



FRESHWATER SPONGES OF ARUNACHAL PRADESH, INDIA

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The sponges are aquatic, sedentary, filter feeding Metazoa with a cellular grade of construction, without organs, mouth or nervous tissue, with a body permeated with pores, canals and chambers and involving a unidirectional water current through the body propelled by random beating of flagella occurring on a single layer of flagellated cells called choanocytes and feed on suspended organic particles. Skeleton - made up mainly of spicules of silica or calcite and spongin fibres laid down around the spicules or parts thereof so that the skeleton held together in a reticulum, a set of plumose fibres, or as dense tracts of spongin and spicules. Fine collagen fibrils occur in the mesohyle of all sponges. Due to having very poorly organised body structure as well as little or no locomotory activities, they have a tendency to high morphological plasticity which leads to their susceptibility to pronounced polymorphism. Sponges can be used as fine indicator for specific population alteration and the analysis of their cytopathology can be employed for the kind as well as degree of pollution.

Colonies of Fresh water sponges are found as adhering to the surface of any substratum inside the water bodies' i.e. aquatic weeds, logs, stones, bricks or any other artificial substratum in the ponds, lakes, water reservoirs, streams, and rivers. Globally about 257 sponge species are found in freshwater (Van Soest RWM, Boury-Esnault N, Vacelet J, Dohrmann M, Erpenbeck D, et al. 2012). After the pioneering works of Dr. N. Annandale practically there is no work for more than half a century. Khara and Chaturvedi (1976) gave a check list on freshwater sponges of India.

Soota and Pattanayak (1982) described 9 species based on the unnamed collection of the Zoological Survey of India and included more up-to-date data. Soota *et al.* (1983) added the ecological studies of freshwater sponges and described 4 species including one new species. Soota (1991) reviewed the hitherto known 31 Indian species of freshwater sponges based on the study of all the available material coupled with the perusal of the relevant literature to date. Pattanayak (1998) described 16 species from West Bengal, Pattanayak (1999) recorded one species from Meghalaya and Pattanayak (2003) reported two species from Tripura state.

At present only 31 species of freshwater sponge recorded from India as per Soota, (1991). But the species *Metania vesparioides* (Annandale, 1908) is included in Soota (1991) restricted to Myanmar only (p.94). Therefore, the total number of species of freshwater sponges of India is now thirty. In India studies on sponges were entirely based on very inadequate surveys and confined only to a few areas.

There are few records of freshwater sponges from Himalayan ranges. According to Soota (1991) *Spongilla lacustris* (Linnaeus, 1758) from Simla (Himachal Pradesh) and Udhampur (Jammu); *Stratospongilla bombayensis* (Carter, 1882) and *Radiospongilla cinerea* (Carter, 1849) from Naukuchia Tal, alt. 4000 ft. Kumaon (Uttarakhand); *Radiospongilla cerebellata* (Bowerbank, 1863) from Mangal-dai near Bhutan frontier (Assam); *Ephydatia ramsayi* (Haswell, 1882) from western Himalayas namely Kumaon, Naukuchia Tal, Bhim Tal, Sat Tal and Nainital and

Ephydatia meyeri (Carter, 1849) from Bhim Tal, Kumaon, alt. 4500 ft. (U.P.). Pattanayk (1999) reported *Eunapius calcuttanus* (Annandale, 1911) from Meghalaya.

There was no record of freshwater sponge from Arunachal Pradesh. During a recent survey (2010 and 2011) to Arunachal Pradesh present authors collected 5 colonies of freshwater sponges which belong to *Radiospongilla cerebellata* (Bowerbank, 1863), *Trochospongilla paulula* (Bowerbank, 1863) and *Ephydatia meyeri* (Carter, 1849).

SYSTEMATIC ACCOUNT

Phylum PORIFERA Grant, 1863

Class DEMOSPONGIAE Sollas, 1885

Subclass CERACTINOMORPHA Levi, 1953

Order HAPLOSCLERIDA Topsent, 1928

Suborder HAPLOSCLERINA Topsent, 1928

Family SPONGILLIDAE Gray, 1867

Genus *Radiospongilla* Penney and Racek, 1968

1. *Radiospongilla cerebellata* (Bowerbank, 1863) (Fig. 1a-c)

1863. *Spongilla cerebellata* Bowerbank, . *Zool. Soc. Lond.*, 1863, p. 465.

1907. *Spongilla proliferens* Annandale, *J. Proc. Asiat. Soc. Beng.*, 3, pp. 15 & 26.

1968. *Radiospongilla cerebellata* Penney and Racek, *Bull. U. S. natn. Mus.* No. 272, p. 73.

1991. *Radiospongilla cerebellata*, Soota, *Rec. zool. Surv. India, Occ. Paper No. 138*, p. 58.

Material examined: 2 ex. Fishery tank at Tafargram, Near Teju town, Lohit District, Arunachal Pradesh; India. 13. 01. 2011; Regn. No. P3625/1; Coll. J. G. Pattanayak and S. Mitra. .

Description: Sponge forming small and shallow cushions form; surface uneven with brain-like corrugations; oscula conspicuous; dermal membrane well developed; colour- dark green when alive; consistency of live sponge soft.

Skeleton - irregular; spongin more in quantity.

Megascleres - Smooth, stout, fusiform and slightly curved to straight amphioxea, sharply pointed at tips; length 0.230-(0.275) - 0.320mm, width 0.010-(0.011)-0.012 mm.

Microscleres - Absent.

Gemmoscleres - curved, slender, cylindrical, amphistrongyla with small spines erect and less in number on the central portion of shaft but recurved and more in number terminally; length 0.080-(0.085)-0.100 mm, width 0.002-(0.0025)-0.003 mm.

Gemmules - Spherical, numerous, scattered throughout the body; pneumatic layer thick, consisting of small spherical air spaces, gemmoscleres embedded in this layer and forming two separate tiers; foramen tubular, porus tube slender and straight, extending to the level of pneumatic layer; diameter range 0.400-(0.455)-0.500 mm.

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Odisha, Tamil Nadu, U.P. and West Bengal.

Outside India: Tropical and subtropical South and South East Asia, China to Russia extending to South-eastern Europe.

Remarks: *Radiospongilla cerebellata* (Bowerbank, 1863) is recorded for the first time from Arunachal Pradesh.

Genus *Trochospongilla* Vejdovsky, 1883

2. *Trochospongilla paulula* (Bowerbank, 1863) (Fig. 2a-c)

1863. *Spongilla paulula* Bowerbank, *Zool. Soc. Lond.*, 1863, p. 453.

1907. *Trochospongilla latouchiana* Annandale, *Rec. Indian Mus.*, 1, 389.

1968. *Trochospongilla latouchiana*, Penney and Racek, *Bull. U. S. natn. Mus.* No. 272, p. 140.

1991. *Trochospongilla paulula* Soota, *Rec. zool. Surv. India, Occ. Paper No. 138*, p. 84.

Material examined: 2 ex. Khonsa, Tirap District, Arunachal Pradesh; India. 06.01.2011; Regn. No. P 3626/1; Coll. J. G. Pattanayak and S. Mitra.

Description: Sponge forming encrustations with variable size; surface uneven; oscula relatively few but prominent; dermal membrane well developed; colour- dark brown when alive; consistency of live sponge very rigid but often brittle.

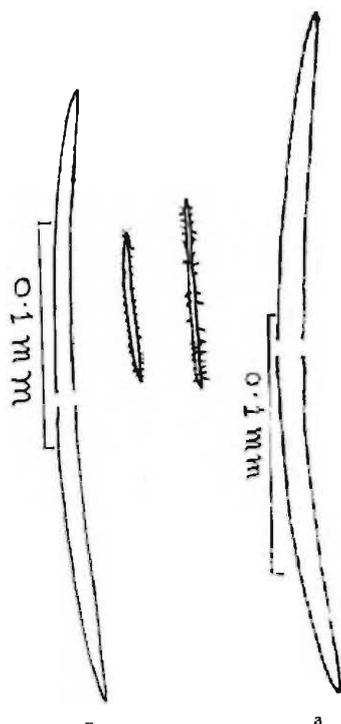


Fig. 1 *Radiospongilla cerebellata*
a=Megasclere
b=Immature gemmosclere
c=Mature gemmosclere

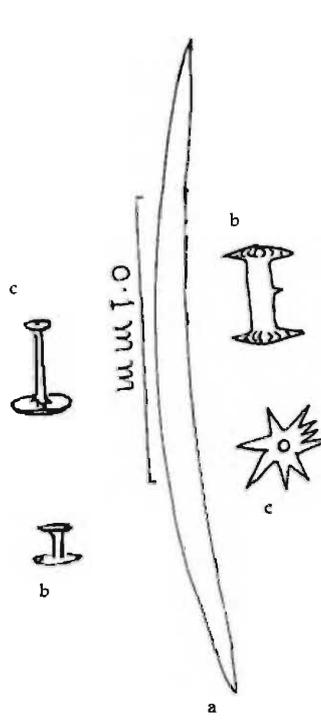


Fig. 2 *Trochospongilla paulula*
a=Megasclere
b & c=Gemmosclere

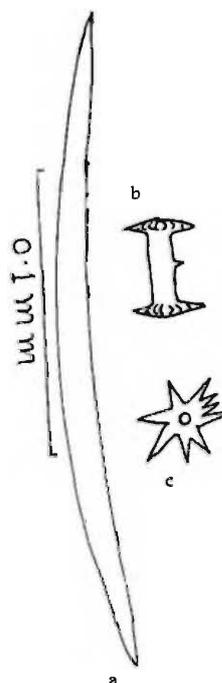


Fig. 3. *Ephydatia meyeri*
a=Megasclere
b=Gemmosclere
c=Roule

Skeleton - formed of distinct vertical spicule fibers joined together by spongin and irregularly arranged transverse fibers.

Megascleres - Smooth, stout, cylindrical and slightly curved to straight amphioxea; length 0.230-(0.275)-0.320 mm, width 0.010-(0.013)-0.015 mm.

Microscleres - Absent.

Gemmoscleres - birotulates with a slender smooth shaft, rotules circular differing in diameter and flat, upper rotules considerably recurved, forming a bowl-like structure; length of shaft 0.012-(0.020)-0.025 mm, 0.003-(0.004)-0.005 mm thick, Upper rotules 0.009-(0.012)-0.015 mm, lower rotules 0.015-(0.020)-0.025 mm in diameter.

Gemmules - Spherical, numerous, scattered throughout the body and loosely held in position by skeletal network; pneumatic layer thin and granular, gemmoscleres embedded in one layer; foramen conical and short porus tube; diameter range 0.165-(0.225)-0.220 mm.

Distribution: India: Arunachal Pradesh, West Bengal.

Outside India: Southern and South-East Asia north to China and south to eastern Australia, Myanmar.

Remarks: *Trochospongilla laulula chiana* (Bowerbank, 1863) is recorded for the first time from Arunachal Pradesh.

Genus *Ephydatia* Lamouroux, 1816

3. *Ephydatia meyeri* (Carter, 1849)

(Fig. 3a-c)

1849. *Spongilla meyeri* Carter, *Ann. Mag. Nat. Hist.*, 4, p. 84.

1867. *Ephydatia meyeri* Gray, *Proc. Zool. Soc. Lond.*, 1867, p. 550

1907. *Ephydatia mulleri* var. *meyeri* Annandale, *J. Proc. Asiat. Soc. Beng.*, 3, p. 26.

1991. *Ephydatia meyeri* Soota, *Rec. zool. Surv. India*, Occ. Paper No. 138, p. 75.

Material examined: 1ex. Durga Temple pond, Bomdila, West Kameng district, 2700 m above

msl, West Kamneng district; 27.12.2011, Regd. No. P3627/1, J.G. Pattanayak and S. Mitra.

Description: Colonies are irregular in shape; surface uneven and corrugated; oscula not prominent; dermal membrane well developed; colour- light brown in live; consistency of live sponge firm and moderately hard.

Skeleton - formed of polyspicular radiating fibers joined together by a small quantity of spongin and secondary transverse fibers.

Megascleres - Smooth, stout, cylindrical and slightly curved amphioxea, sharply pointed at tips; length 0.250-(0.275) - 0.300 mm, width 0.010-(0.011)-0.013 mm.

Microscleres - Absent.

Gemmoscleres - birotulates with moderately stout smooth shafts, sometimes small erect sharp spines on the shaft, rotules equal in diameter and flat, rotules irregularly and very much incised; length of shaft 0.025-(0.029)-0.030 mm, rotules 0.025-(0.028)-0.030 mm.

Gemmules - Spherical, small, numerous, scattered throughout the body; pneumatic layer well developed, thick and irregular, consisting of minute spherical air spaces, gemmoscleres

embedded in one or two layers, inner layer radially and outer layer irregularly arranged; distal rotules of outer layer protruding from outer gemmular membrane; foramen raised but simple and not tubular; diameter range 0.475-(0.555)-0.600 mm.

Distribution: India: Arunachal Pradesh, Haryana, Kerala, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Outside India: China.

Remarks: Annandale (1907) recorded this species as *Ephydatia mulleri* var. *meyeni* as new variety from Indian Museum tank. This species is recorded for the first time from Arunachal Pradesh.

SUMMARY

The paper dealt with 3 species of freshwater sponges recorded for the first time from Arunachal Pradesh, India.

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REFERENCES

- Annandale, N. 1907. Notes on the freshwater Fauna of India. IX. Description of new Freshwater sponges from Calcutta, with a record of two known species from the Himalayas and a list of the Indian forms. *J. Proc. Asiat. Soc. Beng.*, **3**, pp. 15-26.
- Khera S. and Chaturvedi Y. 1976. Check-list of Indian freshwater sponges. *Rec. zool. Surv. India, Misc. Publ. Occ. Paper No. 4*:1-29.
- Pattanayak, J. G. 1998. Freshwater sponges. *Zool. Surv. India., Fauna of West Bengal, State Fauna Series 3* : (Part II) : 1-27.
- Pattanayak, J. G. 1999. Porifera : Freshwater sponges. *Zool. Surv. India., Fauna of Meghalaya., State Fauna Series, 4*: (Part 9) : 1-4.
- Pattanayak, J. G. 2003. Occurrence of *Spongilla lacustris* and *Eunapius carteri* (Demospongiae : Spongillidae) from Tripura, India. *Rec. zool. Surv. India*, **100** (Part 1-2) : 189-193.
- Penney J. T. and Racek, A. A. 1968. Comprehensive Revision of Worldwide collection of freshwater sponges (Porifera : Spongillidae). *Bull. U. S. natn. Mus.* No. 272 : 184 pp.
- Soota, T. D. 1991. Freshwater Sponges of India. *Rec. zool. Surv. India, Occ. Paper No. 138* : 116 pp, text figs. 5.
- Soota T. D. and Pattanayak, J. G. 1982. On some freshwater sponges from the unnamed collection of the Zoological Survey of India. *Rec. zool. Surv. India*, **80** : 215-229.

Soota T. D., Pattanayak, J. G. and Saxena, M. M. 1983. On some freshwater sponges from Gujarat (India). *Rec. zool. Surv. India*, **81** : 255-260.

Van Soest RWM, Boury-Esnault N, Vacelet J, Dohrmann M, Erpenbeck D, *et al.* (2012) Global Diversity of Sponges (Porifera). PLoS ONE 7(4): e35105. doi:10.1371/journal.pone.0035105