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M.A. JÄCH & L. JI (eds.): Water Beetles of China Vol. I 5 - 32 Wien, November 1995

INTRODUCTION

M.A. JÄCH & L. JI

Abstract

The aims of the "China Water Beetle Survey" (CWBS) are explained briefly. Information on the administrative regions, climate, topography, zoogeographical regions and the environmental situation of China is provided. Problems concerning transcription systems and "historical" locality names are discussed. 140 localities, sampled by the CWBS between 1992 and 1994, are listed.

Key words: China Water Beetle Survey, China, aquatic coleoptera, semiaquatic coleoptera, faunistics, zoogeography, early explorers, transcription of Chinese characters, "historical" locality names, CWBS localities

The "China Water Beetle Survey" (CWBS)

At the XIXth International Congress of Entomology in Beijing in July 1992, negotiations were carried out between representatives of the Natural History Museum, Vienna (Section of Coleopterology) and the Chinese Academy of Sciences (Inst. of Applied Ecology, Shenyang) concerning a thorough survey on the biodiversity of the aquatic and semiaquatic beetles of China. A cooperative agreement (for the years 1993 - 1998) was signed soon after the Congress and the "China Water Beetle Survey" was launched in October 1993 with a joint excursion to Hunan and Guangxi. Several research trips followed in 1994 (see below).

The territory of China remains one of the last "*terrae incognitae*" in terms of water beetle research in the Palearctic Realm.

Our excursions have shown clearly, that the water beetle fauna of China is unexpectedly rich in species, especially new species. For example, during a very short excursion in the municipality of Beijing, a new species of Dytiscidae (described as *Platambus jilanzhui* WEWALKA & BRANCUCCI in this volume) was collected by the authors during the International Congress of Entomology in July 1992.

The present survey includes 18 families of aquatic and semiaquatic coleoptera:

Hydroscaphidae, Noteridae, Dytiscidae, Amphizoidae, Hygrobiidae, Haliplidae, Gyrinidae, Hydraenidae, Hydrochidae, Helophoridae, Hydrophilidae, Scirtidae, Elmidae, Dryopidae, Heteroceridae, Psephenidae, Eulichadidae and Curculionidae.

To our knowledge, the following water beetle families have not been recorded yet from China although they are known from neighbouring countries:

Torridincolidae, Spercheidae, and Epimetopidae.

Due to lack of specialists, the following 5 families are not treated in the present survey:

Microsporidae, Georissidae, Ptilodactylidae, Limnichidae, and Chrysomelidae.

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China's administrative regions

Administratively, the **People's Republic of China** is divided into three basic levels: 1) provinces (incl. autonomous regions, municipalities directly under the Central Government), 2) counties (cities, banners, special districts, industrial-agricultural districts, forest districts, prefectures), and 3) townships (towns).

There are 22 provinces (Chinese: sheng), five autonomous regions (zizhiqü), and three municipalities directly under the Central Government (zhixiashi) (see Fig. 1).

The administrative units under a province or an autonomous region include counties (xian, Wade-Giles: hsien), autonomous counties, prefectures (diqü), autonomous prefectures (zhou), leagues (meng), city regions (shi), banners (qi, in Nei Mongol only) and autonomous banners.

Under a county or an autonomous county are townships (xiang) [formerly: commune (gongshe)], nationality townships, towns (zhen), and villages (cün). City districts (or quaters) are named qü.

The municipalities directly under the Central Government and large cities are divided into districts and counties, while the autonomous prefectures are divided into counties, autonomous counties, and cities. The autonomous regions, autonomous prefectures, and autonomous counties are all nationality areas.

Names (Pinyin form) of provinces, autonomous regions and municipalities directly under the Central Government (in square brackets: official abbreviations and Wade-Giles spelling, if different from Pinyin spelling):

Anhui Province [AH, Anhwei]
Beijing Municipality [BJ, Peiping or Peking]
Fujian Province [FJ, Fukien]
Gansu Province [GS, Kansu]
Guangdong Province [GD, Kwangtung]
Guangxi Zhuang Autonomous Region [GX, Kwangsi]
Guizhou Province [GZ, Kweichow]
Hainan Province [HI]
Hebei Province [HEB, Hopeh]
Heilongjiang Province [HL, Heilungkiang]
Henan Province [HEN, Honan]
Hubei Province [HB, Hupeh]
Hunan Province [HN]
Jiangsu Province [JS, Kiangsu]
Jiangxi Province [JX, Kiangsi]
Jilin Province [JL, Kirin]
Liaoning Province [LN]
Nei Mongol Autonomous Region [NM, Inner Mongolia]
Ningxia Hui Autonomous Region [NX, Ningsia]
Qinghai Province [QH, Tsinghai]
Shaanxi Province [SN, Shensi]
Shandong Province [SD, Shantung]
Shanghai Municipality [SH]
Shanxi Province [SX, Shansi]
Sichuan Province [SC, Szechwan]
Tianjin Municipality [TJ, Tientsin]
Tibet (= Xizang) Autonomous Region [XZ]
Xinjiang Uygur Autonomous Region [XJ, Sinkiang]
Yünnan Province [YN]
Zhejiang Province [ZJ, Chekiang]

Besides the People's Republic of China, this book covers also **Taiwan** [= Formosa], the British crown colony **Hong Kong** [= Xianggang][1] and the Portuguese overseas territory **Macao** [= Aomen][2]. The People's Republic of China, Hong Kong and Macao together form so-called "Mainland China". However, Macao, due to its small size (16 km^2), plays a minor role in zoogeographic considerations. So far, no water beetles have been recorded from Macao. The islands of the South China Sea, e.g. Xisha Qündao (Paracel Islands), Nansha Qündao (Spratly Islands), Zhongsha Qündao, are not covered by this book either, and we do not know of any water beetle record from there.

[1] On December 19, 1984, the Chinese and British Governments signed a joint declaration stating that Britain would restore Hong Kong to the People's Republic of China on July 1, 1997.

[2] A declaration was signed by the Chinese and Portuguese Governments on April 13, 1987, stating that Portugal would restore Macao to the People's Republic of China on December 20, 1999.

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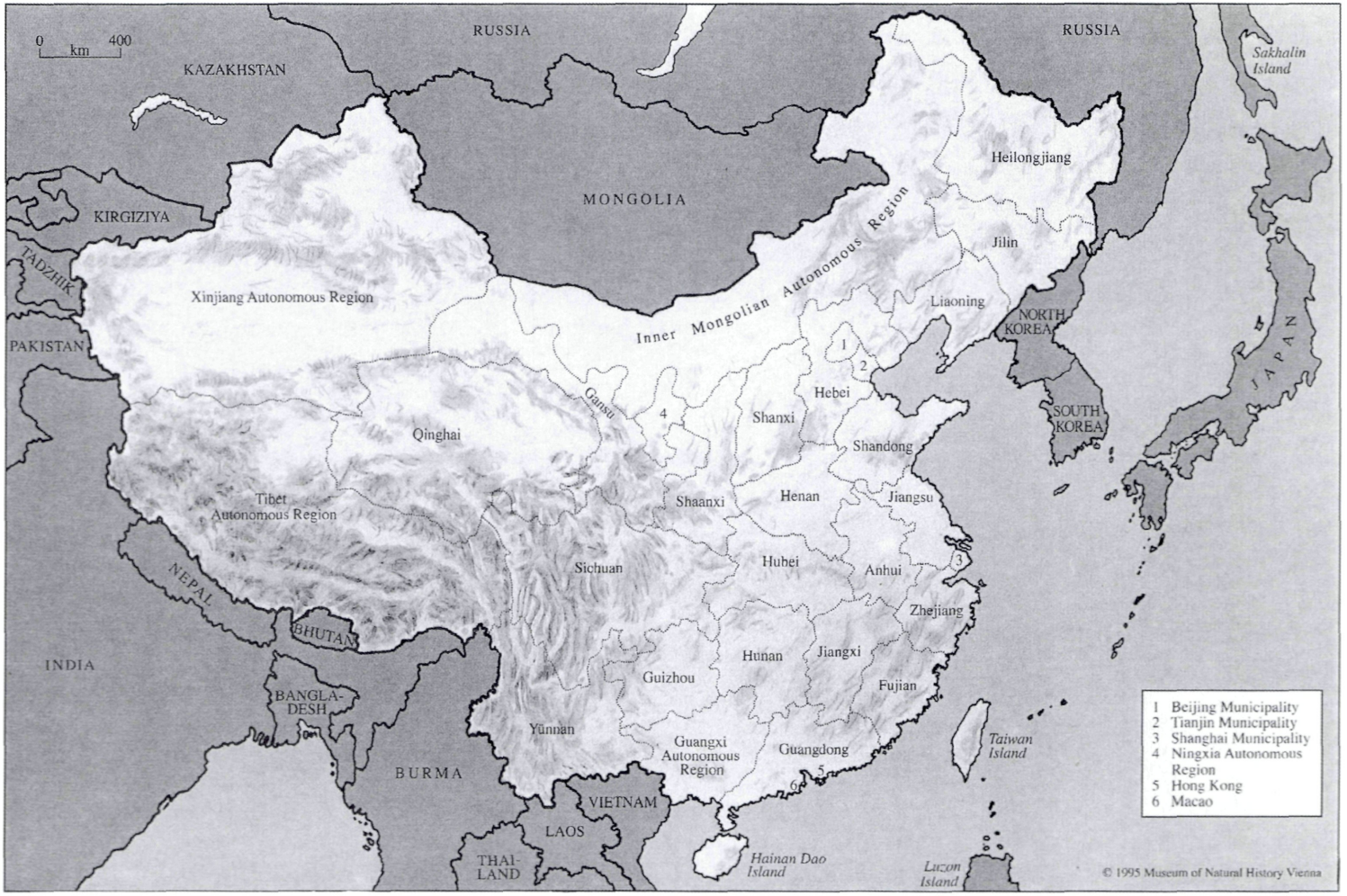

Fig. 1: China's administrative regions.

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Fig. 2: Topography of China.

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Climate and topography

With about 9.6 million km², China is the world's third largest country, ranking after Russia and Canada. Approximately 98 % of China's land area is located between 20° - 50° north latitude.

China's climate is characterized essentially by the summer monsoons which account for hot and humid summers often causing floods, and by the winter high pressure system which creates cold and dry winters. Thus, on average, towns in China are colder than those in other countries on the same latitude.

Regarding rainfall, there is a steep gradient from east to west. One reason for this gradient is that there are many mountain ranges between the sea and the western parts of the country where one of the earth's most hostile places, the Taklimakan desert, is located. The highest annual rainfall is known from Taiwan (6576 mm).

China has an extremely complicated topography: ranges of high mountains, plateaus, hills, vast inland basins, plains and numerous islands (see Fig. 2) form this country. The world's highest mountain, the Qomolangma [Mt. Everest] (8848 m) as well as one of the world's lowest places, Aydingkol Lake (- 154 m) are located in China. Asia's longest river, the Chang Jiang [Yangtze or Jangtzekiang], 6380 km long, is situated entirely in China. It is the world's third longest river, ranking after the Nile and the Amazon. Other famous Chinese rivers are the Yarlung Zangbo Jiang [Tsangpo or Brahmaputra], the Lancang Jiang [Mekong], the Nu Jiang [Salween], the Huang He [Yellow River] and the Heilong Jiang [Amur River].

Zoogeography

Most zoogeographical realms are clearly separated from each other by natural boundaries which form effective barriers to animal dispersal. However, between the eastern Palearctic and the Oriental Realm there is a virtual absence of major barriers. This results in the fact that if a faunistic study is made from Vietnam up to northeast China, we would encounter a fairly continuous graduation from Oriental species in the south to Palearctic species in the north. Thus the delimitation of the border between the Palearctic and Oriental Realm has been subject to controversy and debate (BANARESCU 1991, BRINCK 1946, LATTIN 1967).

China is divided into seven major zoogeographical regions, including 19 subregions (Fig. 3) (see ZHAO & ADLER 1993 and ZHANG 1979). These regions were established mainly on the distribution of mammals and birds. It is possible that further analyses, based also on insects, will lead to some changes in the boundaries of these regions. The concept of China's "Natural Regions" of REN, YANG & BAO (1985) agrees fairly well with these seven zoogeographical regions, except that they separate the East Steppe from the remaining parts of the Nei Mongol-Xinjiang Region, thus establishing eight regions. The zoogeographical regions of China coincide largely with China's major vegetation zones: Northeastern China Region (= Forests of the cool-temperate and temperate zone), North China Region (= Deciduous forest of the warm-temperate zone), Nei Mongol-Xinjiang Region (= Steppe-Desert), Qinghai-Tibet Region (= Alpine vegetation of the Qinghai-Tibet Plateau), Southwest China Region and Central China Region (= Subtropical evergreen forest), South China Region (= Tropical monsoon forest and tropical rain forest).

Environmental situation and nature conservation

Being one of the world's most densely populated countries and one of the world's oldest civilizations, having founded an agricultural civilization 5000 years before present, it is not surprising that China's natural environment has suffered many irrecoverable losses. Urbanization, industrialization and forest exploitation are to be named when searching for the main reasons of these losses.

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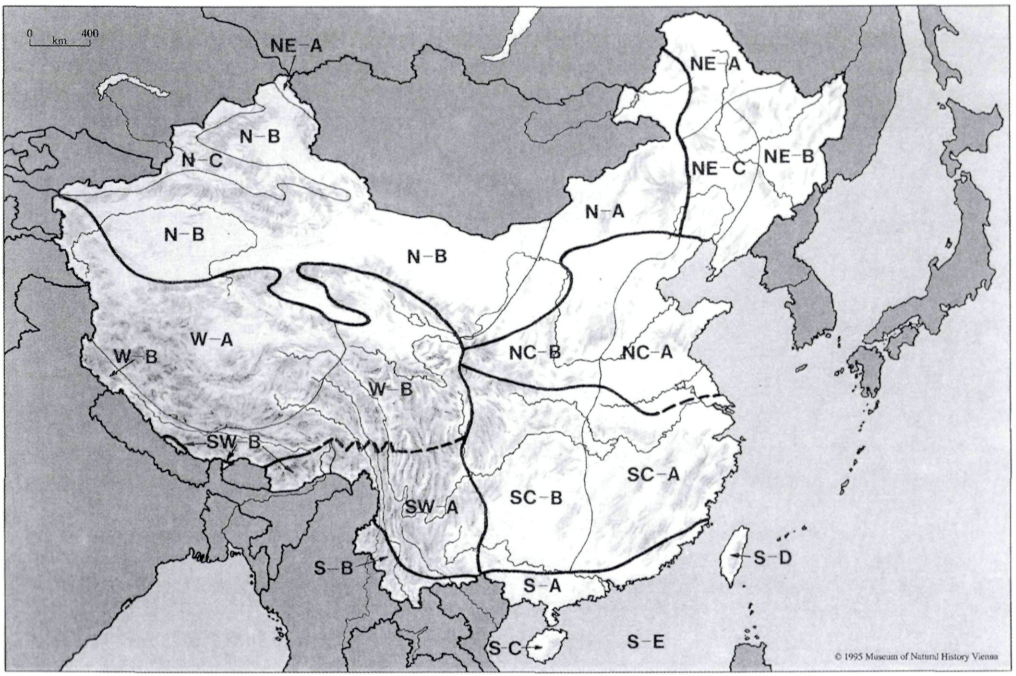

Fig. 3: China's zoogeographical regions and subregions: Northeastern China Region (NE-A Da Hingan Mountains; NE-B Changbai Mountain; NE-C Northeastern Plain); North China Region (NC-A North China Plain; NC-B Loess Plateau); Nei Mongol-Xinjiang Region (N-A East Steppe; N-B West Desert; N-C Tian Shan); Qinghai-Tibet Region (W-A Qinghai-Tibet Plateau; W-B Qinghai-South Tibet); Southwest China Region (SW-A Southwest Mountains; SW-B Himalaya); Central China Region (SC-A East; SC-B West); South China Region (S-A Coast; S-B South Yünnan; S-C Hainan; S-D Taiwan; S-E Islands of South China Sea).

In particular, China's forests have been more extensively destroyed than those of any other country in the world. Deforestation was chronicled as long ago as 2500 years before present by the philosopher Mencius. The major deforestation in Europe was to provide charcoal, to build ships and to provide arable land and pastures for cattle and sheep. However, the origin of deforestation in China is less obvious. The famous French explorer and naturalist, A. David noted in 1872: "I have often wondered what leads the Chinese to destroy the woods of their vast empire so completely... They do not even have the pretext of pasturage, since they raise few cattle, use no milk, and little wool, to explain their passion for ceaselessly burning down mountains.... I think one of their main reasons is a desire for security, obtained by destroying wild animal lairs... experience has taught the Chinese that all cats abandon country denuded of rest and bush..."

The 1950's and the "Cultural Revolution" (1966 - 1976) were anything but beneficial to China's plagued fauna and flora - but nowadays a new, potential threat arises: uncontrolled economic growth. More and more land has to be sacrificed to the alarmingly expanding industry and exploding car traffic. Former habitats of water beetles are turned into factories, warehouses and highways.

According to the "China Plant Red Data Book" (published in 1992) at least 3000 vascular plant species are in danger of extinction. So far, we are not able to state how many Chinese water beetle species are endangered - at least, they are believed to be many. And numerous species which

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have been described by early authors in the last century or the first half of the 20th century may be already extinct today if we take into consideration the very restricted distribution of many species.

Since 1979, the People's Republic of China has joined several international organizations to strenghten its national conservation efforts. Numerous protected areas have been established since: 396 Nature Reserves, covering more than 200 000 km^2, are listed by the IUCN (1992) for the People's Republic of China; these include eight "Biosphere Reserves" (Bogda Shan, Changbai Shan, Dinghu, Fanjing Shan, Wuyi Shan, Shennongjia, Wolong, Xilin Gol) and two "World Heritage Sites". More than 10 Nature Reserves were established in Taiwan, protecting an area of about 5000 km^2 (IUCN 1991). Hong Kong, despite its relative small size, has established 21 well-managed "Country Parks" which make up about 40 percent of its territory; in addition, a mangrove and wetland reserve (Mai Po marshes, listed as a RAMSAR site and managed by the WWF-Hong Kong) was established in the northwest of the New Terrritories (IUCN 1991, 1992). According to IUCN (1992) there are no specific protected areas in Macao. Further information on the nature reserves of China is provided by LI & ZHAO (1989) and ZHAO & al. (1990).

Water beetle research in China

Very little research has been dedicated to the water beetles of China so far. This becomes especially evident when the state of knowledge is compared with Europe or North America. About 1200 water beetle species are described from North America and Europe respectively. Only about 400 (!) water beetle species are recorded from China. 19 new species (2 Dytiscidae, 1 Helophoridae, 3 Hydrophilidae, 2 Dryopidae, 4 Elmidae, 1 Heteroceridae, 1 Psephenidae, 5 Eulichadidae) and 4 new genera (Elmidae) are described from China in this volume. Even the water beetles of Hong Kong, despite Britain's renowned tradition in water beetle research, still are studied poorly taxonomically. David Dudgeon, an ecologist working at the University of Hong Kong since 1977, has found that Hong Kong streams support a diverse array of water beetles.

Era of foreign explorations: The first water beetles from China were described in the early 19th century: e.g. *Cybister bisignatus* AUBÉ, 1838 [= *Cybister sugillatus* ERICHSON, 1834], *Cybister guerini* AUBÉ, 1838, *Cybister bengalensis* AUBÉ, 1838. However, most of these descriptions lack precise data on the locality and the collector, usually referring only to "China". An exception is the material of vertebrates and insects (e.g. *Hydrobius neglectus* HOPE, 1845 [= *Helochares neglectus*] and *Haliplus sinensis* HOPE, 1845 [= *Peltodytes sinensis*]) collected by T. Cantor (1809 - 1860), a Danish naturalist who served as a surgeon to the East India Company in Calcutta, and who volunteered to accompany British forces sent to China in 1840. His regiment, after first being detained at Lantau Island (Hong Kong), was stationed on "Chusan" [= Zhoushan] (see CANTOR 1842), an island situated southeast of Shanghai. Cantor was mainly a herpetologist. The king cobra (*Ophiophagus hannah*) was described by him in 1836. His material is housed in the Natural History Museum, London.

Numerous Chinese water beetle species were described in the second half of the 19th century, by Boheman, Chevrolat, Clark, Fairmaire, Faust, Grouvelle, Hartmann, Jakovlev, Regimbart, Reitter, Sharp, Waterhouse, Westwood, and others. However, only few of these descriptions are provided with precise locality data. Collectors are only rarely named, e.g. J.C. Bowring (1821 - 1893), "Henry Adams", "Arthur Adams", E. Adams", "Major Champion", "Matthew Dickson", and "Stimpson" [= possibly W. Stimpson (1832 - 1872), a naturalist attached to the American naval squadron comprising the North Pacific Exploring Expedition (1853 - 1856)].

Several foreign naturalists visited China in the late 19th/beginning 20th century. Remarkably, they frequently visited the western parts of China ("East Turkestan" [= southern Xinjiang], Tibet and Qinghai), areas which are nowadays not so easily accessable to foreign visitors.

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The well-known French missionary and naturalist A. David (1826 - 1900) on his extensive expeditions (between 1862 and 1874) to northeast China, Beijing, Jiangsu, Sichuan, Qinghai, Zhejiang, Yünnan, Shaanxi, Hebei, Shanxi, Henan, Jiangxi and Fujian discovered such magnificent animals as the giant panda or the giant salamander, but he also collected a number of new species of water beetles: *Hygrobia davidi* BEDEL, 1883 (collected in Jiangxi), *Hydrocassis scapulata* DEYROLLE & FAIRMAIRE, 1878 (collected in Shaanxi, 1875), *Amphizoa davidi* LUCAS, 1882 (collected in Sichuan), *Haliplus diruptus* BALFOUR-BROWNE, 1946 and *H. davidi*, VONDEL, 1991 (collected in Beijing, 1865), *Eulichas davidis* DEYROLLE & FAIRMAIRE, 1878 [= *E. funebris* WESTWOOD, 1853], *Helichus sinensis* FAIRMAIRE, 1888 [= *Praehelichus sinensis*]. Most of his specimens are deposited in the Muséum national d'Histoire naturelle, Paris.

J.C. Excoffier (1861 - 1923) collected mainly in Yünnan. His specimens are partly deposited in the Muséum national d'Histoire naturelle, Paris. *Haliplus* (*Liaphlus*) *excoffieri* VONDEL, 1991 was collected by him in Yünnan in 1898.

During the expeditions of the famous Swedish explorer Sven A. Hedin (1865 - 1952) numerous insects were collected by an expedition staff member (D. Hummel) in Tibet and Xinjiang. Several water beetles were described from these collections: e.g. *Gaurodytes svenhedini* FALKENSTRÖM, 1932 [= *Agabus svenhedini*], *Gaurodytes hummeli* FALKENSTRÖM, 1936 [= *Agabus hummeli*], *Bidessus hummeli* FALKENSTRÖM, 1932 [= *Hydroglyphus hummeli*], *Haliplus hummeli* FALKENSTRÖM, 1932 [= *H. japonicus* SHARP, 1873], *Helophorus lamicola* ZAITZEV, 1908 and *H. ser* ZAITZEV, 1908. The specimens are deposited in the Naturhistoriska Riksmuseet, Stockholm.

An expedition to Burma (1934), led by the Swedish entomologist R. Malaise penetrated also into Chinese territory (W Yünnan) where a few water beetles were collected. These are deposited in the Naturhistoriska Riksmuseet, Stockholm.

F. Stoliczka (1838 - 1874), an Austrian geologist and paleontologist took part in two military-scientific expeditions (1870 and 1873) sent by the British Government and which led him to "Yarkand" [= Sache Xian, Xinjiang], the Karakoram, the Pamir and the Kunlun, thus preceding Przhevalsky's journey through this region by a decade. On the return route from the second mission, Stoliczka became seriously ill re-crossing the Karakoram at a point just east of the world's second highest peak (K2). Eventually, Stoliczka died in Kashmir. A popular book about his first expedition, entitled "Lahore to Yârkand" was published by HENDERSON & HUME (1873). Numerous insects, including new water beetle species, e.g. *Agabus dichrous* SHARP, 1878 and *Ilybius cinctus* SHARP, 1878, were collected during Stoliczka's expeditions. The material is partly deposited in the Indian Museum, Calcutta.

H. Sauter (1871 - 1948) collected in Taiwan. Most of his material is deposited in the Deutsches Entomologisches Institut, Eberswalde. Several water beetles were named after him: *Hydraena sauteri* d'ORCHYMONT, 1913, *Dineutes sauteri* UYTTENBOOGAART, 1915 [= *D. mellyi* (RÉGIMBART, 1882)], *Haliplus sauteri* ZIMMERMANN, 1924 [= *H. regimbarti* ZAITZEV, 1907], *Enochrus sauteri* d'ORCHYMONT, 1913, *Helochares sauteri* d'ORCHYMONT, 1943 and *Stenelmis sauteri* KONO, 1936.

E. Zugmayer (1879 - 1938), a German zoologist from Munich collected in Tibet and Xinjiang. Although he was interested mainly in lizards he also took some water beetles. *Laccobius zugmayeri* KNISCH, 1910, a hydrophilid from Tibet was described from his material which is deposited in the Natural History Museum, Vienna and the Zoologische Staatssammlung, München.

The interests of R.E. Mell (1878 - 1970), another German zoologist, centered on snakes and lepidoptera. However, some water beetles collected by him in Guangdong (e.g. *Stenelmis kuntzeni* BOLLOW, 1941) are deposited in the Museum of the Alexander Humboldt University, Berlin.

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The German entomologist F. Hauser (1853 - 1932) collected extensively in Central Asia and in Xinjiang. Most of his material is housed in the Natural History Museum, Vienna and the Museum of the Alexander Humboldt University, Berlin.

J.F. Klapperich (1913 - 1987), another German entomologist, collected about 160 000 insects in Fujian (1937/38). Most of these insects are deposited in the Museum Alexander König, Bonn. *Orectochilus klapperichi* OCHS, 1942, *Stenelmis klapperichi* BOLLOW, 1941 and *Rhinoncomimus klapperichi* WAGNER, 1940, all from Fujian, are named after him.

E. Csiki [or Cziki] (1875 - 1954) was the first water beetle specialist who visited China. He took part in an extensive expedition (1898) led by E. Zichy (see CSIKI 1901). The water beetles collected during that expedition (e.g *Ilybius chinensis* CSIKI, 1901) are deposited in the Természettudományi Múzeum, Budapest.

E.E. Suenson (1887 - 1966) lived and worked in China from 1917 - 1946. His large insect collections are deposited in the Zoological Museum, University of Copenhagen.

J.L. Gressitt (1914 - 1982), an American entomologist specialized in Cerambycidae, and made extensive collections of insects in southern China. His material is deposited in various museums (e.g. The Natural History Museum, London; California Academy of Sciences, San Francisco; Bishop Museum, Honolulu). *Pachyparnus gressitti* (HINTON, 1936), a dryopid from Taiwan, was named after him.

The entomologist E.A. Pratt journeyed to the upper Chang Jiang (1887 - 1890) as described in his book "To the snows of Tibet through China", published in 1892. His material which includes also water beetles is deposited in various European and American museums (HORN & al. 1990).

G. Lewis (1839 - 1926) collected beetles in China (1862 - 1864), Japan (1867 - 1872, 1880/81) and Sri Lanka (1881/82). Several Chinese water beetle species are named after him: e.g. *Laccophilus lewisius* SHARP, 1873, *Cybister lewisianus* SHARP, 1873, *Berosus lewisius* SHARP, 1873. Most of his material is deposited in the Natural History Museum, London.

J. Whitehead (1861 - 1899) collected in various parts of southeast Asia (Java, Borneo, Philippines). *Pachyparnus whiteheadi* (WATERHOUSE, 1900), a dryopid, was taken by him in Hainan.

In the years 1938 - 1940, several research trips to northeastern China ("Manchuria") were made by M. Weymarn. Numerous water beetles (e.g. *Copelatus weymarni* BALFOUR-BROWNE, 1946) were collected during these trips. Many of his water beetles are deposited in the Natural History Museum, London.

A number of early explorers took part in Russian expeditions, mainly to northern and western China, e.g. P.P. Semenov Tian-Shanskij [or Semenoff-Tian-Shansky] (1827 - 1914), A.P. Semenov Tian-Shanskij [or Semenoff-Tian-Shansky] (1866 - 1942), N.M. Przhevalsky (1839 - 1888), P.K. Kozlov (1863 - 1935), V.I. Roborovsky (1856 - 1910), P.L. von Schrenck [or Schrenk] (1826 - 1894). Their specimens are housed in the Zoological Institute (Academy of Sciences), St. Petersburg.

Chinese water beetle specialists:

The first half of the 20th century brought forth a number of eager Chinese water beetle specialists, some of whom (e.g. Z. Pu) were trained in the USA (modern spelling in square brackets):

M.T. CHEO [= Mingzang ZHOU]: Gyrinidae

Hsutang (or H.T.) [= Xuetang] FENG: Dytiscidae, Noteridae

Chenfu F. WU [= Jingfu HU]: catalogues on several water beetle families

Chih-Lung (or Jillon) [= Zhelong] PU: Hydraenidae, Hydroscaphidae, Hydrophilidae

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Unfortunately, water beetle taxonomy came to an abrupt standstill during the "Cultural Revolution". Only recently, water beetle research increased noticeably, especially in Taiwan. M.-L. JENG (Dryopoidea), L. JI (Hydrophilidae), C.-F. LEE (Dryopoidea), L.-J. WANG (Dytiscidae, Noteridae), J. [or C.] YANG and P. YU (Amphizoidae) must be named here.

Water beetle collections in China:

There are numerous insect collections in China (see list). Most of these collections contain also water beetles. Catalogues were published on a few of them only (YANG & SUN 1991, HUA 1989).

Institute of Zoology, Chinese Academy of Sciences, Beijing.
Beijing Museum of Natural History, Beijing.
Department of Entomology, Beijing Agricultural University, Beijing.
Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang, Liaoning.
Tianjin Museum of Natural History [formerly: Huang-ho & Bei-ho Museum], Tianjin.
Shanghai Institute of Entomology, Chinese Academy of Sciences, Shanghai.
Insect Museum, Northwest Agricultural University, Yangling District, Xianyang, Shaanxi.
Department of Biology, Zhongshan University [formerly: Sun Yatsen University], Guangzhou, Guangdong.
Department of Biology, Nankai University, Tianjin.
Department of Plant Protection, Zhejiang Agricultural University, Hangzhou, Zhejiang.
Department of Plant Protection, Nanjing, Jiangsu.
Department of Plant Protection, Chongqing, Sichuan.
Department of Plant Protection & Institute of Biological Control, Fuzhou, Fujian.
Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming, Yünnan.
Department of Biology, Shaanxi Normal University, Xian, Shaanxi.
Department of Applied Zoology, Taiwan Agricultural Research Institute (TARI), Wufeng, Taichung, Taiwan (includes collection of T.C. Maa).
National Chung Hsing University, Taichung, Taiwan.
National Museum of Natural Science, Taichung, Taiwan.
Department of Plant Pathology & Entomology, National Taiwan University, Taipei, Taiwan.
Taiwan Forestry Research Institute, Taipei, Taiwan.
Taiwan Museum, Taipei, Taiwan.
Musheng Insect Museum, Nantou, Puli, Taiwan (private).

Language and transcription

Any entomologist working on Chinese material should keep in mind that 1) although Chinese is the most widely used language in China it is just one of more than 50 languages spoken in China, 2) that the Chinese language itself consists of a variety of dialects and 3) that different transcription systems were in use, which influenced the spelling of proper names (e.g locality names on labels and in publications, and names of persons).

Transcription systems: Chinese is written in Han characters. There are several transcription systems according to which these Han characters are turned into syllables using the Latin alphabet. The **Wade-Giles** system was the most widely used in the first half of the 20th century and it is still in use in Taiwan. In 1958, the People's Republic of China approved the **Pinyin** system for the latinization of Chinese characters. In 1979 Pinyin was accepted by most nations of the world as the system to be employed officially for latinized Chinese names and it has nowadays replaced Wade-Giles in the People's Republic of China.

Unfortunately, the Pinyin system is not at all satisfying. Especially, since correct pronunciation becomes difficult, and pronunciation rules fail. For instance, the vowel "e" is never pronounced as the "e" in the English "he" or "me". Instead it is often pronounced as the German "a" (e.g. in "er" (= two) or "cheng" (= town)); in the Chinese word for river ("he") it is pronounced as in the English "her", similar to the German "ö" (or somewhat intermediate between the German "e" and "ö"); and in "zhen" (= town) it is pronounced like in the English word "wet", agreeing with the German "e".

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Accordingly, the transcription "hö", instead of "he" and "ar" and "chang" instead of "er" and "cheng" would certainly be more appropriate and would support correct pronunciation. Similarly problematic is the vowel "a" since it is pronounced either as the German "a" (e.g. Hainan, Liaoning) or as the German "ä" (e.g. "tian" (heaven), "xian" (county)). Thus a transcription as "tiän" and "xiän" would certainly be more appropriate. However, to avoid excessive confusion we are here accepting the official Pinyin names and added umlauts only to distinguish between "u" (e.g. Hunan) and "ü" (e.g. Yünnan).

N a m e s o f p e r s o n s (a u t h o r s): The spelling of Chinese author names (especially their given names) has changed with the different transcription systems and it is not unusual that the same author can be found written in 3 different ways in different publications (e.g. the first name of Prof. Pu who has worked on water beetles since 1936).

The spelling of the first name(s) (initials) of Chinese scientists is complicated furthermore by the fact that Chinese first names (given names) usually consist of 2 syllables. While in Taiwan all bi-syllabic Chinese first names are hyphenated or given as two different words (e.g. Ping-Ping, Ping Ping or Ping-ping, abbr.: P.-P., P.P. or P.-p.), in the People's Republic of China hyphenating of first names is no longer officially practiced since 1979 (e.g. Pingping, abbr.: P.). Furthermore, in China it is usual to place the given name after the family name, whereas in Europe the given name (first name) is normally placed in front of the family name. To maintain consistency we have adopted the European system throughout this book.

Examples (modern spelling in square brackets, family names capitalized): Chenfu or Chinfu or Chin-Fu WU [= Jingfu HU]; Jillon or Chih-Lung PU [= Zhelong PU]; CHU [= ZHU]; CHEO [= Mingzang ZHOU]; Yanting CHU [= Yuanding ZHU]; Yinchi HSU [= Yinqi XÜ]; Hsutang FENG [= Xuetang FENG].

To avoid confusion in the "References" sections of this book, the "original spelling" is used as it appears in the original publication. The modern equivalent is given in square brackets behind the original spelling. One should keep in mind that the same author can appear in different places in the alphabetical literature list.

L o c a l i t y n a m e s: Considerable problems may arise when "historical" localities are to be assigned to present provinces. For instance, in Chinese catalogues of 1930 - 1940 Mongolia is meant in a wider sense than the current Chinese Autonomous Region Nei Mongol (Inner Mongolia). It included also Ningxia and northern parts of Gansu and Xinjiang (MURZAEV 1954). Similarly enigmatic is the term "Manchuria", which nowadays includes the three northeastern provinces Heilongjiang, Jilin and Liaoning. During the Japanese occupation (1933 - 1945) Manchukuo, as Manchuria was then called, included Manchuria s.str. and a province named Jehol, which was abolished in 1955 and which included parts of Nei Mongol, Hebei and Liaoning. Similarly, Tibet was once considerably larger than it is today, containing for instance also Qinghai. Parts of western Sichuan were referred frequently to as "East Tibet" by last century's naturalists (e.g. A. David). The historical geographical area known as "East Turkestan" is more or less identical with today's southern Xinjiang Autonomous Region.

As for current names and locations of provinces and "historical" localities see above (under "China's administrative regions") and ZHAO & ADLER (1993: 426 ff.).

However, for a few localities we have not been able to trace down the present names or their coordinates. Any information on these localities would be greatly appreciated: "North China: Caufang"; "Chanyang"; "Danes Island"; "Doo Choo Foo" or "Chu'fu"; "Li-cong", "Lincong" or Lilong"; "Nyenhangli".

Glossary of geographical terms that are frequently used in China (Chinese, Mongolian and Tibetan):

Bandao	Peninsula	Chi, Chitang	Pool (man made)
Bei	North	Co	Lake
Cheng	City	Cün	Village

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Cünzhuang	Village
Da	Big
Dao	Island
Daoyü	Island, group of islands
Ding	Top
Diqü	Prefecture
Dong	East
Feng	Mountain
Gangkou	Harbour, port
Gaoyuan	Plateau
Gou	Small valley, trench, channel
Gobi	Gravel desert
Gol	River
Gongyuan	Park
Guan	Pass
Hai	Sea
He	River
Hou	Rear, back; thick
Hu	Lake
Jiang	River
Jiao	Cape, reef
Jing	Well
Jiu	Old
Kou	Mouth
Liedao	Group of islands
Ling	Mountain range
Lin	Forest
Men	Pass, strait
Nei	Inner
Nan	South
Nongcün	Countryside
Nur	Lake
Pendi	Basin
Pingyuan	Plain
Pao	Lake, pool
Qi	Banner
Qian	Front
Qiao	Bridge
Qiuling	Hill
Qü	Canal
Qüan	Spring
Qündao	Group of islands, archipelago
Senlin	Forest
Shamo	Desert
Shan	Mountain
Shang	Upper
Shanfeng	Mountain
Shanding	Mountain top
Shankou	Pass
Shandi	Mountainous area
Shanmai	Mountain range
Sheng	Province
Shi	City
Shi	Subdivision (diqü) of a province
Shui	Water
Shuiku	Reservoir
Tang	Pool
Ula	Mountain
Wai	Outer
Wan	Bay
Wenqüan	Hot spring
Xi	West
Xi	Stream, brook
Xia	Lower
Xia, Xiagu	Gorge
Xian	County
Xiang	Township
Xiangcün	Village
Xiao	Small
Xin	New
Yang	Ocean
You	Right
Yüan	Round
Yünhe	Canal
Zhaoze	Swamp
Zhen	Town
Zhixia Shi	Municipality
Zhong	Central
Zizhiqü	Autonomous Region
Zhou	Prefecture
Zuo	Left

List of localities sampled by the CWBS, 1992 - 1994

Collections have so far been made in 9 provinces (Beijing, Guangxi, Hunan, Jilin, Liaoning, Shandong, Sichuan, Yünnan) and in Hong Kong (see Fig. 4).

In square brackets "[00]" original field locality number as it appears on labels of specimens collected 1992 - 1994.

1. **Hong Kong**; Hong Kong Island; Victoria Peak, at Hatton Road; small, shaded stream, flowing through secondary forest, ca. 200 m a.s.l.; 24.VI.1992; leg. Jäch; [1]; no water beetles found

2. **Hong Kong**; New Territories; Sha Lo Tung Village, ca. 3 km N Tai Po New Town; small, shaded stream, 1 - 2 m wide, flowing through secondary forest, ca. 200 m a.s.l.; 25.VI.1992; leg. Jäch; [2]

3. **Hong Kong**; New Territories; Sha Lo Tung Village, ca. 3 km N Tai Po New Town; small, shallow, springfed puddles, near fields next to village, ca. 200 m a.s.l.; 25.VI.1992; leg. Jäch; [2a]

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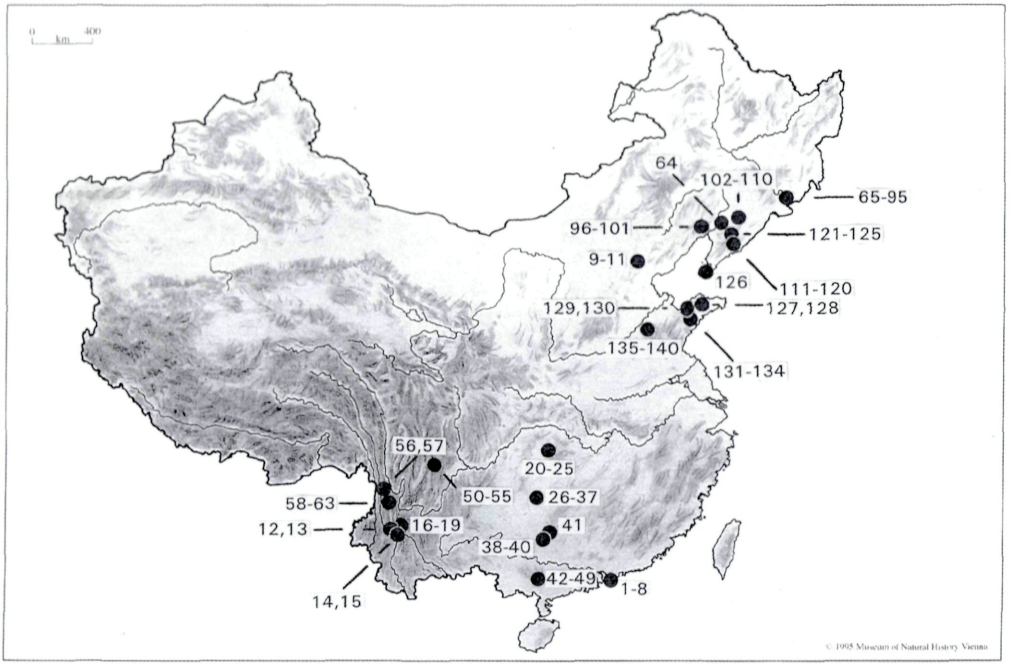

Fig. 4: "China Water Beetle Survey", localities sampled between 1992 - 1994.

4. **Hong Kong**; New Territories; a) stream, ca. 2 m wide, with pebbles and cobbles, only partly shaded by riparian shrubs, small trees and bamboo, near Wu Kau Tang Village, ca. 125 m a.s.l., b) lower course of same stream, ca. 10 - 15 m wide, with large volcanic boulders, partly shaded by secondary forest, between Bride's Pool and Plover Cove Reservoir, ca. 50 m a.s.l.; 25.VI.1992; leg. Jäch; [3]; (see Figs. 5, 6)

5. **Hong Kong**; New Territories; Lam Tsuen River, near Kadoorie Farm, SW Tai Po New Town, stream, 3 - 4 m wide (during wet season), shaded by secondary forest, ca. 125 m a.s.l.; 25.VI.1992; leg. Jäch; [4]

6. **Hong Kong**; New Territories; Tai Mo Shan Country Park, SW Tai Po New Town; Lam Tsuen River, 150 - 500 m a.s.l.; 25.VI.1992; leg. Jäch; [5]; (see Fig. 8)

7. **Hong Kong**; Lantau Island; NW Mui Wo Village; shallow pools and streams between Mui Wo and Ngau Kwu Long, ca. 25 - 100 m a.s.l.; 26.VI.1992; leg. Jäch; [6]; (see Fig. 9)

8. **Hong Kong**; New Territories; Tai Po Kau Forest Nature Reserve near Tai Po New Town; stream, ca. 3 m wide, through secondary forest, ca. 150 - 200 m a.s.l.; 27.VI.1992; leg. Jäch; [7]; (see Fig. 7)

9. **Beijing Municipality**; Ming Tombs; small, unshaded rain puddles; 1.VII.1992; leg. Jäch; [9]

10. **Beijing Municipality**; Xiang Shan (= Fragrant Hills), ca. 35 km NW Beijing City; small stream (epirhitron), flowing through forest; 2.VII.1992; leg. Jäch & Ji; [10 (leg. Jäch) and 10a (leg. Ji)]; (see Fig. 10)

11. **Beijing Municipality**; Beijing City, Continental Grand Hotel; at light; 2.VII.1992; leg. Jäch; [11]

12. **Yünnan Province**; Dali Autonomous Prefecture; Yünlong County; ca. 150 km NW Xiaguan City; Bi Jiang, ca. 40 m wide, slightly polluted, 2000 m a.s.l.; 28.VI.1993; leg. Ji; [no label number]

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13. **Yünnan Province**; Dali Autonomous Prefecture; Yongping County; Gongguoqiao Village; ca. 140 km W Xiaguan City; small stream, 0.5 m wide, unpolluted, shaded, ca. 1600 m a.s.l.; 28.VI.1993; leg. Ji; [no label number]

14. **Yünnan Province**; Dali Autonomous Prefecture; Weishan County; Weibao Shan, 60 km S Xiaguan City and 12 km S Weishan City; pool in a small, shaded, unpolluted stream, 2500 - 3000 m a.s.l.; 1. - 17.VII.1993; leg. Ji; [no label number]

15. **Yünnan Province**; Dali Autonomous Prefecture; Weishan County; Weibao Shan, 60 km S Xiaguan City and 12 km S Weishan City; small, ca. 1 m deep, man made rain water pool, unshaded, unpolluted, 2500 - 3000 m a.s.l.; 1. - 17.VII.1993; leg. Ji; [no label number]

16. **Yünnan Province**; Dali Autonomous Prefecture; Ancient Dali City; 4 km N Xiaguan City; Chang Shan (= Misty Mountain); small stream, 0.5 m wide, slowly flowing, unpolluted; 19.VII.1993; leg. Ji; [no label number]

17. **Yünnan Province**; Dali Autonomous Prefecture; Ancient Dali City; 4 km N Xiaguan; foot hills of Chang Shan; fast flowing and very cold river, ca. 6 m wide, shaded, large rocks on the shore, unpolluted; 19.VII.1993.; leg. Ji; [no label number]

18. **Yünnan Province**; Dali Autonomous Prefecture; Binchuan County; Jizhu Shan (= Chicken Leg Mountain), 31 km N Binchuan City and ca. 70 km NE Xiaguan City; ground water pool, ca. 10 m long and 8 m wide, slightly polluted, 2500 - 3200 m a.s.l.; 31.VII.1993; leg. Ji; [no label number]

19. **Yünnan Province**; Dali Autonomous Prefecture; Binchuan County; Jizhu Shan, 31 km N Binchuan City and ca. 70 km NE Xiaguan; small stream, ca. 1 - 2 m wide, fast flowing and cold, shaded, unpolluted, 2500 - 3200 m a.s.l.; 31.VII.1993.; leg. Ji; [no label number]

20. **Hunan Province**; Xiangxi Prefecture; Dayong County; Zhangjiajie Forest National Park, Suoxiyü Nature Reserve, Wulingyüan section (ca. 30 km N Dayong City); Pipa Xi (= 'Chinese Lute' River), ca. 2 - 3 m wide, shaded, very shallow, sometimes even vanishing beneath the gravel of sandstone and occasional limestone, ca. 650 m a.s.l.; 29.X.1993; leg. Schönmann, Schillhammer & Ji; [1]; (see Fig. 13)

21. **Hunan Province**; Xiangxi Prefecture; Dayong County; Zhangjiajie Forest National Park, Suoxiyü Nature Reserve, Wulingyüan section (ca. 30 km N Dayong City); small, right side tributary of Pipa Xi, short steep stretch with small waterfalls and big boulders, accumulations of decaying plant material, rocks partly covered with moss, shaded, ca. 650 m a.s.l.; 29.X.1993; leg. Schönmann, Schillhammer & Ji; [2]

22. **Hunan Province**; Xiangxi Prefecture; Dayong County; Zhangjiajie Forest National Park, Suoxiyü Nature Reserve, Wulingyüan section (ca. 30 km N Dayong City); ca. 500 m upstream of Shuiraosimen bus station; tributary of Jinbian Xi (= Gold Whip River), slowly flowing, 0.5 - 1.0 m wide; 30.X.1993; leg. Schönmann, Schillhammer & Ji; [3]

23. **Hunan Province**; Xiangxi Prefecture; Dayong County; Zhangjiajie Forest National Park, Suoxiyü Nature Reserve, Wulingyüan section (ca. 30 km N Dayong City); ca. 2 km downstream of Shuiraosimen; small branch of Jinbian Xi, ca. 1 - 2 m wide, slowly flowing, with riffle areas and pools; 30.X.1993; leg. Schönmann, Schillhammer & Ji; [4]

24. **Hunan Province**; Xiangxi Prefecture; Dayong County; Zhangjiajie Forest National Park, Suoxiyü Nature Reserve, Wulingyüan section (ca. 30 km N Dayong City); ca. 3 km upstream of Suoxiyü City; Suo Xi, furcation area in a wide riverbed (50 - 100 m), river divided into several, ca. 2 - 5 m wide streamlets, sandstone and little limestone, ca. 400 m a.s.l.; 31.X.1993; leg. Schönmann, Schillhammer & Ji; [5]; (see Fig. 11)

25. **Hunan Province**; Xiangxi Prefecture; Dayong County; Zhangjiajie Forest National Park, Suoxiyü Nature Reserve, Wulingyüan section (ca. 30 km N Dayong City); ca. 3 km upstream of Suoxiyü City; small tributary of Suo Xi, partly shaded, with large boulders, small waterfalls and pools, ca. 450 m a.s.l.; 31.X.1993; leg. Schönmann, Schillhammer & Ji; [6]

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26. **Hunan Province**; Huaihua Prefecture; Huitong County; 2 km SW Guangping Township; near Paotuan Village; near lower Research Station of Academia Sinica; unnamed river, 5 - 8 m wide, polluted, ca. 300 m a.s.l.; 2.XI.1993; leg. Schönmann, Schillhammer & Ji; [7]; no water beetles found.

27. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; rice fields near loc. 26; 2.XI.1993; leg. Schönmann, Schillhammer & Ji; [7]

28. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; near Paotuan Village, ca. 1 km from Academia Sinica Research Station; small river, flowing through rice terraces, partly dammed up, slightly polluted, ca. 1 m wide, ca. 350 m a.s.l.; 2.XI.1993; leg. Schönmann, Schillhammer & Ji; [8]

29. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; Moshao Village, ca. 15 km W Guangping Town; south slope below the upper Research Station of Academia Sinica; small stream in a deep ravine, shaded, unpolluted, secondary (broadleaf) vegetation, ca. 450 - 550 m a.s.l.; 3.XI.1993; leg. Schönmann, Schillhammer & Ji; [9]

30. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; Moshao Village, ca. 15 km W Guangping Township; ca. 5 km N of upper Research Station of Academia Sinica; small stream, flowing through planted forest (Chinese fir, *Cunninghamia lanceolata*) and rice fields, slightly polluted, ca. 350 m a.s.l.; 4.XI.1993; leg. Schönmann, Schillhammer & Ji; [10]

31. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; Moshao Village, ca. 15 km W Guangping; rain water pools near loc. 30, ca. 350 m a.s.l.; 4.XI.1993; leg. Schönmann, Schillhammer & Ji; [10a]

32. **Hunan Province**; Huaihua Prefecture; Huitong County; Jinlong Shan (= Golden Dragon Mountain); ca. 30 km NE Huitong City; forest stream, ca. 2 - 3 m wide, shaded, large boulders, small waterfalls and flat stretches with shingle and moss-covered stones, pools and accumulations of decaying plant material, upper reaches through broadleaf forest, lower reaches through *Cunninghamia* forest, amphibolite, ca. 600 - 650 m a.s.l.; 5.XI.1993; leg. Schönmann, Schillhammer & Ji; [11]

33. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; ca 10 km S of lower Research Station of Academia Sinica; springfed pools along road ditch and flooded rice fields, ca. 400 m a.s.l.; 6.XI.1993; leg. Schönmann, Schillhammer & Ji; [12]

34. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; flooded rice fields near upper reaches of stream at loc. 27, beyond the reservoir, ca. 400 m a.s.l.; 6.XI.1993; leg. Schönmann, Schillhammer & Ji; [13]

35. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; 2 km upstream of loc. 30, near Moshao Village; small stream, 0.5 - 1 m wide, partly canalized, partly vanishing beneath the gravel, ca. 400 m a.s.l.; 7.XI.1993; leg. Schönmann, Schillhammer & Ji; [14]

36. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; ca. 5 km NW Guangping Town; small stream, flowing through rice fields, fine shingle, sandstone, ca. 350 m a.s.l.; 7.XI.1993; leg. Schönmann, Schillhammer & Ji; [15]

37. **Hunan Province**; Huaihua Prefecture; Huitong County; Guangping Township; river, NW tributary to river of loc. 26, slowly flowing with riffle areas, ca. 3 - 5 m wide, slightly polluted; 350 m a.s.l.; 7.XI.1993; leg. Schönmann, Schillhammer & Ji; [16]; (see Fig. 12)

38. **Guangxi Autonomous Region**; Liuzhou Prefecture; ca. 10 km NE Liuzhou City; ca. 2 km E Shanmenjiang Forest Station; small stream, ca. 0.3 - 0.5 m wide, with accumulations of decaying plant material, ca. 200 m a.s.l.; 10.XI.1993; leg. Schönmann, Schillhammer & Ji; [17]

39. **Guangxi Autonomous Region**; Liuzhou Prefecture; near loc. 38, cattle dung; 10.XI.1993; leg. Schillhammer; [17a]

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40. **Guangxi Autonomous Region**; Liuzhou Prefecture; ca. 10 km NE Liuzhou City; 3 km NW Shanmenjiang Forest Station; small stream, ca. 1.5 - 2.0 m wide, slowly flowing through dense vegetation of small shrubs and some abandoned rice fields, ca. 150 - 200 m a.s.l.; 11.XI.1993; leg. Schönmann, Schillhammer & Ji; [18]

41. **Guangxi Autonomous Region**; Guilin Prefecture; Lipu County; ca. 120 km S Guilin, ca. 80 km E Liuzhou City; Siuren village; fast flowing stream, ca. 1 m wide, unpolluted, partly shaded, gravel and rocks, numerous little waterfalls, volcanic, ca. 350 m a.s.l.; 10.XI.1993; leg. Schönmann, Schillhammer & Ji; [19]

42. **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan (= Sixty-thousand Mountains); 30 km SW Yülin City; several streams in the vicinity of Liuwan Forest Station, 0.5 - 2.0 m wide, rather sandy, rich, original, riverside vegetation, slopes covered with planted forest of mainly *Cunninghamia lanceolata*, crystalline rock, 350 - 400 m a.s.l.; 16.XI.1993; leg. Schönmann, Schillhammer & Ji; [20]; (see Fig. 14)

43. **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; small, steep mountain streams on the S slope of Kui Shan Ding (= Helmet Mountain), cataracts, large crystalline boulders, coarse sand, dense vegetation, slopes covered with planted forest, 600 - 700 m a.s.l.; 17.XI.1993; leg. Schönmann, Schillhammer & Ji; [21]

44. **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; stream W of Kui Shan Ding, 2 - 3 m wide, large crystalline boulders, gravel, coarse sand, surrounded by agricultural area, slightly polluted, 300 m a.s.l., lower reaches (150 m a.s.l.) severely polluted; 17.XI.1993; leg. Schönmann, Schillhammer & Ji; [22]

45. **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan, 20 km E of Liuwan Forest Station; foot hills of Kui Shan Ding; upstream of Zhongxin Substation; small, steep stream, large crystalline boulders, 0.3 - 0.4 m wide, rich riverside vegetation, ca. 300 m a.s.l.; 18.XI.1993; leg. Schönmann, Schillhammer & Ji; [23]

46. **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; ca. 15 km E of Liuwan Forest Station; very small stream, ca. 0.2 - 0.3 m wide, near loc. 45, scanty riverside vegetation, ca. 200 m a.s.l.; 18.XI.1993; leg. Schönmann, Schillhammer & Ji; [24]

47. **Guangxi Autonomous Region**; Yülin Prefecture; near loc. 46, cattle dung; 18.XI.1993; leg. Schillhammer; [24a]

48. **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; stream, 0.4 - 0.5 m wide, downstream of Zhongxin Substation, 120 m a.s.l.; 18.XI.1993; leg. Schönmann, Schillhammer & Ji; [25]

49. **Guangxi Autonomous Region**; Yülin Prefecture; Liuwan Da Shan; stream, ca. 2 km upstream of loc. 42, 0.3 - 0.5 m wide, flowing through rather flat area, rather sandy, ca. 500 m a.s.l.; 20.XI.1993; leg. Schönmann, Schillhammer & Ji; [26]

50. **Sichuan Province**; Leshan Prefecture; Emei Shan, ca. 15 km W Emei City; 1000 - 2500 m a.s.l.; 21. - 23.VI.1994; leg. Schillhammer; [1, 2, 3, 4, 5]; (see Fig. 15)

51. **Sichuan Province**; Leshan Prefecture; Emei Shan, ca. 15 km W Emei City; small freshwater pools, 2230 m a.s.l.; 21.VI.1994; leg. Schillhammer & Ji; [2a]

52. **Sichuan Province**; Leshan Prefecture; Emei Shan, ca. 15 km W Emei City; small stream, ca. 1 m wide, schist, 1530 m a.s.l.; 22.VI.1994; leg. Schillhammer; [4a]

53. **Sichuan Province**; Leshan Prefecture; Emei Shan, ca. 15 km W Emei City; Xianfeng Monastery, swept from vegetation, 1700 m a.s.l.; 22.VI.1994; leg. Schillhammer; [4b]

54. **Sichuan Province**; Leshan Prefecture; Emei Shan, ca. 15 km W Emei City; small stream, 0.5 - 1.0 m wide, rather sterile, limestone, 1230 m a.s.l.; 23.VI.1994; leg. Schillhammer; [5a]

55. **Sichuan Province**; Leshan Prefecture; Emei Shan, ca. 15 km W Emei City; gorge below Hongchun

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Terrace; stream, ca. 1 - 2 m wide, limestone, 860 m a.s.l.; 23.VI.1994; leg. Schillhammer & Ji; [6]; (see Fig. 18)

56. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; Hengduan Shan; ca. 100 km NW Lijiang City; 5 km W Jüdian City, on the road to Weixi City; stream, ca. 10 m wide, very sandy, crystalline rocks, 2100 m a.s.l.; 30.VI., 3.VII.1994; leg. Schillhammer & Ji; [9, 11]; (see Fig. 16)

57. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; Hengduan Shan; ca. 100 km NW Lijiang City; ca. half-way between Jüdian City and Ludian Town; gravel bank upstream of loc. 56, rather sandy, with accumulations of decaying plant material; 2200 m a.s.l.; 1.VII.1994; leg. Schillhammer; [10]

58. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; 10 km SW Lijiang City; small, very cold stream, volcanic rock and boulders of limestone - sandstone agglomerations; 2500 m a.s.l.; 5.VII.1994; leg. Schillhammer & Ji; [13]

59. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; 10 km SW Lijiang City; Monastery, surrounded by a patch of original vegetation; source of stream (loc. 58); 2700 m a.s.l.; 5.VII.1994; leg. Schillhammer & Ji; [14]; (see Fig. 19)

60. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; 15 km N Lijiang City; small valley near the abandoned airport; small stream, 0.5 - 1.0 m wide, limestone, 2800 m a.s.l.; 6.VII.1994; leg. Schillhammer & Ji; [16]; (see Fig. 17)

61. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; Yülongxüe Shan (= Jade Dragon Glacier Mountain), near Baishui (= White Water) Hotel, ca. 30 km N Lijiang; small trickle on steep slope, stones with moss, in primary forest, 2900 m a.s.l.; 7. - 11.VII.1994; leg. Schillhammer; [17]

62. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; Yülongxüe Shan, near Baishui Hotel, ca. 30 km N Lijiang; pools and small forest lake, very shallow, rich subaquatic vegetation, shores with large quantities of decaying plant material; 2900 - 3200 m a.s.l.; 7. - 11.VII.1994; leg. Schillhammer; [17a]; leg. Ji; [17]

63. **Yünnan Province**; Lijiang Autonomous Prefecture; Lijiang County; Yülongxüe Shan, near Heishui (= Black Water) Village, ca. 40 km N Lijiang City; small stream, 0.5 m wide, flowing through primary forest, near loc. 62, ca. 3000 m a.s.l.; 13. - 15.VII.1994; leg. Ji; [18]

64. **Liaoning Province**; Shenyang City Region; ca. 3 km S Shenyang City; shallow, unshaded, rain and ground water pools at bank of Hun He (= Muddy River); 14.VIII.1994; leg. Jäch, Ji & Wang; [1]

65. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City, Baohujü District; Erdao Bai He (= 2nd White River), near bridge, 10 - 15 m wide, fast flowing, 650 m a.s.l.; 15.VIII.1994; leg. Jäch, Ji & Wang; [2]

66. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City, Baohujü District; small ground water pool, shaded, decaying leaves, in forest, ca. 10 m from the river bank; 15.VIII.1994; leg. Jäch; [3]

67. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City, Baohujü District; several unshaded pools in the surrounding of Baihe City, near Academia Sinica Changbai Mountain Research Station, ca. 700 m a.s.l.; 15.VIII.1994; leg. Jäch, Ji & Wang; [4]

68. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 60 km N Baihe City; Shao Tian Chi (= Small Heaven Lake), warm water (probably thermally heated), ca 1700 m a.s.l.; 16.VIII.1994; leg. Jäch, Ji & Wang; [5]

69. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 60 km N Baihe City; small stream, feeding the lake (loc. 68), ca. 1 m wide, warm water, shaded, flowing through birch forest, basalt, 1700 m a.s.l.; 16.VIII.1994; leg. Jäch, Ji & Wang; [6]

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70. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; Erdao Bai He, close to loc. 68, ca. 10 m wide, gravel bank, fast flowing, 1700 m a.s.l.; 16.VIII.1994; leg. Jäch, Ji & Wang; [7]

71. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; near road to Mountain; small stream, ca. 1 - 2 m wide, flowing through dense primary coniferous forest, water very cold, 1700 m a.s.l.; 16.VIII.1994; no water beetles found; [8]

72. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 60 km N Baihe City; river, ca. 5 m wide, very cold water, fast flowing, in very deep (ca. 4 m) gorge, through primary coniferous forest, near road to Changbai Mountain, 1200 m a.s.l.; 16.VIII.1994; leg. Jäch, Ji & Wang; [9]

73. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 60 km N Baihe City; ca. 20 m from loc. 72; rain water pool (probably fed by underground aquifer); 16.VIII.1994; leg. Jäch, Ji & Wang; [10]

74. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 50 km N Baihe City, near the road to Changbai Mountain; stream, 2 m wide, very cold, flowing through primary coniferous forest, 1100 m a.s.l.; 16.VIII.1994; leg. Jäch, Ji & Wang; [11]

75. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; on the way to top of Changbai Mountain, ca. 50 km N Baihe City, ca. 200 m N of Bai Shan Station; stream, ca. 3 m wide, basalt, warm water (probably thermally heated), flowing through degraded primary forest, 1100 m a.s.l.; 16.VIII.1994; leg. Jäch, Ji & Wang; [12]

76. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; 6 km W Baihe City; Toudao Bai He (= 1st White River), ca. 20 m wide, basalt, 600 m a.s.l.; 17.VIII.1994; leg. Jäch, Ji & Wang; [13]

77. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; springfed pool, ca. 50 m from loc. 76, unshaded; 17.VIII.1994; leg. Jäch, Ji & Wang; [14]

78. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; near Hongsi Forest Station, ca. 30 km NE Baihe City; stream, ca. 3 m wide, through primary broadleaf forest, basalt, ca. 650 m a.s.l.; 17.VIII.1994; leg. Jäch, Ji & Wang; [15]; (see Fig. 23)

79. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; shallow pool with muddy edges, close to loc. 78; 17.VIII.1994; leg. Jäch, Ji & Wang; [16]

80. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 30 km NE Baihe City; near Hongsi Forest Station; Sidao Bai He (= 4th White River), ca. 30 m wide, ca. 650 m a.s.l.; 17.VIII.1994; leg. Jäch, Ji & Wang; [17]

81. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; near Baihe City; Erdao Bai He, below the power plant dam, ca. 4 m wide, degraded primary forest, ca. 650 m a.s.l.; 17.VIII.1994; leg. Jäch, Ji & Wang; [18]

82. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 80 km SE Baihe City; Yüan Chi (= Round Lake), *Sphagnum* peat bog, ca. 650 m a.s.l.; 18.VIII.1994; leg. Jäch, Ji & Wang; [19]; (see Fig. 24)

83. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 80 km SE Baihe City; near loc. 82; shallow, unshaded roadside rain pools; 18.VIII.1994; leg. Jäch, Ji & Wang; [20]

84. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 70 km SE Baihe City; blackwater stream, 3 - 5 m wide, slowly flowing, very cold water, margins with *Sphagnum*, 1100 m a.s.l.; 18.VIII.1994; leg. Jäch, Ji & Wang; [20a]

85. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere

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Reserve; ca. 60 km SE Baihe City; near Dong Fang Bridge; river, ca. 5 m wide, 1000 m a.s.l.; 18.VIII.1994; leg. Jäch, Ji & Wang; [21]

86. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 40 km SE Baihe City; Heilong Jiang (= Black Dragon River), 2 - 3 m wide, very cold water, flowing through dense forest, ca. 900 m a.s.l.; 18.VIII.1994; leg. Jäch, Ji & Wang; [22]

87. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 10 km SE Baihe City; small stream, ca. 2 - 3 m wide, slightly polluted, ca. 800 m a.s.l.; 18.VIII.1994; leg. Jäch; [23]

88. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; near loc. 87; roadside pool, unshaded, ca. 50 cm deep; 18.VIII.1994; leg. Jäch; [24]

89. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City, Baohujü District; surroundings of Changbai Mountain Research Station, along the road to Changbai Mountain; unshaded roadside pools, ca. 750 m a.s.l.; 19.VIII.1994; leg. Jäch; [25]

90. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City, Baohujü District; near Power Plant of Baihe City; forest pool, obviously springfed, rich in decaying organic matter, in primary forest, cool water, ca. 750 m a.s.l.; 19.VIII.1994; leg. Jäch; [26]

91. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City; Baohujü District; Erdao Bai He Power Plant Canal, near loc. 81, 90; ca. 750 m a.s.l.; 19.VIII.1994; leg. Jäch; [27]

92. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City; Baohujü District; Erdao Bai He below Erdao Bai He Power Plant, near Baihe City, near loc. 81, but further upriver, below the big dam, ca. 750 m a.s.l.; 19.VIII.1994; leg. Jäch; [28]

93. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Baihe City, Baohujü District; near Power Plant of Baihe City, near loc. 90; unshaded, springfed pools, cold water, ca. 750 m a.s.l.; 19.VIII.1994; leg. Jäch; [29]

94. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 62 km N Baihe City; hot spring, 1 km below the waterfall, temperature varying between 10°C - 50°C within a few centimeters, ca. 1800 m a.s.l.; 20.VIII.1994; leg. Jäch, Ji & Wang; [30]; (see Fig. 20)

95. **Jilin Province**; Yanbian Korean Autonomous Prefecture; Antu County; Changbai Shan Biosphere Reserve; ca. 62 km N Baihe City; Erdao Bai He, including pools on gravel bank, upstream of loc. 70, ca. 1750 m a.s.l.; 20.VIII.1994; leg. Jäch, Ji & Wang; [31]; (see Fig. 21)

96. **Liaoning Province**; Jinzhou City Region; Beizhen County; Yiwulü Shan; ca. 5 km NW Beizhen City (Guaning); Toudao Gou He (= 1st Valley River), 2 - 5 m wide, only partly shaded, flowing through Chinese Pine (*Pinus tabulaeformis*) forest, strongly washed out due to heavy spates which occurred 2 weeks before, ca. 200 m a.s.l.; 22.VIII.1994; leg. Jäch, Ji & Wang; [32]

97. **Liaoning Province**; Jinzhou City Region; Beizhen County; Yiwulü Shan, ca. 20 km NW Beizhen City; Sandao Gou He (= 3rd Valley River), ca. 5 m wide, unshaded, flowing through shrub vegetation, granite, ca. 300 m a.s.l.; 23.VIII.1994; leg. Jäch, Ji & Wang; [33]

98. **Liaoning Province**; Jinzhou City Region; Beizhen County; Yiwulü Shan, ca. 17 km NW Beizhen City; Sandao Gou He, downriver of loc. 97, where it enters the plain, 10 m wide, granite, including small pools on gravel bank, ca. 150 m a.s.l.; 23.VIII.1994; leg. Jäch, Ji & Wang; [34]; (see Fig. 22)

99. **Liaoning Province**; Jinzhou City Region; Beizhen County; Yiwulü Shan, ca. 17 km NW Beizhen City; Sandao Gou He near loc. 98; several shallow pools, rain water or ground water, unshaded, mud, sand; 23.VIII.1994; leg. Jäch, Ji & Wang; [35]

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100. **Liaoning Province**; Jinzhou City Region; Beizhen County; Yiwulü Shan, ca. 10 km W Beizhen City; Erdao Gou He (= 2nd Valley River), ca. 20 m wide, unshaded, slowly flowing through plain, shallow, sandy bottom and margin; 23.VIII.1994; leg. Jäch, Ji & Wang; [36]

101. **Liaoning Province**; Jinzhou City Region; Beizhen County; Yiwulü Shan, ca. 15 km W Beizhen City; upstream of loc. 100; small stream, ca. 1 m wide, partly through secondary forest, granite, ca. 200 m a.s.l.; 23.VIII.1994; leg. Jäch, Ji & Wang; [37]

102. **Liaoning Province**; Fushun City Region; Xinbin County; 70 km NE Fushun City; 3 km S Nanzamu Township; small stream, unpolluted, ca. 1 m wide, slowly flowing, ca. 18°C, shaded, with gravel, incl. rock pools, some stones with moss, flowing through secondary forest (*Larix* sp., *Maackia* sp. and other shrubs), ca. 180 - 200 m a.s.l.; 10.IX.1994; leg. Ji & Wang; [38]

103. **Liaoning Province**; Fushun City Region; Xinbin County; 80 km NE Fushun City; 3 km E Cangshi Town; Hun He, ca. 60 m wide, fast flowing, unshaded, gravel and mud, including gravel pools, ca. 20°C, slightly polluted, ca. 80 m a.s.l.; 11.IX.1994; leg. Ji & Wang; [39]

104. **Liaoning Province**; Fushun City Region; Xinbin County; 80 km NE Fushun City; 12 km SW Cangshi Town; 4 km W Liujiazi Village; fast flowing stream (tributary of Hun He), ca. 3 - 5 m wide, shaded, gravel and mud, ca. 18°C, slightly polluted, surrounding vegetation composed of artificial forest with *Larix* sp. and *Pinus* sp.; 11.IX.1994; leg. Ji & Wang; [40]

105. **Liaoning Province**; Fushun City Region; Xinbin County; 80 km NE Fushun City; 2 km N of loc. 104; small stream, fast flowing, tributary to loc. 104; 11.IX.1994; leg. Ji & Wang; [41]

106. **Liaoning Province**; Fushun City Region; Xinbin County; 80 km NE Fushun City; ground water pool near loc. 105, shallow, warm, muddy margin, ca. 1 m^2, unshaded, unpolluted; 11.IX.1994; leg. Ji & Wang; [42]

107. **Liaoning Province**; Fushun City Region; Xinbin County; 80 km NE Fushun City; 6 km SW Liujiazi Village; small, cold stream flowing to loc. 104, ca. 0.5 - 1 m wide, gravel, shaded, some stones with moss, decaying plant material, river margin covered by rich vegetation, *Larix* sp., *Pinus* sp., *Crataegus* sp., *Juglans* sp., ca. 130 m a.s.l.; 11.IX.1994; leg. Ji & Wang; [43]

108. **Liaoning Province**; Fushun City Region; Qingyuang County; 120 km NE Fushun City; 4 km W Douhutun Town; Shiaojia Gou; small, cold stream, ca. 0.5 - 1 m wide, shaded, gravel, including rock pools, unpolluted, surrounding vegetation composed of shrubs, ca. 100 m a.s.l.; 12.IX.1994; leg. Ji & Wang; [44]

109. **Liaoning Province**; Fushun City Region; Qingyuang County; 120 km NE Fushun City; 4 km W Douhutun Town; Shiaojia Gou; ground water pool near loc. 108, 40 m^2, 1 m deep, margin with stones and mud, unpolluted, more than 20°C, ca. 100 m a.s.l.; 12.IX.1994; leg. Ji & Wang; [45]

110. **Liaoning Province**; Fushun City Region; Qingyuang County; 120 km NE Fushun City; 3 km E Douhutun Town; near loc. 108; small stream, ca. 0.5 m wide, near rice field, slowly flowing, mud, warm, unshaded, slightly polluted, ca. 100 m a.s.l.; 12.IX.1994; leg. Ji & Wang; [46]

111. **Liaoning Province**; Dandong City Region; Fengcheng County; Fenghuang Shan (= Phoenix Mountain), 5 km SE Fengcheng City; small stream, ca. 1 - 2 m wide, very fast flowing, granite, margin partly shaded, with big rocks and gravel, unpolluted, ca. 15°C, vegetation composed of *Larix* sp., *Maackia* sp. and other shrubs, ca. 100 m a.s.l.; 12.IX.1994; leg. Ji & Wang; [47]

112. **Liaoning Province**; Dandong City Region; Fengcheng County; Fenghuang Shan, 5 km SE Fengcheng City, 1 km above loc. 111; stream, slowly flowing through secondary forest, ca. 2 - 3 m wide, granite, shaded, gravel and mud, rock pools, decaying plant material, unpolluted, ca. 15°C, surrounding vegetation composed of big trees (*Larix* sp., *Salix* sp., *Robinia* sp.), ca. 120 m a.s.l.; 24.IX.1994; leg. Ji & Wang; [48]

113. **Liaoning Province**; Dandong City Region; Fengcheng County; Fenghuang Shan; on the way to Fenghuang Shan, 4 km S Fengcheng City; *Sphagnum* swamp, ca. 40 m long, 5 m wide, decaying plant material, margin with stones, mud and numerous water plants, 20°C, *Populus* sp., *Salix* sp.,

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Robinia sp., ca. 20 m a.s.l.; 24.IX.1994; leg. Ji & Wang; [49]

114. **Liaoning Province**; Dandong City Region; Fengcheng County; Fenghuang Shan; near loc. 113; groud water pool, small and shallow, margins with stones and mud, ca. 20°C; 24.IX.1994; leg. Ji & Wang; [50]

115. **Liaoning Province**; Dandong City Region; Fengcheng County; Fenghuang Shan; Xi He (= West River), near localities 112 and 113, ca. 60 m wide, slowly flowing, unshaded, slightly polluted, cobbles, no surrounding vegetation; 24.IX.1994; leg. Ji & Wang; [51]

116. **Liaoning Province**; Dandong City Region; Fengcheng County; ca. 100 km NW Dandong City; 40 km NW Fengcheng City; 7 km SE Liujiahe Village; small stream, ca. 1 - 1.5 m wide, slowly flowing, granite, unshaded, gravel and mud, including gravel pools, unpolluted, ca. 18°C, vegetation mainly composed of *Larix* sp., *Rosa* sp., *Quercus* sp., ca. 100 m a.s.l.; 25.IX.1994; leg. Ji & Wang; [52]

117. **Liaoning Province**; Dandong City Region; Fengcheng County; near loc. 116, close to the path to the mountain top; springfed pool, small and shallow with gravel and muddy edges, 15°C 25.IX.1994; leg. Ji & Wang; [53]

118. **Liaoning Province**; Dandong City Region; Fengcheng County; ca. 100 km SE Benxi City; 2 km N Tongyuanpu Village; small stream, slowly flowing, limestone, unshaded, gravel and mud, polluted, ca. 100 m a.s.l.; 25.IX.1994; leg. Ji & Wang; [54]

119. **Liaoning Province**; Dandong City Region; Fengcheng County; 6 km N of loc. 118, 8 km N Tongyuanpu Village; Xiao Hei Shan (= Small Black Hill); small and shallow ground water pool, margin with mud, ca. 200 m a.s.l.; 25.IX.1994; leg. Ji & Wang; [55]

120. **Liaoning Province**; Dandong City Region; Fengcheng County; Xiao Hei Shan; small stream above loc. 119, 0.5 - 1 m wide, slowly flowing, limestone, shaded, unpolluted, gravel, mud and sand, including gravel pools, decaying leaves, 18°C, rich vegetation of *Larix* sp., *Pinus* sp., *Castanea* sp., *Robinia* sp., *Populus* sp. and *Quercus* sp.; 25.IX.1994; leg. Ji & Wang; [56]

121. **Liaoning Province**; Benxi City Region; Benxi County; ca. 92 km SE Benxi City; 5 km SE Caohekou Town; tributary of Cao He (= Grass River); small stream, 1 m wide, slowly flowing, unshaded, gravel, sand and mud, unpolluted, 20°C, ca. 200 m a.s.l.; 26.IX.1994; leg. Ji & Wang; [57]

122. **Liaoning Province**; Benxi City Region; Benxi County; ca. 50 km SE Benxi City; 1 km W Xiamatang Village; springfed pool, including *Sphagnum* swamp, 50 m long, 1 - 2 m wide, 1 m deep, margin with stones and mud, decaying plant material, 20°C, surrounding vegetation composed of shrubs, ca. 200 m a.s.l.; 26.IX.1994; leg. Ji & Wang; [58]

123. **Liaoning Province**; Benxi City Region; Benxi County; ca. 50 km SE Benxi City; 1 km W Xiamatang Village; small and shallow ground water pool near loc. 122, stones, mud and water plants, decaying plant material, 20°C; 26.IX.1994; leg. Ji & Wang; [59]

124. **Liaoning Province**; Benxi City Region; Benxi County; ca. 50 km SE Benxi City; 5 km S Xiamatang Village; near Aiguo Village; branch of an unnamed river, 3 - 4 m wide, slowly flowing, limestone, unshaded, gravel, mud, including rock pools, slightly polluted, 20°C, vegetation mainly composed of *Quercus* sp., *Robinia* sp. and *Salix* sp.; 26.IX.1994; leg. Ji & Wang; [60]

125. **Liaoning Province**; Benxi City Region; Benxi County; ca. 50 km SE Benxi City; small stream, tributary to loc. 124, ca. 1 m wide, fast flowing, limestone, shaded, gravel, sand and stones with moss, very cold, ca. 13°C, very rich vegetation of *Juglans* sp., *Larix* sp., *Salix* sp., *Crataegus* sp., ca. 300 m a.s.l.; 26.IX.1994; leg. Ji & Wang; [61]

126. **Liaoning Province**; Dalian City; Botanical Garden in the city; man made lake, shaded, margin with gravel and mud, decaying plant material, 20°C, *Pinus tabulaeformis* and broadleaf trees, ca. 30 m a.s.l.; 12.X.1994; leg. Ji & Wang; [62]

127. **Shandong Province**; Yantai Prefecture; Muping County; 45 km SE Yantai City; Kunyü Shan National

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Park; near Laokuang Village; ground water pool, ca. 8 m long, 3 m wide, 0.8 m deep, granite, margin with stones, mud and decaying plant material, ca. 20°C, surrounding vegetation: *Quercus* sp., *Firmiana* sp., *Pinus* sp., *Maackia* sp., ca. 80 m a.s.l.; 13.X.1994; leg. Ji & Wang; [63]

128. **Shandong Province**; Yantai Prefecture; Muping County; 45 km SE Yantai City; Kunyü Shan National Park; 500 m upstream of loc. 127, small stream, ca. 3 m wide, slowly flowing, unshaded, margin with stones and gravel, including rock pools, some stones with moss, ca. 18°C, surrounding vegetation: *Pinus* sp., *Maackia* sp., *Quercus* sp., ca. 90 m a.s.l.; 13.X.1994; leg. Ji & Wang; [64]

129. **Shandong Province**; Yantai Prefecture; Zhaoyuan County; 12 km NE Zhaoyuan City; Luo Shan, near Linglong Gold Mine; small, shallow ground water pool, granite, margin with mud, slightly polluted, warm water, ca. 100 m a.s.l.; 14.X.1994; leg. Ji & Wang; [65]

130. **Shandong Province**; Yantai Prefecture; Zhaoyuan County; 12 km NE Zhaoyuan City; on the way to Luo Shan, 4 km NE Zhaoyuan City; small river, slowly flowing, unshaded, margin with gravel and mud, slightly polluted, ca. 18°C, *Populus* sp. and *Salix* sp. growing along the river; 14.X.1994; leg. Ji & Wang; [66]

131. **Shandong Province**; Qingdao City Region; Lao Shan, 30 km E Qingdao City, near Taiqinggong Temple; Bashui He (= River of Eight Waters), 3 m wide, granite, fast flowing, shaded, with stones and gravel, some stones with moss, no water beetles found, probably due to a flood which occurred two days before and which killed 17 persons; 16.X.1994; [67]

132. **Shandong Province**; Qingdao City Region; Lao Shan, 30 km E Qingdao City, near Yangkou Village; large *Sphagnum* swamp, slightly polluted, 18°C, margin with stones, mud and water plants, ca. 40 m a.s.l.; 16.X.1994; leg. Ji & Wang; [68]

133. **Shandong Province**; Qingdao City Region; Lao Shan, 30 km E Qingdao City, 1 km upstream of loc. 132; small stream, slowly flowing to the sea, ca. 2 - 4 m wide, unshaded, with gravel and mud, slightly polluted; 16.X.1994; leg. Ji & Wang; [69]

134. **Shandong Province**; Zhongshan Park in Qingdao City; man made lake, slightly polluted, margin with stones, mud, decaying plant material, surrounding vegetation mainly composed of *Maackia* sp., *Quercus* sp., *Pinus* sp.; 17.X.1994; leg. Ji & Wang; [70]

135. **Shandong Province**; Tai'an Prefecture; Tai Shan Nature Reserve; 4 km N Tai'an City; Longtan Shuiku (= Dragon Pond Reservoir), granite, margin with stones, mud, decaying plant material, slightly polluted, ca. 15°C, surrounding vegetation composed of *Maackia* sp., *Populus* sp., *Quercus* sp. and *Platycladus* sp., ca. 200 m a.s.l.; 18.X.1994; leg. Ji & Wang; [71]

136. **Shandong Province**; Tai'an Prefecture; Tai Shan Nature Reserve; 1 km N of loc. 135, upstream of Puzhaishi Temple; small, slowly flowing stream and ground water pools among big rocks, unshaded, gravel and mud, some stones with moss, ca. 300 m a.s.l.; 18.X.1994; leg. Ji & Wang; [72]

137. **Shandong Province**; Tai'an Prefecture; Tai Shan Nature Reserve; near Doumugong Temple; small stream, 3 m wide, slowly flowing, limestone, shaded, with stones and gravel, including rock pools, decaying leaves, unpolluted, surrounding vegetation: *Platycladus* sp., *Maackia* sp., *Castanea* sp., *Quercus* sp., *Firmiana* sp., ca. 350 m a.s.l.; 19.X.1994; leg. Ji & Wang; [73]

138. **Shandong Province**; Tai'an Prefecture; Tai Shan Nature Reserve; 50 m upstream of loc. 137, near Jingshigu Stone Carvings; small stream, 2 m wide, slowly flowing to loc. 137, shaded, small stones, gravel pools, unpolluted; 19.X.1994; leg. Ji & Wang; [74]

139. **Shandong Province**; Tai'an Prefecture; Tai Shan Nature Reserve; 100 m upstream of st. 138; small stream, 1 m wide, slightly polluted, limestone, shaded, gravel and rock pools; 19.X.1994; leg. Ji & Wang; [75]

140. **Shandong Province**; Tai'an Prefecture; Tai Shan Nature Reserve; near Doumugong, near loc. 137; spring and small, cold stream below the spring, 0.5 m wide, slowly flowing, shaded, gravel, stones with moss, slightly polluted, surroundings similar to loc. 137; 19.X.1994; leg. Ji & Wang; [76]

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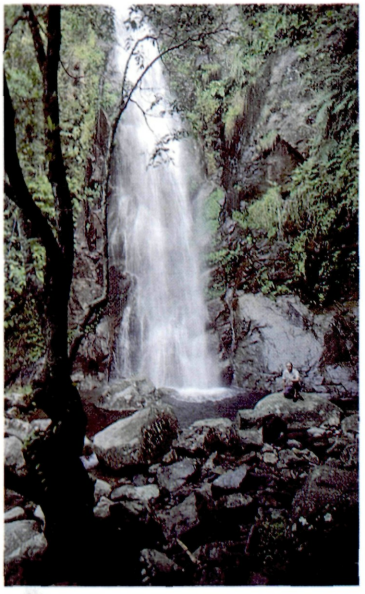

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Figs. 5 - 9: China Water Beetle Survey localities; Hong Kong; 5) CWBS loc. 4, upper course; 6) same, lower course; 7) CWBS loc. 8; 8) CWBS loc. 6, upper course, M.A. Jäch; 9) CWBS loc. 7. [Photographs: Figs. 5 - 7, 9 by M.A. Jäch; Fig. 8 by D. Dudgeon].

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Figs. 10 - 14: China Water Beetle Survey localities; Beijing, Hunan, Guangxi; 10) CWBS loc. 10; 11) CWBS loc. 24; 12) CWBS loc. 37, H. Schönmann; 13) CWBS loc. 20; 14) CWBS loc. 42. [Photographs: Fig. 10 by M.A. Jäch; Figs. 11 - 14 by H. Schillhammer].

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Figs. 15 - 19: China Water Beetle Survey localities; Sichuan, Yünnan; 15) CWBS loc. 50; 16) CWBS loc. 56; 17) CWBS loc. 60; 18) CWBS loc. 55; 19) CWBS loc. 59. [All photographs by H. Schillhammer].

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Figs. 20 - 24: China Water Beetle Survey localities; Jilin, Liaoning; 20) CWBS loc. 94; 21) CWBS loc. 95, M. Wang; 22) CWBS loc. 98; 23) CWBS loc. 78, M. Wang and wife (foreground), L. Ji and wife (background), P. Ji (middle); 24) CWBS loc. 82, L. Ji. [All photographs by M.A. Jäch].

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