig. 15. *Novibipalium trifuscostratum* Kaburaki, 1922. Dorsal view of a creeping specimen (natural size).
Fig. 16. *Bipalium? trilineatum* Stimpson, 1857. Dorsal view of a living specimen (natural size). The correct scientific name of the animal sketched by the original author is uncertain.
Fig. 17. *Bipalium glaucum* (Kaburaki, 1922). Dorsal view of a living specimen (natural size).
Fig. 18. *Bipalium kewense* Moseley, 1878. Dorsal view of the prepharyngeal region of the preserved specimen (natural size).
Fig. 19.* *Rhynchodemus ijimai* Kaburaki, 1922. Dorsal view of a creeping specimen (ca. $\times 3$). Fig. 20. Do. Ventral view of the anterior part of the body showing a depressed part (ca. $\times 20$).
Fig. 21.* *Microplana? ruteocephala* Kaburaki, 1922. Dorsal view of a creeping specimen ($\times 3$). Fig. 22.* Do. Lateral view of the anterior part of the body. Fig. 23.* Do. Dorsal view of the body.

References (Terricola)

Beauchamp, P. de, 1962. *Platydemus manokwari* n. sp., planaire terrestres de Nouvelle-Guinée Hollandaise. Bull.

- Soc. Zool. France, 87 (5-6): 609-615.
- Corrêa, D. D., 1947. A primeira *Dolichoplana* (Tricladida Terricola) do Brasil. Bol. Fac. Filos. Ciênc. Letra. Univ. São Paulo, Zoologia, (12): 57-81 (+pls. I-III).
- Graff, L. von, 1896. Über das System und die geographische Verbreitung der Landplanarien. Verhandl. Deutsch. Zool. Gesellschaft, 6: 41-75.
- Graff, L. von, 1899. Monographie der Turbellarien. II. Tricladida Terricola (Landplanarien). Pp. i-ixv + 1-574; Atlas von Achtundfunfzig Tafeln zur Monographie der Turbellarien. II. Tricladida Terricolen (Landplanarien). Pls. I-LVIII. Verlag von Wilhelm Engelmann, Leipzig.
- Kaburaki, T., 1922c. See 'Introduction.'
- Kawakatsu, M., 1985. A note on the morphology of *Bipalium kewense* Moseley, 1878, and *Bipalium adventitium* Hyman, 1943 (Turbellaria, Tricladida, Terricola). Bull. Fuji Women's College, (23), II: 85-100.
- Kawakatsu, M., 1987. Emendations of scientific names of land planarians: genus *Bipalium* Stimpson, 1858. Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô), Japan, (17): 1-2.
- Kawakatsu, M., 1991. Redescription of *Bipalium trifuscostriatum* Kaburaki, 1922, a land planarian from the Kinki Region, Honshû, Japan (Turbellaria; Tricladida; Terricola). Bull. Biogeogr. Soc. Japan, 46: 39-52.
- Kawakatsu, M. & Kawakatsu, T., 1991. Redescription of *Bipalium hilgendorfi* (von Graff, 1899) (Turbellaria: Tricladida: Terricola), a land planarian from Sapporo, Hokkaido, Japan. Proc. Jap. Soc. Syst. Zool., (45): 7-23.
- Kawakatsu, M., Makino, N. & Shirasawa, Y., 1982. *Bipalium nobile* sp. nov. (Turbellaria, Tricladida, Terricola), a new land planarian from Tokyo. Annot. Zool. Japon., 55: 236-262.
- Kawakatsu, M., Murayama, H., Yamamoto, K. & Yoneyama, N., 1998. Distribution records of *Bipalium nobile* in Japan (Turbellaria, Tricladida, Serriata, Terricola). Shibukitsubo, (19): 25-32. (In Japanese, with English summary.)
- Kawakatsu, M., Ogren, R. E. & Froehlich, E. M., 1998. The taxonomic revision of several homonyms in the genus *Bipalium*, family Bipaliidae (Turbellaria, Seriata, Tricladida, Terricola). Bull. Fuji Women's College, (36), II: 83-93.
- Kawakatsu, M., Ogren R. E., Froehlich, E. M. & Murayama, H., 2001. On the places of origin of three, very large bipaliid land planarians from Japan (Turbellaria, Seriata, Tricladida, Terricola). Shibukitsubo, (22): 39-52.
- Kawakatsu, M., Ogren, R. E., Froehlich, E. M. & Sasaki, G.-Y., 2002 (Ms.). Additions and corrections of the previous land planarian indices of the world (Turbellaria, Seriata, Tricladida, Terricola). Additions and corrections of the previous land planarian indices of the world-10.
- Kawakatsu, M., Oki, I., Tamura, S., Itô, H., Nagai, Y., Ogura, K., Shimabukuro, S., Ichinohe, F., Katsumata, H. & Kaneda, M., 1993. An extensive occurrence of a land planarian, *Platydemus manokwari* de Beauchamp, 1962, in the Ryûkyû Islands, Japan (Turbellaria, Tricladida, Terricola). Biol. Inland Waters, Nara, 8: 5-14.
- Kawakatsu, M., Okochi, I., Sato, H., Ohbayashi, T., Kitagawa, K.-I & Totani, K., 1999. A preliminary report on land planarians (Turbellaria, Seriata, Tricladida, Terricola) and land Nemertine (Enopla, Hoplonemertea, Monostylifera) from the Ogasawara Islands. Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô). Japan, (32): 1-8.
- Kubota, S., Yamamoto, K. & Kawakatsu, M., 2001. First distributional record of three bipaliid species (Plathelminthes, Turbellaria, Tricladida) in Wakayama Prefecture, Honshu, Japan. Nankiseibutu, 43 (1): 6-10. (In Japanese, with English summary.)
- Leidy, J., 1851. Corrections and additions to former papers on helminthology published in the Proceedings of the Academy. Proc. Acad. Nat. Sci. Philad., 5: 284-289.
- Makino, N. & Shirasawa, Y., 1983. Morphological and ecological comparison with two new species of elongated-slender land planarians have several stripes and their new scientific names. [A comparative study on the morphology and ecology of *Bipalium nobile* and another land planarian species with several stripes, with reference to a new scientific name of the latter]. Bull. Tokyo Med. College, (9): 69-83. (In Japanese, with English summary.)
- Moseley, H. N., 1878. Description of a new species of land planarian from the hothouses at Kew Gardens. Ann. Mag. Nat. Hist., (5), 1: 237-239.
- Murayama, H. & Kawakatsu, M., 1999. New distribution records of *Bipalium nobile* in Nigata Prefecture, Honshû, Japan (Turbellaria, Tricladida, Seriata, Terricola). Shibukitsubo, (20): 39-42. (In Japanese, with English summary.)
- Ogren, R. E. & Kawakatsu, M., 1987. Index to the species of the genus *Bipalium* (Turbellaria, Tricladida, Terricola). Bull. Fuji Women's College, (25), II: 79-119.

- Ogren, R. E. & Kawakatsu, M., 1988a. Index to the species of the genus *Bipalium* (Turbellaria, Tricladida, Terricola): Additions and corrections. Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô), Japan, (19): 1-16.
- Ogren, R. E. & Kawakatsu, M., 1988b. Index to the species of the family Rhynchodemidae (Turbellaria, Tricladida, Terricola). Part I: Rhynchodeminae. Bull. Fuji Women's College, (26), II: 39-91.
- Ogren, R. E. & Kawakatsu, M., 1989. Index to the species of the family Rhynchodemidae (Turbellaria, Tricladida, Terricola). Part II: Microplaninae. Bull. Fuji Women's College, (27), II: 53-111.
- Ogren, R. E. & Kawakatsu, M., 1991. Index to the species of the family Geoplanidae (Turbellaria, Tricladida, Terricola). Part II: Caenoplaninae and Pematoplaninae. Bull. Fuji Women's College, (29), II: 25-102.
- Ogren, R. E., Kawakatsu, M. & Froehlich, E. M., 1997. Additions and corrections of the previous land planarian indices of the world (Turbellaria, Seriata, Tricladida, Terricola). Addendum IV. Geographic locus index: Bipaliidae; Rhynchodemidae (Rhynchodeminae; Microplaninae); Geoplanidae (Geoplaninae; Caenoplaninae; Pematoplaninae). Bull. Fuji Women's College, (35), II: 63-103.
- Ogren, R. E., Kawakatsu, M. & Froehlich, E. M., 1998. Additions and corrections of the previous land planarian indices of the world (Turbellaria, Seriata, Tricladida, Terricola). Addendum IV., etc. Errata. Occ. Publ., Biol. Lab. Fuji Women's College, Sapporo (Hokkaidô), Japan, (31): 1-4.
- Ogren, R. E., & Sluys, R., 2001. The genus *Humbertium* gen. nov., a new taxon of the land planarian family Bipaliidae (Tricladida, Terricola). Belg. Jour. Zool., 131 (Supplement 1): 201-204.
- Pantin, C. F. E., 1953. On the name of the ground fluke *Fasciola terrestris* O. F. Müller, on *Othelosoma symondsii* Gray, and on the genus *Amblyplana* von Graff. Jour. Linn. Soc. London, Zool., 42: 207-218 + pls. 41-43.
- Stimpson, W., 1857. See 'Paludicola.'
- Vejdovský, F., 1890. Note sur une nouvelle planaire terrestre *Microplana humicola* nov. gen., nov. sp. suivie d'une liste des Dendrocoeles observés jusqu'à présent en Bohême. Rev. Biol. Nord France, 2: 129-148 + pls. II-III.
- Winsor, L., 1983. A revision of the cosmopolitan land planarian *Bipalium kewense* Moseley, 1878 (Turbellaria: Tricladida: Terricola) Zool. Jour. Linnean Soc., 79: 61-100.
- Yamamoto, K., Takai, M., Ogren, R. E. & Kawakatsu, M., 2001. Chromosomes of bipaliid land planarians from the vicinity of Nagasaki in Kyûshû, Southern Japan (Platyhelminthes, Tricladida, Terricola). Belg. Jour. Zool., 131 (Supplement 1): 221-222.

Note. A complete list of the 'Land Planarian Indices Series' (Ogren & Kawakatsu, 1987-1992; Ogren, Kawakatsu & Froehlich, 1992-1999; Kawakatsu, Ogren & Froehlich, 2000; Kawakatsu, Ogren, Froehlich & Sasaki, 2001) can be seen in the following paper and web articles.

Kawakatsu, M. & Ogren, R. E., 1998. The Asian land planarian fauna Tricladida: Terricola. *Pedobiologia*, 42: 452-456. The References of this paper contain citations of the LP Indices Series published until the spring of 1998.

CD-ROM Introduction (tentative versions):

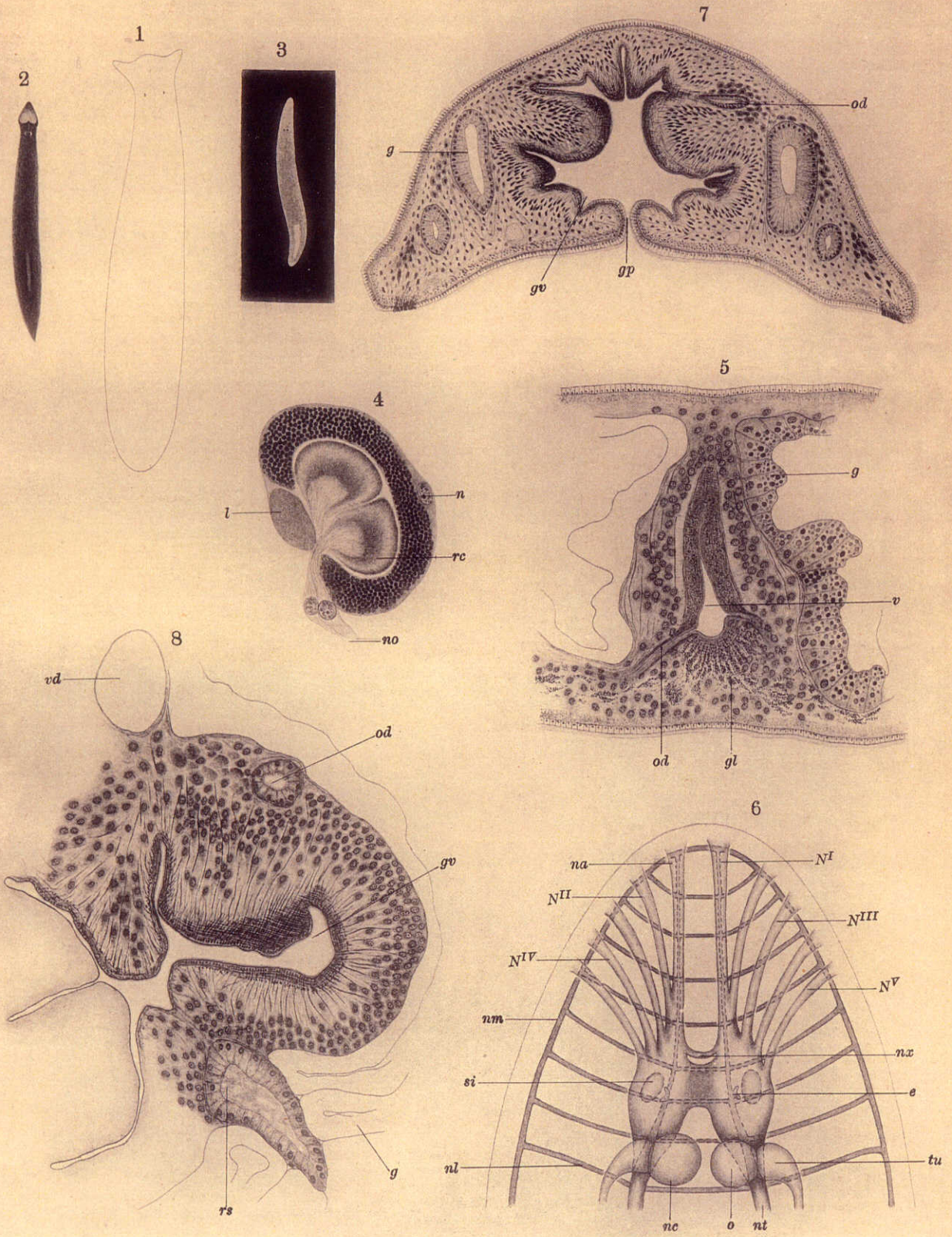
<http://www.ct.sakura.ne.jp/~gen-yu/pla/lst/lstintro.pdf>

<http://www.ct.sakura.ne.jp/~gen-yu/pla/lpindex/ixintro.html>

Acknowledgements

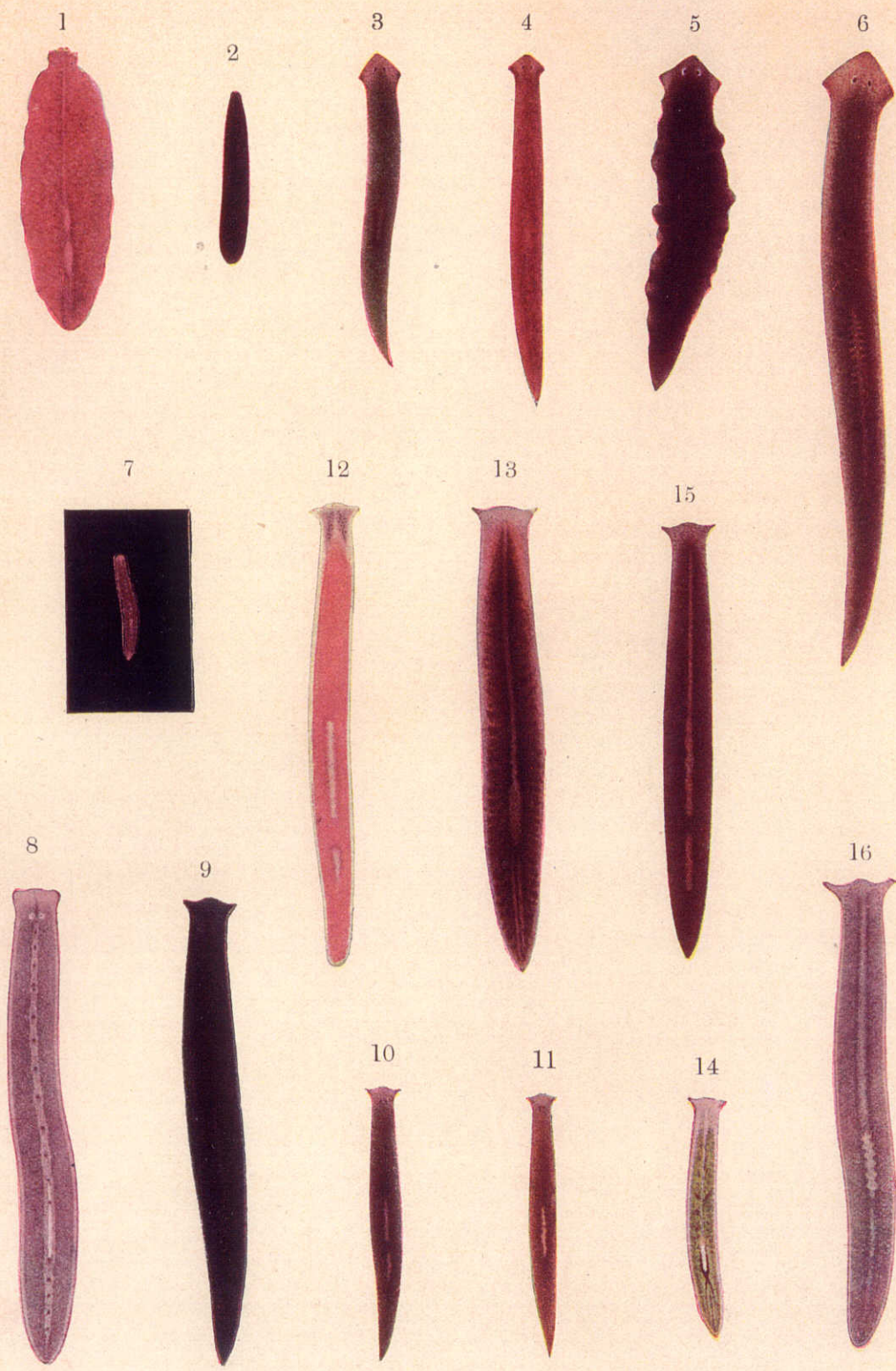
The authors are indebted to Dr. Robert W. Mitchell (Bandera, Texas, U.S.A.) and Dr. Robert E. Ogren (Kingston, Pennsylvania, U.S.A.) for their invaluable advice and careful reading of the final English draft of this web article.

On this occasion, Kawakatsu wishes to express his sincere thanks to these colleagues for our taxonomic discussions and their generous assistance, invaluable help, and kind collaboration during the past 35 productive years of turbellarian studies.



KABURAKI, del.

T. KABURAKI: Japanese Tricladida Maricola.



IJIMA et KABURAKI del.

T. KABURAKI: Japanese Freshwater Triclads.



IJIMA et KABURAKI del.

T. KABURAKI: Terrestrial Planarians from Japanese Territories.