

HISTORY OF THE STUDY OF TURBELLARIA IN CHINA PART 2. AGE OF STUDIES BY JAPANESE AND CHINESE TURBELLARIOLOGISTS¹⁾

by

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3. AGE OF STUDIES BY JAPANESE AND CHINESE TURBELLARIOLOGISTS: 1921-1950

Dr. KABURAKI was a Japanese zoologist who studied various groups of turbellarians from Japan and several other countries during the 1920's. In 1922 (a), he reported the occurrence of 2 species of land planarian from the vicinity of Taipei (Taihoku), Taiwan. These were *Bipalium ruteofulvum* KABURAKI, 1922, and *Bipalium virgatum* STIMPSON, 1857 (reported under the name of "*Placocephalus virgatus*"). Later, KABURAKI (1922 b) reported from Taiwan once again the latter and also *Bipalium trilineatum* STIMPSON, 1857 (under the name of "*Placocephalus trilineatus*"). Because the identifications of these 3 species were made only by the external appearance of preserved, non-sexual specimens, reidentification of them seems to be impossible (cf. KAWAKATSU, 1981, 1983; see also KAWAKATSU, MAKINO & SHIRASAWA, 1982).

KABURAKI (1922 b) also identified the animals from Soochow (*i. e.*, Suchou; = Soshū), near Shanghai, as *Bipalium cantori* (WRIGHT, 1860) and gave a rather detailed description of the species with a schematic figure of the copulatory apparatus. This species was redescribed once again by KATŌ (1950), a Japanese turbellariologist, based upon sexual specimens collected from the vicinities of Hengshuichen and Henglingkuan in Sanshi Hsing (= Sansei-shō) in the northcentral area of China. Although KATŌ (1950, p. 190) noted some differences in the genital anatomy between his sample and that of KABURAKI (1922 b), he concluded that the species may show some local variations (cf. KAWAKATSU, MAKINO & SHIRASAWA, 1982).

In 1925, Dr. SABUSSOWA (also spelled ZABUSOVA; = ZABUSOVA-ZHDANOVA), a Russian turbellariologist, reported 2 species of land planarians from Central China, *Bipalium longicanale* SABUSSOWA, 1925, from the Gobi, Kansu Hsing (= Kanshuku-shō), and *Bipalium univittatum* var. *subboreale* SABUSSOWA, 1925, from the basin of Jang-tsez-kjang, a tributary of the By'tschju, Ch'inghai Hsing (= Seikai-shō).

The first English article on planarians written by a Chinese was a paper by Shao-Wen LIN (1930). It is not a taxonomic article, but included a sketch of a whole mount of a planarian collected in the vicinity of Peiching (Peking; = Peking). His sample was undoubtedly a species of *Dugesia*. In 1931, PING, a Chinese biologist, published an English paper on the fauna of Nanking, Chiang-Su Hsing (= Kōso-shō), in the eastern part of China. He mentioned the occurrence of "*Placocephalus* sp." (*i. e.*, *Bipalium* sp.), "*Planaria* spp.", and "*Dendrocoelum?* sp." His 2 species of "*Planaria*" may be *Dugesia* species;

1). The present paper is continued from the Part 1 of this series (LUE & KAWAKATSU, In press. Ages of Materia Medica and of expeditions by Western peoples) which was presented at the 4th International Symposium on the Turbellaria held in New Brunswick, Canada, on August 5-10, 1984; cf. KAWAKATSU, TAMURA & LUE, 1984). The Part 1 will be published in one of future issues of Hydrobiologia.

while "*Dendrocoelum?* sp." is uncertain.

In 1934, 3 English papers on turbellarians were published by Chinese researchers. One of these, a paper by Tseng-Jui TU (1934), is the first standard taxonomic article on planarians by a Chinese. It included descriptions of 7 species, of which 2 were reported as new. The 7 are as follows: *Stenostomum leucops* (DUGÈS, 1828), *Stenostomum tsinghuaensis* TU, 1934, *Stenostomum brevipharyngium* KEPNER et CARTER, 1931, *Microstomum lineare* (O. F. MÜLLER, 1774), *Macrostomum intermedium* TU, 1934, *Gyatrix hermaphroditus hermaphroditus* EHRENBERG, 1831, and "*Planaria gonocephala* DUGÈS, 1830". All of his specimens were collected from the campus of Tsing-Hua University in Peiching. Sidney D. HSIAO (also spelled as Chin-Ti SU in Chinese phonetics), in 1934, reported the seasonal changes in the reproductive system of "*Planaria gonocephala*" collected in the vicinity of Peiching. Ju-Chi'i LI & Shih'Chang SHEN (1934) reported on the process of regeneration of "*Planaria gonocephala?*" collected on the campus of Tsing-Hua University.

Several years later, TU (1938) discussed the seasonal changes in the genital organs of "*Eu-planaria gonocephala* (DUGÈS, 1830)", occurring in the vicinity of Peiching. He mentioned that the materials of LIN (1930) and that of LI & SHEN (1934) were of the same species (cf. TU, 1938, p. 138, footnote 1).

Later, TU (1940), who at that time was at the Zoologisches Museum der Universität, Berlin, published his most important paper in his serial works entitled "Geschichtlicher Überblick über das Stu-

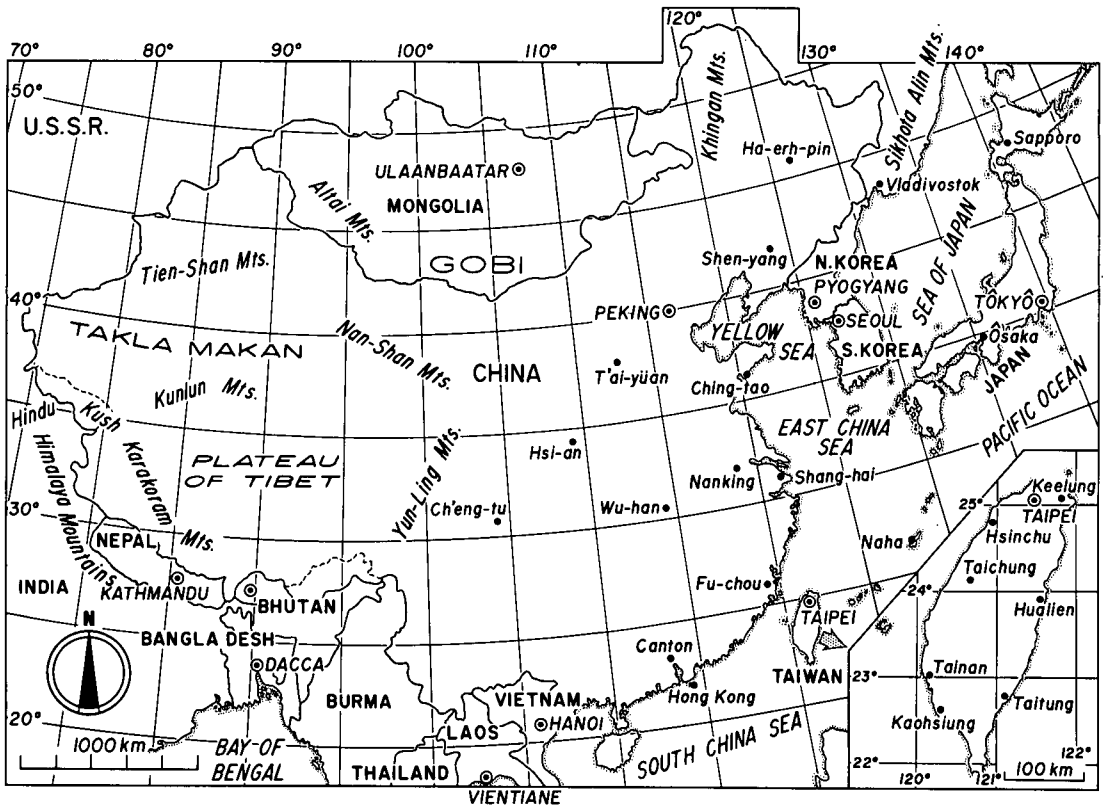


Fig. 1. Sketch map of the Far East showing the Mainland China, Taiwan (the Republic of China), Korea, and Japan. Place names in China are taken primarily from the Times Atlas of the World (1981).

dium der Turbellarien in Ostasien und Stand unserer Kenntnisse von diesen". This paper contains many useful descriptions on the turbellarian fauna of the Far East and neighbouring Asiatic countries.

Judging from the figures of the copulatory apparatus of the Peiching specimens of "*Planaria* (or *Euplanaria*) *gonocephala*" by TU (1934) and HSIAO (1934), the species is, no doubt, *Dugesia japonica* ICHIKAWA et KAWAKATSU, 1964 (cf. KAWAKATSU & WONG, 1975).

Collections of freshwater planarians from the northeastern portion of China (formerly known as Manchoukuo) were made by several Japanese zoologists in the 1930's (Dr. M. UÉNO in 1934, Dr. K. I. OKUGAWA in 1936, and Dr. D. MIYADI in 1938). OKUGAWA (1939) studied these materials and reported 4 species. They are as follows: "*Euplanaria gonocephala* (DUGÈS, 1830)" from a spring of the Hsaing-Sui Temple (= Kyôsuji Temple) at the foot of Mt. To-Ho-Shang (= Mt. Daioshôzan) and a spring along the Huang-Ni River (= Ôdeisen Spring), near Chinchou (= Kinshû), in the Liaotung Peninsula (= Kwantung); *Phagocata uenoi* OKUGAWA, 1939, from a small stream at Ch'ênching (= Shinsei), Peihehsien, a tributary of the River Nên-Hê; *Phagocata miyadii* OKUGAWA, 1939, from a cool spring (Chinming-Shui; = Kinmei-sui), near Lake Chingpai-Hu (= Kyôhaku-ko); *Phagocata* sp. from a cool spring, approximately 150 km NE of Heihê (= Kokka), the Hsiao-Hsing-An-Ling or the Small Khingan Range. OKUGAWA (1940) published redescrptions of these species in Japanese.

KATÔ (1943 b) reported *Dugesia* sp. (or *Phagocata*? sp.) from a spring-fed stream at the Yü-Chüan Temple (= Gyokusenji Temple) at Hangcheu (= Kôshû), near Shanghai. Judging from the sketches of non-sexual specimens in his sample, the species may be *Dugesia japonica*. Later, KATÔ (1950) reported the occurrence of 2 species from Sanshi Hsing in North China: "*Dugesia gonocephala* (DUGÈS, 1830)" from Hêngshichên (= Ôsuichin), Henglingkuan (= Ôreikan), Yüchuchên (= Gyokubôchin), Tungkou (= Dôkô), Chichtsun (= Kaison), and Taihsien (= Daiken); *Polycelis* sp. from Ch'apao (= Chaho). According to his descriptions and figures of the copulatory apparatus of the specimens from Sanshi, there is very little doubt that the animal is *Dugesia japonica* (cf. KAWAKATSU & WONG, 1975).

Investigations on the turbellarians of Taiwan between 1921 and 1950 are very limited. In 1932, Dr. KAWAGUCHI, who was a staff member of the Taihoku Imperial University (now National Taiwan University) at that time, reported on aspects of the physiology of a land planarian, *Bipalium* sp., collected on the campus of the university (cf. KAWAGUCHI, 1932 a, b, c).

Although OKUGAWA (1938) wrote in Japanese on the occurrence of "*Euplanaria gonocephala* (DUGÈS, 1830)" at several localities in Taiwan, he published no descriptive paper on this species. A short Japanese note on the occurrence of a temnocephalid species, an ectoparasite of a freshwater crab, in a stream of Ts'ao-Shan (= Sôzan) or Grass Mountain, near Taipei in Taiwan, was recorded by OKADA (1938; cf. SUZUKI, NINAGAWA & KAWAKATSU, 1983).

KATÔ (1943 a) reported 7 species of polyclads from the eastern coast of Taipei Hsien County (Suao and Nanfang-ao; = Suô and Nanmpô-ô). They are as follows: *Stylochus taiwanica* KATÔ, 1943, *Stylochus suoensis* KATÔ, 1943, *Stylochus utunomii* KATÔ, 1943, *Paraplanocera oligoglana* (SCHMARDA, 1859), *Prosthlostomum formosum* KATÔ, 1943, and *Enchiridium japonicum* KATÔ, 1943 (cf. KATÔ, 1944; see also an annotated republication of the paper by KAWAKATSU in 1982).

4. AGE OF STUDIES BY JAPANESE AND CHINESE TURBELLARIOLOGISTS: 1951 TO THE PRESENT

Between the end of World War II and 1950', Japanese turbellariologists were generally unproductive, except for several publications. In 1953, OKUGAWA published a paper entitled "A monograph of Turbellaria (Acoela, Rhabdocoela, Alloecoela and Tricladida) of Japan and its adjacent regions". This

paper is not great usefulness, however, with regard to the Chinese turbellarian fauna.

In 1962, KAWAKATSU made his start in the taxonomic study of freshwater planarians in cooperation with his many colleagues from various countries around the world. Since IJIMA's (1887) identification of the most common Japanese freshwater planarian as *Planaria gonocephala* DUGÈS, 1830, the name of Japan has often been mentioned in lists noting the distribution of this species (the generic name of *Euplanaria* and *Dugesia* was also used by many authors). This planarian, distributed widely in countries of the Far East, was at last recognized by ICHIKAWA & KAWAKATSU as a new species and was described by them (1964) as *Dugesia japonica*. The occurrence of this species in Taiwan and the Mainland China was confirmed in their later paper (1967) based upon the study of sexually mature specimens from these countries. Thus, it became clear that the species described and recorded from Japan including Ryūkyū Islands, Taiwan, Korea, Kwantung, South Manchuria, and China under the name of *Dugesia* (= *Planaria*; = *Euplanaria*) *gonocephala* (DUGÈS) is a synonym of *Dugesia japonica* ICHIKAWA et KAWAKATSU, 1964.

KAWAKATSU & IWAKI (1968) reported on the morphology and distribution of this species in various parts of Taiwan including both lowland and upland areas. The occurrence of this species in Hong Kong was reported by KAWAKATSU & WONG (1975). A paper by WONG (1975) included an ecological note on habits of the planarian in Hong Kong.

Morphological variation and the distributional range of *Dugesia japonica* occurring in the countries around the East China Sea and the Yellow Sea became clear with publication of the following papers:

The Satsunan Islands and the Ryūkyū Islands (including the Yaeyama Islands) in Southwest Japan: TANAKA (1965); TANAKA, UNTEN & UNTEN (1965); ICHIKAWA & KAWAKATSU (1967); KAWAKATSU & IWAKI (1967); KAWAKATSU & TANAKA (1971, 1976).

Korea: KIM (1964, 1965, 1967, 1968); KAWAKATSU & KIM (1966, 1967); KAWAKATSU, IWAKI & KIM (1967); KAWAKATSU & KANG (1969, 1970).

In 1976, *Dugesia japonica* was separated into 2 subspecies based upon differences in genital anatomy and karyotype. The 2 are *Dugesia japonica japonica* ICHIKAWA et KAWAKATSU, 1964, and *Dugesia japonica ryukyuensis* KAWAKATSU, 1976 (cf. KAWAKATSU, OKI, TAMURA & SUGINO, 1976 a). The nominate subspecies is distributed in the Japanese Islands (excluding the Amami Islands and the Ryūkyū Islands), Taiwan, the Mainland China, and Korea. *D. j. ryukyuensis* is distributed in the Amami Islands, the Ryūkyū Islands, the Mt. Alishan (= Mt. Alisan) area in Taiwan, and in the vicinity of Hangchou (= Kōshū) in the Mainland China.

Cooperative studies within our team on the taxonomy and karyology of *Dugesia japonica* have progressed still further since 1976. Thus, several papers following these lines of research have been published on these planarians from the Tsushima Islands and the Ryūkyū Islands in Southwest Japan, Taiwan and Korea. They are: KAWAKATSU, OKI, TAMURA & SUGINO (1976 a, b), OKI, TAMURA, KAWAKATSU & SUGINO (1976), TAMURA, YAMAYOSHI, OKI, LUE & KAWAKATSU (1978), KAWAKATSU, OKI, TAMURA, YAMAYOSHI, LUE & HAGIYA (1979), TAMURA, YAMAYOSHI, OKI & KAWAKATSU (1979 b), and KAWAKATSU, OKI, TAMURA, YAMAYOSHI & TAKAHASHI (1980). Review of these studies, together with a karyological analysis of *Dugesia japonica* from various localities in Japan, will be found in a paper by OKI, TAMURA, YAMAYOSHI & KAWAKATSU (1981; see also OKI, TAMURA, YAMAYOSHI & KAWAKATSU, 1980; OKI & KAWAKATSU, 1983).

In the vicinity of Taipei in Taiwan, *Dugesia* sp. is also recorded, but its karyotype is very different from that of *Dugesia japonica* (*D. j. japonica* and *D. j. ryukyuensis*). It is, however, similar to that of some southeastern Asiatic species of *Dugesia* (cf. KAWAKATSU, OKI, TAMURA, YAMAYOSHI, LUE & HAGIYA, 1979; see also WANG, WU & LUE, 1981).

Studies on the vertical distribution of freshwater planarians in the countries of the Far East have been promoted by KAWAKATSU and his many colleagues since 1954. Reviews of these studies will be found in papers by KAWAKATSU (1965, 1967, 1974).²⁾

Recently, LUE (1978) and WANG, WU & LUE (1981) studied some physiological and biochemical problems using freshwater planarians obtained in Taipei, Taiwan. In the autumn of 1984, the Japan-Taiwan cooperative scientific field survey of freshwater planarians in Taiwan was carried out by Dr. ÔSAWA, Dr. MUTÔ, Dr. HORI (Nagoya University), Dr. TAKAI (Saga Medical College), KAWAKATSU, and LUE. The main purpose of this trip is a study of "Effect of geographical isolation to the evolutionary rate of nucleotid substitutions — 5S rRNA sequences of freshwater planarians in Taiwan" (supported by Grant-in-Aid for Scientific Research from the Ministry of Education, Japan, No. 59041031).

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SUMMARY

The history of turbellarian studies in China is reviewed with respect to the progress of turbellariology in Japan. Up to the middle of the 19th Century, knowledge of the natural history of these countries, including several records of planarians from each, is to be found only in manuscripts and books of the so-called "Materia Medica". During the latter half of the 19th Century and into the early part of the 20th Century, several Western zoologists laid the foundation for the Western approach to turbellariology in China and Japan (Part 1). Since 1920, knowledge of the Chinese turbellarian fauna has been advanced mainly by Japanese zoologists. In recent years, cooperative studies on the turbellarians of Taiwan (the Republic of China) have begun between Japanese and Chinese zoologists. Turbellarian studies in the Mainland China are, however, at a standstill (Part 2).

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2). The taxonomy and karyology of *Dugesia japonica* from various areas of Japan were also reported by our team (cf. KAWAKATSU, OKI, TAMURA & SUGINO, 1976 a, b; OKI & TAMURA, 1974, 1975 a, b; TAMURA, YAMAYOSHI, OKI & KAWAKATSU, 1978, 1979 a, b; TAMURA, YAMAYOSHI, OKI, MURAYAMA & KAWAKATSU, 1978; TAMURA, YAMAYOSHI, OKI, MURAYAMA, TODA & KAWAKATSU, 1982; YAMAYOSHI, TAMURA, OKI & KAWAKATSU, 1980). Recently, TAMURA (in press) studied the variation of karyotypes of *D. j. japonica* in Ôsaka Prefecture, Central Japan.

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APPENDIX

In the Part 2 of this series, we added a list in Japanese of Chinese and Japanese manuscripts and books of *Materia Medica* and of related publications including descriptions of leeches and land planarians. We also added 3 figures in this publication.

付 録

本論文“中国における渦虫類研究史”は前報(KAWAKATSU, 1969)に続くもので、東洋における渦虫類研究の歴史と発展の過程を西欧世界の同学者達に紹介する目的で執筆した。前報をまとめた当時は参照文献も限られており、記述の誤りもあった。本論文は第4回国際渦虫類シンポジウム(1984年8月5～10日, New Brunswick, Canada)で報告するためにまとめたものであるが、その出版誌の紙数の関係から、1部と2部とに分割することにした(Part 1: 本草学と西欧人による探検の時代, LUE & KAWAKATSU; Part 2: 日本と中国の渦虫類学者による研究の時代, KAWAKATSU & LUE)。即ち, Part 1は *Hydrobiologia* に刷る予定で、本稿は Part 2 である。

参照した本草書と関係文献は、Part 1 の文献表からは省いた。本稿の付録として、それらの文献を和文で掲げておく(原著の年代順に配列した)。大部分の本草書は稀購書である。関係部分のコピーはさまざまな経路で入手したものであるが、特に、故松井松太郎氏と長谷川 仁博士の御好意に負うところが大きかった。誌して、謝意を表したい。

本稿には、極東地域の地図、訓蒙圖彙(1666)の蛭と度古の図(ほぼ原著と同大の寸法にしてある)、及び和漢三才圖會(明治18年刊の活字本)の天蛇の部分を加えた。圖會の原著者寺島良安は、天蛇をヤマビル *Hae-madipsa zeylanica japonica* WHITMAN にあてている。國譯本草綱目では、天蛇を仮にコウガダ(溝牙蛇)科の蛇の1種にあてている。

なお、上記シンポジウムで使用したスライド8枚のコピーは、プレプリント(KAWAKATSU, TAMURA & LUE, 1984)に掲げた。

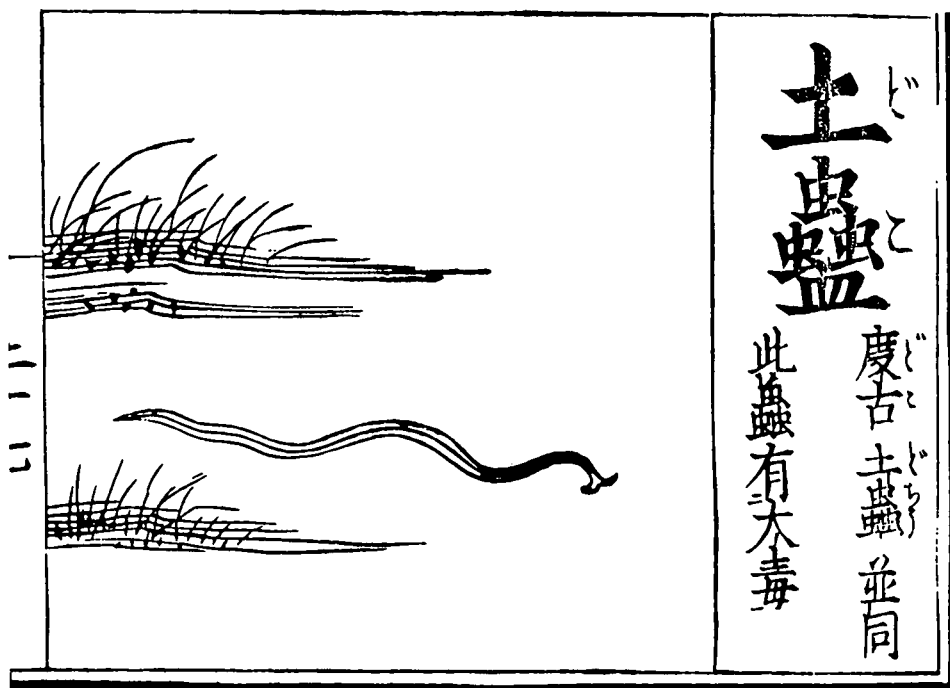
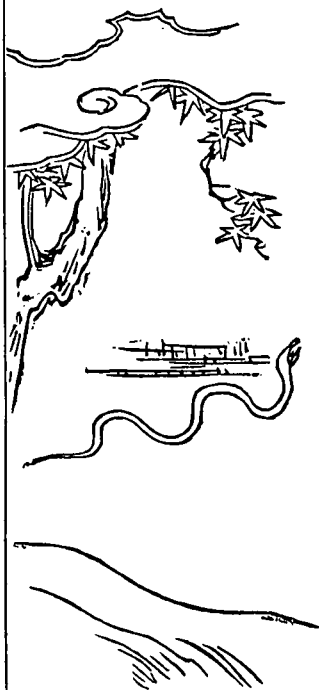


Fig. 2. "Shitsu" or "Hiru" (=leech; top) and "Doko" (= *Bipalium* sp.; bottom) reproduced from the book "Kinmō-Zui" by Tekisai NAKAMURA (1666). These photocopies were taken from the republication of the original book (compiled under the supervision of the Research Society of the Literary Bibliographies in the Recent Times and published by the Benseidō Book Co., Tōkyō, in 1976). They were reproduced here in their actual size in the original book.



天蛇 てんじや

本網天蛇生幽陰之地遇雨後則出其大如筋而區長三四尺色黃赤澆之以醋則消或以石灰糝之亦死

錢塘一田夫忽病癩扁身潰爛號呼欲絕西溪寺僧視之曰此天蛇毒非癩也以秦皮煮汁一斗令其恣飲初日減半三日頓愈

按天蛇非蛇種類而蛭之屬也深山溪陰四時不見月光之地如夏月霖雨中濕熱感生蛭多有枝梢而墮行人之上俗謂之曰蛭降然其大者不過尺紀州熊野熊取越土州野根山越等亦間有之

蛇皮

蛇衣 蛇脫

按蛇秋蟄前脫皮光白色如薄紙首尾全不損也未雨濫者取黑燒傳元禿則生

Fig. 3. "T'ien-Shē" (=Tenja) reproduced from the type-printing book of "Wakan-Sansai-Zue" published in 1885. Its original wood-block book by Ryōan TERAJIMA was published in 1713. The original author considered that the "Tenja" is a species of land leeches.

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中 文 摘 要

中國之渦蟲 (扁形動物) 研究史

呂 光洋・川勝正治 (1) / 川勝正治・呂 光洋 (2)

本篇乃討論有關渦蟲 (扁形動物) 在中國之研究史, 文中亦同時提到相關之日本扁形動物學的研究。一直到十九世紀, 在此東方二個國家之博物; 包括渦蟲之記錄, 僅出現在古典之醫學書籍中。十九世紀中葉以後東西方之接觸逐漸增加, 少數的西方動物學家, 對二個國家之扁形動物開始進行有系統之調查。此乃奠定此二個國家研究扁形動物之基石。從 1921 年之後, 在中國之扁形動物相, 大部份由日本學者研究。最近在中華民國之學者和日本之學者已開始共同研究有關之臺灣淡水渦蟲動物相。在中國大陸, 相關之研究則尚付闕。

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