Preface

China, an East Asian country with a vast land mass, covers a land area of approximately 9.6 million square kilometers and marine area of 4.7 million square kilometers. Because of its great variation in topography, extremely complex natural environment, and greatly diversified climate and vegetation types, it possesses exceedingly rich amphibian resources. These resources not only contained a very rare and unique fauna, but also preserved a large number of relic species. According to statistics, there are currently about 421 species and subspecies of Chinese amphibians (including 4 introduced species), of which 296 species and subspecies, about 71.0% of China's 417 species, are endemic to China and are distributed in varied geographical regions. This therefore reflects the unique distribution characteristics of China's amphibians, and also reflecting the special fauna composition of the amphibians. Consequently, China's amphibian fauna is not only, but also an important part of the world's fauna. In the evolutionary history of animals, amphibians are the transitional group of vertebrates that evolved from the aquatic to terrestrial habitat, thus they occupy an important niche in the evolution of animals. This book further advances the basic works on the investigation of amphibian species diversity, the study of their geographical distribution patterns, the exploration of the relationship between these animals and the changing environments, as well as the elucidation of the zoogeographical divisions and phylogenetic laws of animals. All of these basic information undoubtedly are valuable assets for the research of animal resources of China and even the world, and in addition indispensable for studying the phylogenetic relationships of the amphibians both in China and in the world.

China, to date, has a history of more than 130 years of amphibian research. Before the third decade of the 20th century, this research was mainly done by foreign scholars, who came to China to collect specimens and transport them abroad to various national museums for further study. Chinese scholars embarked on their amphibian studies at about 1930. And so far, for the nearly 80 years, they have accumulated large number of specimens, and first hand knowledge on the geographical distribution and ecological characters of the Chinese amphibians. In addition to the numerous papers and articles stemming from these researches, over 40 books or monographs were also published. These academic monographs with national caliber include: Mangven L. Y. Chang "Contribution à l'etude morphologique, biologique et systématique des amphibiens urodělsde la Chine" (1936), Chengchao Liu "Amphibians of Western China" (1950); Chengchao Liu and Shuqin Hu "Tailless Amphibians of China" (1961); Changyuan Ye *et al*. "Rare and Economic Amphibians of China" (1993); Liang Fei "Atlas of Amphibians of China" (1999); Liang Fei *et al*., "Fauna Sinica Amphibia of China" Vol. 1 (2006), Vol. 2 (2009), Vol. 3 (2009); Liang Fei *et al*., "Colored Atlas of Chinese Amphibians" (2010) and "Colored Atlas of Chinese Amphibians and Their Distributions" (2012). Other writings include provincial based amphibian books, manuals of keys for classification, popular science books, and other compilation of references. All the works above reflects the species diversity of Chinese amphibians from different angles, and summarizes the progress and achievements of the amphibian research in China. In particular, the recently published "Fauna Sinica Amphibia (Vol. 1 - 3)" is the most comprehensive monograph on the Chinese amphibian's research, with great academic value for in-depth study of the amphibians; but, the Fauna is written in Chinese. In recent years, many foreign scholars are very intrigued by the amphibians of China and Southeast Asia, and have spent time in these regions carrying out fieldworks and molecular systematic studies. They often need to consult reference books on the Chinese amphibians. In view of the fact that currently there is still no book in English with comprehensive account on the Chinese amphibians, and in order to strengthen international exchanges and to allow more foreign scholars to understand the current situation of Chinese amphibians research, classification systems, individual taxon's morphological characteristics and species account of the amphibians, we have compiled this book to help scholars both in China and abroad identify amphibian species and conduct their systematic studies.

This book is organized into two parts. The first part contains the introduction section: 1. History of Chinese Amphibian Studies, 2. Overview of China's Nature, 3. Biodiversity and Geographical Distribution of the Amphibians of China, 4. Ecological Types of the Amphibians of China, 5. Taxonomic Terms and Measurements of the Amphibians. The second part the taxonomic section contains the taxonomic accounts of China's known 13 families, 87 genera and 421 species with their Latin names, English names, synonyms, morphological characteristics, biological data, population status, geographic distribution, discussion of classification and key to the adults. The monograph is then divided into two volumes: Volume I contains chapters on the overview, the GYMNOPHIONA, the URODELA and

the ANURA including Bombinatoridae, Megophryidae, Bufonidae and Hylidae totaling 200 species and subspecies; Volume II includes the Ranidae, Dicroglossidae, Occidozygidae, Rhacophoridae, Microhylidae and the four introduced species, totaling 221 species. In this book, there are keys to the adults and more than 4000 copies of various pictures (including pictures of adults, tadpoles, and egg groups, and skeletons of adults). The protection status of the species is based on the Convention on International Trade of the Endangered Species of Wild Fauna and Flora: Appendix I (1993). The species' endangered categories are according to the IUCN (2008, 2013) "Threatened Amphibians of the World" and Liang Fei *et al*., (2010, 2012). Developmental stages of tadpoles are based on the Gosner's stages (1960). The bones showing green coloration in the figures are due to $CuSO_4$ solution dyeing. A question mark "?" behind the distribution site indicates a questionable site of distribution. The red dot in the map shows the distribution site of the species endemic to China, and the green dot indicates the species occurring both inside and outside China. At the back of the book are the following appendices: Keys to Tadpoles and Eggs of the Chinese Amphibians, Measurements of Adults, Tadpoles and Eggs of Chinese Amphibians, Karyotypes of the Chinese Amphibians, a List of the Museum and Other Institutions where the Type Specimens of the Chinese Amphibians were Preserved, a List and Geographic Distribution of all Species of Chinese Amphibians, and Indexes. Although this book is mainly a morphology-based academic work, we also refer to the research papers on the molecular systematics of amphibians. This book is a comprehensive account on all the aspects of all the known species of amphibians in China, it systematically summarizes the studies of Chinese amphibians up to the present day, and it is also an important reference book for the in-depth studies of the amphibian species and their phylogeny in China and the neighboring countries.

The compilation of this book was funded by the Chengdu Institute of Biology, Chinese Academy of Sciences, Chengdu, China and Muséum National d'Histoire Naturelle, Paris, France, in addition to Prof. Jianping Jiang's research group. Chinese scholars (Liang Fei and Changyuan Ye) are responsible for the introduction section, the supraspecific classifications and nomenclatures, taxonomic section including synonymies, characters, biological data, population status, distributions, taxonomic discussions, appendices; the collection, compilation, production and organization of the pictures, in addition to complete review and proof reading of this book. Before May of 2007, the French scholars (Alain Dubois and Annemarie Ohler) were responsible for polishing the initial manuscript of the book from the Chinese party and for enumerating the characteristics of some of the species, in addition for organizing the synonyms of some species (not used in this book) . In June of 2007, because of the many difficulties encountered, the French party proposed and agreed to let the Chinese party continue with editing this book. Since then, after seven years of dedicated work, in July of 2014, the Chinese party completed the manuscript of the book (including introduction section). After seeing the manuscript, the French scholars requested "… remove all the new taxa from the book; we do not support the supraspecific classification and nomenclature, nor the format

of the book…; Otherwise we will have to withdraw completely from authorship of the book". After failing to come to a compromise, finally, the Chinese party agrees to let the French party withdraw from the authorship of this book. Professor Shengxian Zhong, Dr. Leo Yang (USA), Jianping Jiang and Youcong Fei participated in the English translation and proof reading. Professor Shengxian Zhong promoted academic exchanges during the Sino-French cooperation, by doing various exchange visits and field trips, in addition to making a significant contribution to the translation. Photographs were mainly taken by Liang Fei, illustrations were by Jian Li, Yisheng Wang and Liang Fei. Distribution maps of species by Liang Fei and Yan Wang. Jianping Jiang, Mian Hou and Ke Jiang with other scholars at home and abroad also provided specimens, pictures and literatures. At the same time, the writing of this book also received the help and support of numerous scholars in China and abroad, including my colleagues from the Chengdu Institute of Biology, Chinese Academy of Sciences. Here is my heartfelt thanks to all the participants, supporters and concerned scholars, photographers and illustrators.

The coverage of the contents of this book is very broad, requiring a huge amount of work. Although we have studied amphibians for nearly 50 years, and accumulated a large numbers of specimens, related information and pictures, we still feel insufficient. This book will have some unfortunate over-sights, missing information and errors. Therefore, we honestly hope that readers would kindly contribute their valuable suggestions.

Liang Fei 梁斐

Chengdu Institute of Biology, Chinese Academy of Sciences

December 8th, 2014, in Chengdu, P. R. China

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Taxonomic Section

Appendix





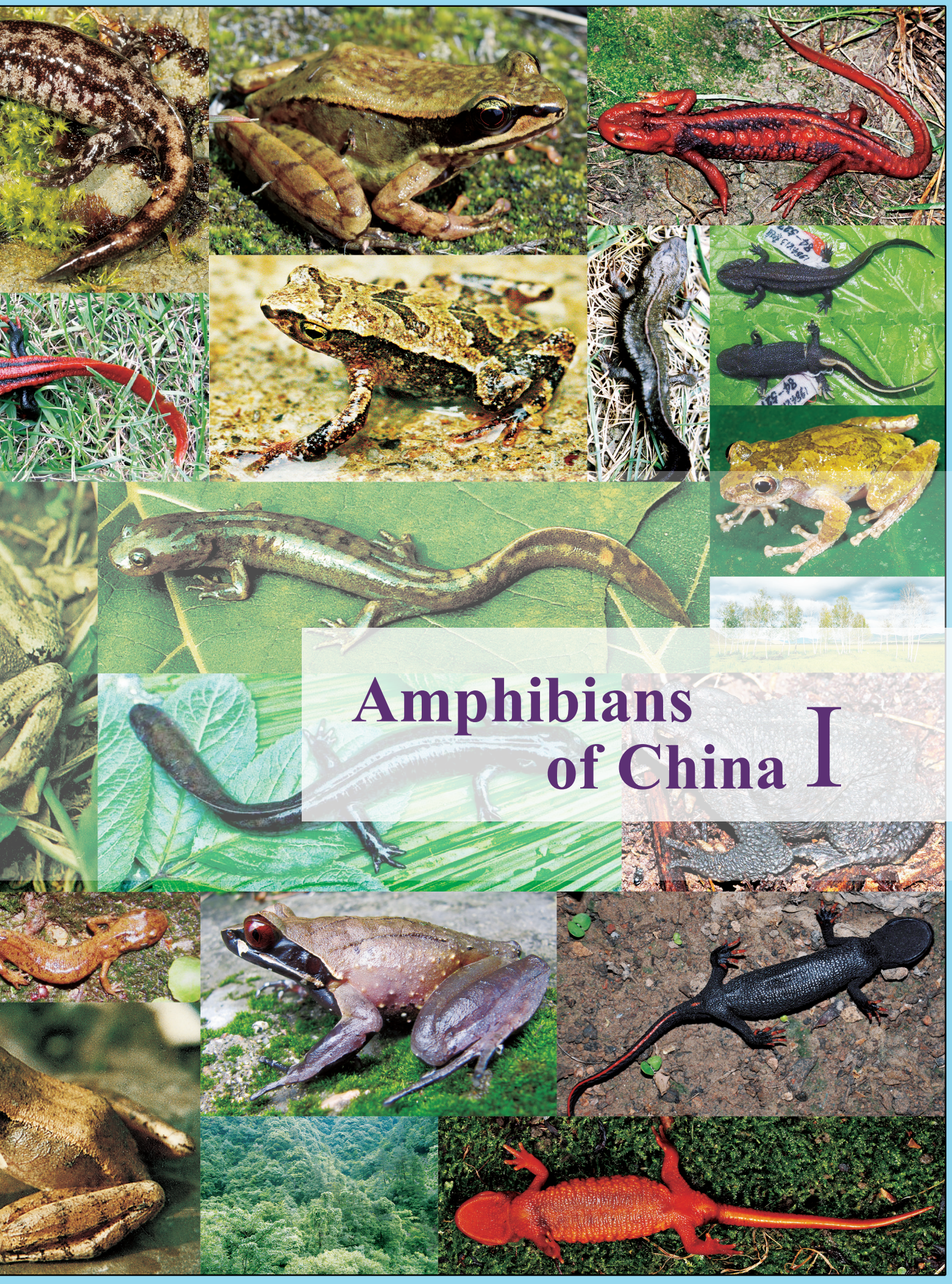










Amphibians of China I

Introduction Section

I

History of Chinese Amphibian Studies

(I) Establishment of the Class Amphibia

Linnaeus (1758, 10th version) was the first scientist to establish the biological classifications (sometime known as the "Linnaean taxonomy"): kingdom, phylum, class, order, family, and genus, to create the binomial name of a species. The class Amphibia was first adopted by Linnaeus, and included not only the true amphibians but also the reptiles and some fishes, and was divided into three orders:

(1) **Reptiles**, a group with feet including *Testudo*, *Draco*, *Lacerta* (contained crocodiles, lizards, and salamanders), and *Rana*.

(2) **Serpentes**, a group without foot, including snakes, slowworm, and caecilian.

(3) **Nantes**, a group with fins.

Frogs were easily distinguished from the other groups and assigned in the genus *Rana* (*sensus lato*), but salamanders were assigned to the so called *Lacerta*, and caecilian was assigned to the order Serpentes, which was separated from the reptiles with feet. According to the research by Guide (1970), Lyonnet (1745) was the first person to adopt the class Reptilia, and he included frogs and toads, besides snakes, tortoises and crocodiles (Zhang MW, 1998:1) in the class. And then, Reptilia was formally used by Laurenti (1768), and it contained three orders: (1) Salientia, included *Pipa*, *Bufo*, *Rana*, *Hyla* of the tailless amphibians, and *Proteus* of the tailed amphibians. (2) Gradientia, included the salamanders [*Triton* (=*Triturus*), *Salamandra*], lizards (*Gekko*, *Chamaeleo*, *Iguana*), and crocodiles (*Crocodylus*). (3) Serpentia, included the caecilian (*Caecilia*) and snakes (*Amphisbaena*, *Anguis*, *Natrix*, *Coronella*, *Boa*, *Coluber*, *Vipera*).

Batsch (1788) created a group 'Batrachi', to include *Bufo*, *Hyla*, *Pipa*, and *Rana* etc., which was the same as the Salientia of Laurenti (1768), and also assigned salamanders to the lizards. Scopoli (1777) recorded two new orders of the class Reptilia: the order Caudata including *Draco*, *Lacerta*, *Siren*, and *Testudo*, and the order Ecaudata. On the basis of the internal structures, reproductive manners, and developmental process of animals, Brongniart (1800) divided amphibians and reptiles into two groups: the first group was reptiles, with caecilian assigned to the order Ophidii; the second group was Batrachia, with only one order, i.e., Batraciens, which included *Salamandra*, *Rana*, *Hyla*, and *Bufo*, of which salamanders was for the first

time separated from the lizards.

Latreille (1804) further indicated that Batrachii was characterized by the absence of claw at the end of their toes, juveniles with gills, and metamorphism presents in an individual's developmental process. Duméril (1806) put forward two French terms, Anoures and Urodèles, the former meant tailless amphibians, and the latter meant tailed amphibians. These two terms were Latinized as Anura and Urodela by Fischer van Waldheim, 1813 (Frost, 2010), and are currently the two orders of the present day amphibians. This was the first time these two groups were separated from the reptiles. Oppel (1811) separated the group Apoda from the Class Reptilia and combined them with the salamanders (Caudata) and the frogs (Ecaudata) as one larger group Nuda; of which the three smaller groups corresponding to the three orders of the present day living amphibians. From then on, amphibians were distinguished from the reptiles with scales. It is necessary to explain here that the term Apoda had been preoccupied by a group of eel-like fish the Apodes by Latreille (1804), and then the former is the junior synonym of the latter. So Apoda had been replaced by Gymnophiona (Rafinesque-Schmaltz, 1814) in the amphibians.

The opinion that the Class Amphibia should be separated from the Class Reptilia was widely adopted by herpetologists [De Blaninville, 1816; Gray, 1825; Wagler, 1828, 1830; Fitzinger, 1826, 1843 (Caecilien still in Reptilia); Günther, 1858; Gegenbaur, 1859] which was further affirmed on the basis of external morphological and anatomical characteristics. Boulenger (1890) indicated that Amphibia was a transition group between Pisces and Reptilia. Dubois (1991) suggested Batrachology as a distinct scientific discipline for the study of amphibians.

(II) Studies by Chinese Scholars of Antiquity

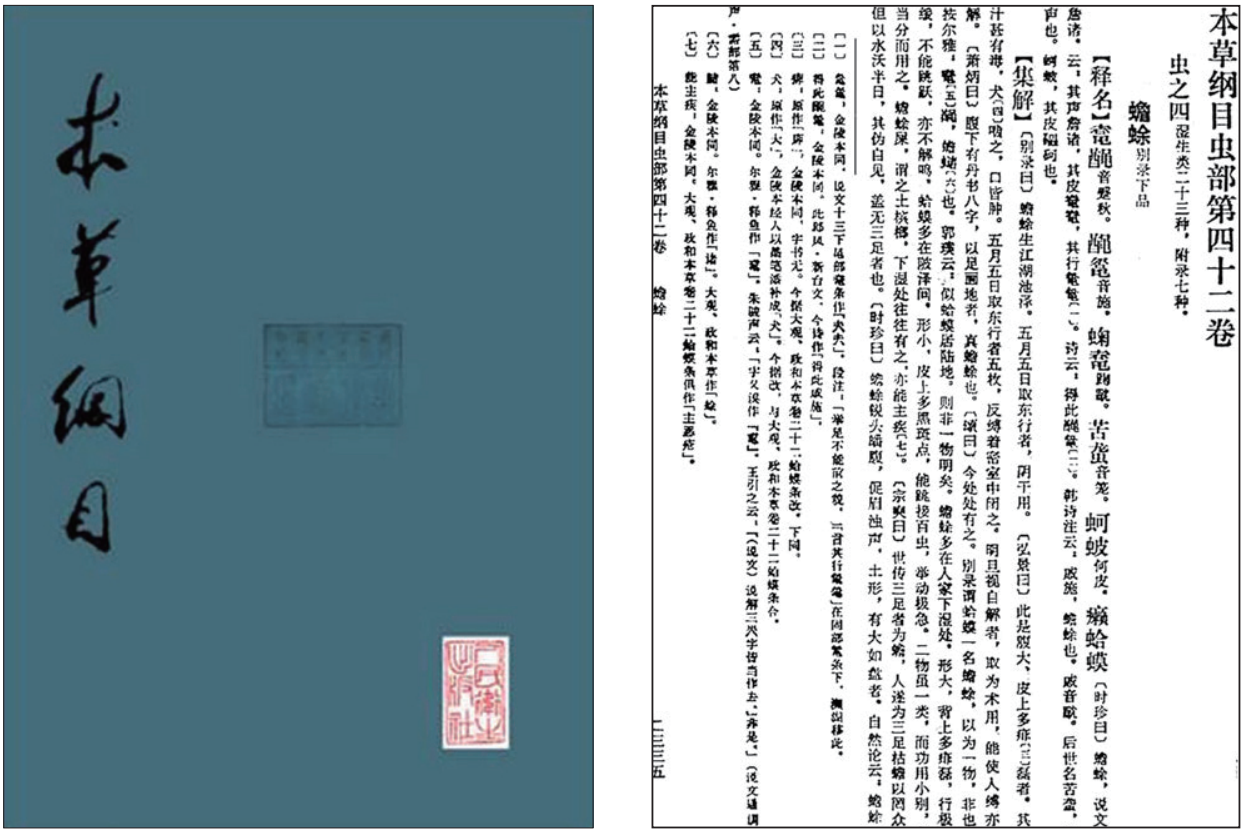
References were found on amphibians researches in the Chinese historical records for at least 3000 years ago: toads (maybe *Bufo gargarizans*) were equated to ugliness and wickedness in *The book of songs* [《诗经 shi jing》, 3000 years ago]. And frog [黿 , 鼃] had been inscribed on bones or tortoise shell approximately in the 16th -17th century B.C. (Guo F *et al.*, 1999). " 人　鱼 " (mermen, now called the Chinese giant salamander, *Andrias davidianus*), " 活 师 " (meaning tadpoles) and " 黾 " (meaning frogs) were mentioned in *The classic of mountains and seas* [《山海经 shan hai jing》, 2500 years ago]. Amphibians were divided into two groups: the worms and the fishes in *Er Ya* (《尔雅 er ya》, 2000 years ago), an ancient book containing commentaries on classics, names, etc., and into three groups in the *Origin of Chinese characters* [《说文解字 shuo wen jie zi》, A.D.100 - 121), that is, 1. the group with 'fish' character including the Chinese giant salamander, 2. the group with 'worm' character including toads, and 3. the ' 黾 ' with "frog" character including toads. Tao Hongjing (A.D. 502 - 549) listed the Chinese giant salamander, toads, and frogs as medicinal animals. In the *Compendium of materia medica* (《本草纲目 Ben cao gang mu》, Shizhen Li, 1596)（Fig.1: A）, amphibians were divided into two sections: The Chinese giant salamander belongs to the fishes without scales, and toads and frogs belong to worms of wet environment. These facts reflected a rudimentary understanding of amphibians in ancient China. The following is a comparison between Li's taxonomy and the present day's taxonomy.

1. The Scales Section—The Fish Without Scales

1) **Fish (鱼 yu):** It is now called the Chinese giant salamander, also known as men fish, mermen and baby fish. Shizhen Li divided the baby fish into two groups: one living in rivers and lakes with the shape and color of catfish [鲇 (nian), 鲶], making baby like "cries", and the other living in the moun-

tain streams, with the same shape and calling but can climb trees.

2) **Salamander fish (鲵鱼 niyu):** It is a fish that can climb trees. At the present, there is only one species in China, and it's the Chinese giant salamander (*Andrias davidianus*). However, no modern scholar has found any report of the salamander being found on a tree.



A B

Fig.1 Compendium of materia medica (Shizhen Li, 1596)
A. cover; B. Vol. 42 (Bufo of the worms section)

2. The Worms Section—Those Living in Wet Environment

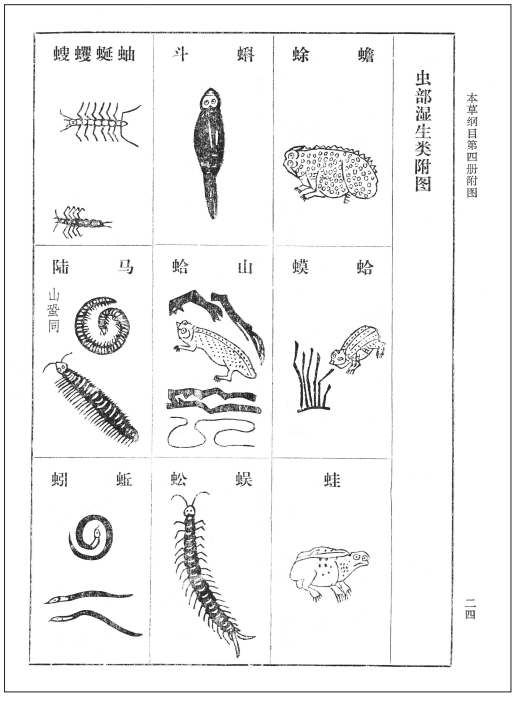
1) Toad (蟾 蜍 chanchu): It has been called many names, Chanzhu (蟾诸 toad), Hepi (蚵蚾), and Laihama (癞 蛤 蟆) (Fig.1: B). From the description of its morphology and ecology, namely "living in wet places of homes, large in size, dark green without spots, numerous warts, inability to jump, cannot vocalize, move about very slowly", this undoubtedly refers to the commonly seen Asian toad *Bufo gargarizans*.

2) Hama (虾蟇 hama): It is the equivalent of "Jingmo (蛉蟇 frog) in the *Er Ya* (尔雅)": and at the same time it must be pointed out that it's not a toad. Hama and toad are different morphologically and ecologically. "Hama lives in pools and ponds, spots on its back, small in size, can jump and catches hundreds of insects, makes 'ga, ga' cries, moves about quickly". It could be a description of the commonly seen terrestrial frog *Fejervarya multistriata*. In addition, it was also recorded that "there are many different Hama, don't be mistaken" , this perhaps referred to the existence of other frogs, being differentiated by "color yellow, forefeet large, hind feet small…" describing maybe the male *Paa*, and

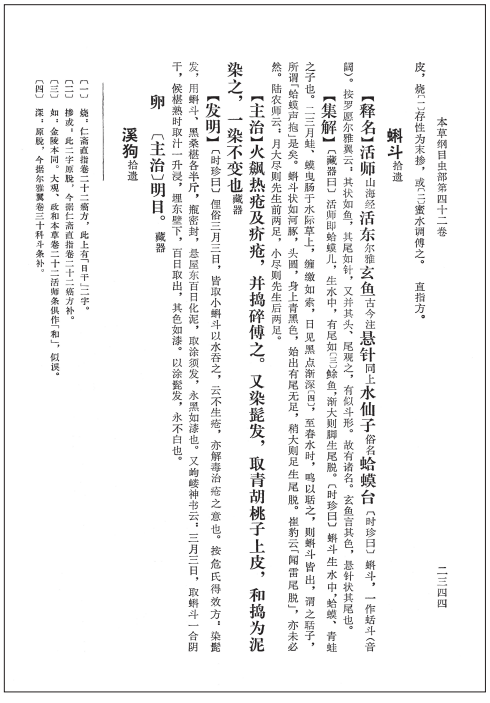
"also have other yellow frog, whole body yellow, belly with umbilical cord, five to seven cm, having natural secretion coming from it" perhaps referring to *Rana*; then "Shiji (石鸡 rock pheasant)", "Jinaozi (锦袄子 brocade jacket)" with long forelimbs, found in the valley in June and July, tasting like Shuiji (水鸡 water rooster)" , perhaps referring to *Odorrana* or *Paa*.

3) Wa (鼃 wa): The character for "frog" in *Compendium of materia medica* is " 蛙 "(Fig. 2: A). Other names are "Changgu (长股 long thighs)", "Tianji (田鸡 field chicken)", "Qingji (青鸡 green chicken)", "Zuoyu (坐鱼 sitting fish)", "Hayu (蛤鱼 ha fish)". Zong said (宗奭), "Wa(鼃)"has long hind legs good for jumping, one with loud calls is a "Wa", one with low calls is a "Ha (蛤)". Shizhen Li recorded: "Wa likes to make calls, often calling by itself. Southerners use it as food, naming it field chicken, claiming: it taste like chicken. He also said: 'Zuoyu' loves to sit." He is probably referring to the Chinese edible frog *Hoplobatrachus chinensis*. In addition he stated, "Wa toad has the most species or, the one with green back has the loudest calls and is known as 'land duck'. The dark colored one the Southerners called it 'ha zi' and it is very delicious tasting. Finally, a small noisy one is called 'Hazi (哈子)'", maybe favoring the description of a *Fejervarya multistriata* or a *Pelophylax nigromaculatus*. "Like 'Hama' (see above) but with blue-green back, narrow body and pointed mouth, commonly referred to as the 'green frog / wa'; those with yellow stripes on their back are called 'gold-striped pond frog, *Pelophylax plancyi* or *Pelophylax hubeiensis*'". In addition, "those with short brief calls belong to the 'wa' group, and farmers use the timing and strength of the calls to predict the success of their harvest", this likely refers to *Pelophylax nigromaculatus*.

4) Tadpole (蝌蚪 kedou): Tadpoles were also named "Huoshi (活 师)", "Huodong (活 东)", "Xuanyu (玄 鱼)", "Shuixianzi (水 仙 子)", and "Hamatai (虾 蟇 台)" (Fig.2: B). Shizhen Li described the egg strings/strands produced by toads: "in two to three days the ' wa toad' drags and wraps rope-like intestine among the aquatic plants, soon black dots appears; gradually spring arrives, tadpoles hatched with great clamors, so called noisy



A



B

Fig.2 Compendium of materia medica (Shizhen Li, 1596)

A. Figure of the worms section; B. The worms section (description of tadpole)

children. ⋯ tadpole shaped like blowfish, round head with dark green body, at birth with tail but no feet, after growing feet appeared and tail disappeared". In addition he also cited Shinong Li who noted "The front legs emerged first in the Yuedajin (月大尽) and the hind legs came first in the Xiaojin (小尽)". The former may refer to the larvae of newts, and the latter that of the frogs.

5) Mountain frog (山 蛤 **shanha,** Fig. 2: A**):** Shizhen Li separated the mountain frog, formerly grouped with "Hama" from"Tianfu" (田父 father of the field), described below in two groups and used them as medicine. " The mountain frog hides among rocks in the mountain, like 'Hama' and large, yellow ⋯ people in the mountain use it as food". This may be referring to *Paa* or *Rana*.

6) Father of the field (田父 tianfu): It was also called " 蝡 Lun" and "Hama". "Big as a shoe, can eat a snake, this therefore is father of the field⋯". According to Shizhen Li: "for worm bite, rub a mixture of the white secretion from the back of '*Tianfu*' with ant's ash". From analyzing the medicinal uses of this animal, it could be *Bufo gargarizans*. But, the reason for Shizhen Li to put it in a different category needs further verification.

7) Stream dog (溪 狗 **xigou,** Fig.2: B):"The stream dog lives in the mountain streams of the south, shaped like 'Hama', tail 3-4 inches long". This may be a description of a salamander, or a large size tadpole.

During their long duration of breeding practices, the Chinese people have made and recorded many observations on frogs, toads and the tailed amphibians, especially the rather large salamanders (Andrias). From the perspective of animal taxonomy, even though Shizhen Li ascribed the amphibians to scaleless fishes and/or toads and frogs to worms of wet environment, he basically separated the amphibians from the reptiles then, while still confusing the salamanders and the lizards. It can be said then, Shizhen Li's classification of the amphibians had already surpassed the quality of his contemporary European scholars.

(III) Studies by Scholars of Modern Times

1. Surveys and Studies by Foreign Scientists Prior to 1950

Linnaeus (1758) was the first foreign researcher to record Chinese amphibians identified from the specimens that had been brought to Europe by Marco Polo in the 13th Century (Fig. 3:A). Swede Osbeck (1723-1805) was the first person to collect specimens of amphibians in China in the 18th century and recorded the species *Rana chinensis* (= *Hoplobatrachus chinensis*) from Guangzhou (= Canton in the literature) of China. Wiegmann(1835) recorded a new species *Rana rugulosa* (= *Hoplobatrachus chinensis*) embedded in specimens collected from Hong Kong, Macau, and Guangzhou by Meyen in 1831. In order to establish a museum, the Dutch in 1820 collected many amphibian specimens from Southern Asia, China, and Japan, and those specimens from China included the genera *Andrias*, *Hynobius*, *Onychodactylus*, *Cynops*, *Leptobrachium*, *Hylarana*, *Polypedates*, *Buergeria*, *Theloderma*, *Microhyla* and *Kalophrynus*, which were denominated by Tschudi, and the genera *Ichthyophis*, *Pelophylax* and *Limnonectes* denominated by Fitzinger. The creation of these genera provided an important basis for further taxonomic studies of Chinese amphibians.

From 1840 to 1949, herpetologists from Britain, Germany, Russia, France, Austria, USA, and Japan came to China in different periods to survey amphibians and collect specimens. Forty-five new species were published by the British herpetologists in 35 articles, 17 new species by the Americans in 50 articles, 9 new species by the Germans and French each in 32 articles, 7 new species by the Russians, and 3 new species by the Japanese. According to preliminary statistics, more than 80 new

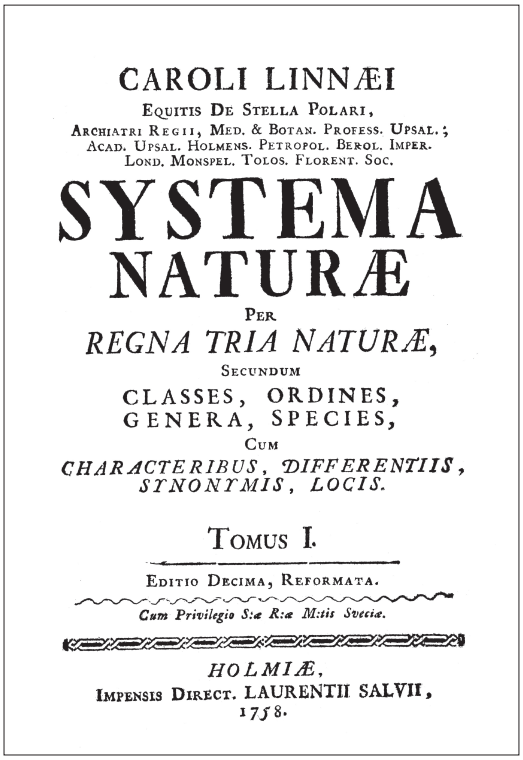

CAROLI LINNÆI
EQUITIS DE STELLA POLARI,
ARCHIATRI REGII, MED. & BOTAN. PROFESS. UPSAL.;
ACAD. UPSAL. HOLMENS. PETROPOL. BEROL. IMPER.
LOND. MONSPEL. TOLOS. FLORENT. SOC.
SYSTEMA NATURÆ
PER
REGNA TRIA NATURÆ,
SECUNDUM
CLASSES, ORDINES,
GENERA, SPECIES,
CUM
CHARACTERIBUS, DIFFERENTIIS,
SYNONYMIS, LOCIS.
TOMUS I.
EDITIO DECIMA, REFORMATA.
Cum Privilegio S:æ R:æ M:tis Sveciæ.
HOLMIÆ,
IMPENSIS DIRECT. LAURENTII SALVII,
1758.

Fig.3:1

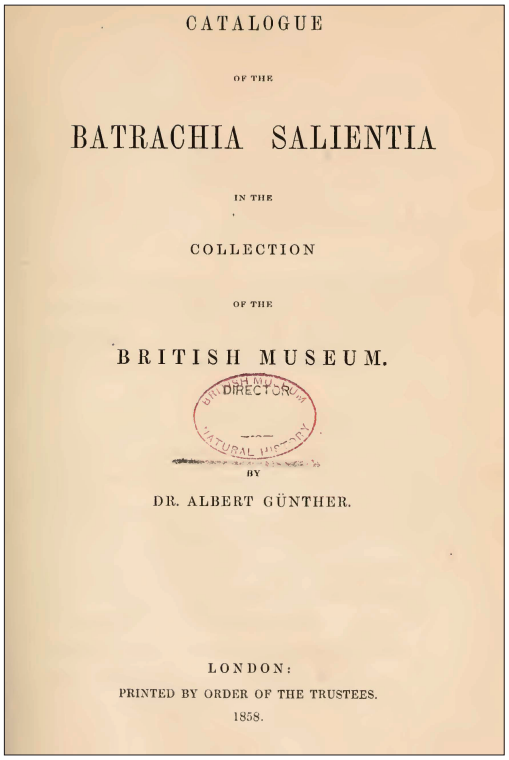
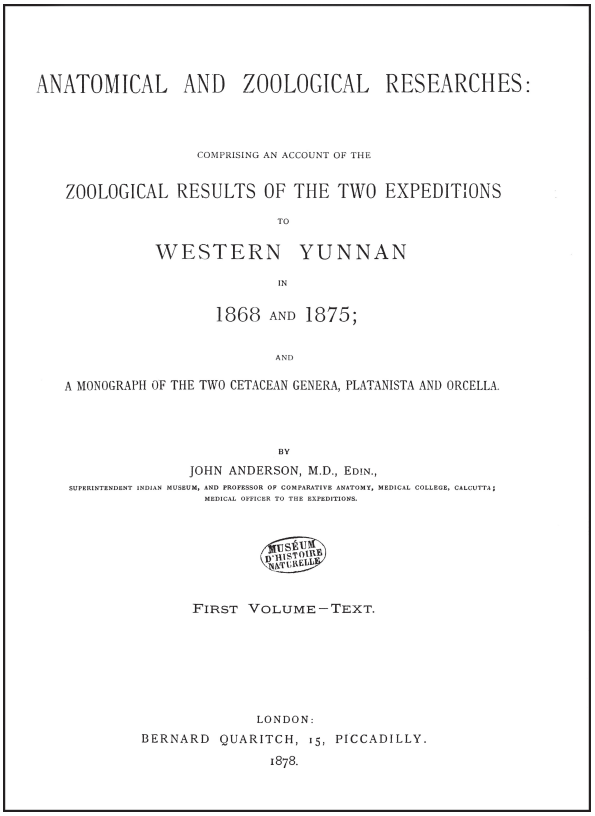

CATALOGUE
OF THE
BATRACHIA SALIENTIA
IN THE
COLLECTION
OF THE
BRITISH MUSEUM.
BY
DR. ALBERT GÜNTHER.
LONDON:
PRINTED BY ORDER OF THE TRUSTEES.
1858.

Fig.3:2

Fig.3:1 Systema naturae (Linnaeus, 1758)
Fig.3:2 Catalogue of the Batrachia Salientia in the collection of the British Museum (Günther A. 1858)

species published by them are currently valid. Even though the type localities of the above new species are in China, the type specimens are now preserved in various museums of different foreign countries. There were approximately 70 colleagues collecting and writing about 170 articles on Chinese amphibians. The following are the summaries of the major contributing countries and colleagues.

Cantor from England collected amphibians in Zhoushan (= Chusan) of Zhejiang Province from 1840 to 1842, from which a new species *Bufo gargarizans* [= *Bufo (Bufo) gargarizans gargarizans*] was discovered, and *Rana nigromaculata (= Pelophylax nigromaculatus)* was incorrectly named as *Rana esculenta* (Cantor, 1842). **Hodgson** collected amphibian specimens in Xizang (= Tibet), China from 1845 to 1859. **Swinhoe** surveyed some regions in China including Taiwan, Penghu and Xiamen in 1861, also in the Hainan Island and the Leizhou Peninsula of Guangdong, and along the Yangzi River in 1868 and 1869, and he published his survey results in his *List of reptiles and batrachians collected in the Island of Hainan* (Swinhoe, 1870a) and *Notes on reptiles and batrachians collected in various parts of China* (Swinhoe, 1870b). After that, Blyth, Gray, and Günther studied these specimens and published new species of amphibians and reptiles several decades after. From 1858 to 1896, **Günther** published 20 papers, discovering 11 new species of amphibians (Fig.3:2), of which four species were with type localities in China include *Hynobius chinensis* and *Rana boulengeri* (= *Quasipaa boulengeri*) (Günther, 1889), collected in Yichang of Hubei Province by Pratt, *Bufo mammatus* [= *Scutiger* (*Aelurophryne*) *mammatus*] (Günther, 1896), collected by Potanin, and *Nanorana pleskei* (Günther, 1896) by Berezowski. Günther (1896) published a new genus *Nanorana*. Gray published two new species, *Cynops chinensis* Gray 1859 (= *Paramesotriton chinensis)* and *Kaloula pulchra* Gray, 1831.



ANATOMICAL AND ZOOLOGICAL RESEARCHES:

COMPRISING AN ACCOUNT OF THE

ZOOLOGICAL RESULTS OF THE TWO EXPEDITIONS

TO

WESTERN YUNNAN

IN

1868 AND 1875;

AND

A MONOGRAPH OF THE TWO CETACEAN GENERA, PLATANISTA AND ORCELLA.

BY

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MUSÉUM D'HISTOIRE NATURELLE

FIRST VOLUME—TEXT.

LONDON:
BERNARD QUARITCH, 15, PICCADILLY.
1878.

Fig.4 Anatomical and zoological researches: comprising an account of the zoological results of the two expeditions to western Yunnan. in 1868 and 1875 (Anderson J, 1878)

Hallowell from the USA (1860) published 47 new species and 10 new genera of amphibians and reptiles from the specimens collected in Japan, Ryukyu Islands, Hong Kong, and Java by John Rogers and his colleagues. China is the type locality for 10 of the species, of which 6 are amphibians, including *Rana multistriata* (= *Fejervarya multistriata*), *Rana trivittata* (= *Hylarana macrodactyla*), *Rana nebulosa* (a nomen dubium, it's of incertae sedis in the genus *Odorrana*; Frost, 2010), *Bufo griseus* (= *Bufo gargarizans*), *Engystoma pulchrum* (= *Microhyla pulchra*) and *Polypedates megacephalus*, and they were all collected in Hong Kong.

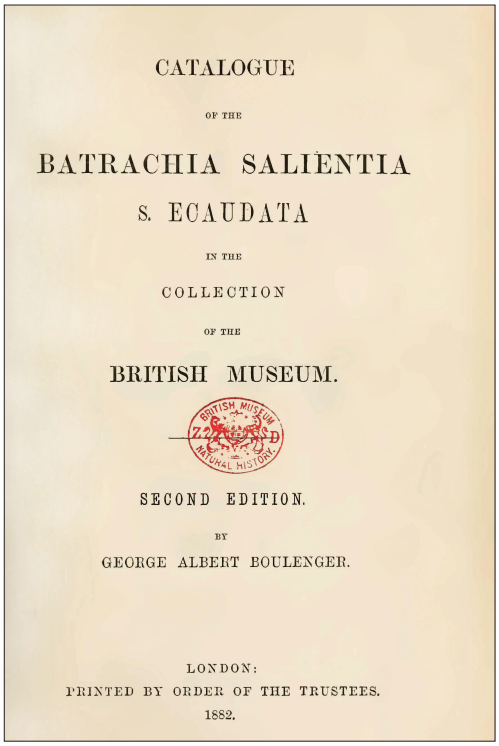
Anderson from England went to Burma and southwestern Yunnan twice after 1868 and collected many specimens. From 1871 to 1879, several articles were published, including *Mandalay to Momien*: *A Narrative of the Two Expeditions to Western China of 1868 and 1875* (1876), and *Anatomical and Zoological Researches: Comprising an Account of the Zoological Results of the Two Expeditions to Western Yunnan* (1878) (Fig. 4), and 9 new species of amphibians and one new genus *Tylototriton* were published (1871).

From 1862 to 1873, French missionary **David** surveyed in Beijing, Hebei, Nei mongol (= Inner Mongolia), Shanxi, Shaanxi, Zhejiang, Fujian, Jiangxi, and Sichuan, and published 8 new species of amphibians, 6 are still valid, and 3 collected from Baoxing County of Sichuan (David, 1871): *Desmodactylus pinchonii* (= *Batrachuperus pinchonii*), *Polypedates mantzorum* (= *Amolops mantzorum*) and *Polypedates dugritei* (= *Rhacophorus dugritei*). In addition, he collected specimens of *Sieboldia davidiana* (= *Andrias davidianus*) denominated by Blanchard (1871) for memory of his contribution to this species.

From 1878 to 1920, **Boulenger**, a Belgian-British zoologist, examined many of the specimens of amphibians that were preserved in the British Museum and collected from northeastern China, Shandong, Fujian, Taiwan, Sichuan, Yunnan, and adjacent countries including Korea, Japan, Vietnam, Burma, India and Nepal by Holst, Moltrecht, Berezowki, Sauter, Graham, Dymond and Tonche, and published more than 60 papers, of which *Catalogue of the Batrachia Salientia* s. *Ecaudata in the collection of British Museum* (1882) (Fig. 5), *A revision of the oriental pelobatid Batrachians* (Genus *Megalophrys*) (1908), *A monograph of the South Asian, Papuan, Melanesian and Australian frogs of the genus Rana* (1920) narrated 36 new species and 5 new genera of amphibians. The type localities of more than 20 species are in China (Fig.6).

In 1911, Scottish zoologists **Annandale** and **Hodgart** surveyed amphibians in Abor (southern part of Mêdog, Xizang, China), the boundary between southeastern Xizang of China and northeastern India, and collected many amphibian specimens. 25 species, including 5 new species, were recorded in *Zoological results of Abor expedition 1911-1912* (Annandale, 1912) the collection of Kemp was also included.

Smith, from England, surveyed amphibians


CATALOGUE

OF THE

BATRACHIA SALIENTIA

S. ECAUDATA

IN THE

COLLECTION

OF THE

BRITISH MUSEUM.

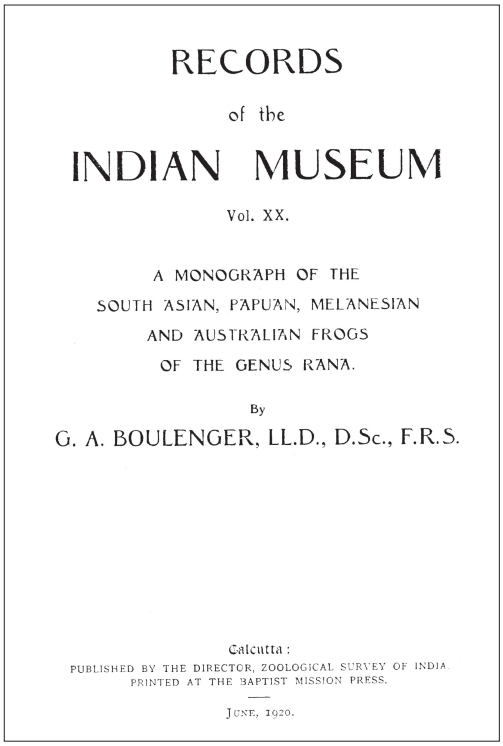
SECOND EDITION.

BY

GEORGE ALBERT BOULENGER.

LONDON:
PRINTED BY ORDER OF THE TRUSTEES.
1882.

Fig.5


RECORDS

of the

INDIAN MUSEUM

Vol. XX.

A MONOGRAPH OF THE
SOUTH ASIAN, PAPUAN, MELANESIAN
AND AUSTRALIAN FROGS
OF THE GENUS RANA.

By

G. A. BOULENGER, LL.D., D.Sc., F.R.S.

Calcutta:
PUBLISHED BY THE DIRECTOR, ZOOLOGICAL SURVEY OF INDIA.
PRINTED AT THE BAPTIST MISSION PRESS.

JUNE, 1920.

Fig.6

Fig.5 Catalogue of the Batrachia Salientia s. Ecaudata of the collection of the British Museum (Boulenger G A. 1882)

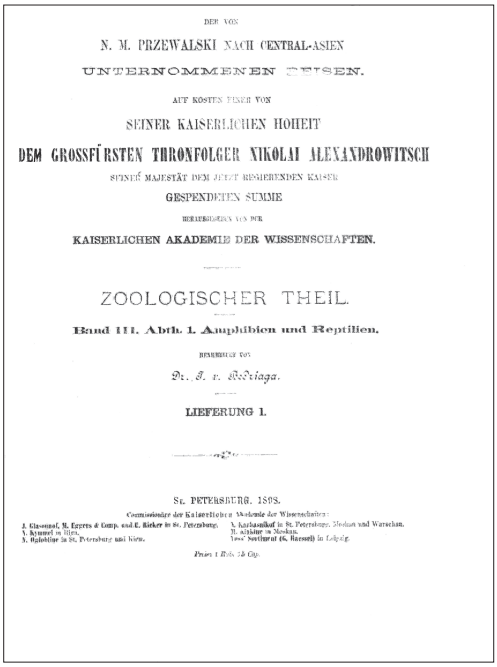
Fig.6 A monograph of the South Asian, Papuan, Melanesian and Australian frogs of the genus Rana (Boulenger G A. 1920)

several times in Southeast Asia, and in 1923 he surveyed Hainan Island. He published seven new species pertaining to China, of which two new species were found on Hainan Island (Smith, 1923).

Russian explorer **Przewalsky** and his colleagues visited China four times in the Amur River region, Inner Mongolia, Xinjiang, Gansu, and Qinghai, and collected more than 8500 specimens of animals, belonging to 680 species, most of which were preserved in the Institute of Zoology, Russian Academy of Sciences. **Bedriaga**, a Russian herpetologist, studied the 1200 specimens of amphibians and reptiles, and published *Wissenschaftliche resultate der von N. M. Przewalski nach Central-Asien unternommenen Reisen. Zoologischer Theil. Amphibien und reptilien* (Band 3, Abt.1) in 1898–1912 (Fig. 7), of which 8 species and 6 new subspecies were recorded. **Nikol'sky** published *Fauna of Russia and adjacent countries, Amphibians* **(**1918), in which he discovered the Chinese relative species: *Hyla arborea ussuriensis*, *Rana amurensis kukunoris,* and *Rana semiplicata* three new species, also recorded *Rugosa emeljanovi,* and *Rana arvalis altaica* (Fig. 8). From 1915 to 1930, **Zarevsky** studied the specimens collected from Nei Mongol, Sichuan (in Baitang and Kangding), Qinghai, and Xizang by **Kozlov** in 1899-1926, and discovered 5 new species of amphibians (Zarevsky, 1924, 1925a, 1925b, 1930).

From 1885 to 1901, German zoologist **Boettger** studied many of the Chinese amphibian specimens preserved in Frankfurt, which were collected from Hubei, Anhui (in Wuhu), Zhejiang (in Ningbo), Shanghai, Hong Kong, Hainan Island, Guangdong and Guangxi, and published about 10 articles, of which *Materialien zur herpetologischen fauna von China* (I, II, III) were published in 1885, 1888, and 1894, respectively, and recorded 40 species of Chinese amphibians, including several new species.

Since 1894, many Japanese researchers traveled to China to survey bio-resources, from which sev-



DER VON

N. M. PRZEWALSKI NACH CENTRAL-ASIEN

UNTERNOMMENEN REISEN.

AUF KOSTEN IHRER VON

SEINER KAISERLICHEN HOHEIT

DEM GROSSFÜRSTEN THRONFOLGER NIKOLAI ALEXANDROWITSCH

SEINER MAJESTÄT DEM JETZT REGIERENDEN KAISER

GESPENDETEN SUMME

HERAUSGEGEBEN VON DER

KAISERLICHEN AKADEMIE DER WISSENSCHAFTEN.

ZOOLOGISCHER THEIL.

Band III. Abth. 1. Amphibien und Reptilien.

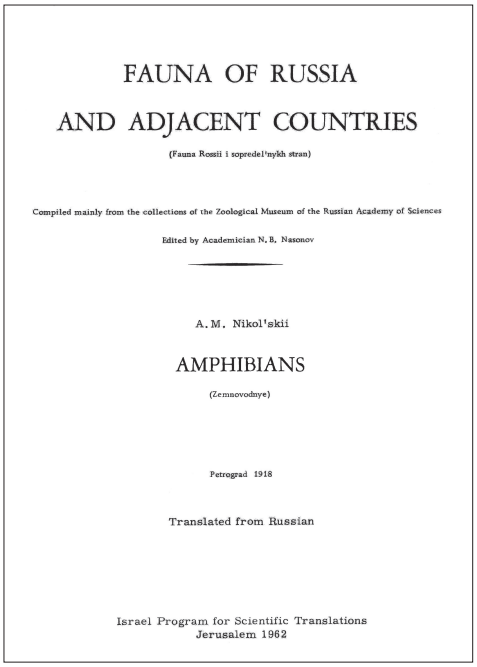
BEARBEITET VON

Dr. J. v. Bedriaga.

LIEFERUNG 1.

ST. PETERSBURG. 1898.

Commissionäre der Kaiserlichen Akademie der Wissenschaften:



FAUNA OF RUSSIA

AND ADJACENT COUNTRIES

(Fauna Rossii i sopredel'nykh stran)

Compiled mainly from the collections of the Zoological Museum of the Russian Academy of Sciences

Edited by Academician N. B. Nasonov

A. M. Nikol'skii

AMPHIBIANS

(Zemnovodnye)

Petrograd 1918

Translated from Russian

Israel Program for Scientific Translations
Jerusalem 1962

Fig.7 Fig.8

Fig.7 Amphibien und reptilien. In Wissenschaftliche resultate der von N. M. Przewalski nach Central-Asien unternommenen reisen. (Bedriaga J von, 1898)

Fig.8 Fauna of Russia and adjacent countries. Amphibians (Nikol'sky A M, 1918)

eral papers were published. **Maki** started collecting specimens from Taiwan, China in 1911, and published a paper *Notes on the salamanders found in the island of Formosa* (1922), in which three new species of tailed amphibians were recorded, *Hynobius arisanensis*, *Hynobius formosanus* and *Hynobius sonani*. **Mori** published *A Hand-list of the Manchurian and eastern Mongolian vertebrata, Amphibia* (1927a) and *On a new Hynobius from South Manchuria* (1927b). **Okada** published *The Tailless batrachians of the Japanese Empire* (1931) (Fig. 9), *The anuran fauna of Formosa*' (1934) and *Amphibia and Reptilia of Jehol* (1935) (Fig.10).

From 1899 to 1910, **Wilson** (visited China four times, the first two times he represented the UK and the last two the USA) and **Zappey** from the USA visited China several times, and kept their collections of specimens at Harvard University. **Jordon** and **Barbour** studied these specimens together with those collected by **Owston**, and published several papers, in which two new species were recorded, *Bufo bankorensis* Barbour, 1908, and *Kaloula borealis* (Barbour, 1908).

For 10 years starting from 1916, **Andrews** from the USA organized a group to survey central Asia, and explored most of China. Among them, from 1921 to 1926, **Pope** surveyed in Guangdong, Hainan Island, Hunan, Fujian, Anhui, Shandong, Hebei and Shanxi. Specifically, Pope investigated Fujian and Hainan Island, collecting a large number of specimens of amphibians while documenting specimens, Pope published several papers, of which *Notes on amphibians from Fukien, Hainan, and other parts of China* (1931) recorded 2 orders, 9 families, 18 genera, and 67 species with morphological descriptions, life history, and biological data (Fig.11).

Stejneger from the USA studied the amphibian specimens that were preserved in the American National Museum and also collected specimens from Japan and China, including Nei Mongol, Hebei, Beijing, Sichuan, Tibet, Yunnan and Taiwan, and published several papers and/or monographs, *Herpetology of Japan and adjacent territory* (1907) (Fig.12). In 1927, he created a new genus *Altirana* endemic to the Qinghai-Xizang Plateau, which was a junior synonym of the genus *Nanorana* by Lu *et*