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Genus Cyathus Haller ex Pers. (Agaricomycetes) from Eastern Himalaya

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ABSTRACT

This paper deals with the morphology and taxonomy of sixteen species of *Cyathus* from Eastern Himalaya, including India and Royal Kingdom of Bhutan. Of these, *Cyathus thindianus* has been described as a new species. Three species viz.*C.berkeleyanus. C.ellipsoideus* and *C.montagnei* have been reported for the first time from Himalaya while *C.gracilis* is being circumscribed for the first time from India. Remaining species viz. *C.striatus, C.novae-zealandiae. C.griseocarpus, C.limbatus, C.poeppigii, C.microsporus, C.intermedius, C.colensoi, C.hookeri, C.stercoreus* and *C.triplex* have only been briefly annotated. A key is provided for the Eastern Himalayan species.

Key words: Bird's nest fungus, Agaricomycetes, peridioles, taxonomy

REMINISCENCESASASTUDENT

As a B.Sc. (Hons. School) student in the Botany Department, I had an opportunity to be student of great botanist's trio of Professors P.N. Mehra, K.S. Thind and K.K. Nanda. There used to be a race among the Honour's School pass outs to do their M.Sc. under the guidance of these stalwarts. I was lucky to be allotted to Prof. K.S. Thind for my M.Sc. degree and deem it as the greatest privilege of my life for having had the opportunity of being his M.Sc. student (1975-1977) and Ph.D. student (1977-82). I had a limited opportunity to interact with Prof. Thind during M.Sc. but during my association as a Ph.D. student I found him as a finest human being, a very gentle mentor and erudite teacher with a strong sense of modesty. It was a golden period of my life when I gradually came under the fold of his infectious enthusiasm for scientific pursuits. His tremendous humility, understanding of human nature and treating even the junior most colleagues with respect and dignity endeared him to all. There are many fond memories of this great teacher who was immensely loved and respected by students and teachers alike. I vividly remember the day when he offered me a fellowship in DST sponsored project. It was a big opportunity for me as it was immediate employment with handsome fellowship after completing M.Sc. I was elated and quickly accepted the offer. But Prof. Thind advised me to consult my parents and then decide. I came to my home place and stayed on there for more than a month as I visited my parents after a long time. My family members left the issue for me to decide. On my return I conveyed my consent to Prof. Thind. He asked me to join the fellowship from the day I was offered the same and plan tour to Eastern Himalaya along with three other colleagues. His generous and helping nature allowed me to have a long holiday before embarking on a massive programme of fungal explorations in the Eastern Himalaya. I chose to work on Gasteromycetes. We left for Darjeeling hills in the first week of October, 1977, though rainy season was over. But we made a good beginning. We had a wonderful working atmosphere in the laboratory. Prof. Thind used to take tea with us daily at 11.A.M. On tea table he used to share his ideas on research and academics and enquire about the individual's progress of work and gave his suggestions. Tea table was such a forum where all of us could discuss any issue with Prof. Thind and among ourselves. He had a broader concept on taxonomy of higher fungi. He used to suggest that every species/taxon

should have a range of variations to accommodate ecovariants and other variable taxa and it is up to the taxonomists to make a right judgement while proposing a new taxon.

Prof. Thind accompanied us on various fungal forays to the Eastern Himalaya including Arunachal Pradesh and Royal Kingdom of Bhutan by a 1965 model left hand drive Willys Jeep. We all cherished his friendly company. He was always keen to explore new areas in search of rare and interesting specimens. An unusual incident happened when we entered a forest in Shergaon (Arunachal Pradesh). In the forest, almost all of us encountered snakes and we immediately returned back on to the main road. Prof. Thind was so upset that he asked us to pack up and said that "I cannot risk my scholars for the sake of fungal specimens". He was a very gentle and kind hearted soul. He generously treated us whenever we visited a place of eatables. There are so many memorable experiences with Prof. Thind which I continue to cherish till date. One such incident makes me nostalgic even today. After completing my Ph.D. in 1982, I joined as RA in 1983 and resigned in 1984 to join at HPAU, Palampur. At a later stage in 1989, I hesitantly wrote to Prof. Thind to kindly issue me an experience certificate of Research Associateship after verifying the records. To my surprise I received the same within a fortnight along with a brief and very meaningful letter. I have carefully preserved this letter and a scanned copy is reproduced here. These lines from a great teacher always



Sitting: Dr. Rishi Kaushal, Late Dr. I.P.S. Thind, Late Prof. S.B. Saxena, Late Prof. K.S. Thind, Late Dr. S.C. Kaushal

Standing: Dr. Rajesh Sharma, Sh. Dalvinder Singh, Late Dr. Ram Murti Sharda, Dr. Brij Mohan Sharma, Dr. Gurpaul Singh Dhingra, Dr. Ashok Mahan Narula



give me satisfaction and keep me motivated. Prof. Thind always had a definite opinion about his students and other associates which was not changed easily. Immense contributions made by him and academic and professional honors that came his way have been enumerated elsewhere but he deserved much more. His gentle nature and a strong sense of modesty did not allow him to chase other rewards and benefits. His untimely demise on December 3, 1991, caused a serious blow to the academic commitment we shared with him. May his wonderful and gentle soul remains in our hearts forever.

INTRODUCTION

The generic name *Cyathus* was first introduced by Haller in 1768 and later adopted by Persoon (1801). The genus *Cyathus* belongs to the family *Agaricaceae* of Class *Agaricomycetes*, included in the agaricoid clade of *Basidiomycota* (Matheny *et al.* 2006; Kirk *et al.*, 2008).It is the most common bird's nest fungus and is characterised by three layered peridium and permanent complex funiculi.Tulasane brothers (1844) divided the genus into two sections: 'Eucyathus' in which fructifications are plicated externally and 'Olla' in which the fructifications' are not plicated externally.Lloyd (1906) divided the genus into five subsections, two in 'Eucyathus' and three in 'Olla'.

According to Brodie (1975) more than 75 species actually exist. He in 1977 gave a comprehensive key to the known species of the genus. The genus currently has 45 species (Kirk *et al.* 2008), with cosmopolitan distribution in temperate and tropical countries, but rarely found in polar or glacial regions (Brodie, 1975). In India, this genus was previously known by 12 species. Of these, only 5 species were recorded from Eastern Himalaya. During the forays to various localities in the Eastern Himalaya including India and Royal Kingdom of Bhutan, 13 species of the genus were collected. Out of these, *C. griseocarpus* has already been described as a

new species by Brodie and Sharma (1980). Two species viz. *C. triplex* and *C. Novae-zealandiae* were reported for the first time from India on the basis of Eastern Himalayan collections (Thind *et al*, 1984).

In this paper, *Cyathus thindianus* is being described here as a new species while *C.berkeleyanus*. *C.ellipsoideus* and *C.montagnei* are reported for the first time from Himalaya on the basis of collections from Bhutan. *C.gracilis* is being described here for the first time from India. Remaining taxa are briefly annotated. All the collections have been deposited in the Herbarium, Department of Botany, Panjab University, Chandigarh (PAN) and in other herbaria mentioned against each collection number. Key to the investigated species has been given below. In the text the species are arranged in the sequence of their segregation in the key

KEYTO SPECIES

- 1. Fructifications distinctly plicate lengthwise, externally or internally or both, outer plicae often hidden by hairy surface...2
- 1' Fructifications not plicated lengthwise, both externally and internally......10

- 3. Fructifications dark, strongly plicate externally and internally, basidiospores large, 11-18x 5-7 µm....*C. striatus*
- 3' Fructifications dark, plicate internally; basidiospores small, 6.5-10 x 5-7 µm...... *C. novae-zealandiae*

- 6. Peridioles elliptical in outline......7
- Basidiospores subglobose to broadly oval, mostly 8.5-10.5 x 7-9 μm......C.berkeleyanus
- 7' Basidiospores ellipsoidal, 10-13 x 7-8.5 µm.. C. ellipsoideus
- 8 Plications on the peridium coarse, grooves up to 0.5 1mm apart *C. limbatus*
- 8' Plications on peridium fine, grooves up to 0.5 mm apart.....9
- 9 Basidiospores large, 22-45 x 16-32 µm..... C. poeppigii
- 9' Basidiospores smaller, 13-20(-22) x 10.5-13 µm...C. montagnei
- 10' Cortex of peridiole double layered as seen in cross

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section.....14

- 11 Basidiospores small, 4 x 5-6 µm*Cmicrospores*
- 11' Basidiospores large, always more than 8 µm long12
- 12 Basidiospores 12-19 x 9-13 μm, wall thick (up to 3.5 μm), peridium internally silvery grey......*C.intermedius*
- 12' Basidiospores narrower, wall thin (up to 1 μm), peridium internally brown or greyish brown13
- 13' Basidiospores ovoid, 8.5-11.5 x 7-8.5 μm, margin markedly flaring out, peridium internally greyish brown......*C. colensoi*
- 14 Peridioles black, irregular in outline, basidiospores globose or subglobose, 15-42 µm in diameter *C. stercoreus*
- 14' Peridioles greyish brown, circular in outline, basidiospores elliptical, 16-22 x 8.5-12 μm......15
- 15' Fructifications without a slender base, external hairs not aggregated into conical tufts, basidiospores 16-19 x 9-12 μm.....C. triplex

TAXONOMY

1. Cyathus striatus(Huds.) ex Pers. Syn.Meth.Fung., p.237 1801.

Figs. 1 and 14

This species is characterized by a large(up to 1.7 cm), dark, robust fructifications with a conspicuous basal emplacement, strongly hairy external surface, flaring margin, internally and externally distinctly plicated peridium,thin tunica, single cortex and large (11-18 x 9-12 μ m),ellipsoid, thick walled(wall up to 3.5 μ m thick) basidiospores.

Collections examined (8 collections): West Bengal: Darjeeling, on soil and twigs, BMS 23001(PAN), October 15, 1977.

Remarks: It is one of the most common species of the genus, mostly found in the temperate climate. It has earlier been reported by several workers from India. In the eastern Himalaya, the species is uncommon except for Darjeeling hills where it was found growing luxuriantly on variety of substrata.

2. Cyathus novae-zealandiae Tul., Ann. Sci. Nat. III,**1**:66, 1844.

Figs. 2 and 15

This species is characterized by dark, internally plicated fructifications and small $(6.5-10 \times 5-7 \,\mu\text{m})$ basidiospores.

Collection examined: Assam: N.C. Hills, Haflong, Jatinga, on dead wooden log, angiospermous forest, BMS 23110 (PAN, DBUV), July 30, 1978.

Remarks: This fungus was reported from India by Thind *et al* (1984) on the basis of above cited collection along with detailed description. Earlier it was known only from Australia and New Zealand.

3. Cyathus griseocarpus Brodie and Sharma, Bot.Notiser 133: 343, 1980.

Figs. 3 and 16

The species possesses ivory to pale pinkish buff fructifications externally, metallic grey peridioles and smaller $(7-9 \times 5-6.5 \,\mu\text{m})$ basidiospores.

Collections examined:(22 collections) Manipur, Imphal, Ukhrul, on dead twigs and soil,pine forest,BMS 23123 (holotype PAN; isotype 78104 DBUV), August 29, 1978.

Remarks: Brodie and Sharma (1980) described this species on the basis of above cited collection. The species, however, appears to be widely distributed in the Eastern Himalaya as it was collected from several other locations in the subsequent years.

This Eastern Himalayan species is close only to *C. bulleri* Brodie in having almost white fruit bodies and silvery interior but differs markedly in having ivory to pale pinkish buff peridium and faintly plicated exterior and interior as compared to strongly plicated fructifications of *C.bulleri*.

4. Cyathu thindianus Sharma sp. nov.

Figs. 4 and 17

MycoBank Number : Mb818086

Diagnosis: Fructifications up to 11 mm tall and up to 7 mm wide at the mouth, externally light brown or greyish brown, internally shinning grey, distinctly plicated. Peridioles globose or subglobose, tunica present; cortex single. Basidiospores mostly ellipsoid, slightly narrow at one end, $12.5-20 \times 9-11.5 \,\mu$ m, thick-walled.

Etymology : The species is named after Late Professor K. S. Thind for his significant contributions in the field of fungal taxonomy.

Description: Fructifications gregarious, sometimes scattered, tall with a slender base, up to 11 mm tall excluding basal emplacement and up to 7 mm wide at the mouth; basal emplacement distinct, externally light brown or greyish brown, covered with fine hairs; internally shinning grey, distinctly plicated, mouth slightly flaring, entire, lip dark, not fimbriated. Peridioles globose or subglobose, greyish brown, up to 2 mm in diameter, wrinkled, rugulose, tunica present; cortex single. Basidiospores mostly ellipsoid, sometimes subglobose or globose, slightly narrow at one end, 12.5-20 x 9-11.5 µm subhyaline, thickwalled, wall up to 2.5 µm thick.

Collection examined: Bhutan, Thimphu, Chankaphug, on dead twigs and soil, BMS 23420 (Holotype PAN); isotype in DBUV, August 12, 1981.

Remarks: This species does not match with any of the known species of *Cyathus* recognised by Brodie(1975, 1977) and is described here as a new species. It is, however, related to *C. novae-zealandiae* Tul., in some features but latter species

differs in having larger (12-14 mm) fructifications, dark brown exterior, covered with appressed tomentum and smaller(11-13 x 5-6 μ m , from type description) basidiospores. *C. helene* Brodie is another species with which *C. thindianus* shows some affinities but the former species differs by its small (up to 7 mm tall) obconic fructifications without a slender base, flaring outward sharply in the upper third, minutely fimbriated lip, thick peridium, angular peridioles with silvery tunica and ovoid to sphaeroidal (15-19 x 12-14 µm) basidiospores.

5. *Cyathus berkeleyanus* (Tul.) Lloyd, *Myc. Writ.*, 2, *Nidulariaceae*, p. 19, 1906.

Figs. 5 and 18

Fructifications gregarious, scattered, campanulate, up to 13 mm tall and up to 9 mm wide at the mouth, emplacement conspicuous, byssoid, externally yellowish grey to light brown, faintly plicated, covered with fine, tufted appressed hair with their tips pointing downwards, internally shiny brownish grey, distinctly plicated, margin somewhat flaring. Peridioles broad ellipsoid, up to 1.5 mm in diameter, rugulose, tunica present, cortex single. Basidiospores subglobose to broadly oval, 8.5-10.5x 7-9 μ m, subhyaline, wall up to 1.2 μ m thick.

Collections examined: Bhutan: Thimphu, Paro, on dead wood, BMS 23310(PAN, DBUV), September 28, 1980: Bunakha, on dead twigs, BMS 23365 (PAN, DBUV), July 29, 1981.

Remarks: *C. berkeleyanus* is being reported here for the first time from Himalaya. According to Brodie (1975), no one writing about this species seems to have been aware of its great variability in size, colour, plication and (to lesser extent) spore size and it is very difficult to recognize this species except by process of elimination.

Bhutan collections also possess some differences when compared with the type description. These collections have larger and unusually pale coloured fructifications, exterior of the peridium is not distinctly plicated and basidiospores somewhat larger, subglobose to broadly oval. These differences have been considered within the range of variations of the species.

6. Cyathus ellipsoideus Brodie, Can. J. Bot. 52: 247, 1974.

Figs. 6 and 19

Fructifications gregarious, scattered, single, close to each other, obconic, narrowing into a short, thick base, up to 11 mm tall and up to 9 mm wide at the mouth; emplacement conspicuous, byssoid, externally brown, faintly plicated, covered with fine matted hair, internally shiny, greyish brown or silvery grey, distinctly plicated, sometimes with a transverse groove near the lip; margin flaring, lip not fimbriated. Peridioles broad ellipsoid, up to 2.5 mm in diameter, greyish brown, wrinkled, shiny, tunica thick and persistent, cortex single. Basidiospores ellipsoid, 10-13 x 7-8.5 μ m, subhyaline, usually with a scar from the point of attachment of basidia, wall up to 1 μ m thick.

Collections examined (4 collections): Bhutan; Thmphu,

Nawephu, on dead twigs, mixed forest, BMS 23248 (PAN, DBUV), September 17, 1980.

Remarks: *C. ellipsoideus* was described by Brodie (1974), on the basis of a collection from Chikmaglur (Mysore, India). It has been collected for the first time outside its type locality. Bhutan collections have slightly less ellipsoid peridioles and smaller basidiospores 15-16 x 9-10 μ m, recorded for *C. elipsoideus* by Brodie, (1974), otherwise these fit well within the description of the type specimens.

7. Cyathus limbatus Tul. Ann. Sci. Nat. Ser. III 1: 78, 1844,

Figs. 7 and 20

This species is marked by dark brown, robust fructifications (up to 8 mm tall) with a well developed basal emplacement, both the peridial surfaces plicated, ridges coarse and wide apart (0.5-1 mm), deep brown to black, non tunicate shiny peridioles having double cortex and larger ($11-17 \times 8.5-12 \mu m$), ellipsoid basidiospores.

Collections examined (7 collections): Meghalaya; Khasi hills, Nongpoh, on dead wood, angiospermous forest, BMS 23083 (PAN, DBUV), July 13, 1978.

Remarks: Cooke (1880) recorded this species for the first time from India, on the basis of Dr. Butler's collections from Royal Botanic Gardens, Calcutta (West Bengal). Later, Lloyd (1906) also mentioned the occurrence of this fungus from India. The species is rare in Western Himalaya (Thind, 1977), but seems to be fairly common in the tropical and subtropical forests of the Eastern Himalaya.

8. Cyathus poeppigii Tul., Ann. Sci. Nat. Ser. III 1:77, 1844.

Figs. 8 and 21

Fructifications caespitose, gregarious, scattered, narrowly obconic, up to 9 mm tall exclusive of basal emplacement) and up to 7 mm wide at the mouth, externally light brown or dark brown, tomentum of fine tufted hair; internally shining, brownish grey, deeply plicated on both sides, plicae up to 0.5 mm apart; margin somewhat flaring, lip not fimbriated. Peridioles subglobose or irregular in outline, black, shiny, wrinkled, rugulose, tunica absent, cortex double, up to 2 mm in diameter. Basidiospores mostly elliptical, sometimes subglobose or globose, very large, 22-45 x 16-32 μ m, sub hyaline, thick-walled, wall up to 5 μ m thick.

Collections examined: Arunachal Pradesh: West Kameng District, Bombdila,Nichifu, on soil and twigs, BMS 23432 (PAN), August 23, 1981; Dirang, on dead twigs, BMS 23472 (PAN), September 1, 1981; Jamiri, on dead twigs, BMS 23527 (PAN), September 14, 1981.

Remarks: This species has earlier been reported from India by Hennings (1901), Lloyd (1906), Ahmad (1942). Thind (1977) regarded it as a rare species in Western Himalaya. However, the species appears to be fairly common in West Kameng district of Arunachal Pradesh. It is easily recognized by its very large spores and deeply plicated peridium. It is close to *C. limbatus* and *C. montagnei* in having plicate exterior and interior but differs markedly by its very large basidiospores.

9. Cyathus montagnei Tul. Ann. Sci. Nat. Ser. III 1: 1844.

Figs. 9 and 22

Fructifications caespitose, gregarious, campanulate, up to 7 mm wide at the mouth, emplacement conspicuous and byssoid; externally yellowish brown becoming greyish brown or light brown in the aged specimens, covered with sharply tufted hair, plicate, plicae hidden below the tomentum; internally shiny grey; margin somewhat flaring out, lip minutely fimbriated. Peridioles regular in outline, globose or subglobose, plump, rugulose, shiny grey, mostly up to 1.5 mm in diameter (sometimes up to 2 mm), tunica present, thin, fragile, evanescent; cortex double. Basidiospores usually elliptical, sometimes subglobose or globose, 13-20 (-22) x 10.5 13 μ m, subhyaline, smooth, thick-walled, wall up to 2 μ m thick.

Collections examined (7 collections): Bhutan; Thimphu, Nawephu, on dead chops, mixed forest, BMS 23247 (PAN, DBUV), September 17, 1980.

Remarks: This species was earlier simply listed from India by Ahmad (1942) on the basis of a collection from Dehra Dun (U.P.). It has been adequately described here for the first time from the Himalaya. It seems to be quite common in the forests around Thimphu (Bhutan).

10. Cyathus microsporus Tul. Ann. Sci. Nat. III 1:73, 1844.

Eastern Himalaya. However, during several fungal forays to up to 7 the region, the species could not be located. It is characterized by small (5 mm high and about 6 mm wide at the mouth), dark brown obconic fructifications, with a slender base and inconspicuous emplacement; externally not plicate, shaggy ow the or covered with appressed hair; internally slightly lighter or flaring outline, about 2 mm in diameter) with thin tunica and single layered mostly cortex; spores $5-6 \times 4 \text{ um}$ (after Brodie and Dennis, 1954).

11. Cyathus intermedius (Mont.) Tul. Ann. Sci. Nat. Ser. III I: 72, 1844.

This species was first reported from India by Lloyd 1906, on the basis of collection from Khasi hills (Meghalaya) in the

Currey (1874), first recorded this species from India, on the basis of Sulpiz Kurz's collections (the then Curator, Royal Botanic Gardens, Calcutta), made from Sibpur, near Calcutta. Thind (1977) also reported it from Manali (H.P.) and on the





FRUCTIFICATIONS

BASIDIOSPORES

Figs. 1-26: Basidiospores and Fructifications: Cyathus striatus (1 and 14), C. novae-zealandiae (2 and 15), C. griseocarpus (3 and 16), C.brodiei (4 and 17), C. berkeleyanus (5 and 18), C. ellipsoideus (6 and 19), C. limbatus (7 and 20), C. poeppigii (8 and 21), C.montagnei (9 and 22), C. colensoi (10 and 23), C. Stercoreus (11 and 24), C. gracilis (12 and 25), C.triplex (13 and 26)

basis of single collection described it in detail. The species, however, could not be collected in Eastern Himalaya and adjoining hills. It is characterized by obconic fructifications, externally covered with strong hair which when young cohere in nodules or tufts, internally silvery grey with smooth peridium, tunicate peridioles with single cortex and larger ($12-19 \times 9-13 \mu m$) spores (Thind, 1977).

12. Cyathus colensoi Berk., N.Z. Flora 2: 192, 1855.

Figs. 10 and 23

C. colensoi is marked by large (up to 10 mm tall and up to 8 mm wide at the mouth) cyathiform or campanulate fructifications, finely tomentose exterior, smooth, shining and greyish brown interior, entire, markedly flaring out margin, minutely fimbriated lip, large (up to 2.5 mm) irregular tunicate peridioles with single cortex and ovoid ($8.5-11.5 \times 7-8.5 \mu m$) basidiospores.

Collection examined: West Bengal: Siliguri, on dead twigs and soil, 23340 (PAN, DBUV), October 2, 1980.

Remarks: This fungus was first recorded from India by Ahmad (1950), on the basis of a collection from Simla hills without any description. Later, Thind (1977) also collected it once from the Western Himalaya and described it in details. The species was first described from New Zealand. According to Brodie (1975) it is known only from that country and Australia. Indian collections resemble well with the description of *C. colensoi* as given by Cunningham (1944) except for slightly smaller spores.

13. Cyathus hookeri Berk. Hook. J. Bot. 6:204, 1854.

This species was first described as new species from Khasi hills (Meghaiaya) by Berkley (1854). It is known only from New Zealand and China (Yunan), outside type locality.

C. hookeri is marked by campanulate fructifications (up to 14 mm tall and up to 10 mm wide at the mouth), narrowing below into a short stipe (2-3 mm long and up to 2 mm thick), minutely tomentose, bay brown exterior, smooth, brown interior, lenticular (up to 2.5 mm in diameter) tunicate peridioles with single cortex and ellipsoid (8-11 x 6-8 μ m) basidiospores, rounded at both the ends (after Brodie, 1975).

14. Cyathus stercoreus (Schw.) de Toni, in Saccardo's Sylloge Fung. 7: 40. 1888.

Figs. 11 and 24

C. stercoreus is characteristic in having larger (up to 13 mm tall and up to 9 mm wide at the mouth) fructifications with a conspicuous basal emplacement, own to brown externally, shaggy hair which become matted with age or worn off, smooth exterior and interior, black, irregular peridioles without tunica, strikingly double cortex and very large (15-42 μ m), globose thick-walled basidiospores.

Collections examined: (10 collections): Meghalaya: Khasi hills; upper Shillong, on humicolous soil, BMS 23038 (PAN), June 26, 1978.

Remarks: This species is widely distributed in Western Himalaya and also appears to be common in the Eastern

Himalaya. It is primarily a coprophilous fungus but also occurs on other variety of substrata.

15. Cyathus gracilis Brodie, Can. J. Bot. 51: 1393, 1973.

Figs. 12 and 25

Fructifications gregarious, slender, obconic,narrowing below into a slender stalk, up to 10 mm tall(exclusive of basal emplacement) and up to 6 mm wide at the mouth, yellowish brown;basal emplacement conspicuous, byssoid, epiphragm white, rupturing at maturity, externally hairy, hairaggregated into distinct conical tufts, not plicate, margin erect, lip minutely fimbriated. Peridioles circular in outline, greyish brown up to 1.5 mm in diameter, wrinkled, tunica thin, evanescent, cortex double. Basidiospore ellipsoid,17.5-22 x 8.5-11.5 μ m, subhyaline smooth, thick-walled, wall up to 4 μ m thick, basidiospores usually with apical notch.

Collection examined: West Bengal: Siliguri, Sevoke, on twigs, angiospermous forest, BMS 23205 (PAN, DBUV), August 10, 1980.

Remarks: This fungus was first described by Brodie (1973) from Luzon in Philippine Island. This collection represents first report of the species outside the type locality. The Eastern Himalayan collection compares well with the type description as given by Brodie (1973) except that the spores in the present collection are usually with an apical notch.

16. *Cyathus triplex* Lloyd's *Myc. Writ.* 2: *The Nidulariaceae*, p.23,1906.

Figs. 13 and 26

This species is characterized by small (up to 8 mm tall), obconic fructifications, externally covered with loosely tufted hair, usually smooth interior, orbicular and flattened peridioles and mostly ellipsoid or ovoid ($16-19 \times 9-12 \mu m$) basidiospores, often with apical notch.

Collection examined: Tripura; Agartala, Baramulah, on twigs and soil, angiospermous forests, BMS 23113 (PAN, DBUV), August, 1978.

Remarks: *C. triplex* was first reported from India by Thind *et al* (1984). The description of Indian specimens agrees well to the concept of the species given by Brodie (1979).

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