Diatrype: New records from Andaman Islands and a checklist from India

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Abstract
Fungal genus *Diatrype* is the type of the family Diatrypaceae, Xylariales, Sordariomycetes. During our fungal exploration in Andaman Islands, India (2015–2018), we encountered six fungi belonging to the genus *Diatrype*. The literature survey suggested that these fungi, viz. *D. buteae* M.S. Patil & S.D. Patil, *D. ilicina* Lar. N. Vassiljeva & S.L. Stephenson, *D. stigma* (Hoffm.) Fr, *D. stigmaoides* Kauffman, *D. subundulata* Lar. N. Vassiljeva & H.X. Ma and *D. syzygii* Narendra & V.G. Rao are new records from Andaman Islands, India. The fungal species are reported and illustrated in this paper with morphological descriptions.

Keywords: ascomycota, identification, morphology, saprobes, taxonomy

Niranjan M, Sarma VV (2020) *Diatrype*: New records from Andaman Islands and a checklist from India. **MycoAsia 2020/02.**

Received: 30.01.2020 | Accepted: 30.05.2020 | Published: 31.05.2020
Handling Editor: Dr. B. Devadatha

Introduction

In the past one and half decades several publications have appeared, which discuss about the higher level of classification of living organisms (Ruggiero et al. 2015) and particularly in Kingdom *Fungi* (Hibbett et al. 2007). The fungal genomic data have been generated by high-throughput sequencing (Tedersoo et al. 2018), barcoded (Vu et al. 2019) and have supported compilation of 'Notes on fungi', particularly at generic level (Wijayawardene et al. 2020). There are more than 140,000 fungal species globally known (Hawksworth 2017, Willis et al. 2018). Major groups of fungi have been updated at genus level in the 'Notes on Ascomycota' by Wijayawardene et al. (2017) and 'Basidiomycota' by He et al. (2019). Sordariomycetes, one of the largest classes in the phylum Ascomycota, which includes unitunicate fungi produced mainly within perithecial ascomata, was revised by Maharachchikumbura et al. (2016). This group has been further revised and updated through 'Refined Families of Sordariomycetes' by Hyde et al. (2020). In this latest compilation, Hyde et al. (2020) revised the family Diatrypaceae and accepted 599 species. *Diatrype* is the type genus of Diatrypaceae and the genus consists of 170 species worldwide (Hyde et al. 2020). Out of these only 17 species have molecular data. There have been many new genera added to this family in recent times (Hyde et al. 2020) including *Halocryptovalsa*, *Halodiatrype* and *Neoeutypella* (Dayarathne et al. 2016, 2019, Phookamsak et al. 2019).

Indian mainland has been well investigated for fungal diversity (Manoharachary et al. 2005). However, very meagre information is available on fungal diversity from Andaman Islands. The fungal diversity was less explored in India until 18th century. In the early 1930s, the first book on fungi from India was published by Butler and Bisby (1931) who described one *Diatrype* species, *D. chlorsarca*. More than 29,000 fungal species have been described from India

(Manoharachary et al. 2005, Manoharachary and Nagaraju 2016). Around 36 species belonging to the genus *Diatrype* have been reported from India (Pande 2008, Mall 2015, Remadevi et al. 2017, http://www.fungifromindia.com/). One new record of *D. enteroxantha* has been submitted recently (Niranjan et al. 2020) and in the present paper six new records of *Diatrype* spp. to Andaman Islands of which three are new records to whole of India.

Diatrype was first described by Fries (1849) based on the type, *D. disciformis*. The generic characters were detailed in Maharachchikumbura et al. (2016). The *Diatrype* members are mostly saprobic and some are phytopathogenic (Thiyagaraja et al. 2019). Based on the current literature the species reported from India are included in Tables 1–2. The Indian *Diatrype* spp. were predominantly surveyed in southern India (Pande 2008). Twenty-seven species were reported from Maharashtra and the remaining seven species were found in Andaman and Nicobar Islands, Karnataka, Kerala, Tamil Nadu and Uttar Pradesh. During diversity studies on ascomycetous fungi from Andaman Islands, species belonging to *Diatrype* were recorded and they are reported in this paper as new records to Andaman Islands. Taxonomic keys have been provided for taxa belonging to the Diatrypaceae (e.g. Maharachchikumbura et al. 2016) and *Diatrype* spp. (Vasilyeva and Stephenson 2004, Chlebicki 2005, Thiyagaraja et al. 2019).

Materials and Methods

Dead and decaying twigs were collected from reserve forests in Andaman Islands, India, and transferred to large polythene bags. They were rinsed with tap water to remove the debris, dried overnight and packed into new plastic bags for shipment to the laboratory. Prior to microscopic examination, the twigs were individually placed in plastic bread boxes, covered with sterile tissue paper, rehydrated by spraying with sterile distilled water and incubated for one week to 2 months. Then the samples were examined under a stereo-zoom microscope (Optika SZM - LED, Italy) to locate fungal fruiting structures. The fruit bodies were cut with a razor blade and the ascomatal content was transferred to a slide mounted in lactophenol or lactophenol cotton blue. The slides were examined under a compound microscope (Olympus CH20i, Japan) to determine their morphological characteristics. Subsequently they were observed under Nikon ECLIPSE TiU upright microscope fitted with DIC lenses and equipped with a Nikon DS-Fi2 digital camera (Japan) for microphotography. Measurements were made using the Nikon NIS - Elements - Imaging Software Version 4.4 program. The photographic plates were prepared using Microsoft Power Point and Adobe Photoshop version 7.0. Morphological identification was made by referring to available literature (Pande 2008, Trouillas et al. 2011, de Almeida et al. 2016, Maharachchikumbura et al. 2016). Herbarium specimens were deposited at the Department of Biotechnology in Pondicherry University, India.

Results

Taxonomy

1. *Diatrype buteae* M.S. Patil & S.D. Patil (1985). **Fig. 1: a–j**

Saprobic on *Dipterocarpus* sp. **Sexual morph:** Stromata crustose, black, thickened covering, white parenchymatous tissue below. *Ascomata* 220–367 µm high × 172–240 µm wide, without necks, scattered, perithecial, globose, coriaceous, superficial to immersed, necks protruding out, ostiolate, with a wide, thick, apical apex. Necks 142–210 µm long × 110–140 µm in diam. *Peridium* is composed of two layers: an inner hyaline and an outer brown layer with cells of *textura angularis*. *Hamathecium*: paraphyses septate, unbranched, longer than asci, broad to narrow. *Asci* 40–72.5 × 6.2–7.5 µm ($\overline{x}$ = 60.6 × 7.2, n=25), unitunicate, 8-spored, clavate, with a J^- apical ring in Lugol′s reagent, smooth-walled, spore content subapical, long pedicellate.

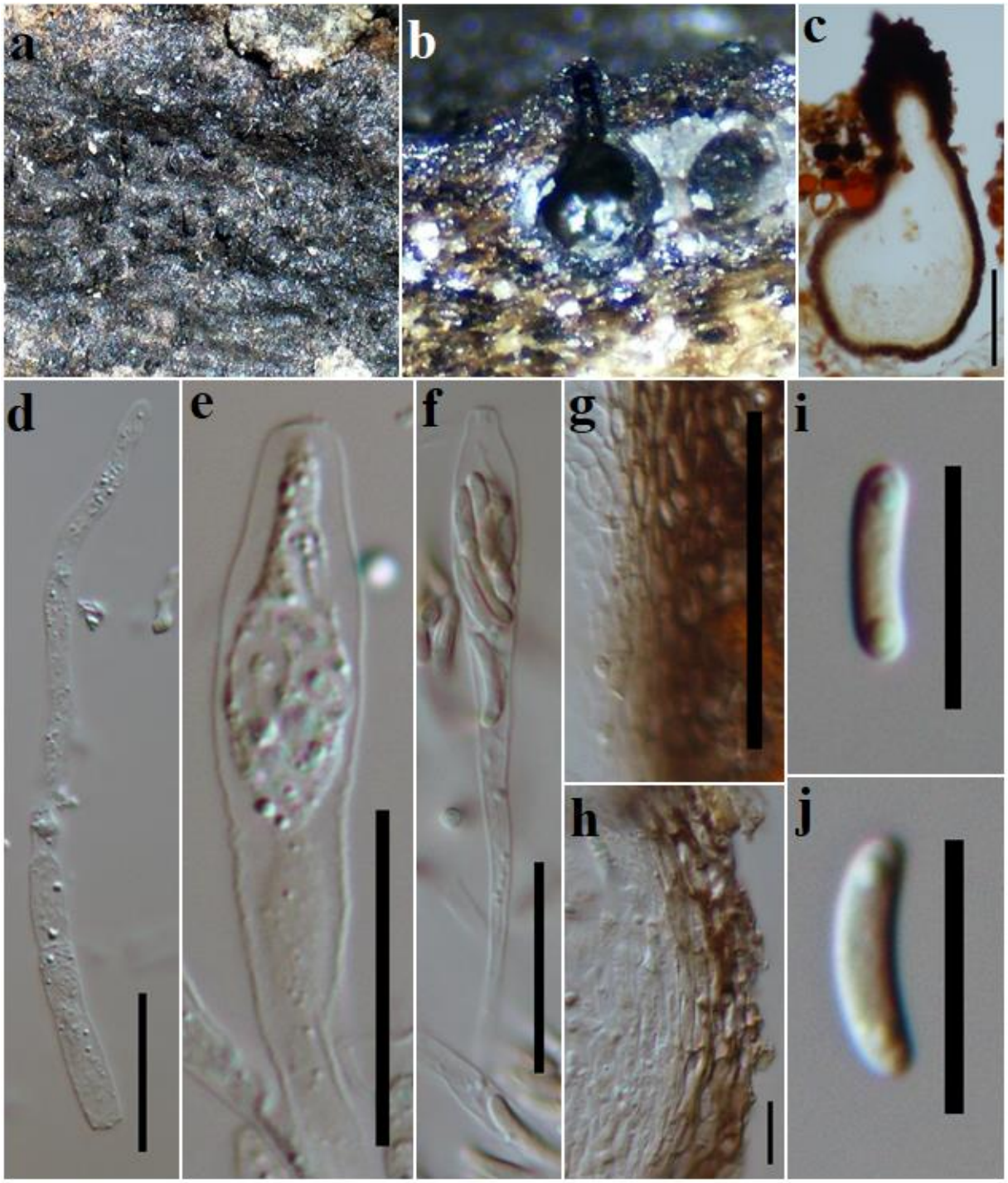

Fig. 1: *Diatrype buteae* (PUFNI 433) **a** Ascomata **b, c** Vertical section of ascoma **d** Paraphyses **e–f** Asci **g**, **h** Textura angularis **i–j** Ascospores. Scale bars: **c** =100 µm **h** =50 µm. **d–g** =20 µm **i–j** =10 µm.

Ascospores 7.5–10 (12.5) × 2–2.5 µm ($\overline{x}$ = 9.94 × 2.34, n=26)**,** hyaline to sub hyaline, overlapping triseriate, one-celled, pale brown, smooth-walled, allantoid, rounded ends, biguttulate. **Asexual morph:** Undetermined.

Materials examined: INDIA, Andaman and Nicobar Islands, North Andaman, Ram Nagar. Isolated from a twig of *Dipterocarpus* sp. 4 February, 2016, M. Niranjan & V.V. Sarma (PUFNI 433); South Andaman, Port Blair, Kalatan (11°47′58″N 92°42′46″E) on *Calamus basui* (T363F1, T365F2) 20 May, 2018; Port Blair, Chidiya Tapu Viewpoint (11°29′2″N

92°42′39″E), on *Bischofia javanica* (T370F1), 20 May, 2018; Port Blair, Chidiya Tapu (11°29′39″N 92°42′21″E) on *Pterocarpus dalbergioides* (T393F1, T395F1), 20 May, 2018; Port Blair, Chidiya Tapu Viewpoint (11°30′48″N 92°42′36″E), on *Diospyros marmarata* (T426F1), 20 May, 2018; Chidiya Tapu Viewpoint (11°29′35″N, 92°42′43″E) on *Lannea coromandelica* (T444F1, T445F1), 20 May, 2018; Middle Andaman, Baratang (12°10′8″N 92°47′5″E), on *Gliricidia sepium* (T208F1, T209F1, T210F3, T217F1, T218F1, T219F1, T220F1, T224F1, T230F1, T321F1), 05 January, 2017.

Notes: White ectostroma can be found in *Diatrypella*, *Diatrype*, *Cryptovalsa*, *Eutypa*, *Eutypella* (Trouillas et al. 2011, Vasilyeva and Stephenson 2004, 2009, Mehrabi et al. 2017, de Almeida et al. 2016). Excepting *Diatrypella* and *Cryptovalsa*, the remaining genera have asci with 8 spores. The present taxon is closely related to *D. buteae* and *D. disciformis* (Pande 2008). The holotype *Diatrype buteae* was described in 1985, on *Butea monosperma* (Lam,) Kuntze and many isotypes are found on many hosts such as *Casuarina equisetifolia* Forst, *Caesalpina sepiaria* Roxb, *Diospyros* sp., *Embelia viridiflora* (A. DC.) Scheff., *Pithecollobium duIce* Benth, *Securigena leucopyrus* Muell-Arg, and *Strychnos* sp. (Patil and Patil 1985). In the present study also, it has been recorded on many hosts and the Andaman Islands form the new site for this fungus, thus extending its geographic range. The epitype of *Diatrype buteae* in present collection has similar ascomatal characters such as globose shape and in length (250–375 vs. 220–367 µm) but less wide than the holotype (172–240 vs. 300–600 µm). Further, the asci are slightly smaller and wider (40–72.5 × 6.2–7.5 vs. 65–85 × 6.5–6.8 µm) than the holotype, whereas the ascospores are smaller in size (10–20 × 3–3.2 vs. 7.5–10 (12.5) × 2–2.5 µm). Present collection has hamathecium with paraphyses and guttules in ascospores, which are not found in the holotype. It forms a new record to the Island region.

2. *Diatrype ilicina* Lar. N. Vassiljeva & S.L. Stephenson (2009). **Fig. 2: a–k**
Saprobic on *Calamus andamanicus*. **Sexual morph:** *Ascomata* perithecial, scattered, immersed, globose to subglobose, coriaceous. *Peridium*: outer brown and inner hyaline layers with *textura angularis* cells. *Hamathecium*: paraphyses septate, unbranched, basally wider, narrowing towards apex, longer than asci. *Asci* 45–62.5 × 4.5–7 µm ($\overline{x}$ = 53.8 × 6.2, n=26), unitunicate, 8-spored, spore bearing part 20–25 µm, flattened apex with a J -ve apical ring in Lugol′s reagent, long pedicellate. *Ascospores* 6.2–7.5 × 2–2.5 µm ($\overline{x}$ = 6.9 × 2.2, n=26), one-celled, hyaline to pale brown, overlapping uniseriate, allantoid, obtuse ends, smooth-walled. **Asexual morph:** Undetermined.

Materials examined: INDIA, Andaman and Nicobar Islands, South Andaman, Port Blair, Chidiya Tapu (11°31′4.3″N 92°42′59.5″E). Recorded on *Calamus andamanicus*, 6 February, 2016, M. Niranjan & V.V. Sarma (PUFNI 378); South Andaman, Port Blair, Shoal Bay-10 (11°52′14″ N 92°44′17″E) (T127F3) on Bamboo culms, 07 February, 2016; South Andaman, Chidiya Tapu (11°29′20″ N 92°42′36″E) on unidentified twig (T169F1, T170F1), 08 January, 2017; Manjery (11°51′85″N 92°65′35″E) on *Tamarindus indica* (T119F3), 11 December, 2017; Middle Andaman, Baratang (12°13′21″ N 92°48′15″E), on unidentified twigs (T2F3, T2F5) 05 January, 2017; Betapur (12°9′57″ N 92°46′38″E), on unidentified twig (T40F1) 05 January, 2017; Baratang (12°13′21″N 92°48′15″E) on *Lagerstroemia hypoleuca* (T134F2, T138F3, T138F9, T154F4), 05 January, 2017; North Andaman, Diglipur, Mohanpur (13°11′25″ N 92°53′23″E), on unidentified (T574F4F1) 06 January, 2017.

Notes: *Diatrype ilicina* is closely related to *D. stigmaoides* and *D. caryae* with respect to their ascospore and ascal measurements (Vasilyeva and Stephenson 2009). A list of *Diatrype* species closely related to *D. lijiangensis* and their morphological differences were provided by

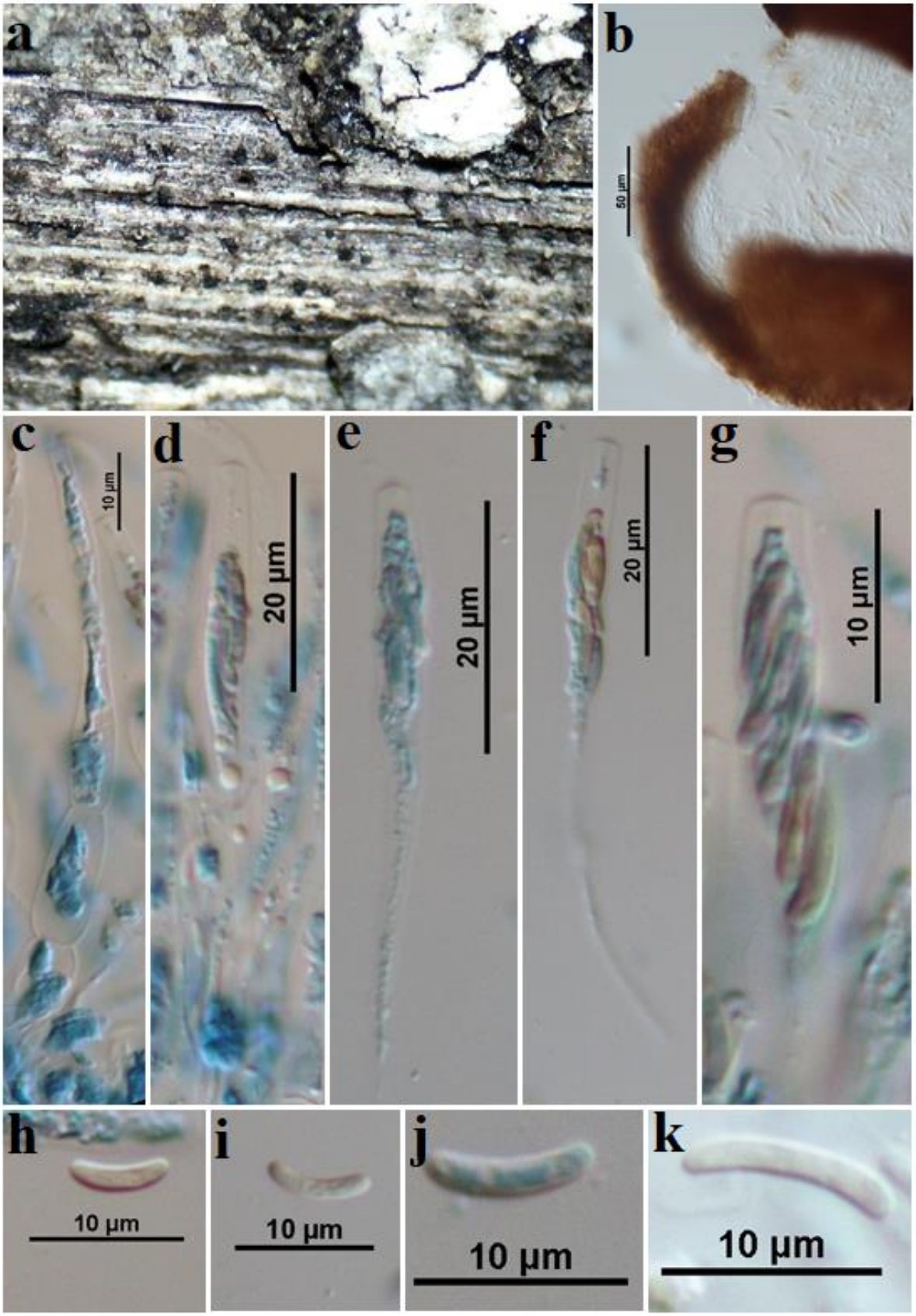

Figure 2: *Diatrype ilicina* (PUFNI 378) **a** Ascomata **b** Vertical section of ascoma **c** Paraphyses **d–g** Asci **h–k** Ascospores.

Thiyagaraja et al. (2019). The morphological characters of *Diatrype* are: perithecia embedded in discoid or widely effuse stromata, individual necks erumpent, with or without periphyses (Thiyagaraja et al. 2019). *D. ilicina* has individual short necks coming out of the cortex, poorly developed stromata, mostly scattered, asci slightly larger (45–62.5 × 4.5–7 vs. 40–55 × 4–6 µm) when compared to the holotype (Vasilyeva and Stephenson 2009). *Diatrype ilicina* is reported first time from India and Andaman and Nicobar Islands.

3. *Diatrype stigma* (Hoffm.) Fr. (1849). **Fig. 3: a–p**
Saprobe on *Bambusa* sp. **Sexual morph:** *Stromata* immersed to erumpent, composed of two layers: thin outer black to dark brown layer and inner hyaline parenchymatous tissue. *Ascomata* 810–920 × 250–360 µm including neck, multi-peritheciate, broadly ovoid to globose, clustered, erumpent, individual necks 490–530 × 100–160 µm, periphyses limited to apical ends. *Peridium* 20 µm wide, consists of two layers, outer thick, brown, and inner hyaline *textura angularis* cells, even throughout. *Hamathecium:* paraphyses 1.7–2.5 µm wide, filamentous, septate, unbranched, with lipid droplets, longer than asci. *Asci* (57-) 86–105 × 5–6.25 µm ($\overline{x}$ = 72.7 × 5.2, n=25), unitunicate, clavate, apically broader with two nodes as apical apertures, J +ve in Lugol′s reagent, pars sporifera (pps.) 27.5–45 µm**,** long-pedicellate. *Ascospores* 7.5–10 × 2.5 µm ($\overline{x}$ = 8.2 × 2.5, n=25), 8-spored, di- to tri-seriate, one-celled, allantoid, hyaline to pale brown, limited to apical region. **Asexual morph:** Undetermined.

Materials examined: INDIA, Andaman and Nicobar Islands, South Andaman, Chidiya Tapu (11°30′36.5″N 92°41′23.4″E). Recorded on Bamboo culm, 8 January, 2017. South Andaman, Shoal Bay-10 (11°52′14″ N 92°44′17″E) (T159F3) on *Gigantochloa albociliata* culms, 07 February, 2016; South Andaman, Shoal Bay-10 (11°52′14″ N 92°44′17″E) (T200F1) on *Atlantia monophylla*, 06 February, 2016; South Andaman, Chidiya Tapu (11°28′56″ N 92°42′35″E) on an unidentified twig (T37F1) 08 January, 2017; Manjery, National Reserve Forest (11°31′15″ N 92°39′15″E) on unidentified twig (T5F1, T13F1) 29 March, 2017; South Andaman, Chidiya Tapu, Viewpoint (11°28′50″ N 92°42′38″E) on unidentified twig (T85F1) 30 March, 2017; North Andaman, Diglipur, Khudirapur (13°13′50″ N 92°57′22″E) (T273F1) on unidentified twig, 04 February, 2016; Diglipur, Durgapur (13°16′0″ N 93°2′25″E) (T347F1) on *Dipterocarpus* sp., 04 February, 2016; Diglipur, Durgapur (13°12′0″ N 93°2′8″E) (T384F1) on unidentified twig, 04 February, 2016; Diglipur, Ram Nagar (13°11′45″ N 93°1′59″E) (T432F1) on *Hibiscus tilliaceus*, 04 February, 2016; Diglipur, Durgapur, Ross Island (13°18′27″N 93°04′08″E), on unidentified twig (T467F1), 17 May, 2018 M. Niranjan & V.V. Sarma.

Notes: *Diatrype stigma* (Hoffm.) Fr. recorded in the present study has similar morphology with the holotype (Pande 2008, Vasilyeva and Ma 2014) but slightly differs in having clustered stromata rather than wide spreading, wider asci 27.5–45 × 5–6.25 vs. 25–30 × 5-7 µm and larger ascospores (7.5–10 × 2.5 vs. 6–8 × 1.5-2 µm) (Vasilyeva and Ma 2014). *D. stigma* is a new record to Andaman and Nicobar Islands. It shares morphological similarities with *D. decorticata, D. lijiangensis* and *D. subundulata* in having the similar ascospore dimensions (Thiyagaraja et al. 2019). While *D. subundulata* produces yellow ascospores, *D. decorticate* hyaline and *D. lijiangensis* hyaline to pale brown ascosproes, whereas *D. stigma* produces distinctly hyaline to pale yellow ascospores. *Diatrype stigma* is already reported from mainland India but it is for the first time reported from Andaman and Nicobar Islands.

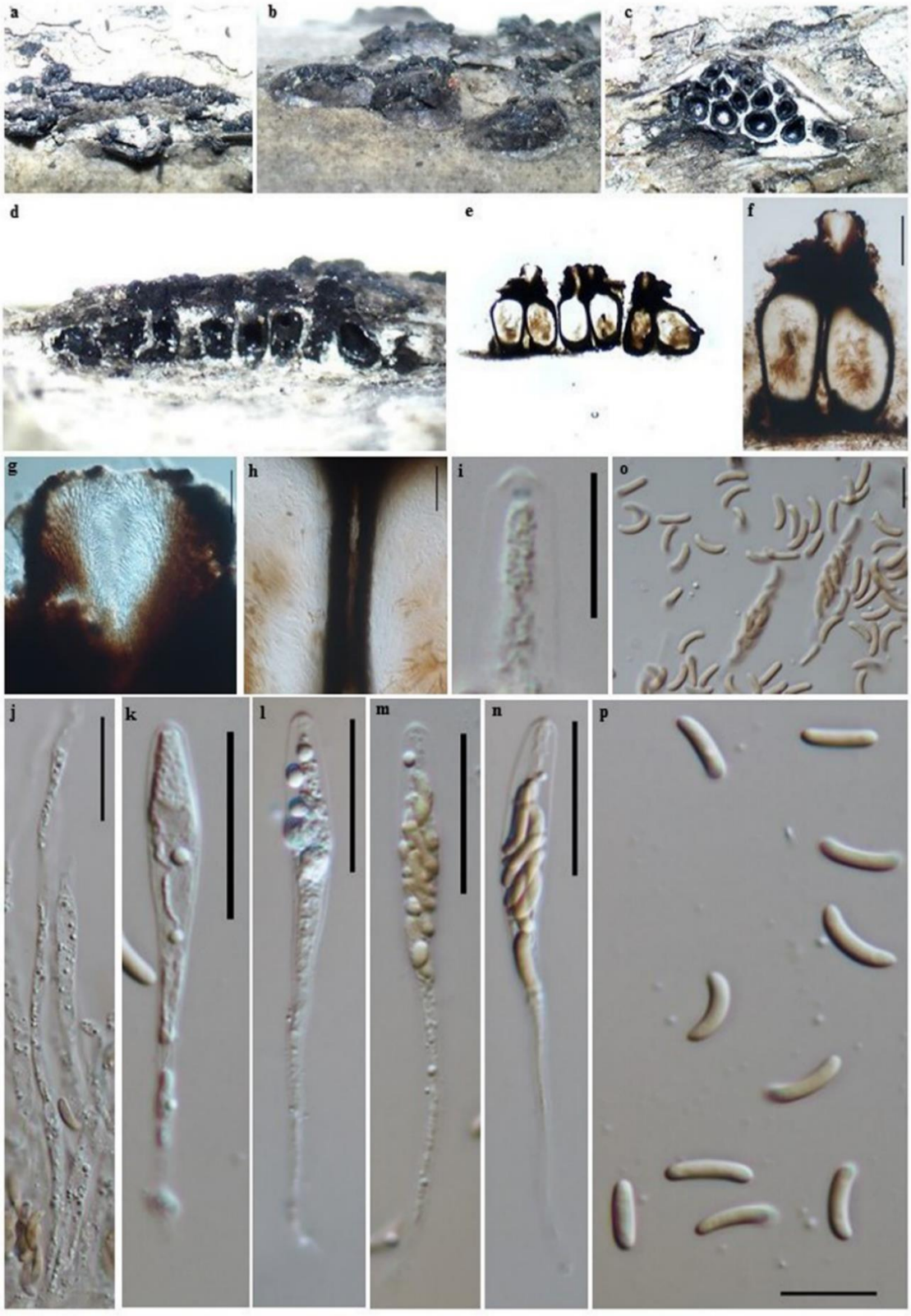

Figure 3: *Diatrype stigma* (PUFNI17433) **a–b** Ascostromata **c** Transverse section ascostroma **d–f** Vertical section ascostroma **g** Ostiolate neck, **h** Peridium **i** Apical ring **j** Paraphyses **k–n** Asci **o, p** Ascospores. Scale bars: **g, h**=50 µm **j–n**= 20 µm **i, o–p** =10 µm.

4. *Diatrype stigmaoides* Kauffman (1930)**. Fig. 4: a–h**
Saprobic on *Pometia pinnata*. **Sexual morph:** *Stromata* immersed, composed of black to brown tissue. *Ascomata* 325–490 × 300–355 µm, perithecial, scattered, immersed in stroma, coriaceous, central medium ostiolate neck. *Hamathecium*: paraphyses simple, sparsely present, septate, with constriction, unbranched. *Asci* 60–100 × 3.7–5 µm, unitunicate 8-spored, clavate, obtuse apex with an indistinguishable amyloid ring, long pedicellate. *Ascospores* 4–5.5 × 1.2–2 µm, hyaline, one-celled, oblong to allantoid, smooth-walled. **Asexual morph:** Undetermined.

Material examined: INDIA, Andaman and Nicobar Islands, South Andaman, Port Blair, Shoal Bay-9 (11°52′12.3″N 92°44′19.8″E). Recorded on *Pometia pinnata* (PUFNI 46) 22 October, 2015. M. Niranjan & V.V. Sarma.

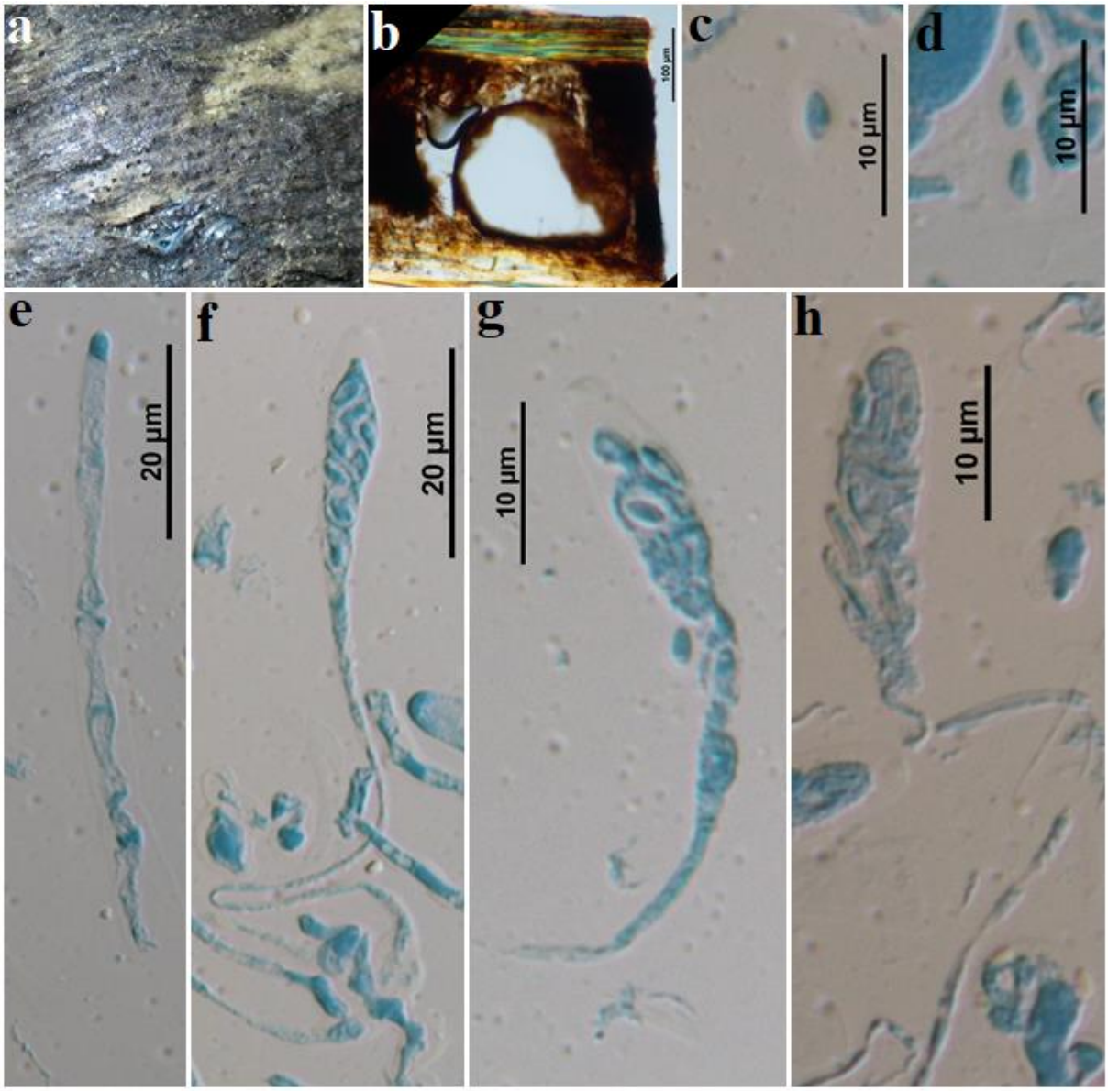

Figure 4: *Diatrype stigmaoides* (PUFNI 46) **a** Ascomata **b** Vertical section of ascoma **c, d** Ascospores **e** Paraphyses **f–h** Asci.

Notes: *Diatrype stigmaoides* is similar to the type in having globose, perithecial ascomata, clavate asci with J +ve rings and hyaline, allantoid ascospores (Vasilyeva and Stephenson 2004,

2009). Slight differences were found in the present taxon vs the type (Thiyagaraja et al. 2019), including smaller ascomata 325–490 × 300–355 vs. 400-500 µm diam; asci 60–100 × 3.7–5 vs. 80-100 × 5–6 µm and ascospores 4–5.5 × 1.2–2 vs. 4–6 µm. Similarly, it has black, regular stromata rather than irregular brown stromata in the type. *D. stigmaoides* is for the first time reported in India and *Pometia pinnata* has been found to be the new host record in addition to *Quercus* spp.

5. *Diatrype subundulata* Lar. N. Vassiljeva & Hai X. Ma (2014) **Fig. 5: a–f**
Saprobic on unidentified twigs. **Sexual morph:** *Stromata* immersed, with brown surface, black internal lining below, white parenchymatous tissue around the ascomata. Ascomata 185–240 × 160–185 µm, perithecial, scattered in stroma, subglobose. *Hamathecium*: paraphyses septate, unbranched, constricted at septa. *Asci* 40–56 × 4.8–6 µm, unitunicate, 8-spored, triseriate, fusoid, apex with rounded ends, with J -ve apical rings in Lugol′s reagent, long-pedicellate. *Ascospores* 7.5–10 × 2–2.5 µm, yellow, one-celled, allantoid, obtuse ends, smooth-walled. **Asexual morph:** Undetermined.

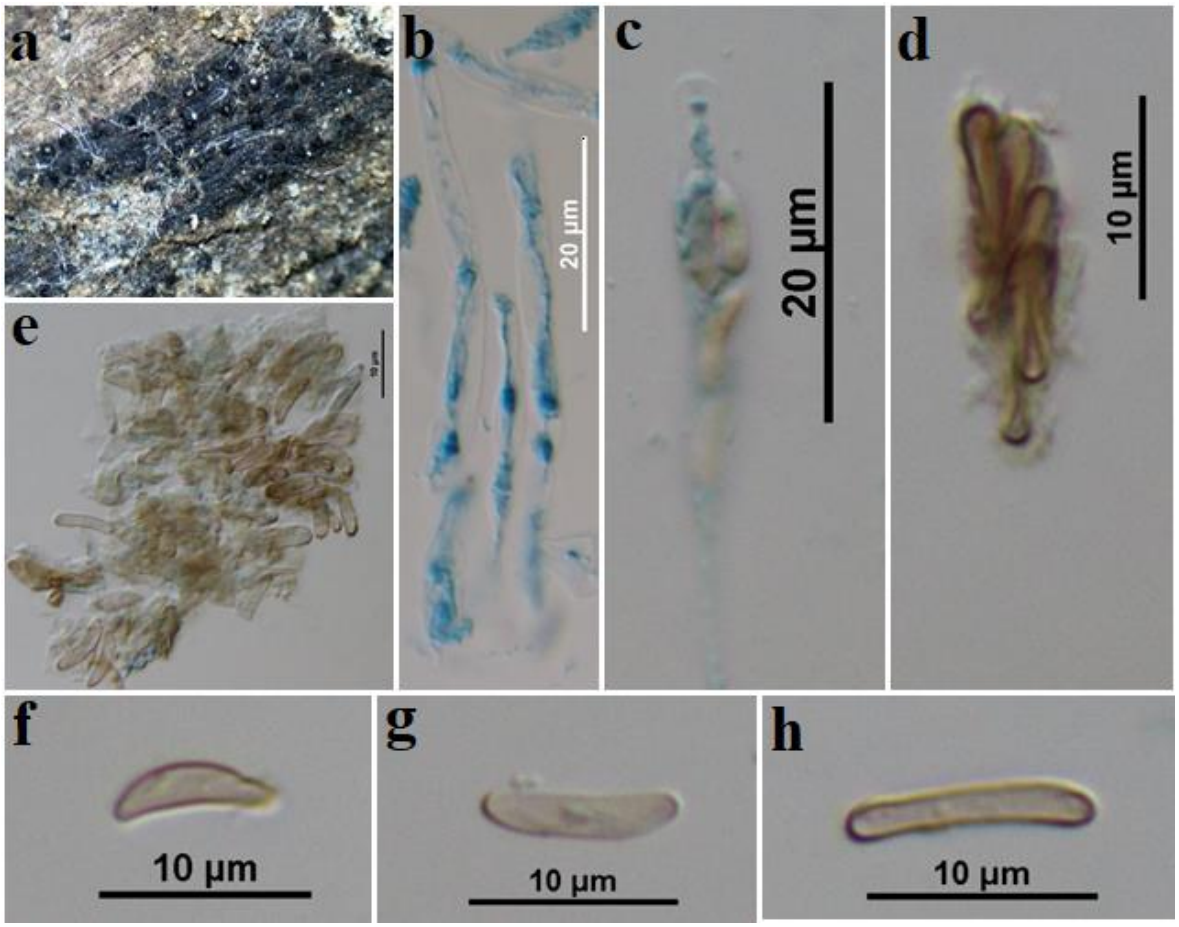

Figure 5: *Diatrype subundulata* **(**PUFNI 207**) a** Ascostromata **b** Paraphyses c, d Asci **e–h** Ascospores.

Materials examined: INDIA, Andaman and Nicobar Islands, South Andaman, Port Blair, Chidiya Tapu (11°30′52.7″N 92°42′43″E), Recorded on unidentified twig 21 October, 2015. M. Niranjan & V.V. Sarma (PUFNI 207); South Andaman, Port Blair, Chidiya Tapu (11°30′52″ N 92°42′43″E) on *Dipterocarpus* sp., twig (T183F1) 21 October, 2015; Port Blair, Chidiya Tapu (11°31′7″N 92°42′52″E) (T94F1) 07 February, 2016 on an unidentified decaying twig.

Notes: A detailed description of *Diatrype subundulata* has been provided by Vasilyeva and Ma (2014). *D. subundulata* has stromata similar to *Diatrype caryae* (Vasilyeva and Stephenson 2009) but differs in having larger and less wide asci (40–56 × 4.8–6 vs. 35–40 5-7 µm), larger ascospores (7.5–10 × 2–2.5 vs. 7–9 × 1.7–1.9 µm) size (Vasilyeva and Ma 2014, Thiyagaraja et al. 2019). The stromata are flattened on host, with black lining, aggregated perithecia in stroma, ascospores are allantoid and yellow similar to holotype. *D. subundulata* has ascospore length (7–9 µm) similar to *D. acericola*, *D. atlantica* and *D. bullata*, but differs in width 1.7–1.9 vs. 0.9–1.1 µm compared to *D. acericola*. Another difference is in color, i.e., yellow rather than hyaline to pale yellow. Occurrence of *D. subundulata* on *Dipterocarpus* sp. forms a new host record in addition to a new geographical record for its occurrence in Andaman and Nicobar Islands and India.

6. *Diatrype syzygii* Narendra & V.G. Rao (1974). **Fig. 6: a–i**
Saprobic on *Areca catechu* twigs. **Sexual morph:** *Stromata* pseudostromatic, superficial, black, spreading, continuous, thin layered on crust of bark. *Ascomata* 200–240 × 190–320 µm, perithecial, immersed in cortex, black, globose, coriaceous, pseudoparenchymatic tissue between the necks, central ostiole, long, erumpent through stroma, apex star-like, sulcate. Peridium: dark brown to hyaline with *textura angularis* cell layers, *Hamathecium*: paraphyses cellular, longer than asci, septate, unbranched. *Asci* 40–87.5 × 3.7–5 µm with pars sporifera (p. sp. 30-40 x 3.5-5 µm), spindle-shaped, unitunicate, apically thickened with J -ve apical rings. *Ascospores* 4.7–7.5 × 1.2–2.5 µm, sub-hyaline, pale brown at maturity, straight to slightly curved, allantoid to sub-allantoid, ends obtuse. **Asexual morph:** Undetermined.

Materials examined: INDIA, Andaman and Nicobar Islands, Middle Andaman, Adazig. Recorded on *Areca catechu* twig, 3 February, 2016, M. Niranjan & V.V. Sarma (PUFNI 245); South Andaman, Shoal Bay-10 (11°52′14″ N 92°44′17″E) (T162F1) on *Gigantochloa albociliata* culms, 07 February, 2016.

Notes: The type specimen of *D. syzygii* Narendra & Rao described in 1974 is poorly known. The holotype has ascomata quite larger than the present collection 493–663 × 323–425 vs. 200–240 × 190–320 µm, asci smaller and wider 30.4–38 × 4–5.7 vs. 30–40 × 3.5–5 µm and similar length of ascospores i.e. 4.7–7.6 × 2–2.8 vs. 4.7–7.5 × 1.2–2.5 µm (Pande 2008, Narendra and Rao 1974). The holotype of *D. syzygii* differs in having multiple ascomata per stroma vs. 3–8 in the present collection and yellow ascosopres rather than hyaline. While the holotype was recorded on *Syzygium cumini* the present taxon was recorded on *Areca catechu* and *Gigantochloa albociliata* thus extending its host range.

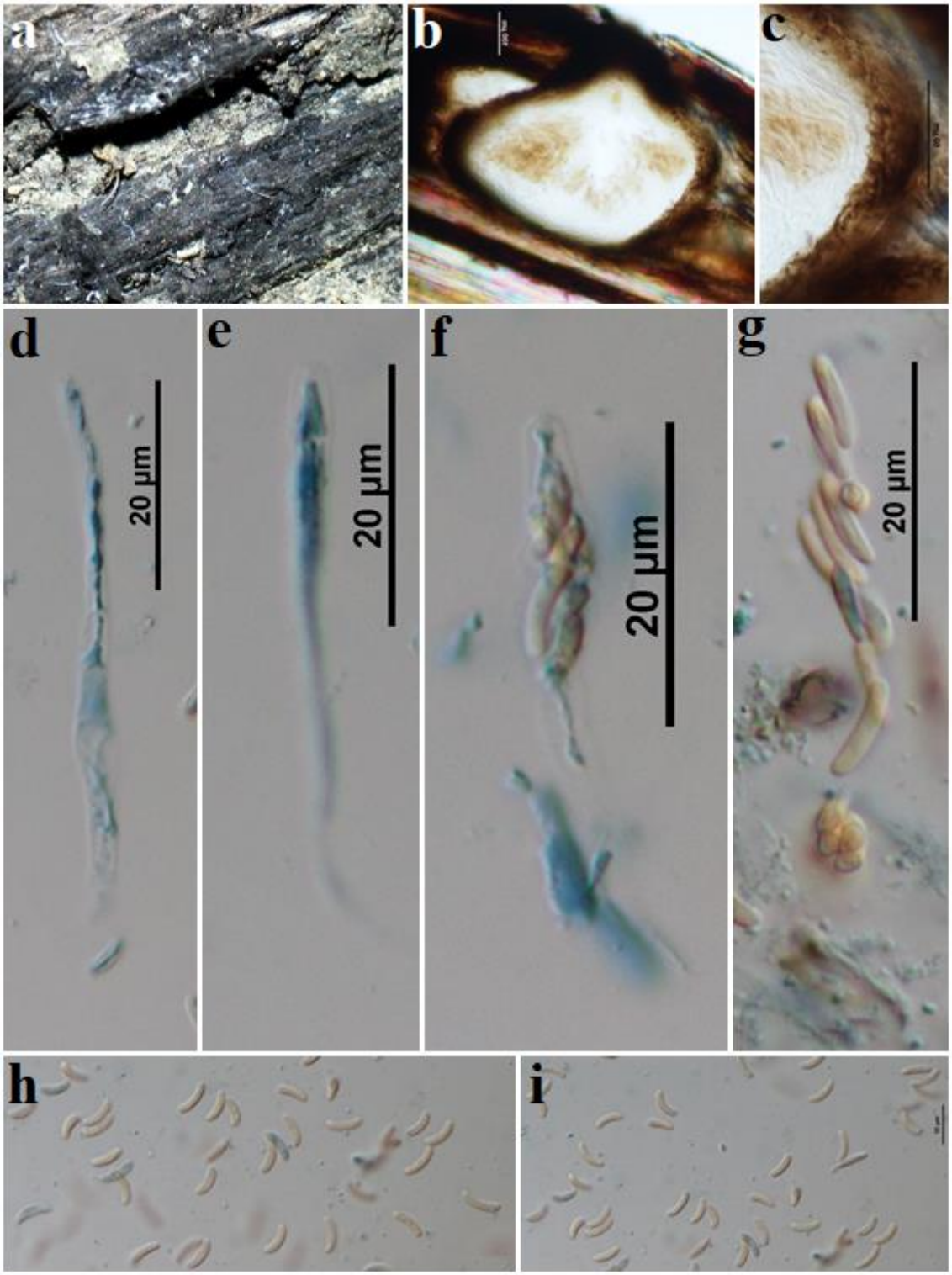

Figure 6. *Diatrype syzygii* (PUFNI 245) **a** Ascomata, **b** Section of ascoma **c** Peridium **d** Paraphyses **e**–**g** Asci **h**, **i** Ascospores.

Table 1: List of Indian *Diatrype* species

Species	Host[a]	State	Reference
Diatrype albopruinosa (Schwein.) Shear.	*Maackia amurensis, Padus avium*		Pande 2008
D. amorphae Săvul. & Sandu.	*Acacia* sp., *Erythrina indica* & *Cassia occidentalis*	KA	Pande 2008
D. artemisiae[*] Tilak.	*Artemisia nilgirica*	TN	Pande 2008
D. azedarachae Cooke.	*Azadirechta indica, Melia azadirech*	MH	Pande 2008
D. buteae[*] M.S. Patil & S.D. Patil.	*Butea monosperma, Casuarina equisetifolia, Caesalpinia sepiaria, Diospyros* sp, *Embelia viridiflora* & *Pithecolobium dulce*	MH	Pande 2008
D. carissae[*] Tend.	*Carrisa congesta*	MH	Tendulkar 1970
D. celastrina Ellis & Everh.	*Celastrus paniculata*	MH	Pande 2008
D. chlorosarca Berk. & Broome.	*Bambusa* sp.	KL, MH	Remadevi 2017
D. clerodendri[*] Rehm.	*Clerodendron inerme*	MH	Pande 2008
D. delacourei Fabre.	*Zizyphus mauritiana*	MH	Pande 2008
D. disciformis (Hoffm.) Fr.	*Eugenia jamolana, Bambusa* sp, *Inga dulcis, Rosa* sp, *Scutia indica* & *Zizyphus jujuba*	MH, UP	Mall 2015
D. enteroxantha (Sacc.) Berl.	*Paraishia insignis*	A & NI	Niranjan et al. 2020
D. fici[*] Tilak & Jadhav.	*Ficus glomerata*	MH	Pande 2008
D. grewiae[*] S.B. Kale & S.V.S. Kale.	*Grewia* sp.	MH	Pande 2008
D. helictericola[*] Tend.	*Helicteris isora*	MH	Tendulkar 1970
D. ilicina Lar.N. Vassiljeva & S.L. Stephenson.	*Bamboo* culms, *Lagesteroemia hypoleuca* & *Tamarindus indica,*	A & NI	Present study
D. japonica Sacc.	*Actinodaphne hookeri*	MH	Pande 2008
D. kamati Tilak	*Celastrus paniculata*	MH	Pande 2008
D. linearis Ellis & Everh.	*Eucalyptus globosus*		Pande 2008
D. loranthi[*] Tend.	*Loranthus cuneatus*	MH	Tendulkar 1970
D. mangiferae[*] R. Rao.	*Mangifera indica, Vinca rosea, Millingtonia hortensis* & *Zizyphus jujuba.*	MH	Pande 2008
D. palmarum Rick.	*Phoenix sylvestris*	MH	Konta et al. 2020
D. panacis[*] M.S. Patil & S.D. Patil.	*Strobilanthus* sp., *Panax fruticosa, Bignonia* sp., *Scutia indica, Justicia gendarussa* & *Jacaranda mimosifolia*	MH	Pande 2008
D. pavettae[*] M.S. Patil & S.D. Patil.	*Pavetta indica* & *Lantana camara*		Pande 2008
D. radiate Ellis.			Pande 2008

D. stigma (Hoffm.) Fr. Sacc.	*Atalantia monophylla*, *Dipterocarpus* sp., *Gigantochloa albociliata*, *Hibiscus tilliaceus* & *Rosa* sp.	MH	Pande 2008
D. stigmaoides stigmaoides.	*Pometia pinnata*	A & NI	Present study
D. subundulata Lar.N. Vassiljeva & Hai X. Ma.	*Dipterocarpus* sp.	A & NI	Present study
D. syzygii Narendra & V.G. Rao.	*Syzygium cumini*	MH	Pande 2008
D. tectonae M.S. Patil & S.D. Patil.	*Tamarindus indicus*, *Bougainvillea spectabilis*, *Allophyllus cobbe*, *Lasiosiphon eriocephalus* & *Tectona grandis*	MH	Pande 2008
D. tumidella Peck.	*Tylophora asthamatica*, *Zizyphus rugosa* & *Smilax macrophylla*	MH	Pande 2008
D. utahensis Rehm.	*Pongamia pinnata*, *Butea monosperma*, *Vitis edgeworthi*, *Holarrhena antidysenterica*, *Calycopteris floribunda* & *Duranta plumeri*	MH	Pande 2008
D. virescens (Schwein.) Cooke.	*Garuga pinnata* & *Glycosmis pentaphylla*	MH	Pande 2008
D. viticis[*] Tend.	*Vitex negundo*	MH	Tendulkar 1970

Notes: A & NI = Andaman & Nicobar Islands; KA= Karnataka; KL= Kerala; MH=Maharashtra; TN=Tamil Nadu; UP=Uttar Pradesh. [*]Holotype form India. [a]In the host listed only form the Indian collection

Table 2: List of Indian *Diatrype* species and their dimensions

Species	Ascostromata	Ascomata (In µm)	Asci (In µm)	Ascospores (In µm)
Diatrype albopruinosa	1.5–2.5 mm	480–640 × 250–320	61–85 × 9–13	9–13 × 2–4
D. amorphae	0.8–1.2 × 0.7–1.0 mm	800–980 × 280–380	90–130 × 8–12	9–11 × 1–2
D. artemisiae	————	160–200 × 60–100	60–90 × 3–4	8–10 × 2.5–3.8
D. azedarachae	500–625 × 1000–5000 µm	400–450 × 315–500	65.8 × 5–6.5	10–16 × 3–3.5
D. buteae	625–750 × 1750–2125 µm	220–367 × 172–240	40–72.5 × 6.2–7.5	7.5–10 (12.5) × 2–2.5
D. carissae	1760–1840 × 560–640 µm	336–448 × 224–352	72–76 × 4–8	12–14 × 2–3.6
D. celastrina	2–3 mm	400–500	50–60 × 6–10	10–15 × 3–6
D. chlorosarca	****	****	****	****
D. clerodendri	1–3 mm	200–400 × 400–450	40–50 × 5–6	10–13
D. delacourei	600–675 × 1300 3750 µm	275–375 × 500–675	60–70 × 6.8–8	12–14 × 3–3.5
D. disciformis	1–1.5 × 0.6–0.8 mm	272–448 × 192–432	48–56 × 12–16	8–12 × 4
D. enteroxantha	————	169–258 × 186–236	(28) 31.6–42 (47) × 4.3–6.4	5.1–7.7 × 1.6–2.6
D. fici	————	400–550 × 225–390	50–95 × 5–8	8–12 × 1.6–2.4
D. grewiae	1.5–2.5 mm	450–480 × 375–400	————	6–8 × 1–2
D. helictericola	1600–800 µm	416–460 × 192–304	38–45.6 × 7.2–7.6	11.4–15.2 × 3.8
D. ilicina	1 mm thick	300–400	45–62.5 × 4.5–7	6.2–7.5 × 2–2.5
D. japonica	750–1250 × 2500–3125 µm	250–375 × 550–800	60–80 × 10	13–16 × 3–4
D. kamati	1–2 mm	90–150 × 160–250	45–60(64) × (4)6–9	10–16 × 3–5
D. linearis	625–750 × 1125–1750 µm	250–375 × 575–700	50–100 × 6–6.2	6.5–8.3 × 3–3.2
D. loranthi	1600 × 960 µm	272–400 × 512–720	60–80 × 6	10–12 × 3.6–4
D. mangiferae	————	540–630 × 255–525	80–96 × 5–8	8–13 × 2.4–3.3
D. palmarum	****	****	****	****
D. panacis	450–1000 × 1125–1500 µm	375–500 × 400–700	45–55 × 6–6.5	6.5–10 × 3–3.2
D. pavettae	625–750 × 1000–1125 µm	150–425 × 525–625	60–85 × 6.5–8	10–16.5 × 3–3.5
D. radiata	1–2.25 mm	480–675 × 275–400	78–100 × 10–13	13–16 × 3–3.5
D. stigma	700–1125 × 500–700 µm	810–920 × 250–360	(57) 86–105 × 5–6.25	7.5–10 × 2.5
D. stigmaoides	0.5–1 mm thick	324–488 × 298–356	60–97.5 × 3.7–5	4–5.5 × 1.2–2
D. subundulata	————	186–239 × 160–186	40–56 × 4.8–6	7.5–10 × 2–2.5
D. syzygii	300–450 × 1000–1500 µm	200–240 × 190–320	37.5–87.5 × 3.7–5	4.7–7.5 × 1.2–2.5
D. tectonae	550–625 × 1500–2000 µm	200–275 × 450–500	100 × 10	10–13 × 3.5–6
D. tumidella	1–2 mm	400–700 × 240–400	50–95 × 8–12	8–14 × 2–4
D. utahensis	————	450–720 × 240–400	40–78 × 6–12	12–14 × 2–4
D. virescens	2.5–4 mm	300–580 × 290–450	70–120 × 7–15	8–12 × 2–4
D. viticis	1040–1221 × 560–640 µm	336–448 × 544–640	44–88 × 4–6	10–12 × 2.8–4

**** Data could not be retrieved

Discussion

Family Diatrypaceae, belonging to the order Xylariales (Sordariomycetes) is a very large family with 20 genera and more than 600 species (Maharachchikumbura et al. 2016, Hyde et al. 2020). This family is characterized by perithecial ascomata, usually embedded in a black stroma, cylindric-clavate to clavate, long pedicellate, unitunicate asci containing J + or J – apical rings and allantoid ascosproes (de Almeida et al. 2016). The placement of taxa in Diatrypaceae is confused due to their polyphyletic nature and this family is in need of a thorough monographic revision based on both morphology and molecular data (Trouillas et al. 2011, Shang et al. 2016, Maharachchkumbura et al. 2016). While Wijayawardene et al. (2017) mentioned 60 species belonging to *Diatrype*, a recent compilation has accepted 170 species as belonging to this genus (Hyde et al. 2020), whereas 330 epithets are found in Index Fungorum (2020).

Indian *Diatrype* spp. are poorly known when compared to rest of the world. Pande (2008) compiled 35 species and one more species was recorded recently (Remadevi et al. 2017). Several species of *Diatrype* have recently been transferred to closely related genera such as *Eutypella* and *Peroneutypa* (Shang et al. 2018). *Diatrype caricae, D. collarata* and *D. gymnosporiae* were transferred to *Eutypella* and *D. corniculata* was transferred to *Peroneutypa*. In the present paper six new records from Andaman and Nicobar Islands, viz., *Diatrype buteae, D. stigma, D. syzygii*. *D. ilicina, D. stigmaoides* and *D. subundulata* are reported of which three are new records to rest of India also. Further studies incorporating molecular data are warranted to improve our understanding of phylogeny and taxonomy of *Diatrype* species from India and their relationships with the global counterparts.

Acknowledgements

V.V. Sarma would like to thank Science and Engineering Board, Department of Science and Technology, Government of India, for funding a project (SERB/SB/SO/PS/18/2014 dt.19.5.2015), the Department of Biotechnology, Pondicherry University for facilities; Forest Department of Andaman and Nicobar Islands, India is thanked for providing permission to collect samples. M. Niranjan thanks SERB, Govt. of India for a fellowship.

Statement on conflict of interest

The authors state that there is no conflict of interest.

Author contribution

The work was designed by the corresponding author and all the experimental work was done by the first author. The manuscript was written by both authors.

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