XXI. CONTRIBUTIONS TO THE FAUNA OF YUNNAN BASED ON COLLECTIONS MADE BY J. COGGIN BROWN, B.Sc., 1909—1910

INTRODUCTION.

By J. COGGIN BROWN, *B.Sc., F.G.S., Geological Survey of India.*

The collections which form the subjects of these reports were made for the most part in the western districts of the province of Yunnan, in the years 1909-1910.

Yunnan is the most westerly province of the Chinese Empire, and comprises an area of about 150,000 square miles lying roughly between the 21st and 29th degrees of latitude north of the equator, and between the 98th and the 106th degrees of longitude east of Greenwich. It is bounded on the west by Burma, on the south by Tongking, on the east by the provinces of Kuang-si and Kwei-chou and on the north by the province of Ssu-chuan and by Tibet. The whole province is exceedingly mountainous, and its western part is sculptured by a series of great rivers, the Shweli, Salween, Mekong, and upper waters of the Black and Red rivers of Tongking. The basins of these rivers are separated by high mountain ranges, which towards the north-west often attain a height of 15,000 to 20,000 feet whilst the lowest river valleys have an elevation of about 7,000 or 8,000 feet. Orographically this region is connected with Western Ssu-chuan and Tibet, and it is not surprising to find a Tibetan mammalian fauna extending into it.[1] The climate is colder here than in other parts and snow is liable to fall at any time. Many of the mountain ranges are bare, but large forests of fir, cedar and other trees exist in places. Towards the south the heights decrease, until in the extreme south the tops of the hills run down to as low as 5,000 feet, and the bottom of the river valleys are sometimes below 2,000 feet. At the same time there are many exceptions to this rule and peaks of over 11,000 feet are known in the south-west. Further to the east the country opens out, and becomes more plateau-like, there are larger stretches of level ground and the ascents to the hill tops are not so steep or extended. At the same time it must not be supposed that this part of the province is not mountainous, though it is less so than the more western parts. Large plains of

[1] See "On the collection of mammals brought from Yunnan by Prince Henry of Orleans," by E. de Pousargues. Appendix B in "From Tonkin to India," by Prince Henri d'Orleans. English translation by Hamley Bent, London, 1898.

fluviatile and lacustrine origin, often containing lakes and surrounded on all sides by mountains, prevail over this area and have been estimated to comprise one-fifteenth part of the province and to contain nearly half of the population. The general elevation of the plains may be taken as 5,500 feet with the mountain tops reaching another 3,000 or 4,000 feet above them.

The climate of these regions is excellent. During the dry season which lasts from November to May, there is no great heat. In the winter months frost is common at night, but snow rarely falls and all through the day the weather is usually bright and pleasant. The general precipitation of the rainy season, which lasts from June to September, is high, though the actual rainfall varies much locally. Long intervals of fine weather are, however, frequent enough in the rains. The plains of the west are all intensely cultivated, highly organised systems of irrigation bring the water from the mountain sides on to the fields, and incidentally prove a means of destruction of the young fish, which are swept down on to the fields and easily secured by the people. The principal crop is rice, which is reaped in October, after which the fields are planted again with the winter crops of poppy, wheat, beans and peas. Maize, hemp, sesamum and other oil producing seeds, tobacco, and in the warmer parts, sugar-cane and tea are also grown. Many of the mountain ranges have been denuded of all large trees, and are now covered with grass and bracken, forming admirable breeding grounds for pheasant, partridge and other game birds, though these are largely kept in check by foxes and various birds of prey.

In the more isolated mountain districts, the slopes are covered with pine woods, and further southwards with trees of a more tropical kind. A recent writer has well remarked, "To a traveller accustomed to the vast jungles of Burma, Yunnan would appear a bare country, but it would seem well wooded when compared to the barren hills of the north-west frontier of India."[1]

Evergreen tropical forests exist in the extreme south-west, but further north along the frontier they give place to the evergreen temperate forests which characterise some parts of the Northern Shan States and of the Kachin Hills. In the extreme east of Yunnan and also in small isolated areas about the Burma-China frontier, limestone plateaux are found, which are dry and barren, owing to underground circulation of the water.

The border between the hilly areas of Upper Burma and Yunnan is purely a political and administrative one, ethnographically there is little difference between the indigenous tribes on either side, whilst the classical researches of Anderson have shown that the fauna is much the same. In the same way, north-western Yunnan belongs to the Tibetan region, and southern Yunnan has nothing to distinguish it geographically from those parts of the Southern Shan States and Upper Tongking which it adjoins.

[1] See "Yunnan, the link between India and the Yangtze," by H. R. Davies, pp. 311.

Mammals are by no means common in Yunnan owing to the destruction of the forests and food supplies, and to the extermination of the larger species by hunters. Few opportunities for collecting them arose.

Fishes are plentiful in the larger rivers and lakes, in the smaller streams they are rare, owing to the enterprise of the Chinese. Lake Erh-hai, from which various specimens were obtained, is a picturesque sheet of water 30 miles long and from 5 to 7 miles broad, bounded on the east by low bare hills, and on the west by a narrow but highly cultivated plain which quickly gives place to the Ts'ang Shan mountains rising to 14,000 feet above the sea. This plain contains the city of Ta-li Fu (Long. 100° 5′, Lat. 25° 42′), at an elevation of 6,900 feet above the sea. Along the greater part of the western shore the fields come down to the water's edge, but in places the waves beat up on to extensive shell banks which are largely made up of the remains of *Margarya*. Water-weeds flourish for many yards out from the shore and provide food and shelter for various forms of aquatic life. Fish are very plentiful and fleets of junks are always engaged in netting them. In the shallow waters near the shore, the smaller kinds are caught by the aid of a trained diving bird which appears to be a kind of cormorant. The fishing industry is in the hands of the Minchia, a tribe of aborigines who inhabit the Ta-li Fu plain. All round the shore wading birds find their food, while ducks of many kinds are to be seen on the waters. In the outlet of this lake near Hsia-kuan almost the only sponges found in Yunnan up to the present, are to be obtained. They consist of small rounded or irregular growths of a brilliant green colour, which grow on pieces of stone, wood or old shells.

In Western Yunnan insect life is not very abundant, probably on account of the temperate climate, but further southwards a great variety prevails.

Few reptiles were seen, the specimens which were obtained coming mainly from the rocky lava-covered downs of the Tengyueh district. Batrachians are common on the flooded fields in the early part of the year. The Salamander *Tylototriton verrucosus*, Anderson, is common in damp ditches and old walls around Tengyueh.

I wish to express my thanks to Dr. N. Annandale, Superintendent of the Indian Museum, who supplied me with a complete collecting outfit and through whose kind offices I was given a grant of Rs. 500 to meet expenses, without which it would have been impossible to have carried out this work.

LIST OF PRINCIPAL PLACES AND DISTRICTS FROM WHICH SPECIMENS WERE COLLECTED.

Name.	District.	Longitude E.	Latitude N.	Elevation (feet above sea level).
Bhamo	In Upper Burma	97° 13′	24° 15′	361
Tengyueh ..	..	98° 33′	25° 2′	5,365
Yung-chang Fu ..	....	99° 5′	25° 7′	5,400
Chu-tung	Yung-ping Hsien	99° 26′	25° 27′	5,500
Yang-pi ..	....	99° 53′	25° 38′	5,200
Hsia-kuan	Ta-li Fu	100° 6′	25° 35′	6,700
Ta-li Fu	..	100° 5′	25° 42′	6,800
Yunnan Fu ..	..	102° 45′	25° 2′	6,400
Shan Kuan	Ta-li Fu ..	100° 9′	25° 55′	6,800
Pu-piao	Yung-chang Fu ..	98° 58′	25° 2′	4,600
Ma-chan-kai ..	Tengyueh	98° 30′	25° 20′	6,000
Pe-lien	Tengyueh ..	98° 34′	25° 11′	5,800
Ku-tung-kai	Tengyueh ..	Very close to Ma-chan-kai.		6,000
Lung-ling ..		98° 43′	24° 37′	5,100
Lahsa		97° 53′	24° 25′	4,500
Lo-po-ssu-chuang or Mong Hum.	....	98° 15′	24° 42′	5,100
Mong Wan or Lung-chuan	..	97° 59′	24° 20′	3,100
Man Hsien	....	97° 48′	24° 30′	2,800
Nan Tien or Mong Ti ..	....	98° 22′	24° 52′	3,800
Mong Hsa ..	....	99° 32′	23° 43′	4,550
Mong Pan	..	100° 23′	23° 7′	5,500
Lu-shui-ho ..	Hui-li Chou (in the province of Ssu-chuan).	102° 3′	26° 15′	6,200 ?
Kuan-ping ..	Yun-lung Chou ..	99° 31′	25° 51′	7,100
Ta-lu ..	Yung-pe Ting	100° 50′	26° 37′	7,800
Ta-shui-chai ..	....	A village in the Lo-po-ssu-chuang valley.		3,900
Wei-yuan Ting ..	..	100° 44′	23° 30′	3,200
Yun-Chou ..	..	100° 6′	24° 27′	3,800
Ssu-mao		101° 2′	22° 45′	4,900
Ching-tung Ting ..	....	100° 57′	24° 27′	3,900

Note.—With the exception of the two places noted, all the localities are situated within the province of Yunnan.

PART I.—SPONGES AND POLYZOA.

By N. ANNANDALE, *D.Sc., F.A.S.B., Superintendent, Indian Museum.*

SPONGES.

1. *Spongilla* (*Euspongilla*) *proliferens*, Annandale.

A small dried specimen on a piece of stick from a lake full of weeds at Mong Pan (alt. 5—6,000 feet), W. Yunnan. This species was also taken by Mr. Coggin Brown at Prome in Upper Burma.

2. *Spongilla* (? *Euspongilla*) *yunnanensis*, sp. nov.

Sponge hard, coherent, light, forming small rounded masses of a dull greenish colour (dry); the surface smooth; no branches; the oscula conspicuous, level with the surface, circular, of moderate size, with well-defined borders; the external membrane adhering closely to the sponge, stretched over a considerable part of each osculum; an ill-defined basal chitinous membrane present.

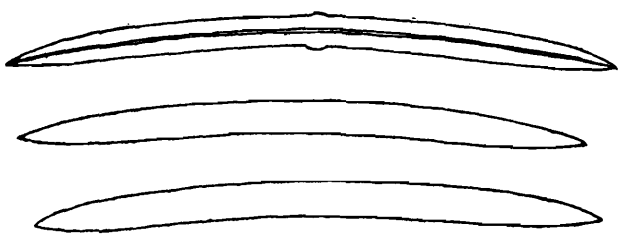

FIG. 1.—Skeleton spicules of *Spongilla yunnanensis*, Annand.

Skeleton moderately loose, not very regular; the radiating fibres well defined but slender; the transverse fibres distinct, situated somewhat widely apart; a considerable amount of spongin present.

Spicules.—Skeleton spicules (fig. 1) smooth, sharp, moderately slender, measuring on an average 0·246 × 0·016 mm., as a rule nearly straight but not infrequently bent at an angle. No flesh spicules.

Gemmules not observed.

Habitat.—South outlet of Lake Ta-li Fu (Erh-hai), Yunnan, W. China; alt. 6,900 feet. Specimens taken at the beginning of March, 1910.

It is always dangerous to describe specimens of Spongillidæ without gemmules as the types of species, but *S. yunnanensis* resembles *S. philippinensis* so closely in general structure that the two species must be closely allied. The former is distinguished by its smooth spicules and stronger skeleton. The type specimen measures 35 × 35 × 40 mm. and is attached to a small stone.

3. *Spongilla* (? *Stratospongilla*) *coggini*, sp. nov.

Sponge not very hard, fragile, tomentose, of a brilliant green colour, forming irregular masses of moderate size, occasionally with short flattened branches; the oscula inconspicuous, usually situated in depressions on the surface; external membrane closely adherent to the sponge; a well-defined but delicate chitinous basal membrane present.

Skeleton close but not very coherent, forming an almost regular net-work with comparatively small meshes; radiating and transverse fibres of almost equal diameter; very little spongin present.

Spicules.—Skeleton spicules (fig. 2) moderately stout, measuring on an average 0·272 × 0·02 mm., pointed or rounded at the ends, as a rule straight or nearly straight; their surface minutely but not closely spined, the spines straight, becoming closer and slightly longer near the extremities, which usually

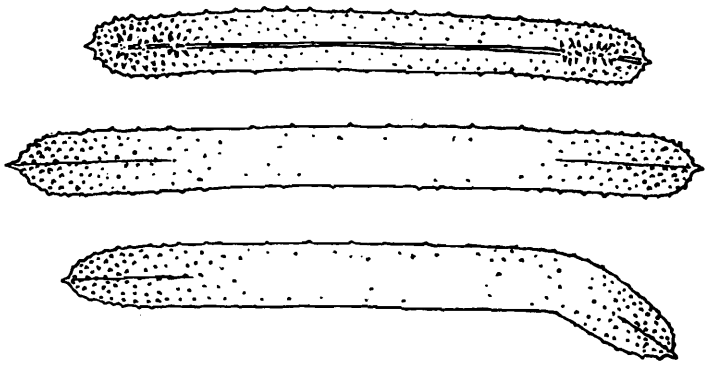

FIG. 2.—Skeleton spicules of *Spongilla coggini*, Annand.

terminate in a single spine of larger size than any of the rest.

Gemmules of moderate size, few in number, flattened at the base, dome-shaped above, with a central indentation or concavity; their chitinous coat thin and brittle, covered by a delicate outer membrane in continuity with the basal membrane of the sponge; no granular or cellular pneumatic coat; no foramen; no gemmule spicules.

Habitat the same as that of *S. yunnanensis*, together with which this species was taken.

The specimens of *S. coggini* vary considerably in size, but the largest does not measure more than 50 × 40 × 38 mm. There are a great many of them, the majority being evidently complete. Many small stones and dead *Corbicula* and *Margarya* shells are included in their substance. I can find no trace of microscleres, but the gemmules seem to be fully formed, their outer coat being covered with diatoms, organic débris and small fragments of silica apparently of natural shape.

S. coggini is evidently a close ally of *S. clementis*, which was discovered, together with *S. philippinensis*, in Lake Lanao in the Philippines. *S. clementis*, however, has smooth skeleton spicules and the gemmule is armed with microscleres. It is interesting that the two sponges found in Lake Ta-li Fu should be so like the two from Lake Lanao, but our knowledge of the fauna of both lakes is still incomplete.

POLYZOA.

? *Plumatella javanica*, Kraepelin.

A dried specimen from Mong Pan, taken together with the specimen of *S. proliferens* referred to above, appears to belong to this form, which is common in northern India and Burma.