Abstract

In this study, fungal specimens of the family Diatrypaceae were collected from karst areas in Guizhou, Hainan and Yunnan Provinces, China. Morpho-molecular analyses confirmed that these new collections comprise a new genus *Pseudodiatrype*, three new species (*Diatrype lancangensis*, *Diatrypella pseudoregonensis* and *Eutypa cerasi*), a new combination (*Diatrypella oregonensis*), two new records (*Allodiatrype thailandica* and *Diatrypella vulgaris*) from China and two other known species (*Neoeutypella baoshanensis* and *Paraeutypella citricola*). The new taxa are introduced, based on multi-gene phylogenetic analyses (ITS, β-tubulin), as well as morphological analyses. The new genus *Pseudodiatrype* is characterised by its wart-like stromata with 5–20 ascomata immersed in one stroma and the endostroma composed of thin black
outer and inner layers of large white cells with thin, powdery, yellowish cells. These characteristics separate this genus from two similar genera *Allodiatrype* and *Diatrype*. Based on morphological as well as phylogenetic analyses, *Diatrype lancangensis* is introduced as a new species of *Diatrype*. The stromata of *Diatrype lancangensis* are similar to those of *D. subundulata* and *D. undulate*, but the ascospores are larger. Based on phylogenetic analyses, *Diatrype oregonensis* is transferred to the genus *Diatrypella* as *Diatrypella oregonensis* while *Diatrypella pseudooregonensis* is introduced as a new species of *Diatrypella* with 8 spores in an ascus. In addition, multi-gene phylogenetic analyses show that *Eutypa cerasi* is closely related to *E. lata*, but the ascomata and asci of *Eutypa cerasi* are smaller. The polyphyletic nature of some genera of Diatrypaceae has led to confusion in the classification of the family, thus we discuss whether the number of ascospores per asci can still be used as a basis for classification.

Keywords
Five novel taxa, phylogeny, systematics, taxonomy, Xylariales

Introduction

Diatrypaceae is an important family of higher ascomycetes, belonging to Xylariales (Maharachchikumbura et al. 2016). In the latest compilation, Hyde et al. (2020a) revised the family Diatrypaceae and included several new genera (i.e. *Allodiatrype* Konta & K.D. Hyde, *Halocryptovalsa* Dayar. & K.D. Hyde and *Neoeutypella* M. Raza et al.). This was followed by Wijayawardene et al. (2020) in which 20 genera were accepted into Diatrypaceae. The Diatrypaceae is characterised by perithecial ascomata embedded in a poor or well-developed, brown or black-coloured stroma, long-stalked and 8-spored or numerous-spored asci and allantoid, unicellular ascospores (Glawe and Rogers 1984; Rappaz 1987; Mehrabi et al. 2015; de Almeida et al. 2016). Members of Diatrypaceae occur on a wide range of hosts in terrestrial and marine environments worldwide, some of which are important plant pathogens (Moyo et al. 2018a; Mehrabi et al. 2019; Dayarathne et al. 2020; Konta et al. 2020). For many decades, canker diseases on grapevine have been attributed to the species of Diatrypaceae worldwide, for example in China *Cryptosphaeria* Ces. & De Not., *Cryptosphaeria* Ces. & De Not, *Diatrype* Fr., *Diatrypella* (Ces. & De Not.) De Not., *Eutypa* Tul. & C. Tul. And *Eutypa* (Nitschke) Sacc., are responsible for canker diseases in grapevine (Trouillas et al. 2011; Gao et al. 2013; Moyo et al. 2018b). Besides cankers of grapevine, some species have been reported as the causal pathogenic agents of fruit trees and woody plants in Europe and the USA (Trouillas et al. 2011; Gao et al. 2013).

Thirteen species of *Cryptosphaeria* and *Diatrype* were introduced by Vasiljeva and Ma (2014) from north-eastern China, which includes two new species and four new records. China has the largest range of karst distribution in the world. The landform of karst can be found in almost all Provinces of China, with the most extensive distribution in Guizhou and Yunnan Provinces (Miao et al. 2007). Karst virgin forest is a relatively stable ecosystem with rich biological resources, highly primitive and maintaining stable biological diversity (Dong et al. 2002). The special karst and ecological environment is home to a rich diversity of diatrypaceous fungi.
In this study, we revisit species of Diatrypaceae collected from karst areas in Guizhou, Hainan and Yunnan Provinces of China. Based on morpho-molecular analyses, one new genus and three new species are introduced; in addition, a new combination and two new records from China are reported. Descriptions and illustrations of new taxa and new records are provided.

**Materials and Methods**

**Fungi collection, isolation and identification**

Samples of decaying wood were collected from October 2019 to November 2020 in forests and nature reserves of Guizhou, Hainan and Yunnan Provinces in China. The specimens were observed with a stereomicroscope while microscopic images of the samples were taken using a Nikon ECLIPSE Ni compound microscope, with a Canon EOS 700D digital camera. Measurements were taken with Tarosoft (R) Image Frame Work (v.0.9.7). More than 30 asci and ascospores were measured for each specimen examined. Photoplates were arranged and improved by using Adobe Photoshop CS6 software. Isolations of fungi were made by single spore isolation (Chomnunti et al. 2014) and germinated spores were transferred to potato dextrose agar (PDA) medium for purification. The specimens were deposited at the Herbarium of Cryptogams, Kunming Institute of Botany Academia Sinica (KUN-HKAS) and Herbarium of Guizhou Medical University (GMB). Strains of the new genus and new species are maintained in the Guizhou Medical University Collection Centre (GMBC).

**DNA extraction, Polymerase Chain Reaction (PCR) and phylogenetic analyses**

Genomic DNA was extracted from fungal mycelium following the manufacturer’s protocol of the BIOMIGA Fungal gDNA isolation Kit (BIOMIGA, Hangzhou City, Zhejiang Province, China). Extracts of DNA were stored at –20 °C.

PCR was carried out in a volume of 25 μl containing 9.5 μl of ddH₂O, 12.5 μl of 2× Taq PCR Master Mix (2 × Taq Master Mix with dye, TIANGEN, China), 1 μl of DNA extracts and 1 μl of forward and reverse primers (10 μM each) in each reaction. Primers pairs, ITS4 and ITS5, rRPB2-7CR and rRPB2-5f, LROR and LR5, T1 and Bt2b, as well as Bt2a and Bt2b (Vilgalys and Hester 1990; White et al. 1990; Glass and Donaldson 1995; O’Donnell and Cigelnik 1997), were used to amplify internal transcribed spacer (ITS) sequences, RNA polymerase II second largest subunit (RPB2) sequences, large subunit ribosomal (LSU) sequences and β-tubulin (TUB2) sequences, respectively.

PCR profiles for the ITS and LSU are as follows: initially at 95 °C for 5 minutes, followed by 35 cycles of denaturation at 94 °C for 1 minute, annealing at 52 °C for 1 minute, elongation at 72 °C for 1.5 minutes and a final extension at 72 °C for 10 minutes. PCR profile for the RPB2 is as follows: initially at 95 °C for 5 minutes, followed by 35 cycles of denaturation at 95 °C for 1 minute, annealing at 54 °C for 2 minutes,
Table 1. Taxa used in the phylogenetic analyses and their corresponding GenBank accession numbers.

| Taxa                        | Strain number | GenBank Accession number | Reference                        |
|-----------------------------|---------------|--------------------------|----------------------------------|
| Allocryptovalsa elaeidis    | MFLUCC 15-0707 | MN308410 MN340296        | Konta et al. (2020)              |
| A. polyspora                | MFLUCC 17-0364 | MF959500 MG334556        | Senwanna et al. (2017)           |
| A. rhabenbortii             | WA08CB        | HQ692619 HQ692525        | Trouillas et al. (2011)          |
| Allocryptotyphula averagei | MFLUCC 15-0713 | MN308411 MN340297        | Konta et al. (2020)              |
| A. elaeidica                | MFLUCC 15-0737a | MN308415 MN340299        | Konta et al. (2020)              |
| A. elaeidis                 | MFLUCC 15-0708a | MN308412 MN340298        | Konta et al. (2020)              |
| A. thailandica              | MFLUCC 15-3662 | KU153592 NA              | Li et al. (2016)                 |
| A. thailandica              | MFLUCC 15-0711 | MN308414 NA              | Konta et al. (2020)              |
| A. thailandica              | GMB0050       | MW797108 MW814880        | This study                       |
| Anthostoma decipiens        | IPV-FW349     | AM399021 AM20693         | Unpublished.                     |
| Cryptophora ligniota        | CBS 273.87    | KT425233 KT425168        | Acero et al. (2004)              |
| C. pullmanensis             | ATCC 52655    | KT425235 KT425170        | Trouillas et al. (2015)          |
| C. subcutanea               | DSUB100A      | KT425189 KT425124        | Trouillas et al. (2015)          |
| C. subcutanea               | CBS 240.87    | KT425232 KT425167        | Trouillas et al. (2015)          |
| Cryptovalsa ampelina        | A001          | GQ293901 GQ293972        | Trouillas et al. (2010)          |
| C. ampelina                 | DRO101        | GQ293902 GQ293982        | Trouillas et al. (2010)          |
| Diatrype bullata            | UCDDCCh400    | DQ006946 DQ007002        | Rohlhausen et al. (2006)         |
| D. disciformis              | GNA14         | KR605644.1 KY352434.1    | Senanayake et al. (2015)         |
| D. disciformis              | D21C, CBS 205.87 | AJ302437 NA            | Acero et al. (2004)              |
| D. exertoxantha             | HUEFS155114   | KM396617 KT003700        | de Almeida et al. (2016)         |
| D. exertoxantha             | HUEFS155116   | KM396618 KT022236        | de Almeida et al. (2016)         |
| D. lancangensis             | GMB0045       | MW797113 MW814885        | This study                       |
| D. lancangensis             | GMB0046       | MW797114 MW814886        | This study                       |
| D. lancangensis             | GMB0047       | MW797116 MW814887        | This study                       |
| D. palmicola                | MFLUCC 11-0020 | KP744438 NA              | Liu et al. (2015)                |
| D. palmicola                | MFLUCC 11-0018 | KP744439 NA              | Liu et al. (2015)                |
| D. pilospora                | D17C          | AJ302433 NA              | Acero et al. (2004)              |
| D. stigma                   | DCASH200      | GQ293947 GQ294003        | Trouillas et al. (2010)          |
| D. undulata                 | D20C, CBS 271.87 | AJ302436 NA            | Acero et al. (2004)              |
| Diatrypella atlantica       | HUEFS 136783  | KM396614 KR259647        | de Almeida et al. (2016)         |
| D. banksiae                 | CPC 29118     | KY173402 NA              | Crous et al. (2013)              |
| D. delonicis                | MFLUCC 15-1014 | MH812994 MH847797        | Hyde et al. (2019)               |
| D. delonicis                | MFLU 16-1032  | MH812995 MH847791        | Hyde et al. (2019)               |
| D. elaeidis                 | MFLUCC 15-0279 | MN308417 MN340300        | Konta et al. (2020)              |
| D. favacea                  | Isolate 380   | KU120616 NA              | de Almeida et al. (2016)         |
| D. favacea                  | DL26C         | AJ302440 NA              | Unpublished                      |
| D. frutii                   | UFMGCB 1917   | HQ377280 NA              | Vieira et al. (2011)             |
| D. howae                    | MFLUCC 15-0274 | MN308418 MN340301        | Konta et al. (2020)              |
| D. howae                    | MFLUCC 17-0368 | MF959501 MG334557        | Senwanna et al. (2017)           |
| D. huberiensis              | CFCC 52413    | MW632937 NA              | Zhu et al. (2021)                |
| D. inanensis                | KQD18         | KM245033 KY352429        | Mehrabi et al. (2015)            |
| D. macrospora               | KQD15         | KR605648 KY352430        | Mehrabi et al. (2016)            |
| D. oregonensis (Diatrype oregonensis) | DPL200 | GQ293940 GQ293999        | Trouillas et al. (2010)          |
| D. oregonensis (Diatrype oregonensis) | CA117 | GQ293934 GQ293996        | Trouillas et al. (2010)          |
| D. pseudooregonensis        | GMB0039       | MW797115 MW814888        | This study                       |
| D. pseudooregonensis        | GMB0040       | MW797117 MW814889        | This study                       |
| D. pseudooregonensis        | GMB0041       | MW797118 MW814890        | This study                       |
| D. pseudooregonensis        | GMB0042       | MW797119 MW814891        | This study                       |
| D. pseudooregonensis        | GMB0043       | MW797120 MW814892        | This study                       |
| D. pseudooregonensis        | GMB0044       | MW797110 MW814882        | This study                       |
| D. pulvinata                 | H048          | FR715523 FR715495        | de Almeida et al. (2016)         |
| D. pulvinata                 | DL29C         | AJ302443 NA              | Unpublished                      |
| D. tectonae                 | MFLUCC 12-0172a | KY283084 NA          | Shang et al. (2017)              |
| D. tectonae                 | MFLUCC 12-0172b | KY283085 KY421043       | Shang et al. (2017)              |
| D. verruciformis            | UCROK1467     | JX144793 JX174093        | Lynch et al. (2013)              |
## New contributions to Diatrypaceae

| Taxa                                      | Strain number | GenBank Accession number | Reference                  |
|-------------------------------------------|---------------|--------------------------|----------------------------|
| **D. verruciformis**                       | UCR0K754      | JX144783                  | JX174083                   | Lynch et al. (2013) |
| **D. vulgaris**                            | HVFR02        | HQ692591                  | HQ692505                   | Trouillas et al. (2011) |
| **D. vulgaris**                            | HVGR03        | HQ692590                  | HQ692502                   | Trouillas et al. (2011) |
| **D. vulgaris**                            | GMB0051       | MW797107                  | MW814879                   | This study             |
| **D. yunnanensis**                         | VT01          | MN653008                  | MN887112                   | Zhu et al. (2021)      |
| **Eutrype armeniaca**                      | ATCC 28120    | DQ006948                  | DQ006975                   | Rolshausen et al. (2006) |
| **E. astroidea**                           | E409, CBS 292.87 | AJ302458            | DQ006966                   | Rolshausen et al. (2006) |
| **E. cerasi**                              | GMB0048       | MW797104                  | MW814893                   | This study             |
| **E. cerasi**                              | GMB0049       | MW797105                  | MW814877                   | This study             |
| **E. flavovirens**                         | E48C, CBS 272.87 | AJ302457            | DQ006959                   | Rolshausen et al. (2006) |
| **E. laevis**                              | E409, CBS 291.87 | AJ302449            | NA                        | Acero et al. (2004)    |
| **E. lata**                                | CBS290.87     | HM164736                  | HM164770                   | Trouillas and Gubler (2010) |
| **E. lata**                                | EP18          | HQ692611                  | HQ692501                   | Trouillas et al. (2011) |
| **E. lata**                                | RG03A        | HQ692614                  | HQ692497                   | Trouillas et al. (2011) |
| **E. leptoplaque**                         | CBS 248.87    | DQ006922                  | DQ006974                   | Rolshausen et al. (2006) |
| **E. leptoplaque**                         | CBS 287.87    | DQ006924                  | DQ006961                   | Rolshausen et al. (2006) |
| **E. matura**                              | CBS 219.87    | DQ006926                  | DQ006967                   | Rolshausen et al. (2006) |
| **E. microsasca**                          | BAF 51550     | KP646566                  | KP646572                   | Grassi et al. (2014)   |
| **E. sparsa**                              | 3802 3b       | AY684220                  | AY684201                   | Trouillas and Gubler (2004) |
| **E. teraguma**                            | CBS 284.87    | DQ006923                  | DQ006960                   | Rolshausen et al. (2006) |
| **Eutypella caricae**                       | EL51C         | AJ302460                  | NA                        | Acero (2000)            |
| **E. c. victulata**                        | M68           | JF340269                  | NA                        | Archipova et al. (2012) |
| **E. c. victulata**                        | EL59C         | AJ302468                  | NA                        | Acero et al. (2004)    |
| **E. lepica**                              | EL54C         | AJ302463                  | NA                        | Acero et al. (2004)    |
| **E. lepica**                              | Isolate 60    | KU320622                  | NA                        | de Almeida et al. (2016) |
| **E. microloca**                           | BCMX01        | KC405566                  | KC405560                   | Paolinielli-Alfonso et al. (2015) |
| **E. parasitica**                          | CBS 210.39    | DQ118966                  | NA                        | Jurc et al. (2006)     |
| **E. semicircularis**                      | MP4669        | JQ517314                  | NA                        | Mehrabi et al. (2016)  |
| **Halodiatrype sulciorniae**               | MFLUCC 15-0185 | MHS304410        | MHS30724                   | Dayarathe et al. (2020) |
| **Halodiatrype sulciorniae**               | MFLUCC 15-0953 | KXS57916                  | KXS57931                   | Dayarathe et al. (2016) |
| **H. sulcicola**                           | MFLUCC 15-1277 | KXS57915                  | KXS57932                   | Dayarathe et al. (2016) |
| **Kretzschmaria deusta**                   | CBS 826.72    | KU683767                  | KU684190                   | U’Ren et al. (2016)    |
| **Monosporascus cannonballus**              | CMM3466       | JX971617                  | NA                        | Unpublished             |
| **M. cannonballus**                        | ATCC 26931    | FJ430598                  | NA                        | Unpublished             |
| **Neoentypella baoshanensis**              | GMB0052       | MW797106                  | MW814878                   | This study             |
| **N. baoshanensis**                        | LC 12111      | MH822887                  | MH822888                   | Hyde et al. (2019)     |
| **N. baoshanensis**                        | EL51C, CBS 274.87 | AJ302460            | NA                        | Acero et al. (2004)    |
| **N. baoshanensis**                        | MFLUCC 16-1002 | MT310662                  | NA                        | Phukhamsakda et al. (2020) |
| **N. baoshanensis**                        | GL08362       | JX241652                  | NA                        | Gao et al.(2013)       |
| **Paraeutypella citriola**                 | HVFT07        | HQ692579                  | HQ692512                   | Trouillas et al. (2011) |
| **Pa. citriola**                           | HVGFR01       | HQ692589                  | HQ692521                   | Trouillas et al. (2011) |
| **Pa. citriola**                           | GMB0053       | MW797109                  | MW814881                   | This study             |
| **Pa. guizounensis**                       | KUMCC 20-0016 | MW939349                  | MW239660                   | Dissanayake et al. (2021) |
| **Pa. guizounensis**                       | KUMCC 20-0017 | MW936141                  | MW239661                   | Dissanayake et al. (2021) |
| **Pa. viitis**                             | UCD2291AR     | HQ288224                  | HQ288303                   | Ürbez-Torres et al. (2012) |
| **Pa. viitis**                             | UCD2428TX     | FJ790851                  | GU294276                   | Ürbez-Torres et al. (2009) |
| **Pedaniopsis rhizophorae**                | BCC44877      | KJ488853                  | NA                        | Klasyubov et al. (2014) |
| **Pe. rhizophorae**                        | BCC44878      | KJ488854                  | NA                        | Klasyubov et al. (2014) |
| **Pemmatypa alophila**                     | EL58C, CBS 250.87 | AJ302467            | NA                        | Acero et al. (2004)    |
| **Pe. curvistipula**                       | HUEFS 136877  | KM396641                  | NA                        | de Almeida et al. (2016) |
| **Pe. dominatipora**                       | MFLUCC 17-2144 | MG873479                  | NA                        | Shang et al. (2018)    |
| **Pe. mackenziei**                         | MFLUCC 16-0072 | KY283083                  | KY06363                    | Shang et al. (2017)    |
| **Pe. mangrovei**                          | PUFDS26       | MG844286                  | MH094409                   | Phookamsak et al. (2019) |
| **Pseudodiatrype bainanensis**             | GMB0054       | MW797111                  | MW814883                   | This study             |
| **Ps. bainanensis**                        | GMB0055       | MW797112                  | MW814884                   | This study             |
| **Quaternaria quaternata**                 | EL06C, CBS 278.87 | AJ302469            | NA                        | Acero et al. (2004)    |
| **Q. quaternata**                          | GNF13         | KX605645                  | NA                        | Mehrabi et al. (2016)  |
| **Xylaria hypoxylon**                      | CBS 12620     | AM993141                  | KX271279                   | Persoi et al. (2009)   |

1. Types species of the genus; **NA**: No sequence is available in GenBank; Newly generated sequences are indicated in **bold**.
elongation at 72 °C for 1.5 minutes and a final extension at 72 °C for 10 minutes (Konta et al. 2020). PCR profile for the TUB2 are as follows: initially at 95 °C for 5 minutes, followed by 35 cycles of denaturation at 94 °C for 1 minute, annealing at 52 °C for 1 minute, elongation at 72 °C for 1.5 minutes and a final extension at 72 °C for 10 minutes (de Almeida et al. 2016). PCR products were submitted to Sangon Biotech, Shanghai, China for purification and sequencing.

Phylogenetic analyses

Phylogenetic analyses were performed by searching homologous sequence data of the family Diatrypaceae in the GenBank database, selected from NCBI and recently published papers (Mehrabi et al. 2019; Dayarathne et al. 2020; Konta et al. 2020; Dissanayake et al. 2021; Zhu et al. 2021). After the preliminary identification results of the sequences, multiple sequence alignments (ITS and β-tubulin) were aligned using BioEdit v. 7.0 (Hall 1999). Alignments were converted from FASTA to PHYLIP format by using Alignment Transformation Environment online (https://sing.ei.uvigo.es/ALTER/, Glez-Peña et al. 2010). Maximum Likelihood (ML) analyses and Bayesian posterior probabilities (BYPP) were performed by using RAxML-HPC BlackBox (8.2.12) and MrBayes on XSEDE (3.2.7a) tools in the CIPRES Science Gateway platform, based on a combination of ITS and TUB2 sequence data (Miller et al. 2010). Both of the two methods use the GTR+I+G model of evolution (Nylander 2004). The Bootstrap supports of ML analyses were obtained by running 1,000 pseudo-replicates and BYPP using a simulation technique called Markov chain Monte Carlo (or MCMC) to approximate the posterior probabilities of trees. Six simultaneous Markov Chains were run for 3,000,000 generations and trees were sampled every 1,000th generation. Finally, the tree was visualised in FigTree v.1.4.4 (Rambaut 2012) and edited by using Adobe Photoshop CS6 software. The final alignment and phylogenetic trees were deposited in TreeBASE under the submission ID28176 (http://www.treebase.org/)

Result

Phylogenetic analyses

Based on RAxML and BYPP analyses, phylogenetic analyses were similar in overall tree topologies and did not differ significantly. The dataset consists of 105 taxa for representative strains of species in Diatrypaceae, including outgroup taxa with 1071 characters, including gaps (ITS: 1–486, β-tubulin: 486–1071). The RAxML analyses resulted in a best scoring likelihood tree selected with a final ML optimisation likelihood value of -15731.506304, which is shown in Fig. 1.

The phylogenetic tree, based on combining ITS and β-tubulin sequence data, is also shown in Fig. 1 and contains 17 clades within Diatrypaceae. Below, we list the placements of new taxa:
Figure 1. Phylogram generated from Maximum Likelihood (RAxML) analyses, based on ITS-β-tubulin matrix. ML bootstrap supports (≥ 70%) and Bayesian posterior probability (≥ 0.90) are indicated as ML/BPP. The tree is rooted to *Kretzschmaria deusta* (CBS 826.72) and *Xylaria hypoxylon* (CBS 122620). Ex-type strains are in red. Newly generated strains are in black bold.
Clade 1: *Diatrype pseudooregonensis* and *Diatrype oreonensis* clustered with the species of *Diatrype* in Clade 1 with high bootstrap support. *Diatrype pseudooregonensis* is introduced as an 8-spored new species of *Diatrype* and *Diatrype oreonensis* is renamed as *Diatrype oreonensis*.

Clade 4: *Pseudodiatrype* formed a separate branch in a clade (Clade 4) basal to the genus *Allodiatrype*.

Clade 7: *Diatrype lancangensis* clusters with the species of *Diatrype* and *Diatrype* in an unresolved clade. However, *Diatrype* and *Diatrype* have previously shown confused classification which is difficult to distinguish, based on phylogenetic aspects alone. Therefore, we introduce *Diatrype lancangensis* as a new species of *Diatrype*, based on phylogenetic analyses and morphological differences (Table 2).

Clade 8: *Eutypa cerasi* forms a distinct lineage which is sister to *Eutypa lata* (EP18, RGA01) (Fig. 1).

**Taxonomy**

*Diadrypella* Fr.

**Notes.** The genus *Diadrypella* was introduced by Fries (1849). The genus is characterised by stromata widely effuse or verrucose, flat or slightly convex, with discoid or sulcate ostioles at the surface, 8-spored and long-stalked asci and hyaline or brownish, allantoid ascospores. In this study, we introduce a new species of *Diadrypella* from China.
**Diatrype lancangensis** S.H. Long & Q. R. Li, sp. nov.

Mycobank No: 839655

Fig. 2

**Holotype.** GMB0045.

**Etymology.** Refers to the name of the location, where the type specimen was collected.

**Description.** Saprobic on decaying branches of an unidentified plant. **Sexual morph:** Stromata immersed in bark, aggregated, irregular in shape, widely effused, flat, margin diffuse, surface dark brown to black, with punctiform ostioles scattered at surface, with tissues soft, white between perithecia. Entostroma dark with embedded perithecia in one layer. Perithecium semi-immersed in stroma, globose to subglobose, glabrous, with cylindrical neck, brevicollous or longicollous 283.5–343.5 μm high, 207–290 μm broad (av. = 315.5 × 248.0 μm, n = 10), ovoid, obovoid to oblong, monostichous, aterrimus. Ostiole opening separately, papillate or apapillate, central. Peridium 30–50 μm thick, dark brown to hyaline with textura angularis cell layers. Asci 90.5–160.5 × 7.0–15.0 μm (av. = 129.5 × 10.5 μm n = 30) 8-spored clavate, unitunicate, with rounded apex, apical rings inamyloid. Ascospores 11–18.5 × 2–4 μm (av. = 14.9 × 2.8 μm, n = 30), irregularly arranged, allantoid, slightly curved, brown to dark brown, smooth, aseptate, usually with oil droplets. Asexual morph: undetermined.

**Culture characteristics.** Ascospores germinating on PDA within 24 hours. Colonies on PDA, white when young, became luteous, dense but, thinning towards edge, margin rough, white from above, reverse white at margin, pale yellow to luteous at centre, no pigmentation produced on PDA medium, no conidia observed on PDA or on OA media.

**Specimens examined.** CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°1'17.44"N, 99°35'10.05"E) on branches of an unidentified plant, 4 October 2019. Altitude: 2549 m., Y.H. Pi & Qiong Zhang, LC172 (GMB0045, holotype, KUN-HKAS 112664, isotype, ex-type living culture GMBC0045).

**Additional specimens examined.** CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°1'17.44"N, 99°35'10.05"E) on branches of an unidentified plant, 4 October 2019. Altitude: 2549 m., Y.H. Pi and Qiong Zhang, LC173 (GMB0046, KUN-HKAS 112665, living culture GMBC0046); CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°1'15.48"N, 99°35'24.08"E) on branches of an unidentified plant, 5 October 2019. Altitude: 2623 m., Y.H. Pi and Qiong Zhang, LC262 (GMB0047, KUN-HKAS 112672, living culture GMBC0047).

**Additional sequences.** GMB0045 (LSU: MW797057, RPB2: MW81490); GMB00046 (LSU: MW797058); GMB0047 (LSU: MW797060, RPB2: MW814903)

**Note.** Our new strain, GMBC0045 falls into the unresolved clade (Clade 7) which comprises five Diatrypella and one Diatrype species (Fig. 1), this clade is consistent with the study of Konta et al. (2020). The taxonomic confusion of Diatrypaceae has led to difficulties in separating the genera. We consider that the new species belongs to the genus Diatrype, based on the stromata features mentioned above which closely resemble descriptions of Diatrype subundulata Lar. N. Vassiljeva & Hai X. Ma and Diatrype undu-
Figure 2. *Diatrype lancangensis* (GMB0045, holotype) **A** stromata on host substrate **B, C** stromata on host **D** transverse sections through ascostroma **E** vertical section through ascostroma **F** culture on PDA **G** ostiolar canal **H** peridium **I–K** ascospores **L–N** asci. Scale bars: 10 μm (**G–N**).
New contributions to Diatrypaceae

_Pseudodiatrype_ S.H. Long & Q.R. Li, gen. nov.
MycoBank No: 839658

**Etymology.** Refers to this genus resembling _Diatrype_ in morphology, but it is phylogenetically distinct.

**Type species.** _Pseudodiatrype hainanensis_ S. H. Long & Q.R. Li sp. nov.

**Description.** Saprobic on decaying branches of an unidentified plant. Sexual morph: Stromata scattered or aggregated on host, wart-like, pustulate, visible as black, rounded to irregular in shape on host surface, erumpent through host bark, 5–20 ascomata immersed in one stroma. Endostroma consists of outer layer of black, small, dense, thin parenchymal cells and inner layer of white, large, loose parenchymal cells, thin, pale yellow, powdery near margin of the black cells. Ostiole opening through host bark and appearing as black spots, separately, papillate or apapillate, central. Perithecium immersed in stroma, globose to subglobose, glabrous, with cylindrical neck, brevicolous or longicolous. Peridium is composed of an outer layer of dark brown to black, thin-walled cells, arranged in textura angularis, the inner layer of hyaline thin-walled cells of textura angularis. Asci 8-spored, unitunicate, clavate, long-stalked, apically rounded, apical rings inamyloid. Ascospores irregularly arranged, allantoid, slightly or moderately curved, smooth, subhyaline, aseptate, usually with two oil droplets.

Asexual morph: undetermined.

**Note.** The genus _Pseudodiatrype_ is introduced to accommodate the new collection made from Hainan Province of China and typified by _Pseudodiatrype hainanensis_. _Pseudodiatrype_ is monotypic and, morphologically, resembles _Diatrype_ and _Allodiatrype_ Konta & K.D. Hyde. However, _Pseudodiatrype_ can be distinguished from _Diatrype_ by its 5–20 ascomata immersed in a stroma, while the stroma of species of _Diatrype_ is

_lata_ (Pers.) Fr. (Vasilyeva et al. 2014). However, the ascospores of these species are larger than the ascospores of _D. subundulata_ and _D. undulata_ (Table 2). Phylogenetic analyses also showed that _D. lancangensis_ falls on a separate branch that clustered with species of _Diatrypella_ and _Diatrype_ (Fig. 1). Hence, by combining morphological characteristics and phylogenetic analyses, it seems appropriate to categorise this species as _Diatrype_.

In the phylogenetic analyses, it can be seen that Clade 7 can be defined as a new genus, but it is difficult to find the common morphological similarities among these species. More specimens and sequence or chemical composition analysis are needed in the future to determine whether Clade 7 can be a new genus. The characteristics of the stromata of _Diatrypella_ spp. in clade 7 are solitary and scattered, which is distinctly different from widely effuse, flat and slightly convex stromata of _Diatrype lancangensis_ and _Diatrype palmicola_ (Liu et al. 2015; Hyde et al. 2020b; Zhu et al. 2021). And in the recent study, Zhu et al. (2021) proposed that the species of _Diatrypella_ in Clade 7 were isolated from _Betula_ spp., it may have host specificity. Because of the above two reasons, we think it is better to classify our strains into _Diatrype_.

_Pseudodiatrype_ S.H. Long & Q.R. Li, gen. nov.
distributed over large areas, sometimes covering the surface of the host (Vasilyeva and Ma 2014; Konta et al. 2020). *Pseudodiatrype* differs from *Alloiatrype* by having its 5–20 ascomata immersed in a stroma, whereas the stroma of *Allodiatrype* has only 1–10 ascomata. Moreover, the endostroma of *Allodiatrype* is composed of dark brown outer layer cells and yellow inner layer cells (Konta et al. 2020), which are different from the endostroma of *Pseudodiatrype* having black outer and inner cells surrounded by powdery, pale yellow cells. In addition, the sizes of stroma and ascospores are different from species of *Diatrype* and *Allodiatrype* (Table 2). In the phylogenetic analyses, species of *Pseudodiatrype* appeared in a separate branch which is distinct from other genera within *Diatrypeaceae* (Fig. 1), thus, justifying the erection of the new genus *Pseudodiatrype*.

**Pseudodiatrype hainanensis** S. H. Long & Q.R. Li, sp. nov.
MycoBank No: 839659
Fig. 3

**Holotype.** GMB0054.

**Etymology.** Refers to the location of collections, Hainan Province.

**Description.** Saprobic on decaying branches of an unidentified plant. Sexual morph: Stromata wart-like, pustulate, 2–3.6 mm long and 1.6–3 mm broad (av. = 3.2 × 1.9 mm, n = 30), about 2 mm thick, 5–20 in single stroma, visible as black, rounded to irregular in shape on the host surface, erumpent through host bark, solitary to gregarious. Endostroma composed of an outer layer of dark brown to black, small, tightly packed, thin parenchymatous cells and an inner layer of white, large, loose parenchymal cells with powdery, thin, yellowish tissue. Ostiole opening separately, papillate or apapillate, central. Perithecium immersed in the stroma, globose to subglobose, glabrous, with cylindrical neck, brevicollous or longicollous, 193–347 μm high, 138–206 μm diam. (av. = 278 × 156 μm, n = 10). Peridium 30–50 μm thick, dark brown to hyaline with *textura angularis* cell layers. Asci 110–155.5 × 6–10 μm (av. = 132 × 8 μm, n = 30), 8-spored, unitunicate, clavate, long-stalked, apically rounded with inamylloid rings. Ascospores 8.5–13 × 1.5–2.5 μm (av. = 10.5 × 2 μm, n = 30), irregularly arranged, allantoid, slightly or moderately curved, smooth, subhyaline, aseptate, usually with two oil droplets. Asexual morph: undetermined.

**Culture characteristics.** Ascospores germinating on PDA within 24 hours. Colonies on PDA, white when young, became pale brown, dense, but thinning towards edge, fluffy to slightly fluffy, white from above, pale brown from below, no pigmentation produced on PDA medium, no conidia observed on PDA or OA media.

**Specimens examined.** CHINA, Hainan Province, Wuzhishan City, Wuzhishan Nature Reserve (18°54′21.81″N, 109°40′54.12″E) on branches of unidentified plant, 14 November 2020. Altitude: 775 m. Y.H. Pi & Q.R. Li, WZS59 (GMB0054, holotype, KUN-HKAS 112700, isotype, ex-type living culture GMBC0054).

**Additional specimen examined.** CHINA, Hainan Province, Wuzhishan City, Wuzhishan Nature Reserve (18°54′21.81″N, 109°40′54.12″E) on branches of an uni-
Figure 3. *Pseudodiatrype hainanensis* (GMB0054, holotype) **A** stromata on host substrate **B, C** stromata on host **D** transverse section through ascostroma **E** vertical section through ascostroma **F** culture on PDA **G** section through the ascostroma **H** ostiolar canal **I** peridium **J–M** ascospores **N–P** asci. Scale bars: 40 μm (**G**); 10 μm (**H–P**).
dentified plant, 14 November 2020. Altitude: 775 m, Y.H. Pi & Q.R. Li, WZS66 (GMB0055, living culture GMBC0055)

**Additional sequences.** GMB0054 (LSU: MW797055, RPB2: MW814900); GMB0055 (LSU: MW797056, RPB2 MW814901).

**Note.** A peculiar feature of *Pseudodiatrype hainanensis* is the composition of endostroma. There are black outer layer cells, white inner layer cells and powdery, yellowish cells that are smaller than the white cells at the edge of the endostroma near the black cells in endostroma.

*Diatrype* (Ces. & De Not.) De Not.

**Notes.** The genus *Diatrype* was introduced by Cesati & De Notaris (1863) and was typified with *Diatrype verruciformis* (Ehrh.) Nitschke. This genus was characterized by pustule-like stromata erumpent through the host surface, polysporous asci and allantoid ascospores and libertella-like asexual morphs (Senanayake et al. 2015; Hyde et al. 2017; Shang et al. 2017). In this study, we introduce a new species, a new combination and a new record of *Diatrype vulgaris* from Guizhou Province for China.

*Diatrype* pseudooregonensis S.H. Long & Q.R. Li, sp. nov.
MycoBank No: 839656
Fig. 4

**Holotype.** GMB0041

**Etymology.** Refers to its similar species of *Diatrype oregonensis*.

**Description.** Saprobic on decaying branches of unidentified plant. **Sexual morph:** Stromata pustulate, with groups of 3–16 perithecia, rugose, visible as black, erumpent, scattered, surrounded by a thin, black line in host tissue, solitary to gregarious, 1–3 mm long and 0.5–2 mm broad (av. = 2 × 1.5 mm, n = 30), about 1 mm thick. Endostroma white to light yellow. Ostiole opening separately, papillate or apapillate, central. Perithecium immersed in stroma, globose to subglobose, glabrous, with cylindrical neck, brevicollossus or longicollossus 218.5–465 μm high, 112–257 μm diam. (av. = 306 × 164 μm, n = 10), globose to subglobose, glabrous, ostioles individual. Peridium: 30–50 μm thick, dark brown to hyaline with textura angularis cell layers. Asci 95–149 × 6.5–11.5 μm (av. = 120 × 10.5 μm, n = 30), 8-spored, unitunicate, clavate or cylindrical, long-stalked, apically rounded, apical rings inamyloid. Ascospores 11–16 × 1.5–3.5 μm (av. = 14 × 2.5 μm, n = 30), irregularly arranged, allantoid, slightly or moderately curved, subhyaline to slightly brown, smooth, aseptate, usually with two oil droplets. **Asexual morph:** undetermined.

**Culture characteristics.** Ascospores germinating on PDA within 24 hours. Colonies on PDA, white when young, became pale brown, dense, but thinning towards the edge, margin rough, white from above, white at margin and light brown at centre from
Figure 4. *Diatrypella pseudooregonensis* (GMB0041, holotype) A stromata on host substrate B, C stromata on host substrate D transverse section through ascostroma E vertical section through ascostroma F culture on PDA G section through the ascostroma H ostiolar canal I, J asci K–N ascospores. Scale bars: 20 μm (G); 10 μm (H–N).
below, no pigmentation produced on PDA medium, no conidia observed on PDA or on OA media.

**Specimens examined.** CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°1'19.88"N, 99°35'30.68"E) on branches of an unidentified plant, 5 October 2019. Altitude: 2677 m, Y.H. Pi & Qiong Zhang, LC323 (GMB0041, **holotype**, KUN-HKAS 112646, **isotype**, ex-type living culture GMBC0041)

**Additional specimens examined.** CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°1'13.51"N, 99°35'25.59"E) on branches of an unidentified plant, 6 October 2019. Altitude: 2630 m, Y.H. Pi & Qiong Zhang, LC384 (GMB0043, KUN-HKAS 112681, living culture GMBC0043); CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°1'15.00"N, 99°35'39.73"E) on branches of an unidentified plant, 5 October 2019. Altitude: 2698 m, Y.H. Pi & Qiong Zhang, LC312 (GMB0040, KUN-HKAS 112674, living culture GMBC0040); CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°35'19.09"N, 99°35'19.09"E) on branches of an unidentified plant, 5 October 2019. Altitude: 2569 m, Y.H. Pi & Qiong Zhang, LC193 (GMB0039, KUN-HKAS 112667, living culture GMBC0039); CHINA, Yunnan Province, Baoshan City, Lancang River Nature Reserve (25°1'19.11"N, 99°35'24.80"E) on branches of an unidentified plant, 5 October 2019. Altitude: 2649 m, Y.H. Pi & Qiong Zhang, LC335 (GMB0042, KUN-HKAS 112647, living culture GMBC0042); CHINA, Guizhou Province, Anshun City, Pingba District (26°25'9.65"N, 106°24'24.48"E) on branches of an unidentified plant, 1 August 2020. Altitude: 1250 m, Y.H.Pi, PB51 (GMB0044, KUN-HKAS 112693, living culture GMBC0044).

**Additional sequences.** GMB0041 (LSU: MW797062, RPB2: MW814906); GMB0043 (LSU: MW797064, RPB2: MW814907); GMB0040 (LSU: MW797061, RPB2: MW814905); GMB0039 (LSU: MW797059, RPB2: MW814904); GMB0042 (LSU: MW797063); GMLB0044 (LSU: MW979054, RPB2: MW814899).

**Note.** Morphologically, *Diatrype* has 8 ascospores in a single ascus, while *Diatrypella* has more than eight ascospores in each ascus (Senanayake et al. 2015). However, previous research (e.g. Acero et al. 2004 and Trouillas et al. 2011) suggested that both *Diatrypella* and *Diatrype* are polyphyletic within the family. In the phylogenetic analyses, *Diatrypella pseudooregonensis* grouped closely to the *D. verruciformis* and thus, we consider this new species to belong in the genus *Diatrypella*, because it is doubtful whether the number of ascospores per asci is useful as a basis for generic classification.

*Diatrypella vulgaris* Trouillas, W.M. Pitt & Gubler, Fungal Diversity 49: 212 (2011)
MycoBank No: 519404
Fig. 5

**Description.** *Saprobic* on decaying branches of an unidentified plant. **Sexual morph:** *Stromata* scattered on the host, 0.8–1.5 mm long and 0.8–2 mm broad (av. = 1.2 ×
Figure 5. *Diatrypella vulgaris* (GMB0051, new record for China) A stromata on host substrate; B, C close-up of stroma D transverse sections through ascostroma E vertical section through ascostroma F culture on PDA G section through the ascostroma H, I ostiolar canal J, K asci L–O ascospores. Scale bars: 20 μm (G); 10 μm (H–I).
1.3 mm, n = 30) pustulate, visible as black, rounded to irregular in shape on host surface, semi-immersed, erumpent through host bark, with 2–8 ascomata immersed in one stroma. *Endostroma* consists of outer dark brown, small, dense, thin parenchymal cells and an inner layer of white, large, loose parenchymal cells. *Ostiole* opening separately, papillate or apapillate, central 710.7–787.2 μm high, 270.2–422 μm diam. (av. = 742 × 363 μm, n = 10). *Peritheciun* immersed in stroma, round to oblong, with cylindrical neck, brevicollous or longicollous. *Peridium* composed of outer layer of dark brown to black, thin-walled cells, arranged in *textura angularis*, inner layer of hyaline thin-walled cells of *textura angularis*. *Asci* 111.4–152.9 × 10.6–17.5 μm (av. = 124.5 × 15.5 μm, n = 30), polysporous, clavate, long-stalked, apically rounded. *Asccospores* 8–11 × 1–2 μm (av. = 8.9 × 1.7 μm, n = 30), overlapping, crowded, allantoid, slightly or moderately curved, smooth, subhyaline, yellowish in mass, aseptate, usually with two oil droplets. **Asexual morph**: undetermined.

**Culture characteristics.** Ascospores germinating on PDA within 24 hours. Colonies on PDA, white when young, became pale brown, dense, but thinning towards edge, medium dense, white from above, reverse side white at margin, flesh to pale brown at centre, no pigmentation produced on PDA medium, no conidia observed on PDA or on OA media.

**Specimens examined.** China, Guizhou Province, Guiyang City, Gaopo Township (26°29′72.02″N, 106°29′55.57″E), on branches of unidentified plant, 30 October 2020. Altitude: 1589 m, S.H. Long, GP02 (GMB0051, KUN-HKAS 112697, living culture GMBC0051).

**Additional sequences.** GMB0051 (LSU: MW797051, RPB2: MW814897).

**Note.** The comparison of ITS sequences in NCBI showed that this isolate is 100% similar to the strain of *Diatrypella vulgaris* (HVGRF03), isolated from holotype specimen. Morphologically, GMB0051 shows the same features as *Diatrypella vulgaris*. The stromata of these specimens are similar, but ascospores of GMB0051 are thinner than those of the HVGRF03 (8–10 × 2–2.5 μm) and, when compared with the ascospores of strain MFLUCC 17-0128 (4.5–7.5 × 1–2 μm), they are shorter than GMB0051 (Trouillas et al. 2011; Hyde et al. 2017). Here, we use the ITS sequence similarity between the new collection and the type strain of *Diatrypella vulgaris* as the identification tool. *Diatrypella vulgaris* has been reported in Austria and Thailand (Trouillas et al. 2011, Hyde et al. 2017). This is the first report of *Diatrypella vulgaris* from China.

*Diatrypella oregonensis* (Wehm.) S.H. Long & Q.R. Li, comb. nov.
MycoBank No: 839728

≡ *Eutypella oregonensis* Wehm. Pap. Mich. Acad. Sci. 11: 163 (1930)
≡ *Diatrype oregonensis* (Wehm.) Rappaz, Mycol. helv. 2(3): 420 (1987)

**Description.** See Trouillas et al. (2010).

**Note.** The strains of *Diatrype oregonensis* (DPL200, CA117) generated from Trouillas et al. (2010) grouped in *Diatrype s. str. Diatrype oregonensis* was erected...
in 1930 as *Eutypella oregonensis* (Kauffman 1930). No available sequences from type material were found. After re-examination of holotype specimen of *Diatrype oregonensis*, Trouillas et al. (2010) introduced two strains of *Diatrype oregonensis* (DPL200 and CA117). Although neither of these strains are ex-type, they are, the most authoritative strains. Here, we tentatively transfer *Diatrype oregonensis* to *Diatrypella* as *Diatrypella oregonensis*, based on the phylogenetic analyses (Fig. 1). *Diatrypella oregonensis* is similar to *D. pseudooregonensis* in having 8-spored asci (Rappaz 1987; Trouillas et al. 2011). Nevertheless, we consider that the number of ascospores as a basis for distinguishing *Diatrypella* from *Diatrype* is not useful.

**Allodiatripe** Konta & K.D. Hyde Mycosphere 11(1): 247 (2020)

**Notes.** The genus *Allodiatripe* was introduced by Konta et al. (2020), which was characterised by regular or irregular-shaped stromata, erumpent through host surface, asci with 8 spores and aseptate, allantoid ascospores. In this study, we introduce a new record of *Allodiatripe thailandica* (R.H. Perera et al.) Konta & K.D. Hyde collected from Yunnan Province in China.

**Allodiatripe thailandica** (R.H. Perera et al.) Konta & K.D. Hyde, Mycosphere 11(1): 253 (2020)

Mycobank No: 556932

Fig. 6

≡ *Diatrype thailandica* R.H. Perera et al., Fungal Diversity 78: 1–237, [105] (2016)

**Description.** Saprobic on decaying branches of unidentified plant. **Sexual morph:** Stromata wart-like, pustulate, 0.5–1.8 mm long and 0.8–2.2 mm broad (av. = 1.2 x 1.3 mm, n = 30), about 1 mm thick, 1–18 in a single stroma, visible as black, rounded to irregular in shape on the host surface, erumpent through host bark, solitary to gregarious. **Endostroma** composed of an outer layer of dark brown to black, small, tightly packed, thin parenchymatous cells and an inner layer of white to yellow, large, loose parenchymal cells. **Ostiole** opening separately, papillate or apapillate, central. **Perithecium** immersed in stroma, globose to subglobose, glabrous, with cylindrical short neck, 377–447 μm high, 191–264 μm diam. (av. = 406 x 221 μm, n = 10). **Peridium** hyaline to dark brown with **textura angularis** cell layers. **Asci** 80–113.5 x 6.9–10 μm (av. = 109.3 x 8.5 μm, n = 30), 8-spored, unitunicate, clavate, long-stalked, upper part inflated, apically rounded to truncate, apical rings inamyloid. **Ascospores** 6–11 x 2–2.5 μm (av. = 8.9 x 2.3 μm, n = 30), irregularly arranged, allantoid, slightly curved, smooth, subhyaline, aseptate, usually with two oil droplets. **Asexual morph:** undetermined.

**Culture characteristics.** Ascospores germinating on PDA within 24 hours. Colonies on PDA, white when young, became pale yellow, irregular in shape, medium dense, flat or effuse, slightly raised, with edge fimbriate, fluffy to fairly fluffy, white
Figure 6. *Allodiatripy thailandica* (GMB0050, new record for China) **A** stromata on host substrate **B, C** close-up of stromata **D** transverse section through ascostroma **E** vertical section through ascostroma **F** culture on PDA **G** section through the ascostroma **H** ostiolar canal **I–K** ascospores **L–N** asci. Scale bars: 20 μm (**G**); 10 μm (**H–N**).
from above, reverse side white at margin, pale brown at centre, no pigmentation produced on PDA medium, no conidia observed on PDA or on OA media.

**Specimens examined.** China, Yunnan Province, Baoshan City, Lancang River Nature Reserve (24°57'25.35"N, 99°44'22.82"E), on branches of unidentified plant, 2 October 2019. Altitude: 1317 m, Y.H. Pi & Qiong. Zhang, LC103 (GMB0050, KUN-HKAS 112660, living culture GMBC0050).

**Additional sequences.** GMB0050 (LSU: MW797052).

**Note.** The ITS sequence data were subjected to BLAST in NCBI and the results showed that it is 100% similar to *Allodiatrype thailandica*. Additionally, based on morphological and phylogenetic analyses, this strain was identified as the *A. thailandica*. The stromata are similar, but the ascospores of GMB0050 are longer and wider than the ascospores of strain MFLUCC 15-3662 (3.8–6.9 × 1–1.4 μm) isolated from the holotype specimen, but it is similar to the strain MFLU 17-0735 (6.5–10.7 × 1.6–2.7 μm) (Perera et al. 2020). Here, we use the ITS sequence similarity between the new collection and the type strain of *Allodiatrype thailandica* as basis for identification. *A. thailandica* has been reported in Thailand in 2016 as *Diatrype thailandica* and recognised as *A. thailandica* by Konta et al. (2020). This is the first report of *Allodiatrype thailandica* from China.

*Neoeutypella* M. Raza, Q.J. Shang, Phookamsak & L. Cai, *Fungal Diversity* 95: 167 (2019)

**Note.** The genus *Neoeutypella* was introduced by Phookamsak et al. (2019) and is characterised by carbonaceous stromata immersed or semi-immersed on the host, 8-spored asci and hyaline or pale reddish-brown to brown ascospores. In this study, we introduce a new collection of *N. baoshanensis*, isolated from Guizhou Province in China.

*Neoeutypella baoshanensis* M. Raza, Q.J. Shang, Phookamsak & L. Cai, *Fungal Diversity* 95: 168 (2019)

Mycobank No: 555372

Fig. 7

**Description.** see Phookamsak et al. (2019).

**Specimens examined.** China, Guizhou Province, Guiyang City, Gaopo Township (26°29'72.37"N, 106°29'59.33"E), on branches of unidentified plant, 30 November 2020. Altitude: 1589 m, S.H. Long, GP01 (GMB0052, KUN-HKAS 112696, living culture GMBC0052).

**Additional sequences.** GMB0052 (LSU: MW797050, RPB2: MW814896).

**Note.** The morphological characteristics of this specimen are consistent with those of *N. baoshanensis* a species described by Phookamsak et al. (2019). Based on phylogenetic and morphological analyses, we consider that this specimen is *Neoeutypella baoshanensis*. 
Figure 7. *Neoeutypella baoshanensis* (GMB0052) A stromata on host substrate B close-up of stromata C transverse section through ascostroma D vertical section through ascostroma E pigments in KOH F culture on PDA G section through the ascostroma H ostiolar canal I, J ascospores K–M asci. Scale bars: 20 μm (G); 10 μm (H–M).
Neoeutypella baoshanensis was described as the type species of Neoeutypella on dead wood of Pinus armandii Franch. from Yunnan Province in China (Phookamsak et al. 2019). This is the first record of N. baoshanensis from Guizhou Province, China.

Eutypa Tul. & C. Tul.

Notes. Tulasne & Tulasne (1863) introduced the genus Eutypa with Eutypa lata as the type species. This genus includes several phytopathogens, such as E. lata (Pers.) Tul. & C. Tul. and E. leptoplaca (Durieu & Mont.) Rappaz (Moyo et al. 2017). The morphological characteristics of this genus are black, rounded to irregular-shaped stromata on the host surface, erumpent through host epidermis, solitary to gregarious, entostromatic region, consisting of white pseudoparenchymatous cells and thin black pseudoparenchymatous tissue around the white entostroma, 8-spored, spindle-shaped asci and hyaline, oblong to allantoid ascospores (Rappaz 1987; Moyo et al. 2017). We introduce a new species of Eutypa collected from Guizhou Province in China.

Eutypa cerasi S.H. Long & Q.R. Li, sp. nov.
Mycobank No: 839657
Fig. 8

Holotype. GMB0048.

Etymology. Refers to its host, Prunus cerasus.

Description. Saprobic on decaying branches of Prunus cerasus. Sexual morph: Stromata immersed in bark, covering surface of host, irregular in shape, widely effused, flat, margin diffuse, surface dark brown to black, with punctiform ostioles scattered at surface. Endostroma consists of an outer layer of black, small, dense, thin parenchymal cells and an inner layer of white, large, loose parenchymal cells. Perithecium semi-immersed in stroma, globose to subglobose, glabrous, with cylindrical neck, brevicollous 203–304 μm high, 346–477 μm diam. (av. = 408 × 250 μm, n = 10), ovoid, ovoid to oblong. Ostiole opening separately, papillate or apapillate, central. Peridium 30–50 μm thick, dark brown to hyaline with textura angularis cell layers. Asci 83.2–120 × 5.1–8.2 μm (av. = 104.4 × 6.3 μm n = 30) 8–spored clavate, unitunicate, rounded to truncate apex, apical rings inamyloid. Ascospores 7.3–9.9 × 1.4–2 μm (av. = 8.5 × 1.7 μm, n = 30), overlapping, allantoid, slightly curved, subhyaline, smooth, aseptate, usually with oil droplets. Asexual morph: undetermined.

Culture characteristics. Ascospores germinating on PDA within 24 hours. Colonies on PDA, white when young, became pale yellow, irregular in shape, medium dense, flat or effuse, white from above, reverse white at margin, pale yellow at centre, no pigmentation produced on PDA medium, no conidia observed on PDA or on OA media.
Figure 8. *Eutypa cerasi* (GMB0048, holotype) **A** stromata on host substrate **B, C** close-up of stroma **D** transverse section through ascostroma **E** vertical section through ascostroma **F** culture on PDA **G** section through the ascostroma **H** peridium **I–K** ascospores **L–N** asci. Scale bars: 20 μm (**G**); 10 μm (**H–N**).
Specimens examined. China, Guizhou Province, Guiyang City, Aha Lake National Wetland Park (26°32'50.21"N, 106°40'15.78"E), on branches of *Prunus cerasus*, 12 August 2020. Altitude: 1089 m, S.H. Long, AH4 (GMB0048, holotype, KUNHKAS 112685, isotype, ex-type living culture GMBC0048).

Additional specimens examined. China, Guizhou Province, Guiyang City, Aha Lake National Wetland Park (26°32'47.79"N, 106°40'21.09"E), on branches of *Cerasus* sp., 12 August 2020. Altitude: 1089 m, S.H. Long, AH40 (GMB0049, KUNHKAS 112683, living culture GMBC0049).

Additional sequences. GMB0048 (LSU: MW797048, RPB2: MW814894); GMB0049 (LSU: MW797049, RPB2: MW814895).

Notes. *Eutypa lata* is an important pathogen that has a wide range of hosts. However, the classification of *E. lata* is confusing because there are many variants in previous studies; now all are classified as *E. lata* (Index Fungorum 2020). Morphologically, the new collection GMB0048 has similar stromata with *Eutypa lata*, but the ascomata of the new collection are smaller than the ascomata (400 μm diam.) of the original description of *E. lata* (Tulasne & Tulasne, 1863). The ascomata and asci of the new collection are smaller than the ascomata (400–600 μm diam.) and asci (110–180 × 5–7 μm) of the description of *E. lata* (Rappaz 1987). Additionally, in the phylogenetic analyses, *E. cerasi* is located on a branch that forms a sister clade with EP18 and RGA01 and CBS 290.87 basal to *E. cerasi*. Therefore, combining phylogenetic and morphological analyses, we introduce *Eutypa cerasi* as a new species of *Eutypa*.

**Paraeutypella** L.S. Dissan., J.C. Kang, Wijayaw. & K.D. Hyde.

Notes. *Paraeutypella* was introduced by Dissanayake et al. (2021) to accommodate *Paraeutypella guizhouensis* and the genus currently comprises three species. The genus is characterised by poorly developed stromata erumpent through the bark, grouped and irregularly shaped, sometimes confluent, dark brown to black, spindle-shaped, 8-spored asci and allantoid, overlapping, subhyaline ascospores (Trouillas et al. 2011; de Almeida et al. 2016; Dissanayake et al. 2021). In this study, we illustrate *Paraeutypella citricola* collected from Guizhou Province in China.

*Paraeutypella citricola* (Speg.). L.S. Dissan., Wijayaw., J.C. Kang & K.D. Hyde, in Dissanayake, Wijayawardene, Dayarathne, Samarakoon & Dai, Biodiversity Data Journal 9: e63864, 14 (2021)  
Mycobank No: 228646  
Fig. 9

≡ *Eutypella citricola* Speg., Anal. Mus. nac. Hist. nat. B. Aires 6: 245 (1898)
Figure 9. *Paraeutypella citricola* (GMB0053) A stromata on host substrate B, C stromata on host D transverse section through ascostroma E vertical section through ascostroma F culture on PDA G section through the ascostroma H ostiolar canal I peridium J–K ascospores L–O asci. Scale bars: 40 μm (G); 10 μm (H–O).
Description. For description, see Dissanayake et al. (2021).

Specimens examined. CHINA, Guizhou Province, Guiyang City: Aha Lake National Wetland Park (26°20'37.28"N, 108°21'4.34"E), on branches of unidentified plant, 30 August 2020. Altitude: 802 m, S.H. Long, LGS147 (GMB0053, KUN-HKAS 112704, living culture GMBC0053).

Additional sequences. GMB0053 (LSU: 797053, RPB2: MW814898).

Notes. The ITS sequence data were compared by using NCBI and the result showed that it is 100% similar to the ex-type strain (HVVIT07) of P. citricola. The morphological features of the new collection are consistent with those described by Dissanayake et al. (2021). This collection is identified as a P. citricola, based on morphological and molecular data.

Discussion

In this study, one new genus, three new species, two new records from China, a novel combination and two known species were reported from karst areas of China. We used molecular data to delimit the species of Diatrypaceae. The new genus Pseudodiatrype is morphologically similar to Allodiatripe and Diatrype, but distinct in the size of stromata, number of ascomata and colour of endostroma; it also formed a distinct branch in the phylogenetic analyses (Fig. 1). Diatrype oregonensis was transferred to Diatrypella oregonensis based on the phylogenetic analyses. Based on phylogenetic analyses, Diatrypella pseudooregonensis was introduced as an 8-spored species of Diatrypella.
Our phylogenetic analyses, based on ITS and β-tubulin, agree with the previous studies (Acero et al. 2004; Trouillas et al. 2011; Mehrabi et al. 2015, 2016; de Almeida et al. 2016; Shang et al. 2017; Dissanayake et al. 2021; Zhu et al. 2021). However, several genera are not monophyletic; for example, Cryptosphaeria, Diatrype, Diatrypella, and Eutypa. The identification of species of Diatrypaceae has been a problem due to the polyphyletic generic concepts based on the features of the stromata in early research (Fries 1823). Recently, new approaches have been proposed for classifying Diatrypaceae. Acero et al. (2004) proposed to classify them by ITS sequence-based phylogenetic analyses, while Carmarán et al. (2006) suggested that the identification should be based on the morphology of the asci. However, due to the lack of type specimens, the lack of β-tubulin sequence and polyphyletic origins have resulted in molecular data that correlate poorly with morphological criteria used to delineate genera and species within the Diatrypaceae (Acero et al. 2004). Moreover, Acero et al. (2004) has mentioned that Diatrypella quercina should be placed in the genus Diatrype despite its polysporous asci since the molecular data placed Diatrypella quercina in the branch of the genus Diatrype.

Diatrype and Diatrypella have morphologically similar verruculose stromata and allantoid ascospores and the polysporous or 8-spored ascus serve as a basis for distinguishing the two genera. However, in phylogenetic analyses, species of these two genera overlap. In this study, we used the phylogenetic analyses as the main basis for classification following Vasilyeva and Stephenson (2005) and Liu et al. (2015). Clade 1 contains Diatrypella verruciformis which is the type species of Diatrypella, of which Diatrypella pseudooregonensis, Diatrypella oregonensis have 8-spored, and other species in clade 1 have polysporous ascus. Clade 12 contains the Diatrype type species Diatrype disciformis, of which Diatrype iranensis and Diatrype macrospora have polysporous ascus, and other species in clade 12 have 8-spored ascus. Hence, we concluded that the number of ascospores in each ascus cannot be used as a criterion for distinguishing Diatrypella from Diatrype.

The phylogenetic tree shows that the classification of Diatrypaceae is confusing. Members of Diatrypella (D. favacea, D. hubeiensis, D. pulvinata and D. yunnanensis) cluster with Diatrype palmicola and Diatrype lancangensis. Maybe this clade should be identified as a new genus. We will discuss its classification status after more strains, more gene sequences and new taxonomic features are collected. Some species of Diatrypella (D. iranensis and D. macrospora) which have polysporous ascus are placed between species of Diatrype, and they are transferred to Diatrype iranensis and Diatrype macrospora by Zhu et al. (Zhu et al. 2021). Diatrype enteroxantha is often derived from the sister clade of Allodiatrype rather than the Diatrype clade. Additionally, Eutypa microasca (BAFC51550) clusters with Peroneutypa species (Clade 17). The above-mentioned confusion also showed in the original publication and other recent studies (Grassi et al. 2014; Mehrabi et al. 2016; Shang et al. 2018; Hyde et al. 2019; Phookamsak et al. 2019; Konta et al. 2020). Therefore, addressing the taxonomic confusion of this family requires a re-examination of older taxa, based on morphological studies, epitypification and multi-gene phylogenetic analyses (Ariyawansa et al. 2014).
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Reference

Acero FJ, González V, Ballesteros JS, Rubio V, Checa J, Bills GF, Salazar O, Platas G, Peláez F (2004) Molecular phylogenetic studies on the Diatrypaceae based on rDNA-ITS sequences. Mycologia 96: 249–259. https://doi.org/10.1080/15572536.2005.11832975

Arhipova N, Gaitnieks T, Donis J, Stenlid J, Vasaitis R (2012) Heart-rot and associated fungi in Alnus glutinosa stands in Latvia. Scandinavian Journal of Forest Research 27: 327–336. https://doi.org/10.1080/02827581.2012.670727

Ariyawansa HA, Hawksworth DL, Hyde KD, Jones EGB, Maharachchikumbura SSN, Manamgoda DS, Thambugala KM, Udayang a D, Camporesi E, Daranagama A, Jayawardena R, Liu JK, Mckenzie EHC, Phoookamsak R, Senanayake IC, Shivas RG, Tian Q, Xu JC (2014) Epitypification and neotypification: guidelines with appropriate and inappropriate examples. Fungal Diversity 69: 57–91. https://doi.org/10.1007/s13225-014-0315-4

Carmarán CC, Romero AI, Giussani LM (2006) An approach towards a new phylogenetic classification in Diatrypaceae. Fungal Diversity 23: 67–87.

Chomnunti P, Hongsanan S, Hudson BA, Tian Q, Peršoh D, Dhami MK, Alias AS, Xu JC, Liu XZ, Stadler M, Hyde KD (2014) The sooty moulds. Fungal Divers 66: 1–36. https://doi.org/10.1007/s13225-014-0278-5

Crous PW, Wingfield MJ, Guarro J, Cheewangkoon R, van der Bank M, Swart WJ, Stchigel AM, Cano-Lira JF, Roux J, Madrid H, Damm U, Wood AR, Shuttleworth LA, Hodges CS, Munster M, de Jesús Yáñez-Morales M, Zúñiga-Estrada L, Cruywagen EM, De Hoog GS, Silvera C, Najafzadeh J, Davison EM, Davison PJN, Barrett MD, Barrett RL, Manamgoda DS, Minnis AM, Kleczewski NM, Flory SL, Castlebury LA, Clay K, Hyde KD, Matusse-Sitoe SND, Chen S, Lechat C, Hairaud M, Lesage-Messens L, Pawłowska J, Wilk M, Śliwińska-Wyrzychowska A, Meituk M, Wrzosek M, Pavinic-Zupanc D, Maleme HM, Slippers B, Mac Cormack WP, Archuby DI, Grünwald NJ, Tellería MT, Dueñas M, Martín MP, Marincowitz S, de Beer ZW, Perez CA, Gené J, Marin-Felix Y, Groenewald JZ
(2013) Fungal Planet description sheets: 154–213. Persoonia: Molecular Phylogeny and Evolution of Fungi 31: 1–188. https://doi.org/10.3767/003158513X675925
Dayarathne MC, Phookamsak R, Hyde KD, Manawasinghe IS, Toanun C, Jones EBG (2016) Halodiatrype, a novel diatrypaceous genus from mangroves with H. salinicola and H. avicenniae spp. nov. Mycosphere 7: 612–627. https://doi.org/10.5943/mycosphere/7/5/7
Dayarathne MC, Wanasinghe DN, Devadatha B, Abeywickrama P, Jones EBG, Chomnunit P, Sarma VV, Hyde KD, Lumyong S, McKenzie EHC (2020) Modern taxonomic approaches to identifying diatrypaceous fungi from marine habitats, with a Novel Genus Halocryptovalsa Dayarathne & K.D.Hyde, Gen. Nov. Cryptogamie Mycologie, 41: 21–67. https://doi.org/10.5252/cryptogamie-mycologie2020v41a3
de Almeida DAC, Gusmão LFP, Miller AN (2016) Taxonomy and molecular phylogeny of Diatrypaceae (Ascomycota, Xylariales) species from the Brazilian semi-arid region, including four new species. Mycological Progress 15: 1–27.
Dissanayake LS, Wijayawardene NN, Dayarathne MC, Samarakoon MC, Dai DQ, Hyde KD, Kang JC (2021) Paraeutypella guizhouensis gen. et sp. nov. and Diatrypella longiasca sp. nov. (Diatrypaceae) from China. Biodiversity Data Journal 9: e63864. https://doi.org/10.3897/BDJ.e63864
Dong D, Fang C, Zhao W, Xie Z (2002) Evaluation of geochemical quality control in determination of Mn in soils using a sequential chemical extraction. Chinese Geographical Science 12: 166–170. https://doi.org/10.1007/s11769-002-0026-8
Fries EM (1823) Systema Mycologicum 3: 1–202.
Gao LL, Zhang Q, Sun XY, Jiang L, Zhang R, Sun GY, Zha YL, Biggs AR (2013) Etiology of moldy core, core browning, and core rot of fuji apple in China. Plant Disease 97: 510–516. https://doi.org/10.1094/PDIS-01-12-0024-RE
Glass NL, Donaldson GC (1995) Development of primer sets designed for use with the PCR to amplify conserved genes from filamentous ascomycetes. Applied & Environmental Microbiology 61: 1323–1330. https://doi.org/10.1128/aem.61.4.1323-1330.1995
Glawe DA, Rogers JD (1984) Diatrypaceae in the Pacific Northwest. Mycotaxon 20: 401–460.
Glez-Peña D, Gómez-Blanco D, Reboiro-Jato M, Fdez-Riverola F, David P (2010) ALTER: program-oriented conversion of DNA and protein alignments. Nucleic Acids Research 38: 14–18. https://doi.org/10.1093/nar/gkq321
Grassi E, Belen Pildain M, Levin L, Carmaran C (2014) Studies in Diatrypaceae: the new species Eutypa microasca and investigation of ligninolytic enzyme production. Sydowia 66: 99–114.
Hall TA (1999) BioEdit: a user-friendly biological sequence alignment editor and analysis program for windows 95/98/NT. Nucleic Acids Symposium Series 41: 95–98.
Hyde KD, Norphanphoun C, Maharachchikumbura SSN, Bhat DJ, Jones EBG, Bundhun D, Chen YJ, Bao DF, Boonmee S, Calabon MS, Chaiwan N, Chethana KWT, Dai DQ, Dayarathne MC, Devadatha B, Dissanayake AJ, Dissanayake LS, Doilom M, Dong W, Fan XL, Goonasekara ID, Hongsanan S, Huang SK, Jayawardena RS, Jeewon R, Karunarathna A, Konta S, Kumar V, Lin CG, Liu JK, Liu NG, Luangs-aard J, Lumyong S, Luo ZL, Marasinghe DS, McKenzie EHC, Niego AGT, Niranjan M, Perera RH, Phukhamsakda C, Rathnayaka AR, Samarakoon MC, Samarakoon SMBC, Sarma VV, Senanayake IC,
New contributions to Diatrypaceae

Shang QJ, Stadler M, Tibpromma S, Wanasinghe DN, Wei DP, Wijayawardene NN, Xiao YP, Yang J, Zeng XY, Zhang SN, Xiang MM (2020a) Refined families of Sordariomycetes. Mycosphere 11: 305–1059. https://doi.org/10.5943/mycosphere/11/1/7

Hyde KD, Dong Y, Phookamsak R, Jeewon R, Bhat DJ, Jones EBG, Liu NG, Abeywickrama PD, Mapook A, Wei D, Perera RH, Manawasinghe IS, Pem D, Bundhun D, Karunarathna A, Ekanayaka AH, Bao DF, Li JF, Samarakoone MC, Chaiwan N, Lin CG, Phuthacharoen K, Zhang SN, Senanayake IC, Goonasekara ID, Thambugula KM, Phukhamsakda C, Tennakoon DS, Jiäng HB, Yang J, Zeng M, Huanraluek N, Liu JK, Wijesinghe SN, Tian Q, Tibpromma S, Brahmanage RS, Boonmee S, Huang SK, Thiyagaraja V, Lu YZ, Jayawardenas RS, Dong W, Yang EF, Singh SK, Singh SM, Rana S, Lad SS, Anand G, Devadatha B, Niranjan M, Sarma VV, Liimatainen K, Hudson BA, Niskanen T, Overall A, Alvarenga RLM, Gibertoni TB, Pfliegler WP, Horváth E, Imre A, Alves AL, da Silva Santos AC, Tiago PV, Bulgakov TS, Wanasinghe DN, Bahkali AH, Doilom M, Elgorban AM, Maharachchikumbura SSN, Rajeshkumar KC, Haelewaters D, Mortimer PE, Zhao Q, Lumyong S, Xu JC, Sheng J (2020b) Fungal diversity notes 1151–1276: taxonomic and phylogenetic contributions on genera and species of fungal taxa. Fungal Diversity 100: 5–277. https://doi.org/10.1007/s13225-020-00439-5

Hyde KD, Norphanphoun C, Abreu VP, Bazzicalupo A, Thilini Chethana KW, Clericiuzio M, Dayaratnhe MC, Dissanayake AJ, Ekanayaka AH, He MQ, Hongsanan S, Huang SK, Jayasiri SC, Jayawardena RS, Karunarathna A, Konta S, Kušan I, Lee H, Li JF, Lin CG, Liu NG, Lu YZ, Luo ZL, Manawasinghe IS, Mapook A, Perera RH, Phookamsak R, Phukhamsakda C, Siedlecki I, Soares AM, Tennakoon DS, Tian Q, Tibpromma S, Wanasinghe DN, Xiao YP, Yang J, Zeng XY, Abdel-Aziz FA, Li WJ, Senanayake IC, Shang QJ, Daranagama DA, de Silva NI, Thambugula KM, Abdel-Wahab MA, Bahkali AH, Berbee ML, Boonmee S, Bhat DJ, Bulgakov TS, Buyck B, Camporesi E, Castañeda-Ruíz RF, Chomnunti P, Doilom M, Dovana F, Gibertoni TB, Jadan M, Jeewon R, Jones EBG, Kang JC, Karunarathna SC, Lim YW, Liu JK, Liu YZ, Plautz Jr HL, Lumyong S, Maharachchikumbura SSN, Maťočec N, McKenzie EHC, Mešić A, Miller D, Pawłowska J, Pereira OL, Promputtha I, Romero AL, Ryvarden L, Su HY, Suetrong S, Tkáčec Z, Vizzini A, Wen TC, Wistrassameewong K, Wrzosek M, Xu JC, Zhao Q, Zhao RL, Mortimer PE (2017) Fungal diversity notes 603–708: taxonomic and phylogenetic notes on genera and species. Fungal Diversity 87: 1–235. https://doi.org/10.1007/s13225-017-0391-3

Hyde KD, Tennakoon DS, Jeewon R, Bhat DJ, Maharachchikumbura SSN, Rossi W, Leonardi M, Lee HB, Mun HY, Houbraken J, Nguyen TTT, Jeon SJ, Frisvad JC, Dhanushka N, Wanasinghe DN, Luücking R, Aptom A, Cáceres MES, Karunarathna SC, Hongsanan S, Phookamsak R, de Silva NI, Thambugula KM, Jayawardena RS, Senanayake IC, Boonmee S, Chen J, Luo ZL, Phukhamsakda C, Pereira OL, Abreu VP, Rosado AWC, Bart B, Randrianjohany E, Hofstetter V, Gibertoni TB, de Silva Soares AM, Plautz Jr HL, Sotáio HMP, Xavier WKS, Bezerra JDP, de Oliveira TGL, de Souza-Motra CM, Magalhães OM, Bundhun D, Harishchandra D, Manawasinghe IS, Dong W, Zhang SN, Bao DF, Samarakoone MC, Pem D, Karunarathna A, Lin CG, Yang J, Perera RH, Kumar V, Huang SK, Dayaratnhe MC, Ekanayaka AH, Jayasiri SC, Xiao YP, Konta S, Niskanen T, Liimatainen K, Dai YC, Ji XH, Tian XM, Mešić A, Singh SK, Phutthacharoen K, Cai L, Sorvongxay T,
Thiyagaraja V, Norphanphoun C, Chaewan N, Lu YZ, Jiang HB, Zhang JF, Abeywickrama PD, Aluthmuhandiram JVS, Brahanmanage RS, Zeng M, Chethana T, Wei DP, Rébllová M, Fournier J, Nekvindová J, do Nascimento Barbosa R, dos Santos JEF, de Oliveira NT, Li GJ, Ertz D, Shang QJ, Phillips AJL, Kuo CH, Camporesi E, Bulgakov TS, Lumyong S, Jones EBG, Chomnunti P, Gentekaki E, Bungartz F, Zeng XY, Fryar S, Tkalčec Z, Liang J, Li GS, Wen TC, Singh PN, Gafforov Y, Promputtha I, Yasanthika E, Goonasekara ID, Zhao RL, Zhao Q, Kirk PM, Liu JK, Yan JY, Mortimer PE, Xu JC (2019) Fungal diversity notes 1036–1150: taxonomic and phylogenetic contributions on genera and species of fungal taxa. Fungal Diversity 96: 1–242. https://doi.org/10.1007/s13225-019-00429-2

Index Fungorum (2020) Index Fungorum http://www.indexfungorum.org/Names/Names.asp

Jurc D, Ogris N, Slippers B, Stenlid J (2006) First report of *Eutypella* canker of Acer pseudoplatanus in Europe. Plant Pathology 55: 577–577. https://doi.org/10.1111/j.1365-3059.2006.01426.x

Kauffman CH (1930) The fungous flora of Siskiyou Mountains in southern Oregon. Papers of the Michigan Academy of Science, Arts, and Letters 11: 151–210.

Klaysuban A, Sakayaroj J, Jones EG (2014) An additional marine fungal lineage in the Diatrypaceae, Xylariales: *Pedumispora rhizophorae*. Botanica marina 57: 413–420. https://doi.org/10.1515/bot-2014-0017

Konta S, Maharachchikumbura SSN, Senanayake IC, McKenzie EHC, Stadler M, Boonmee S, Phookamsak R, Jayawardena RS, Senwanna C, Hyde KD, Elgorban AM, Eungwanichayapant PD (2020) A new genus *Allodiatrype*, five new species and a new host record of diatrypaceous fungi from palms (Arecaceae). Mycosphere 11: 239–268. https://doi.org/10.5943/mycosphere/11/1/7

Li GJ, Hyde KD, Zhao RN, Hongsanan S, Abdel-Aziz FA, Abdel-Wahab MA, Alvarado P, Alves-Silva G, Ammirati JF, Ariyawansa HA, Baghela A, Bahkali AH, Beug M, Bhat DJ, Bojantchev D, Boonpratuang T, Bulgakov TS, Camporesi E, Boro MC, Ceska O, Chakraborty D, Chen JJ, Chethana KWT, Chomnunti P, Consiglio G, Cui BK, Dai DQ, Dai YC, Daranagama DA, Das K, Dayarathne MC, Crop ED, De Oliveira RJV, De Souza CAF, De Souza JL, Dentinger BTM, Dissanayake AJ, Doilom M, Drechslersantos ER, Ghobad-Nejhad M, Gilmore SP, Góes-Neto A, Gorczak M, Haimstma GH, Hapuarachchi KK, Hashimoto A, He MQ, Henske JK, Hirayama K, Iribarren MJ, Jayasiri SC, Jayawardena RS, Jeon SJ, Jerónimo GH, Jesus AL, Jones EBG, Kang JC, Karunarathna SC, Kirk PM, Konta S, Kuhnert E, Langer E, Lee HS, Lee HB, Li WJ, Li XH, Liimatainen K, Lima DX, Lin CG, Liu JK, Liu XZ, Liu ZY, Luangs-Ard JJ, Lücking R, Lumbsch HT, Lumyong S, Leaño EM, Marano AV, Matsumura M, Mckenzie EHC, Mongkolsamrit S, Mortimer PE, Nguyen TTT, Niskanen T, Norphanphoun C, Omalley MA, Parmen S, Pawlowska J, Perera RH, Phookamsak R, Phukhamsakda C, PiresZottarelli CLA, Raspé O, Reck MA, Rocha SCO, De Santiago ALCMA, Senanayake IC, Setti L, Shang QJ, Singh SK, Sir EB, Solomon KV, Song J, Srikitikulchai P, Stadler M, Suetrong S, Takahashi H, Takahashi T, Tanaka K, Tang LP, Thambugala KM, Thanakitipattana D, Theodorou MK, Thongbai B, Thummarukcharoen T, Tian Q, Tibpromma S, Verbeaken A, Vizini A, Vlasak J, Voigt K, Wanasinghe DN, Wang Y, Weerakoon G, Wen HA, Wen TC, Wijayawardene NN, Wongkanoun S, Wrzosek M, Xiao YP, Xu JC, Yan JY, Yang J, Yang SD, Hu Y, Zhang
New contributions to Diatrypaceae

JF, Zhao J, Zhou LW, Peršoh D, Phillips AJL, Maharachchikumbura SSN (2016) Fungal Diversity notes 253–366: taxonomic and phylogenetic contributions to fungal taxa. Fungal Diversity 78: 1–237. https://doi.org/10.1007/s13225-016-0366-9

Liu JK, Hyde KD, Gareth EBG, Ariyawanssa HA, Bhat DJ, Boonmee S, Maharachchikumbura SS, Mckenzie EH, Phookamsak R, Phukhamsakda C, Shenoy BD, AbdelWahab MA, Buyck B, Chen J, Chethana KWT, Singtripop C, Dai DQ, Dai YC, Daranagama DA, Dis-sanayake AJ, Doilom M, D’souza MJ, Fan XL, Goonasekara ID, Hirayama K, Hongsanan S, Jayasiri SC, Jayawardena RS, Karunarathna SC, Li WJ, Mapook A, Norphanhoun C, Pang KL, Perera RH, Peršoh D, Pinruan U, Senanayake IC, Somrithipol S, Suetrong S, Tanaka K, Thambugala KM, Tian Q, Tibpromma S, Udayanga D, Wijayawardene NN, Wanasinge D, Wisitrassameewong K, Zeng XY, Abdel-Aziz FA, Adamek S, Bahkali AH, Boonyuen N, Bulgakov T, Callac P, Chomnunti P, Greiner K, Hashimoto A, Hofsatter V, Kang JC, Xing DL, Li H, Liu XZ, Liu ZY, Matsumura M, Mortimer PE, Rambold G, Randrianjohany E, Sato G, Sri-Indrasutdhi V, Tian CM, Verbeken A, Bracket W, Wang Y, Wen TC, Xu JC, Yan JY, Zhao RL, Camporesi, E (2015) Fungal diversity notes 1–110: taxonomic and phylogenetic contributions to fungal species. Fungal Diversity 72: 1–197. https://doi.org/10.1007/s13225-015-0324-y

Luque J, Garcia-Figueres F, Legorburu FJ, Muruamendiaraz A, Armengol J, Trouillas FP (2012) Species of Diatrypaceae associated with grapevine trunk diseases in Eastern Spain. Phytopathologia Mediterranea 51: 528–540. https://doi.org/10.14601/Phytopathol-Mediterr-9953

Lynch SC, Eskalen A, Zambino PJ, Mayorquin JS, Wang DH (2013) Identification and pathogenicity of Botryosphaeriaceae species associated with coast live oak (Quercus agrifolia) decline in southern California. Mycologia 105: 125–140. https://doi.org/10.3852/12-047

Maharachchikumbura SSN, Hyde KD, Jones EBG, McKenzie EHC, Bhat JD, Dayarathne MC, Huang SK, Norphanhoun C, Senanayake IC, Perera RH, Shang QJ, Xiao Y, D’souza MJ, Hongsanan S, Jayawardena RS, Daranagama DA, Kotta S, Goonasekara ID, Zhuang WY, Jeewon R, Phillips AJL, Abdel-Wahab MA, Al-Sadi AM, Bakhali AH, Boonmee S, Boonyuen N, Cheewangkoon R, Dissanayake AJ, Kang J, Li QR, Liu JK, Liu XZ, Liu ZY, Luangs-Ard JJ, Pang KL, Phookamsak R, Promputtha I, Suetrong S, Stadler M, Wen T, Wijayawardene NN (2016) Families of Sordariomycetes. Fungal Diversity 79: 1–317. https://doi.org/10.1007/s13225-016-0369-6

Mehrabi M, Asgari B, Hemmati R (2019) Two new species of Eutypella and a new combination in the genus Peroneutypa (Diatrypaceae). Mycological Progress 18: 1057–1069. https://doi.org/10.1007/s11557-019-01503-4

Mehrabi M, Hemmati R, Vasilyeva LN, Trouillas FP (2015) A new species and a new record of Diatrypaceae from Iran. Mycosphere 6: 60–68. https://doi.org/10.5943/mycosphere/6/1/7

Mehrabi M, Hemmati R, Vasilyeva LN, Trouillas FP (2016) Diatrypella macrospora sp. nov. and new records of diatrypaceous fungi from Iran. Phytotaxa 252: 43–55. https://doi.org/10.2307/3762061

Miao Q, Wang Y, Li J, Yuan S, Shi L, Gu X (2007) Study on the spring drought rule in the karst region of yunnan and guizhou plateau in china. International Society for Optics and Photonics 6790: 67903Z. https://doi.org/10.1117/12.746860
Miller MA, Pfeiffer W, Schwartz T (2010) Creating the CIPRES Science Gateway for inference of large phylogenetic trees. In: Gateway Computing Environments Workshop 2010 (GCE), New Orleans, Louisiana, November 2010: 1–8. https://doi.org/10.1109/GCE.2010.5676129

Moyo P, Mostert L, Spies CF, Damm U, Hallen F (2018b) Diversity of Diatrypaceae species associated with dieback of grapevines in South Africa, with the description of Eutypa cremea sp. nov. Plant Disease 102: 220–230. https://doi.org/10.1094/PDIS-05-17-0738-RE

Nylander JAA (2004) MrModeltest v2.2. Program distributed by the author: 2. Evolutionary Biology Centre, Uppsala University 1–2.

O’Donnell K, Cigelnik E (1997) Two divergent intragenomic rDNA ITS2 types within amonophyletic lineage of the fungus Fusarium are nonorthologous. Molecular Phylogenetics and Evolution 7: 103–116. https://doi.org/10.1006/mpev.1996.0376

Paolini-Alfonso M, Serrano-Gomez C, Hernandez-Martinez R (2015) Occurrence of Eutypella microtheca in grapevine cankers in Mexico. Phytopathologia Mediterranea 54: 86–93. https://doi.org/10.14601/Phytopathol_Mediterr-14998

Perera RH, Hyde KD, Maharachchikumbura S, Jones EBG, McKenzie EHC, Stadler M, Lee HB, Samarakoon MC, Ekanayaka AH, Camporesi E, Liu JK, Liu ZY (2020) Fungi on wild seeds and fruits. mycosphere 11: 2108–2480. https://doi.org/10.5943/mycosphere/11/1/14

Peršoh D, Melcher M, Graf K, Fournier J, Stadler M, Rimbold G (2009) Molecular and morphological evidence for the delimitation of Xylaria hypoxylon. Mycologia 101: 256–268. https://doi.org/10.3852/08-108

Phookamsak R, Hyde KD, Jeewon R, Bhat DJ, Jones EBG, Maharachchikumbura SSN, Raspé O, Karunarathna SC, Wanasinghe DN, Hongsanan S, Doilom S, Tennakoon DS, Machado AR, Firmino AL, Ghosh A, Karunarathna A, Mešić A, Dutta AK, Thongbai B, Devadatha B, Norphanphoun C, Senwanna C, Wei DP, Pem D, Ackah FK, Wang GN, Jiang HB, Madrid H, Lee HB, Goonasekara ID, Manawasinghe IS, Kušan I, Cano J, Gené J, Li JF, Das K, Acharya K, Anil Raj KN, Deepna Latha KP, Thilini Chethana KW, He MQ, Dueñas M, Jadan M, Martin MP, Samarakoon MC, Dayarathne MC, Raza M, Park MS, Teresa Telleria M, Chaiwan N, Matočec N, de Silva NO, Pereira OL, Singh PN, Manimohan P, Uniyal P, Shang QJ, Bhatt RP, Perera RH, Alvarenga RLM, Nogal-Prata S, Singh SK, Vadthanarat S, Oh SY, Huang SK, Rana S, Konta S, Paloi S, Jayasiri SC, Jeon JS, Mehmood T, Gibertoni TB, Nguyen TT, Singh U, Thiyagaraja V, Sarma VV, Dong W, Yu XD, Lu YZ, Lim YW, Chen Y, Tkalčec Z, Zhang ZF, Luo ZL, Daronagama DA, Thambubala KM, Tibpromma S, Camporesi E, Bulgakov TS, Dissanayake AJ, Senanayake IC, Dai DQ, Tang LZ, Khan S, Zhang H, Promputtha I, Cai L, Chommunti P, Zhao RL, Lumyong S, Boonmee S, Wen TC, Mortimer PE, Xu JC (2019) Fungal diversity notes 929–1036: taxonomic and phylogenetic contributions on genera and species of fungal taxa. Fungal Diversity 95: 1–273. https://doi.org/10.1007/s13225-019-00421-w

Phukhamsakda C, McKenzie EHC, Phillips AJL, Gareth Jones EB, Jayarama Bhat D, Stadler M, Bhunjun CS, Wanasinghe DN, Thongbai B, Camporesi E, Ertz D, Jayawardena RS,
New contributions to Diatrypaceae

Perera RH, Ekanayake AH, Tibpromma S, Doilom M, Xu J, Hyde KD (2020) Microfungi associated with *Clematis* (Ranunculaceae) with an integrated approach to delimiting species boundaries. Fungal Diversity 102: 1–203. https://doi.org/10.1007/s13225-020-00448-4

Rambaut A (2012) FigTree: Tree Figure Drawing Tool Version 1.4.0 2006–2012, Institute of Evolutionary Biology, University of Edinburgh. http://tree.bio.ed.ac.uk/software/figtree/

Rappaz F (1987) Taxonomy and nomenclature of the octosporous Diatrypaceae. Mycologia Helvetica 2: 285–648.

Rolshausen PE, Mahoney NE, Molynieux RJ, Gubler WD (2006) A reassessment of the species concept in *Eutypa lata*, the causal agent of *Eutypa* dieback of grapevine. Phytopathology 96: 369–377. https://doi.org/10.1094/PHYTO-96-0369

Senanayake IC, Maharachchikumbura SN, Hyde KD, Bhat JD, Jones EG, Mckenzie EH, Dai DQ, Daranagama DA, Dayaratne MC, Goonasekara ID, Konta S, Li WJ, Shang QJ, Stadler M, Wijayawardene NN, Xiao YP, Norphanphoun C, Li Q, Liu XY, Bakhali AH, Kang JC, Wang Y, Wen TC, Wendt I, Xu JC, Camporesi E (2015) Towards unraveling relationships in Xylariomycetidae (Sordariomycetes). Fungal Diversity 73: 73–144. https://doi.org/10.1007/s13225-015-0340-y

Senwanna C, Phookamsak R, Doilom M, Hyde KD, Cheewangkoon R (2017) Novel taxa of Diatrypaceae from Para rubber (*Hevea brasilensis*) in northern Thailand; introducing a novel genus *Allocryptovalsa*. Mycosphere 8: 1835–1855. https://doi.org/10.5943/mycosphere/8/10/9

Shang QJ, Hyde KD, Jeewon R, Khan S, Promputtha I, Phookamsak R (2018) Morpho-molecular characterization of *Peroneutypa* (Diatrypaceae, Xylariales) with two novel species from Thailand. Phytotaxa 356: 1–18. https://doi.org/10.1080/15572536.2005.11832975

Shang QJ, Hyde KD, Phookamsak R, Doilom M, Bhat DJ, Maharachchikumbura SS, Promputtha I (2017) *Diatrypella tectonae* and *Peroneutypa mackenziei* spp. nov. (Diatrypaceae) from northern Thailand. Mycological progress 16: 463–476. https://doi.org/10.1007/s11557-017-1294-0

Thiyagaraja V, Senanayake IC, Wanasinghe DN, Karunarathna SC, Worthy FR, To-Anun C (2019) Phylogenetic and morphological appraisal of *Diatrype lijiangensis* sp. nov. (Diatrypaceae, Xylariales) from China. Asian Journal of Mycology 2: 198–208. https://doi.org/10.5943/ajom/2/1/10

Trouillas FP, Gubler WD (2004) Identification and characterization of *Eutypa leptoplaca*, a new pathogen of grapevine in Northern California. Mycological Research 108: 1195–1204. https://doi.org/10.1017/S0953756204000863

Trouillas FP, Urbez-Torres JR, Gubler WD (2010) Diversity of diatrypaceous fungi associated with grapevine canker diseases in California. Mycologia 102: 319–336. https://doi.org/10.3852/08-0885

Trouillas FP, Hand FP, Inderbitzin P, Gubler WD (2015) The genus *Cryptosphaeria* in the western United States: taxonomy, multilocus phylogeny and a new species, *C. multicontinentalis*. Mycologia 107: 1304–1313. https://doi.org/10.3852/15-115

Trouillas FP, Wayne MP, Sosnowski MR, Huang R, Peduto F, Loschiavo A, Savocchia S, Scott ES, Gubler WD (2011) Taxonomy and DNA phylogeny of Diatrypaceae associated with *Vitis vinifera* and other woody plants in Australia. Fungal Diversity 49: 203–223. https://doi.org/10.1007/s13225-011-0094-0
Tulapsne L-R, Tulapsne C (1863) Selecta Fungorum carpologia, Paris, 2, 56.

U’ren JM, Miadlikowska J, Zimmerman NB, Ltzoni F, Stajich JE, Arnold AE (2016) Contributions of North American endophytes to the phylogeny, ecology, and taxonomy of Xylariaceae (Sordariomycetes, Ascomycota). Molecular Phylogenetics and Evolution 98: 210–232. https://doi.org/10.1016/j.ympev.2016.02.010

Úrbez-Torres JR, Adams P, Kamas J, Gubler WD (2009) Identification, incidence, and pathogenicity of fungal species associated with grapevine dieback in Texas. American Journal of Enology and Viticulture 60: 497–507.

Úrbez-torres JR, Peduto F, Striegler RK, Urrearomero KE, Rupe JC, Cartwright RD, Gubler WD (2012) Characterization of fungal pathogens associated with grapevine trunk diseases in Arkansas and Missouri. Fungal Diversity 52: 169–189. https://doi.org/10.1007/s13225-011-0110-4

Vasilyeva LN, Ma HX (2014) Diatrypaceous fungi in north-eastern China. 1. Cryptosphaeria and Diatrype. Phytotaxa 186(5): 261–270. https://doi.org/10.11646/phytotaxa.186.5.3

Vasilyeva LN, Stephenson SL (2005) Pyrenomycetes of the Great Smoky Mountains National Park. II. Cryptopula Ces. et De Not. and Diatrypella (Ces. et De Not.) Nitschke (Diatrypaceae). Fungal Diversity 19: 189–200.

Vieira MLA, Hughes AFS, Gil VB, Vaz AB, Alves TM, Zani CL, Rosa CA, Rosa LH (2011) Diversity and antimicrobial activities of the fungal endophyte community associated with the traditional Brazilian medicinal plant Solanum cernuum Vell. (Solanaceae). Canadian Journal of Microbiology 58: 54–56. https://doi.org/10.1139/w11-105

Vilgalys R, Hester M (1990) Rapid genetic identification and mapping of enzymatically amplified ribosomal DNA from several Cryptococcus species. Journal of Bacteriology 172: 4238–4246. https://doi.org/10.1128/jb.172.8.4238-4246.1990

White TJ, Bruns T, Lee SJWT, Taylor JW (1990) Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. PCR protocols: a guide to methods and applications 18: 315–322. https://doi.org/10.1016/B978-0-12-372180-8.50042-1
New contributions to Diatrypaceae

Khare R, Gaikwad S, Wijesundara DSA, Tang LZ, He MQ, Flakus A, Rodriguez-Flakus P, Zhurbenko MP, McKenzie EHC, Stadler M, Bhat DJ, Liu JK, Raza M, Jeewon R, Nasonova ES, Prieto M, Jayalal RGU, Yurkov A, Schnittler M, Shchepin ON, Novozhilov YK, Liu P, Cavender JC, Kang Y, Mohammad S, Zhang LF, Xu RF, Li YM, Dayarathe MC, Ekanayaka AH, Wen TC, Deng CY, Lateef AA, Pereira OL, Navathe S, Hawksworth DL, Fan XL, Dissanayake LS, Erdogdu M (2020) Outline of Fungi and fungus-like taxa. Mycosphere 11: 1060–1456. https://doi.org/10.5943/mycosphere/11/1/8

Zhu H, Pan M, Wijayawardene NN, Jiang N, Ma R, Dai D, Tian C, Fan X (2021) The Hidden Diversity of Diatrypaceous Fungi in China. Frontiers in Microbiology 12: 646262. https://doi.org/10.3389/fmicb.2021.646262