HISTORY OF THE STUDY OF TURBELLARIA IN CHINA

PART 3. SUPPLEMENTARY NOTES ON
THE TURBELLARIOLOGY IN
THE PEOPLE'S REPUBLIC OF CHINA

by

MASAHARU KAWAKATSU and DE-ZENG LIU

INTRODUCTION

Since two previous publications in this series (KAWAKATSU & LUE, 1984; LUE & KAWAKATSU, 1986), KAWAKATSU has obtained additional references published by several Chinese turbellariologists. Especially, a most welcome addition to the literature on Chinese turbellarians is several Chinese papers published in the Mainland China (LEE, 1936; CHOW & KIANG, 1945; TU, 1949 a; TU & PO, 1959; HUANG & TU, 1956). The copies of these rare papers were sent to KAWAKATSU from the junior author (LIU), who is now carrying out researches on triclaid turbellarians from the northeastern area of China. Although the copies of two Chiness papers (TU, 1949b; TU & WEN, 1965) have not been obtained yet, we may suppose their contents from the other Chinese papers.

The purpose of this “Supplementary Notes” is to present a more detailed outline of Chinese turbellariology during the 1930’s to the 1960’s than the historical review that was given in the Part 2 of this series (cf. KAWAKATSU & LUE, 1984). In this account, some comments about erroneous scientific names found in Chinese literature will be given by KAWAKATSU from a modern taxonomic viewpoint of turbellarians.

As always, the names of Chinese persons and places are romanized according to a Wade's method except for some given in Roman letters by the original authors.

DURING THE 1930's

Studies on turbellarians in the Mainland China during the 1930’s were reviewed by KAWAKATSU & LUE (1984, pp. 105-107). PING’s (1931) records of unidentified freshwater planarians from Nanking, Chiang-Su Sheng, in the eastern part of China, were already referred to in the publication mentioned above. The following record of an unidentified Chinese land planarian from Nanking is also found in PING (op. cit., p. 179):

"... a land form, Placoccephalus, which is about 30 cm. in length, and often found in comparatively dry soil. This genus is characteristic of its broad flattened head, flattened body with rounded lateral margins and a dark median line on its dorsal surface in the anterior third of its body, and very slimy all over its body surface. When it is found, it is often covered with dirt due to the sticky substance it secretes. There seems to be only one species of this genus but without specific name (its specific name) has not been found out yet.”
The genus *Placocephalus* VON GRAFF, 1896, is a synonym of the genus *Bipalium* STIMPSON, 1858 (cf. OGRES & KAWAKATSU, 1987). Due to a brief description of *Bipalium* sp. (species of Nan-kung) cited above, KAWAKATSU cannot make any further taxonomic comment in detail upon PING's species.

LEE (1936) reported the occurrence of *Temnocephala semperi* WEBER, 1890, a ecosymbiotic trematocephalid of a freshwater crab, *Potamon* sp., at Foochow, Fukien Shêng in the southeastern area of China. His description, both in English and Chinese, is accompanied with 6 morphological and histological figures of the animal based upon numerous samples he examined. LEE (op. cit.) also described a new species of the polystomatid trematoda *Diplorchis nigromaculatus* LEE, 1936.

During the 1930's, TU (1934, 1938 a, b, 1939 a, b) published five English and German papers on the taxonomy and ecology of turbellarians, of which two were already mentioned by KAWAKATSU & LUE (1984, p. 106). In the rest of three German papers (1938 b, 1939 a, b), he discussed the distribution of 3 German freshwater planarians: “*Euplanaria gonocephala* (DUGÈS, 1830)”, occurring in the vicinity of Berlin; “*Jijimia (Polycelis) tenuis* (JJIMA)” and “*Polycelis nigra* (EHRENBERG)”, occurring in the vicinity of Berlin and the other six areas in Germany. The scientific names of animals he employed should be corrected as follows:

*Dugesia gonocephala* (DUGÈS, 1830). This is a European species. “*Euplanaria gonocephala* (DUGÈS)” from China (Peiching or Peiping or Peking) studied in his 1934 and 1938 (a) papers is *Dugesia japonica japonica* ICHIKAWA et KAWAKATSU, 1964.

*Polycelis tenuis* JJIMA, 1884. The late Dr. Isao JJIMA used his family name as JJIMA in his 1884 paper; later, in his 1887 paper, he used as JJIMA. The genus *Jijimia* BERGENDAL, 1896, is now classified as a synonym of the genus *Polycelis* EHRENBERG, 1831, or a subgenus of it. “*Jijimia*” is an error for *Jijimia*.

*Polycelis nigra* (MÜLLER, 1774). This species was originally described by MÜLLER (1774, p. 54) as *Fasciola nigra* n. sp. (in part). EHRENBERG (1831) transferred the species from *Fasciola* into his new genus *Polycelis* (cf. KENK, 1974, p. 56).

Studies on Chinese freshwater planarians by a Japanese zoologist, OKUGAWA (1939), were reviewed by KAWAKATSU & LUE (1984, p. 107).

**DURING THE 1940's**

TU's (1940) monumental work, a check list of turbellarians from Southeast Asiatic countries, and three papers by two Japanese zoologists (OKUGAWA, 1940; KATÔ, 1944) were reviewed in KAWAKATSU & LUE (1984, pp. 106-107).

In 1945, KIANG & CHOW, who were at the Biological Institute, National University of Chekiang, Kweichow, Hsi-Chiang Shêng, in the surotheastern area of China, reported on a lateral piece regeneration in “*Planaria gonocephala*” from China (in English).

TU (1949 a, b) published two science educational papers in Chinese. One of these is entitled “Flatworms and their reproduction” (translated by KAWAKATSU). It includes 5 sections, i. e., introduction, general morphology, sexual and asexual reproductions, seasonal change of reproduction and seasonal variation of the body size in “*Euplanaria gonocephala*” from China. The descriptions of the last 2 sections are undoubtedly based upon his 1938 (a) German paper. It must be noted that TU (1938 a) described as follows (p. 153):

“Die Bildung der Eikapsel findet bei dieser Art nicht im Atrium, sondern im Uterus statt” (see also figs. 3 and 4 on pages 151-152).
In his 1949 (a) Chinese paper, he used a term "Receptaculum seminis" not previous "Uterus". The present term of that organ is a copulatory bursa or bursa copulatoris. One of the functions of copulatory bursa seems to be the digestion of excess sperm (cf. HYMAN, 1951, p.157).

Tu's (1949 b) Chinese paper entitled "Invertebrate animals from the Kunming and its vicinity" (translated by KAWAKATSU) may include localities of "Euplanaria gonocephala". Kunming is located in Yün-Nan Shêng in the southwestern area of China.

**DURING THE 1950's**

KAWAKATSU & LUE (1984, pp.105-108) reviewed the turbellarian studies in China based upon two papers published by Japanese zoologists: KATÔ (1950) and OKUGAWA (1953). The latter is a check list of turbellarians from the Far East.

Frequencies of the occurrence of supernumerary eyes in "Planaria gonocephala" from 2 localities (Meitan, Kui-Chou Shêng in the south-central area and Hangchow, Hsi-Chiang Shêng in the southeastern area) were reported in a Chinese paper by CHOW & KIANG (1950). Their conclusions can be summarized as follows:

1) Some animals collected from the Hangchow locality have supernumerary eyes (4.5%).
2) Regenerated animals from transverse cut pieces of normal animals with 2 eyes show a high rate of supernumerary eyes (average, 9%).
3) Regenerated animals from transverse cut pieces of animals with supernumerary eyes show a very high rate of supernumerary eyes (average, 23.95%).
4) Regenerated animals from transverse cut pieces of normal animals pretreated with a solution of planarian extract show a high rate of supernumerary eyes (average, 15.92%).

The following Chinese paper with an English summary was published by HUANG & TU (1956): The distribution and the seasonal changes in the reproductive organs of Euplanaria gonocephala (DUGÈS) in Kunming and its vicinity. The followings are the complete citation of their summary.

"The freshwater planarian, Euplanaria gonocephala (Dugèes) is widely distributed in Kunming and its vicinity. We collected and recorded at 7 places: Tsuei-Hu, Haiyuanshi, Takuan-Lo, Hsishan (West mountain), Heilung-Tan, Peilung-Tan and Chêng-Kung.

Concerning the reproductive season of Euplanaria gonocephala (Dugèes), there were two different opinions: Stoppenbrink (1904) regarded that this animal reproduces sexually in summer, while Steinmann (1913), Hsiao (1935) and Tu (1938) regarded winter as its breeding season. Our result from Kunming reveals that the reproductive organs of this planarian are well developed during the whole year except January & February, therefore we are in position to consider that it does not reproduce sexually in winter at Kunming. This result is contrary to that obtained by Hsiao and Tu at Peking.

The water temperature at Takuan-Lo, Kunming, was found to be always above 20°C from April to October, and the reproductive organs during the same period were almost always well developed, therefore we consider that the maturation of reproductive organs is related to the temperature of the water.

By observation of the changes of the body length in the whole year, we found no distinct correlation between the body length & the degree of maturation of the reproductive organs.

The average diameter of the egg-capsule is 1.11 mm, and the length of its stalk is 0.54 mm. There are 6 young planarians hatched out from each capsule. The newly hatched planarians are colorless and semitransparent."

As was already noted in the previous paper (KAWAKATSU & LUE, 1984, p.107), the
Peiching, or Peking, specimens of "Planaria (or Euplanaria) gonocephala" by Tu (1934) and HSIAO (1934) are undoubtedly Dugesia japonica japonica ICHIKAWA et KAWAKATSU, 1964. Tu's (1938 a) material was collected at Peiping (=Peking). The European species he mentioned in the summary cited above is Dugesia gonocephala (DUGÉS, 1830).

According to the description in the text of HUANG & Tu's (1956) paper, the Kunming material was identified as "Euplanaria gonocephala" only by the external appearance. There is some possibilities that the Kunming species is not Dugesia japonica. The real identification of the species from this area in China should be based upon the histological sections of sexually mature specimens. They also mentioned the occurrence of another species in the Kunming localities. This unidentified species has a blackish coloration with a pair of eyes; its body shape is very similar to that of a European species Ifimia tenuis (i.e., Polyceles tenuis). KAWAKATSU supposes that it is a Phagocata sp.

The distribution of freshwater planarians in various geographical areas in the Mainland China and the northern area of North Korea was reported by Tu & PO (1959). This Chinese paper deserves high praise because it has every records of freshwater planarians known in China until nearly the end of 1959 (including Tu's many unpublished data). Moreover, this is the first and only paper on North Korean freshwater planarian fauna. The data included in that paper are as follows (KAWAKATSU added some taxonomic comments on each species):

"Dugesia (=Euplanaria) gonocephala (DUGÉS, 1830)"

After it was demonstrated that the genus Dugesia GIRARD, 1850, has priority over the genus Euplanaria HESSE, 1897 (cf. HYMAN, 1939 a), this is the first employment of Dugesia by the late Dr. Tu.

Localities in China. Many localities in the vicinities of Kunming, Yün-Nan Shēng (雲南省昆明市附近一带；Tu's data)\(^3\); Meitan, Kui-Chou Shēng (貴州省貴州；cf. CHOW & KIANG, 1950)\(^3\); several localities in the vicinities of Hangchow, Hsi-Chiang Shēng (浙江省杭州市；cf. CHOW & KIANG, 1950)\(^3\); Nanking, or Nanching, Chiang-Su Shēng (江蘇省南京市；cf. PING, 1931); several localities in the vicinities of Ch’ingt’ao, Shan-Tung Shēng (山東省青島市一带；Tu's data); several localities in the vicinities of Peking, or Peiping, Hē-Pei Shēng (河北省北京市一带；cf. LIN, 1930; LI, 1934; TU, 1934, 1938 a; HSIAO, 1935); a spring of the Hsiao-Sui Temple at the foot of Mt. To-Ho-Shang and a spring along the Huang-N River, near Chinchou, in the Liaotung Peninsula (遼東半島大和尚山活水及黃泥川；cf. OKUGAWA, 1939, 1940); Tailen, Liao-Ning Sēng (遼寧省大連市；Tu's data); several localities in the vicinities of Antung, Liao-Ning Shēng (遼寧省東北市一带；Tu's data); several localities in the vicinities of Anshan, Liao-Ning Shēng (遼寧省鞍山市一带；Tu's data); many localities of Chilin, Chi-Lin Shēng (吉林省吉林市一带；Tu's data); a shallow well in Shényang, Liao-Ning Shēng (遼寧省瀋陽市水井；Tu's data).

Localities in North Korea.\(^4\) Anju, Pyeongan Nam Do (平安南道旧安州；Tu’s Data); San-teng (its correct location is uncertain; 三登；Tu’s data); Yangdeog, Pyeongan Nam Do (平安南道陽德；Tu’s data); Fouhsi, near Pyonggang, Gangweon Bug Do (江原北道平康附近福熙；Tu’s data); Chiuhuali, near Cheolweon, Gangweon Do (江原道鐵原附近九華里；Tu’s data).

---

1. For taxonomic status of dugesiid animals from this area, see KAWAKATSU’s foregoing note in this section.
2. Real identification of dugesiid animals from this area should be necessary.
3. KAWAKATSU studied one sexual and many asexual specimens from the Hangchow locality and identified the material as Dugesia japonica ICHIKAWA et KAWAKATSU, 1964 (cf. ICHIKAWA & KAWAKATSU, 1967, p. 179, fig. 2 J, 181-182, fig. 3 C, 183, fig. 4, H, 184-185; KAWAKATSU, 1971, p. 47, fig. 2 J, 49, fig. 4 C). Later, in 1976, KAWAKATSU replaced the animal from this population as Dugesia japonica ryukyuensis KAWAKATSU, 1976 (cf. KAWAKATSU, OKI, TAMURA & SUGINO, 1976, pp. 102-109, figs. 13 and 14).
4. Several localities whose Korean sound was not clarified are shown in Chinese sound.
**Phagocata miyadii** OKUGAWA, 1939.

**Locality in China.** A cool spring (Chinming-Shui), near Lake Chingpo-Hu, Heilung-Chiang Sheng (黑龙江镜泊湖畔; cf. OKUGAWA, 1939, 1940); several localities at Ch'enshan, near Anshan, Liao-Ning Sheng (遼寧省鞍山市附近千山一带; TU's data); several localities (Ch'it'iaohé, Tsoku and T'umênling) in the vicinities of Chilin, Chi-Lin Sheng (吉林省吉林市附近一带; TU's data).

**Localities in North Korea.** Yangdeog, Pyeongan Nam Do (平安南道陽徳; TU's data); Fouhsi, near Pyonggang, Gangweon Bug Do (江原北道平康附近福熙; TU's data).

**Phagocate uenoi** OKUGAWA, 1939.

**Locality in China.** A small stream at Ch'enching, Peiheihsien, a tributary of the River Nên-He, Heilung-Chiang Sheng (黑龙江北黑線辰滑; cf. OKUGAWA, 1939, 1940).

This species is only known from the type locality. Dr. Tu did not observe this species.

**Phagocate?** sp. (species of Kunming).

**Locality.** A small spring-fed stream located near Chhinten, Kunming, Yün-Nan Sheng (云南省昆明市附近金殿; cf. HUANG & TU, 1956; TU & PO, 1959).5)

**Polycellis tibetica** HYMAN, 1934.

**Localities.** Many localities in Kashmir and Indian Tibet (Sonamarg, Matayan, Dras, Kargil, Himis, Gonpa, Loh, Bao, Kyam, and Tso; cf. HYMAN, 1934).

According to TU & PO (1959), animals of this blackish colored species are 15 mm in length and have a rounded head with a pair of well-developed auricules; with numerous small eyes (approximately 100 in total number). The species is distributed in the alpine region of the northeastern area of Tibet (Hsitsand).6) HYMAN's species is probably identical with *Polycellis (olim Sorocellis) tibetica* (ZABUSOV, 1911) from Tibet (Var'-'Chiu, Tsa-Chzhou) (cf. KENK, 1974, p. 57; see also ICHIKAWA & KAWAKATSU, 1964 b).

**Crenobia alpina** (DANA, 1766).

TU & PO (1959) noted that this species is distributed in the northeastern area of China from Heilung-Chiang Sheng to Neimêngku (黑龙江省至内蒙). Their description of this species is undoubtedly based upon ARNDT's (1918, p. 326) old record cited below.

"Das *Planaria alpina* auch dem Amurland nicht fremd ist, beweist eine Beobachtung, die ich im Oktober 1916 im Großen Chingan 51° n. Br., 121° ö. L. (Greenwich) machte. In der Nähe der Station Petler der chinesischen Ostbahn, ...."

ARNDT (1921, p. 326) also reported the occurrence of "*Planaria alpina*" from "Bergbäche in der Umgebung von Wladivostok (davon 8 auf Russkij Ostroff, der Russischen Insel, im Japanischen Meer)" (see also ARNDT, 1922).

**Crenobia alpina** is a species distributed in Europe and Asia Minor; it has several subspecies in Europe. It can hardly be doubted that ARNDT's (1918, 1921) records of this species in the northeastern area of the Far East are due to his misidentification of the other triclaid species (probably a *Phagocata* species). Therefore, *Crenobia alpina* should be removed from the Chinese freshwater planarian fauna (see also LUE & KAWAKATSU, 1986, p. 321).

The following records on Chinese freshwater planarians were not included in a paper by TU & PO (1959). They are as follows:

---

5) See foregoing taxonomic note by KAWAKATSU in this section on an unidentified species from Kunming.

6) TU & PO (1959) did not show any exact localities of this species in Tibet. KAWAKATSU doubts whether the late Dr. Tu observed this species in Tibet or not. The future survey of the freshwater planarian fauna of Tibet should be necessary.
Dugesia sp. (or Phagocata? sp.) from a spring-fed stream at the Yu-Chuan Temple at Hangchow, Hsi-chiang Shên (浙江省杭州附近玉泉寺; cf. KATÔ, 1944). This species may be Dugesia japonica (cf. KAWAKATSU & LUE, 1984, p. 107).

"Dugesia gonoecephala (DUGÉS, 1830)" from several localities (Hêngshîchên, Henglingkuan, Yúchûchên, Tungkou, Chiehtsun, and Taihsien) in Shan-Hsi Shên (山西省樑水鎮，橫嶺關，王茅鎮，銅鷄，解村，代縣; cf. KATÔ, 1950). Judging from the schematic figures of the copulatory apparatus of specimens from 2 localities, the species is Dugesia japonica japonica ICHIKAWA et KAWAKATSU, 1964 (cf. KAWAKATSU & LUE, 1984, p. 107).

Phagocata sp. from a cool spring, approximately 150 km NE of Heihê, the Hsiao-Hsing-An-Ling or the Small Khingan Range, Heilung-Chiang Shên (黑龙江省黑河北東150 km 小興安嶺; cf. OKUGAWA, 1939, 1940; see also KAWAKATSU & LUE, 1984, p. 107). This unidentified species may be Phagocata miyadii.

Polyceles sp. (species of Shanhsi) from Ch'ap'u, Shan-Hsi Shên (山西省茶舖; cf. KATÔ, 1950; see also KAWAKATSU & LUE, 1984, p. 107). According to KATÔ's (op. cit.) short description in Japanese with a sketch figure of the head of an asexual specimen, this blackish colored species has a rounded head with a pair of short, bluntly pointed auricules; eyes are 50 to 60 in total number in a small specimen.

Figures 1 and 2 show the geographical distribution of freshwater planarians in the Mainland China, Korea, and their neighbouring countries (except for Japan) based upon the data cited in the present paper.

Back to the appraisal of the contents of Tu & Po's (1959) Chinese paper. In the sections of "Discussion" and "Summary" of that paper, they discussed the relations between water temperature of natural habitats and the formation of sexual organs in "Dugesia gonoecephala" from China. Their principal thinking on this subject are as follows:

—— 44 ——
Fig. 1. For explanation see page 44.
Fig. 2. For explanation see page 47.
1) "Dugesia gonocephala", a eurythermic planarian, is distributed in wide areas of the world.

2) Sometimes animals were found in rivers of a very high water temperature (32°C) in the vicinities of Chilin (in the northeastern area of China).

3) Three kinds of populations classified according to the difference of sexuality of animals were found; namely, asexual populations, sexual populations, and populations whose sexual and asexual reproductions were altered.

4) If the water temperature is lower than 12°C, animals cannot form their sexual organs. The sexual organs degenerate and fission may occur at a very high temperature condition.

5) Animals inhabiting in a very low temperature place without a considerable seasonal variation of temperature cannot form their sexual organs.

DURING THE 1960's

The following lecture was given by TU & WEN (1965) at the 30th Annual Science Conference held in Peiping (=Peking): "Why is it that the turbellaria species of Kirin (=Chilin) municipality has no reproductive organs?"

Details, however, are uncertain, since the original copy of this Chinese abstract is not available yet. KAWAKATSU supposes that it is not appreciably different from the summary of TU & PO (1959) cited in the foregoing section.

AT THE CONCLUSION OF THIS SUPPLEMENTARY NOTES

As was reviewed in the previous (KAWAKATSU & LUE, 1984) and the present papers in this series, the late Dr. Tseng-Jui Tu was, no doubt, an eminent, Chinese turbellariologist during the 1930's to 1960's. However, KAWAKATSU dares to pointed out that there are two weak points in his serial studies. One is a lack of accuracy in his identification of freshwater planarians as a taxonomist. He usually did not publish sketches and/or photographs of animals and their schematic figures of the copulatory apparatus he identified (except for his 1934 paper). Thus, further confirmation of his identification of the species becomes impossible by other turbellariologists.

Then, he often failed to look into many important references in his research field published in various countries. The principal cause is the rupture between the countries during World War II and he could not have a chance to communicate with other foreign turbellariologists at the time.

It is no exaggeration to say that the turbellarian studies in the Mainland China have been at a standstill for the past 40 years. The junior author (LIU), who started a new taxonomic study on

---

Fig. 2 Sketch map of the Korean Peninsula showing the geographical distribution of freshwater planarians in North Korea (Democratic People's Republic of Korea) and South Korea (Republic of Korea). For the data in North Korea (after Tu & Po, 1959), see in the text. The data in South Korea are reproduced from fig. 1 in KAWAKATSU & KANG (1969, p. 44).

▲: Dugesia japonica japonica ICHIKAWA et KAWAKATSU, 1964
●: Phagocata vivida (IJIMA KABURAKI, 1916)
○: Phagocata miyadii OKUGAWA,1939
■: Sphallopoda coreana KAWAKATSU et KIM, 1967

---

47
freshwater planarians from the Harbin area in Heilung-Chiang Shêng after 1984, recently established contact with KAWAKATSU. And, we are now planning the following cooperative studies on freshwater planarian fauna of the northeastern area of China.

1) Identification of species distributed in the Harbin (Haërhpín) area from a modern taxonomic viewpoint and publication of the data in English. LIU already collected samples of 3 species: Dugesia japonica, Phagocata miyadii and Dendrocoelopsis? sp. (in litt.).

2) Redescription of Dugesia japonica from this area with karyological data. Comparison of the local variation of the copulatory apparatus of this species from the Harbin area and the Sikhote-Alinia in the Kabarovsk-Vladivostok area, U.S.S.R. (cf. PORFIRJEVA & TIMOSCHKIN, 1984), is highly necessary.

3) Redescription of Phagocata miyadii in comparison with Phagocata vivida (IJIMA et KABURAKI, 1916). In the mountainous areas in South Korea, Phagocata vivida shows a wide distribution (cf. KIM, 1964, 1967, 1968; KAWAKATSU & KANG, 1969). Moreover, PORFIRJEVA & TIMOSCHKIN (1984) reported the occurrence of this species from the Sikhote-Alinia. Karyological analysis of Phagocata miyadii is also necessary.

Finally, the authors devoutly hope that this first cooperative paper may contribute as a foundation stone to the new start of a modern Chinese turbellariology.

ACKNOWLEDGEMENTS

KAWAKATSU is indebted to Dr. Roman KENK, U. S. National Museum of Natural History, Smithsonian Institution, Washington, D. C., U. S. A., and Professor Dr. Sui-Kuei WU, the University of Colorado at Boulder, Colorado, U. S. A., for some pertinent literature on Chinese turbellarians.

SUMMARY

The present status of turbellarian studies in the Mainland China is reviewed based upon additional references published by several Chinese turbellariologists. Especially, the late Dr. Tseng-Jui Tu's serial Chinese articles published from 1949 to 1965 are reviewed in detail. It is pointed out that the turbellarian fauna of China should be studied once again from a modern taxonomic viewpoint.

REFERENCES


CHOW, P. S. & KIANG, H. M., 1950. Notes on supernumerary eyes observed in specimens of Planaria gonoccephala collected from the Meitan (Kui-Chou Shêng) and Hangchow (Hsi-Chiang Shêng) localities, China. Chinese Sciences, 1 (2-4): 427-425. (In Chinese.) English translation is responsible by KAWAKATSU.

DANA, J. P. M., 1766. De Hirudinis nova specie, noxa, remediiisque adhibendis. Mélanges


Russian with English summary.)


APPENDIX I

In the present article, the names of Chinese places are romanized according to Wade’s method. Their sounds are very different from the present-day Chinese (Pinyin sounds). Some other romanized Chinese place names are also found in many English books, maps and atlases. The sounds in Japanese of Chinese characters are quite different from the Chinese sounds. Variations of the romanized Chinese place names mentioned in this article are given in the following list. They arranged as follows: Chinese characters (new, simplified Chinese characters for everyday use are given in parentheses), English spellings (E), Wade’s spellings (W), Pinyin spellings (P), and Japanese spellings (J).
雲南省：Yunnan Province (E); 云南省 (Yunnan) Shēng (W); Yünnán Shěng (or Xing) (P); Un'nan Shō (J).

貴州省：Kweichow Province (E); Kui-Chou (or Kueichou) Shēng (W); Gutzhōu Shēng (P); Kishū Shō (J).

浙江省：Chekiang Province (E); Hsi-Chiang (or Chêchiang) Shēng (W); Zhējīāng Shēng (P); Sekkō Shō (J).

江蘇(苏)省：Chiangsu Province (E); Chiang-Su (or Kiangsu) Shēng (W); Jiāngsū Shēng (P); Kōso Shō (J).

山東(東)省：Shantung Province (E); Shan-Tung (Shantung) Shēng (W); Shāndōng Shēng (P); Santō Shō (J).

山西省：Shansi Province (E); Shan-Hsi (Shanhsii) Shēng (W); Shēaxī Shēng (P); Sansei Shō (J).

河北省：Hopeh Province (E); Hê-Pei (or Hopei) Shēng (W); Hēběi Shēng (P); Kahoku Shō (J).

遼寧(辽宁)省：Liaoning Province (E); Liao-Ning (Liaoning) Shēng (W); Liáoníng Shēng (P); Ryōnei Shō (J).

吉林省：Kirin Province (E); Chi-Lin (Chilin) Shēng (W); Jiǔn Shēng (P); Kitsurin Shō (J).

黑龍(黑龙)江省：Heilungchiang Province (E); Heilung-Chiang (or Heilungkīang) Shēng (W); Hēilōng-jiāng Shēng (P); Kokuryūkō Shō (J).

西藏(藏): Tibet (E); Hsitsang (W); Xi-zāng (P); Chibetto (J).

內蒙古：Inner Mongolia (E); Neimengku (W); Něiměnggū (P); Naimóko (J).

遼東(辽东)半島：Liaotung Peninsula (E); Liaotung Pántao (W); Liáodōng Bándāo (P); Ryōtō Hantō (J).

小興安(与)嶺：Small Khingan Range (E); Hsiao-Hsing-An-Ling (or Siao Hinganling) (W); Xiāoxīng'ān líng (P); Shō-Kōanrei (J).

昆明市 (＝雲南省)：Kunming (E); Kunming (or K'unming) (W); Kūmíng (P); Konmei (J).

杭州市：Hangchow (E); Hangchou (W); Hángzhōu (P); Köshū (J).

南京市：Nanking (E); Nanking (or Nanching) (W); Nánjīng (P); Nankin (J).

青島(島)市：Tsingtao (E); Ch'ingt'ao (W); Qīngdāo (P); Chintō (J).

北京市：Peking (E); Peiching (or Peching) (W); Bèijīng (P); Pekin (J).

大連 (连)市：Dairen (E); Tailen (W); Dāilíán (P); Dairen (J).

吉林省：Kirin (E); Chilin (W); Jiǔn (P); Kitsurin (J).

瀋陽(沈阳)市：Shenyang (E); Shenyang (W); Shēnyāng (P); Shinyō (J).

鞍山市：Anshan (E); Anshan (W); Ānshān (P); Anzan (J).

安東(东)市 (＝丹東(东)市)：Antung (E); Antung = Tantung (W); Dāndōng (P); Antō = Tantō (J).

哈爾濱(哈尔滨)市：Harbin (E); Harbin (W) (or Heârhpîn) (W); Hârōbin (P); Harubin (J).

**APPENDIX II**

Since the languages of Japanese, Chinese and Korean do not belong to the Indo-European languages the scientific names of plants and animals can hardly be acclimated to these Oriental languages. In Japan, the standard Japanese name is usually given to each species except for the rare ones, so that each species has both the scientific and the Japanese names. The Japanese names are written in the Japanese syllabary.

The standard Japanese names of the freshwater planarian species were already given by KAWAKATSU (1977, pp. 64–67). In China, the Chinese names are written in Chinese characters, and the standard Chinese names of the freshwater planarian species are given in this section.

— 52 —
Family DUGESIIDAE BALL, 1974
   Genus Dugesia GIRARD, 1850
   Dugesia japonica ICHIKAWA et KAWAKATSU, 1964
   Dugesia japonica japonica ICHIKAWA et KAWAKATSU, 1964
   Dugesia japonica ryukyuensis KAWAKATSU, 1976
   Dugesia gonocephala (DUGÈS, 1830)
Family PLANARIIDAE STIMPSON, 1858
   Genus Phagocata LEIDY, 1847
   Phagocata vivida (IJIMA et KABURAKI, 1916)
   Phagocata miyadai OKUGAWA, 1939
   Phagocata uenoi OKUGAWA, 1939
   Genus Polycelis EHRENBERG, 1831
   Polycelis sapporo (IJIMA et KAKURAKI, 1916)
   Polycelis akkeshi ICHIKAWA et KAWAKATSU, 1963
   Polycelis auriculata IJIMA et KABURAKI, 1916
   Polycelis schmidtii (ZABUSOV, 1916)
   Polycelis tibetica HYMAN, 1934
Family KENKIIDAE HYMAN, 1937
   Genus Sphalloplana DE BEAUCHAMP, 1931
     Sphalloplana coreana KAWAKATSU et Kim, 1967
Family DENDROCOELIDAE HALLEZ, 1892
   Genus Bdellocephala DE MAN, 1875
   Bdellocephala annandalei IJIMA et KABURAKI, 1916
   Bdellocephala brunnea IJIMA et KABURAKI, 1916
   Bdellocephala borealis KAWAKATSU, 1978
   Genus Dendrocoelopsis KENK, 1930
   Dendrocoelopsis exensis ICHIKAWA et OKUGAWA, 1958
   Dendrocoelopsis lactea ICHIKAWA et OKUGAWA, 1958
   Dendrocoelopsis ichikawai KAWAKATSU, 1977
   Dendrocoelopsis kishidai KAWAKATSU, 1978


Addresses of the Authors:
Dr. Masaharu KAWAKATSU, Professor of Biology, Biological Laboratory, Fuji Women's College, Kita-16, Nishi-2, Kita-ku, Sapporo (Hokkaido) 001, Japan.
Mr. De-Zeng, Liu, Professor of the Institute of Applied Microbiology, Heilongjiang Academy of Sciences, Genetic Engineering Research Laboratory, 32 Zhao-Lin Street, Harbin, Heilongjiang 15001, People's Republic of China.