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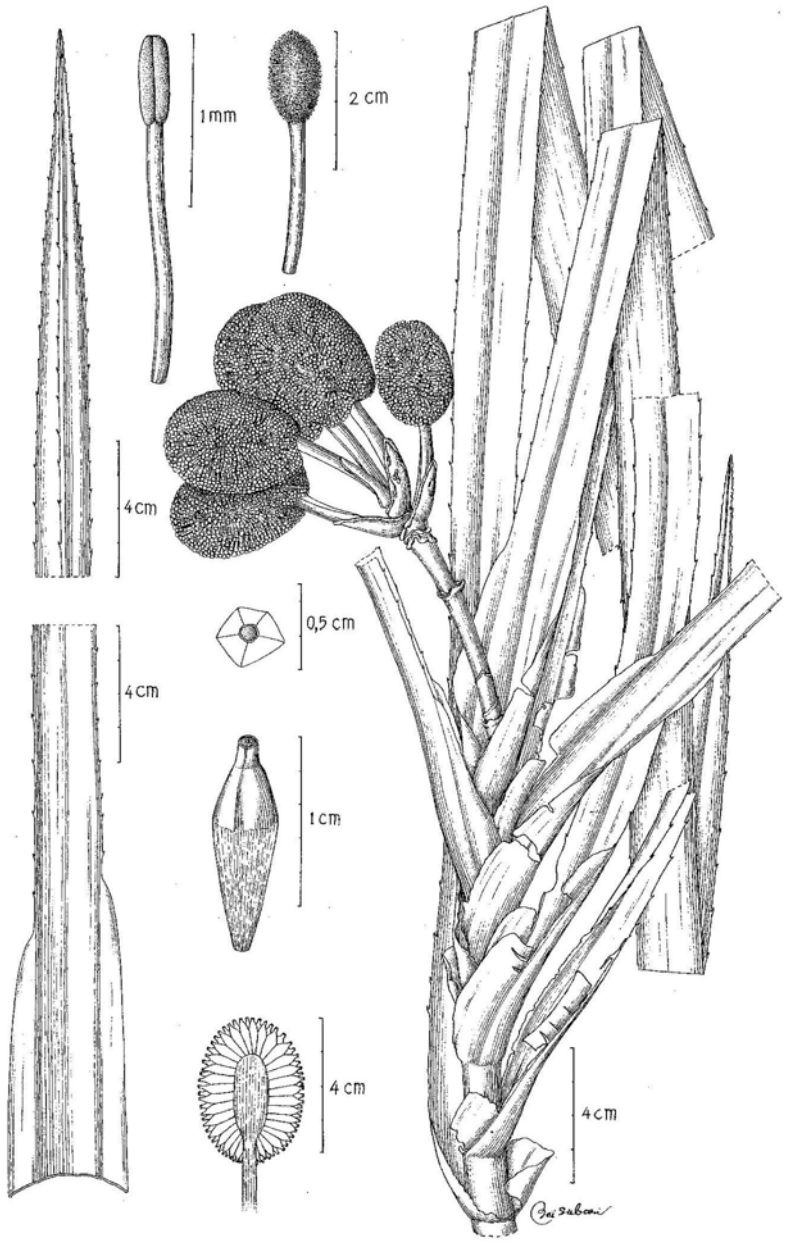

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BRYOPHYTES OF MOUNT PATUHA, WEST JAVA, INDONESIA

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ABSTRACT
GRADSTEIN, R. *et al.* 2010. Bryophytes of Mount Patuha, West Java, Indonesia. *Reinwardtia* 13(2): 107–123. — This paper presents the results of a two–day survey of the bryophyte flora of Mt. Patuha and its surroundings near Bandung, West Java, carried out in the framework of the 5th regional training course on bryophyte and lichen diversity and conservation organized by SEAMEO BIOTROP, Bogor, in July 2009. A total of 159 bryophyte species were identified, including 98 mosses, 60 liverworts, and 1 hornwort, representing almost 1/6 of the total bryophyte flora of Java. Three moss species, *Bryohumbertia subcomosa* (Dix.) J.–P. Frahm, *Fissidens gymnogynus* Besch. and *F. polypodioides* Hedw., and one liverwort, *Lejeunea pectinella* Mizut., are new additions to the Javanese flora. The bryophyte diversity of Mt. Patuha is well representative of the Malesian flora and is rich in uncommon species. However, the relatively poor representation of shade epiphytes and commonness of sun epiphytes and generalists reflect disturbance of the forest by anthropogenic activities. Careful attention should be given to conservation of the remaining natural forest in order to prevent further losses of the rich bryophyte diversity of the area.

Keywords: Bryophytes, Mount Patuha, Flora diversity.

ABSTRAK
GRADSTEIN, R. *et al.* 2010. Briofita dari Gunung Patuha, Jawa Barat, Indonesia. *Reinwardtia* 13(2): 107–123. — Makalah ini merupakan hasil survai 2 hari flora briofita di Gunung Patuha dan sekitarnya dekat Bandung, Jawa Barat, yang dilakukan dalam rancangan kerja pelatihan regional ke–5 keanekaragaman briofita dan *lichen* dan konservasinya yang dikelola oleh SEAMEO BIOTROP, Bogor, pada bulan Juli 2009. Sejumlah 159 jenis briofita diidentifikasi termasuk 98 lumut, 60 lumut hati dan 1 *hornwort*, yang mewakili hampir 1/6 dari jumlah briofita di Jawa. Tiga jenis lumut, yaitu, *Bryohumbertia subcomosa* (Dix.) J.–P. Frahm, *Fissidens gymnogynus* Besch. dan *F. polypodioides* Hedw., and 1 lumut hati, *Lejeunea pectinella* Mizut., merupakan tambahan pada flora di Jawa. Keanekaragaman briofita di G. Patuha sangat baik mewakili Flora briofita di Malesia dan sangat kaya pada jenis–jenis yang tidak umum. Tetapi, relatif sedikit yang mewakili epifit di daerah yang terlindung dan sangat umum pada epifit di daerah terbuka, dan dapat menggambarkan adanya kerusakan hutan oleh aktifitas manusia. Perhatian yang hati–hati sebaiknya diberikan pada konservasi hutan alam yang tersisa untuk mencegah lebih jauh hilangnya keanekaragaman briofita di daerah tersebut.

Kata kunci: Briofita, Gunung Patuha, Keanekaragaman flora

INTRODUCTION

Mount Patuha (2434 m; 7°09'S 107°24'E) is a twin stratovolcano mountain located approximately 35 km southwest of Bandung in West Java, Indonesia. The summit contains two volcanic craters about 600 m apart. The northwest crater, near the highest point of the mountain, is dry but the southeast crater is filled with water, forming a greenish–white lake known as "Kawah Putih" (white crater). Mt. Patuha represents a relatively stable volcanic system with no historical volcanic eruption recorded (Neumann van Padang, 1951). The crater lake contains highly acidic water, and the place has been the source of sulphur extraction for many years (De Jongh, 1925; Sriwana *et al*., 2000). Now, the lake has turned into a famous tourist spot and is loaded with visitors during weekends and holidays.

The area surrounding and below the crater is covered mostly by secondary vegetation. Previous disturbances, possibly forest fire (judging from the dense thickets of bracken fern surrounding the crater lake) and human encroachment, have severely altered the vegetation. The natural vegetation, occurring in scattered patches along the road to the crater lake between 1600–2100 m, is tropical montane rainforest. At about 1600 m, where the road begins, a substantial area has been cleared many years back for *Eucalyptus* tree plantation, while land below this elevation has been largely converted into tea plantations and small strawberry farms.

The first botanist who visited Mt. Patuha is probably Francisco de Noroña, a Spanish botanist. In the years 1786–1787 he visited and collected plant materials from many places nearby Bogor and Bandung, including the surroundings of Mt. Patuha (van Steenis–Kruseman, 1950; van Steenis, 1972). Unfortunately, his collections could not be located

after he passed away one year later, leaving an unpublished manuscript with a set of drawings of the plants collected during his Java trip (van Steenis, 1972). In the 19th century, the mountain has been frequently visited by botanists, such as C.L. Blume, F.W. Junghuhn, P.W. Korthals, C.G.C. Reinwardt, and O. Warburg, to name a few (van Steenis–Kruseman, 1950). Many of the early collections are cited in revisionary studies of specific plant groups or in the Flora of Java published at that time. In the first half of the 20th century, C.G.G.J. van Steenis visited Mt. Patuha and recorded flowering plant species found in the area and nearby mountains in his monumental "The mountain flora of Java" (van Steenis, 1972). More recently, little botanical work has been done in the area; the area has occasionally been visited by graduate students and researchers from the nearby institutions in Bandung but publications are lacking (Wiriadinata, *pers. com.*). There are no publications dealing with the bryophyte flora of Mt. Patuha.

During the 5th regional training course on bryophyte and lichen diversity and conservation organized by SEAMEO BIOTROP, Bogor, 14–23 July 2009, participants of the workshop spent two days (17–18 July 2009) collecting in the area of Mount Patuha and its surroundings. The program of the first day included a visit to the crater lake and collecting along the road to the crater. Vegetation types surveyed included natural to disturbed montane rainforest, tree plantations, and roadside or cut slope vegetation. The second day was spent surveying the tea plantation adjacent to Situ (Lake) Patenggang, another well–known tourist site located at the north–west slope of Mt. Patuha, and a small patch of disturbed montane forest along the river at the south-eastern side of the lake. The two–day survey yielded nearly 500 bryophyte specimens, from an elevation range of 1500–2100 m. All specimens were identified and the results are presented and discussed in this paper.

RESULTS AND DISCUSSION

A total of 159 bryophyte species were identified, including 98 species (and one variety) of mosses (*Bryophyta s. str.*), 60 of liverworts (*Marchantiophyta*), and 1 of hornworts (*Anthocerotophyta*). These figures represent almost 1/6 of the total bryophyte flora of Java, which consists of about 600 species of mosses (Fleischer, 1904–1923) and *ca.* 570 species of liverworts and hornworts (Söderström *et al.*, in press). Three moss species reported here, *Bryohumbertia subcomosa* (Dix.) J.–P. Frahm, *Fissidens gymnogynus* Besch., and *F. polypodioides* Hedw., and the liverwort *Lejeunea pectinella* Mizut. are new additions to the Javanese flora. Identification of the liverworts was somewhat handicapped by the lack of a comprehensive Flora. The preliminary identification manual for liverworts and hornworts of Java (Gradstein, 2009) still lacked keys to some important genera and therefore not all species could be identified with certainty to species level.

Like in other mountain regions of Malesia (*e.g.*, Tan, 1982; Frahm *et al.*, 1990; Suleiman & Edwards, 2002; Damanhuri *et al.*, 2005; Tan *et al.*, 2006; Sporn *et al.*, 2009; Gradstein & Culmsee, 2010), the bryophyte flora of Mt. Patuha is well represented by members of the liverwort family *Lejeuneaceae* (18 species in 12 genera) and the moss families *Dicranaceae* (13 species in 8 genera) and *Hookeriaceae s.l.* (including *Pilotrichaceae* and *Daltoniaceae*; 11 species in 7 genera) (Table 1). The bryophyte diversity of the mountain is well representative of the Malesian flora, with many of its species occurring widespread from Sumatra to New Guinea, and some extending to India and the Pacific region or even further into other portions of the tropics. No local endemics has been observed but several uncommon Malesian bryophyte species were recorded such as the mosses *Chaetomitrium ciliatum* Bosch & Sande Lac., *Cyclodictyon blumeanum* (Müll. Hal.) Kuntze, *Hampeella pallens* (Sande Lac.) M. Fleisch., *Pseudohypnella verrucosa* (Dozy & Molk.) M. Fleisch., *Sclerodontium pallidum* subsp. *celebesiae* (Broth.) H.A. Crum, and *Thamnobryum ellipticum* (Bosch & Sande Lac.) Nieuwl., and the liverworts *Acrolejeunea arcuata* (Nees) Grolle & Gradst., *Herbertus armitanus* (Steph.) H.A. Mill., *Lejeunea pectinella* Mizut. and *Plagiochilion braunianum* (Nees) S. Hatt. The rather high number of uncommon bryophyte species collected on Mt. Patuha demonstrates the importance of this mountain as a habitat for cryptogamic species.

Some taxa that are common in other Malesian mountain areas at similar elevations, however, were not detected or only poorly represented in our collections from Mt. Patuha. Among mosses, these include the large genera *Acroporium* (only 4 species collected), *Distichophyllum* (only 1 species and 1 variety), and *Syrrhopodon* (only 1 species represented here), among liverworts the genera *Herbertus* (only 1 species, found only once), *Lepidozia* (only 1 species), *Schistochila* (only 1 species), and *Thysananthus* (no species). The absence of typical montane forest species such as *Hypnodendron dendroides* (Brid.) Touw, *Leucobryum javense* (Brid.) Mitt., *Trismegistia calderensis* (Sull.) Broth., and many members of *Sematophyllaceae* and *Lepi-*

Table 1. Summary of the bryophytes collected on Mount Patuha and its surrounding area.

Families	Genera	Species
Liverworts and Hornworts		
Adelanthaceae	3	3
Aneuraceae	1	2
Anthocerotaceae	1	1
Calypogeiaceae	1	1
Cephaloziaceae	1	1
Fossombroniaceae	1	1
Frullaniaceae	1	7
Geocalycaceae	1	1
Herbertaceae	1	1
Jungermanniaceae	2	2
Lejeuneaceae	12	18
Lepidoziaceae	2	3
Lophocoleaceae	2	5
Marchantiaceae	2	2
Mastigophoraceae	1	1
Metzgeriaceae	1	1
Pallaviciniaceae	1	1
Plagiochilaceae	2	6
Radulaceae	1	1
Scapaniaceae	1	1
Schistochilaceae	1	1
Trichocoleaceae	1	1
Total	**39**	**61**
Mosses		
Bartramiaceae	2	3
Brachytheciaceae	2	2
Bruchiaceae	1	1
Bryaceae	4	4
Buxbaumiaceae	1	1
Calymperaceae	2	2
Cryphaeaceae	1	1
Dicranaceae	8	13
Fissidentaceae	1	9
Funariaceae	1	1
Hookeriaceae	7	11
Hypnaceae	3	6
Hypnodendraceae	1	1
Hypopterygiaceae	2	2
Leucobryaceae	1	1+1 var.
Meteoriaceae	5	5
Mniaceae	1	1
Neckeraceae	2	2
Orthotrichaceae	1	5
Polytrichaceae	1	2
Pottiaceae	3	3
Pterobryaceae	3	3
Ptychomniaceae	2	2
Racopilaceae	1	1
Rhizogoniaceae	1	2
Sematophyllaceae	6	9
Trachypodiaceae	2	3
Thuidiaceae	1	2
Total	**66**	**98 + 1 var.**

doziaceae from Mt. Patuha is possibly due to the lack of extensive covers of dense, moist forest in study area. Many of the poorly represented groups are characteristic desiccation–intolerant shade epiphytes of the understory and lower canopy of the moist montane forests of Malesia. On the other hand, we found many desiccation–tolerant species growing abundantly in the surveyed forest sites, e.g. the mosses *Brachymenium nepalense* Hook., *Ectropothecium buitenzorgii* (Bél.) Mitt., *Pogonatum neesii* (Müll. Hal.) Dozy, and *Sematophyllum subpinnatum* (Brid.) E. Britton, and various species of *Frullania* and *Lopholejeunea*. These species are characteristic sun–epiphytes or generalists of the forest, which become more widespread when the forest canopy is disrupted and when microclimatic conditions become dryer (Gradstein, 1992; Gradstein & Sporn, 2009).

A high number of bryophyte species listed here were collected in roadside vegetation shaded by forest trees, or in tea–bushes planted at the fringe of the remaining forest patches. Further away from the forest, bryophyte diversity was generally much decreased, for example near the guest houses far away from the nearest forest. It thus appears that the remaining natural forest patches may have functioned as the mother stock for many of the bryophyte species encountered in this trip.

In brief, anthropogenic activities seem to have played an intensive role in shaping the current vegetation of the Mount Patuha area. Careful attention should be given to the conservation of the remaining indigenous forest in order to prevent further losses of the rich bryophyte diversity of the mountain. Although the present study was not a comprehensive one, we believe that the results of the two–day survey reflect the richness of the bryophyte diversity of Mt. Patuha and its surroundings. The list may serve as a contribution to a future checklist of the bryophyte flora of the mountain, which is still lacking, and to a monitoring of the changes of the cryptogamic flora of the area over time.

SPECIES LIST

Collection information together with the names of the collectors and specimen numbers are given for all listed taxa. Synonyms used in older important floristic works on the bryophyte flora of Java (*e.g.*, Fleischer, 1904–1923) are given in parentheses after the currently recognized name. Notes on important morphological features, distribution, or taxonomic status of selected species are also given. Specimens have been deposited in the Herbarium Bogoriense (BO) and the herbarium of BIOTROP (BIOT). Species new to Java are marked with an asterisk (*).

Liverworts and hornworts

ADELANTHACEAE

Denotarisia linguifolia (De Not.) Grolle

Common on soil over rock along the road to crater, 2000–2100 m, *Afiatri Putrika & Dian Apriana 16*. A beautiful, large *Solenostoma*–like plant with rose colour, densely imbricate leaves and characteristic dark triangular marks in the trigones of the leaf cells.

Jamesoniella flexicaulis (Nees) Schiffn.

On bark of trees along the road to crater, 2050 m, *Afiatri Putrika & Dian Apriana 5*, *20*.

Syzygiella subintegerrima (Nees) Spruce

On palm trunk along the road to crater, 2050 m, *Afiatri Putrika & Dian Apriana 7*.

ANEURACEAE

Riccardia parvula Schiffn.

On soil in disturbed forest adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 11*.

Riccardia sp.

On soil in disturbed forest adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 12*.

ANTHOCEROTACEAE

Phaeoceros laevis (L.) Prosk.

On soil in tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 13*. This hornwort species is recognized by the yellow spores, the 2–3–celled, thin–walled elaters with rudimentary spiral bands, and the rather fleshy thallus with ± entire margins and without internal cavities. This is the only species of *Phaeoceros* known from Indonesia (Hasegawa, 1984; Gradstein, 2009) and the only hornwort that we recorded during this survey.

CALYPOGEIACEAE

Calypogeia cf. *goebelii* (Schiffn.) Schiffn.

On soil in disturbed forest adjacent to Situ

(Lake) Patenggang, 1500 m, *Eny Yuniati 2*. According to Grolle (1977) and Piippo (1984) the oil bodies in this species are blue; however, in our material they were colourless. In other respects, however, the material seems to fit the description of *C. goebelii*.

CEPHALOZIACEAE

Cephalozia hamatiloba Steph.

On soil in disturbed forest adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 12*. The plants were sterile and very similar to the common, northern hemispheric *C. bicuspidata* (L.) Dumort., which is not known from Java. The latter species can only be separated from *C. hamatiloba* by characters of the fertile plant.

FOSSOMBRONIACEAE

Fossombronia japonica Schiffn.

On naked soil of steep earth bank at car park adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 10*; *Robbert Gradstein 12162*. The genus *Fossombronia* is from Java by two species (Krayesky *et al*., 2005) and has been little studied. Characteristic of *F. japonica* Schiffn. are the somewhat toothed leaf margins, the deeply violet–purple rhizoids, the reticulate spore surface and the elaters, which are very scarce and possess only 0–1 spiral band. Formerly, this species was reported from Java as *F. cristula* Austin (Piippo, 1991) but according to Krayesky *et al*. (2005) the latter species is endemic to North America and does not occur in Asia. *Fossombronia japonica* is characteristic of naked soil in gardens and plantations, and of earth banks in cultivated areas.

FRULLANIACEAE

Frullania apiculata (Reinw. *et al*.) Dumort.

On bark of trees at car park at the entrance of road to crater, 1600 m, *Robbert Gradstein 12166*. The rather smooth–barked tree trunks along the road and in the disturbed, open forest near the entrance of the road to the crater of Mt Patuha, at the car park, were densely covered by large mats of *Frullania*, easily recognized from a distance by the dark reddish to purple colour. We collected no less than 6 different *Frullania* species in this location.

Frullania arecae (Spreng.) Gottsche

On bark of trees at car park at the entrance of road to crater, 1600 m, *Robbert Gradstein 12163*; *Soonthree Kornochalert 1410*.

Frullania gracilis (Reinw. *et al*.) Dumort.

On bark of trees at car park at the entrance of road to crater, 1600 m, *Robbert Gradstein 12165*.

Frullania grandistipula Lindenb.

On bark in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 10*; *Soonthree Kornochalert 1411*.

Frullania neurota Taylor

On bark of trees at car park at the entrance of road to crater, 1600 m, *Robbert Gradstein 12168*.

Frullania ornithocephala (Reinw. *et al*.) Nees

On bark of trees at car park at the entrance of road to crater, 1600 m, *Robbert Gradstein 12167*.

Frullania riojaneirensis (Raddi) Spruce

On bark of trees at car park at the entrance of road to crater, 1600 m, *Robbert Gradstein 12164*.

GEOCALYCACEAE

Notoscyphus lutescens (Lehm. & Lindenb.) Mitt.

On rock along the road to crater, near crater entrance, 2100 m, *Afiatri Putrika & Dian Apriana 2*. An attractive, bluish–green, small *Solenostoma*–like plant with small bifid underleaves, a striate–papillose leaf cuticle and large, brown, bone–shaped oil bodies. The family placement of the plant has been problematical but the marsupium, the succubous leaves, the rough cuticle and the rhizoids in tufts from underleaves suggest that it belongs in the family Geocalycaceae. The species characteristically grows in thin mats in shaded places along road sides, on thin soil over rock, at higher elevation.

HERBERTACEAE

Herbertus armitanus (Steph.) H.A. Mill.

On palm trunk along the road to crater, 2050 m, *Robbert Gradstein 12172*. Characteristic of this rather rare *Herbertus* species is the long ciliate leaf tip made up, at least in part, of rectangular cells. In the related, more common *H. dicranus* the leaf tip is shorter and made up of quadrate cells (Juslén, 2006).

JUNGERMANNIACEAE

Solenostoma haskarlianum (Nees) Schust. ex Váňa & Long (Syn. *Jungermannia hasskarliana* (Nees) Mitt.)

On soil over rock in the crater, 2100 m, *Mika Rizki Puspaningrum 11*. *Solenostoma* has often been treated as a subgenus of *Jungermannia*, but has recently been reinstated as a separate genus based on the results of molecular analysis.

Solenostoma tetragonum (Lindenb.) Schust. ex Váňa & Long (Syn. *Jungermannia tetragona* Lindenb.)

On soil over rock in the crater, 2100 m, *Mika Rizki Puspaningrum 3, 6*. The scattered occurrence of one single, large oil body in selected leaf cells (most cells are without oil body) is a very characteristic feature of living material of this plant.

LEJEUNEACEAE

Acrolejeunea arcuata (Nees) Grolle & Gradst.

On bark of tree along the road to crater, 2000 m, *Soonthree Kornochalert 1408*. A rare Malesian species occurring at higher elevations, from 1500–3500 m (Gradstein, 1975).

Cheilolejeunea trifaria (Reinw. *et al.)* Mizut.

On bark of trees along the road to crater, 2000–2100 m (voucher lacking).

Cololejeunea haskarliana (Lehm. & Lindenb.) Steph.

On living leaf in disturbed forest adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 8*.

Drepanolejeunea cf. *ternatensis* (Gottsche) Steph. ex Schiffn.

On bark of trees along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 15, 18*.

Harpalejeunea filicuspis (Steph.) Mizut.

On twigs of tea plants at the edge of tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Afiatri Putrika & Dian Apriana 20*, *Mika Rizki Puspaningrum 9*.

Lejeunea flava (Sw.) Nees

On bark of trees along the road to crater, 2000–2100 m (voucher lacking).

Lejeunea cf. *anisophylla* Mont.

On living leaves in tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Robbert Gradstein 12170*, det. Lee Gaik Ee. The material is rather poorly developed and the identification therefore remains uncertain. *Lejeunea anisophylla* Mont. is a very common and widespread species in tropical Asia but has surprisingly not yet been recorded from Java.

**Lejeunea pectinella* Mizut.

On bark of trees along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 8, 13*, det. Lee Gaik Ee. This rare species, previously known from Sabah, is new to the flora of Java. It is related to *Lejeunea discreta* Lindenb., a species widespread in Southeast Asia, but differs by the very broad, reniform underleaves, the strongly involute free margin of the lobule, and the crenulate leaf margins.

Leptolejeunea foliicola Steph.

On living leaves in tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Robbert Gradstein 12171*.

Leucolejeunea xanthocarpa (Lehm. & Lindenb.) A. Evans

On bark of trees along the road to crater and on twigs of tea plants at the edge of tea plantation adjacent to Situ (Lake) Patenggang, 1500–2100 m, *Afiatri Putrika & Dian Apriana 24*.

Lopholejeunea applanata (Reinw. *et al*.) Schiffn.

On twigs of tea plants at the edge of tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Soonthree Kornochalert 1415*. The genus *Lopholejeunea*, easily recognized by the usually black colour of the plants, was very diverse in the Mt. Patuha area and we collected no less than 5 different species. The Asiatic species of this genus were recently monographed by Zhu & Gradstein (2005).

Lopholejeunea ceylanica Steph.

On bark of tree in montane forest along the road to crater, 2000–2100 m, *Soonthree Kornochalert 1405*.

Lopholejeunea eulopha (Taylor) Schiffn.

On twigs of tea plants at the edge of tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Afiatri Putrika & Dian Apriana 25*; *Soonthree Kornochalert 1418*.

Lopholejeunea subfusca (Nees) Schiffn.

On bark of trees along the road to crater and on twigs of tea plants at the edge of tea plantation adjacent to Situ (Lake) Patenggang, 1500–2100 m, *Soonthree Kornochalert 1400, 1416*.

Lopholejeunea zollingeri (Steph.) Schiffn.

On bark of trees at car park at the entrance of road to crater, 1600 m, *Robbert Gradstein 12169*; *Soonthree Kornochalert 1413*.

Metalejeunea cucullata (Reinw. *et al*.) Grolle

On bark of trees along the road to crater, 2000–2100 m (voucher lacking).

Ptychanthus striatus (Lehm. & Lindenb.) Nees

On bark of trees at car park at the entrance of road to crater, 1600 m, *Soonthree Kornochalert 1414*.

Spruceanthus semirepandus (Nees) Verd.

On bark of tea plants in tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 5*; *Soonthree Kornochalert 1417*.

LEPIDOZIACEAE

Bazzania intermedia (Lindenb. & Gottsche) Trevis.

On bark in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 6*; *Mika Rizki Puspaningrum 4*.

Bazzania tridens (Reinw. *et al*.) Trevis.

On bark in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 20*.

Lepidozia wallichiana Gottsche

On rotten log in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 11*.

LOPHOCOLEACEAE

Chiloscyphus ciliolatus (Nees) J.J. Engel & R.M. Schust.

On rotten log in montane forest along the road to crater, 2000 m, *Nursahara Pasaribu 289*.

Chiloscyphus muricatus (Lehm.) J.J. Engel & R.M. Schust.

On tree base in montane forest along the road to crater, 2000 m (voucher lacking). A unique feature of this minute *Chiloscyphus* species are the numerous sharp teeth covering the whole surface of the leaf. The species is widespread in the southern hemisphere.

Heteroscyphus argutus (Nees) Schiffn.

On rotten log in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 14*.

Heteroscyphus aselliformis (Reinw. *et al*.) Schiffn.

On bark of trees in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 26*.

Heteroscyphus coalitus (Hook.) Schiffn.

On rotten log in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 23*; *Mika Rizki Puspaningrum 2*.

MARCHANTIACEAE

Dumortiera hirsuta (Sw.) Nees

On wet soil along river adjacent to Situ (Lake) Patenggang, 1500 m, *Fuad Bahrul Ulum 10*.

Marchantia sp.

On soil in tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Mika Rizki Puspaningrum 14*. The plants were sterile and could therefore not be identified.

MASTIGOPHORACEAE

Mastigophora diclados (Brid. ex F. Weber) Nees

On palm trunk along the road to crater, 2050 m, *Eny Yuniati 10*.

METZGERIACEAE

Metzgeria crassipilis (Lindb.) A. Evans

On bark of trees in montane forest along the road to crater and twigs of tea plants at the edge of tea plantation adjacent to Situ (Lake) Patenggang, 1500 –2100 m, *Fuad Bahrul Ulum 8*; *Mika Rizki Puspaningrum 15*.

PALLAVICINIACEAE

Symphyogynopsis gottscheana (Mont. & Nees) Grolle

On moist soil in disturbed forest adjacent to Situ (Lake) Patenggang, 1500 m, *Afiatri Putrika & Dian Apriana 22*.

PLAGIOCHILACEAE

Plagiochila fusca Sande Lac.

On palm trunk along the road to crater, 2050 m (voucher lacking).

Plagiochila junghuhniana Sande Lac.

On bark in montane forest along the road to crater, 2000–2100 m, *Afiatri Putrika & Dian Apriana 12*.

Plagiochila salacensis Gottsche

On bark in montane forest along the road to crater, 2000–2100 m (voucher lacking).

Plagiochila sciophila Nees

On bark in montane forest along the road to cra-

ter, 2000–2100 m, *Mika Rizki Puspaningrum 1*; *Nursahara Pasaribu 290*.

Plagiochilion braunianum (Nees) S. Hatt.

On palm trunk in montane forest along the road to crater, 2000–2100 m, *Afiatri Putrika & Dian Apriana 3*. A rather rare species, collected in Java only a few times. The species is easily separated from the much more common *Plagiochilion oppositum* by the entire leaves (sharply toothed in *P. oppositum*) (Inoue, 1984).

Plagiochilion oppositum (Reinw. *et al.*) S. Hatt.

On bark in montane forest along the road to crater, 2000–2100 m, *Afiatri Putrika & Dian Apriana 5, Mika Rizki Puspaningrum 7*.

RADULACEAE

Radula javanica Gottsche

On bark of trees along the road to crater and on twigs of tea plants at the edge of tea plantation adjacent to Situ (Lake) Patenggang, 1500–2100 m, *Afiatri Putrika & Dian Apriana 21*.

SCAPANIACEAE

Scapania javanica Gottsche

On rock along the road to crater, 2000–2100 m, *Afiatri Putrika & Dian Apriana 26*.

SCHISTOCHILACEAE

Schistochila sciurea (Nees) Schiffn.

On rotten log in montane forest along the road to crater, 2000 m, *Afiatri Putrika & Dian Apriana 17*.

TRICHOCOLEACEAE

Trichocolea tomentella (Ehrh.) Dumort.

On rotten log in montane forest along the road to crater, 2000–2100 m, *Afiatri Putrika & Dian Apriana 4*.

Mosses

BARTRAMIACEAE

Breutelia arundinifolia (Duby) M. Fleisch.

On cut slope and soil bank by roadside, along the road to crater, 2000 m, *Luong Thien Tam & Ng Aik Min 32*.

Philonotis hastata (Duby) Wijk & Margad. [syn. *P. evaninervis* M. Fleisch., *P. laxissima* (Müll. Hall.) Bosch & Sande Lac.]

Common, on ground in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Luong Thien Tam & Ng Aik Min 77*.

Philonotis secunda (Dozy & Molk.) Bosch & Sande Lac.

Common, on ground in the tea plantation adjacent to Situ Patenggang Lake, 1500 m, *Kanjana Wongkuna 1958*.

BRACHYTHECIACEAE

Platyhypnidium muelleri (A. Jaeger) M. Fleisch.

On wet rock along river adjacent to Situ (Lake) Patenggang, 1500 m, *Yong Kien–Thai 7613, 7615*. A species that grows in habitats which occasionally submerged by water. The plant can be recognized by its imbricate branch leaves and ovate to orbicular leaves with broadly acute apex and consistently serrulate margin.

Rhynchostegium celebicum (Sande Lac.) A. Jaeger

On rock in montane forest along the road to the crater, 2000 m, *Fadzilah Ag. Kanak 10*.

BRUCHIACEAE

Trematodon longicollis Michx. [syn. *T. acutus* Müll. Hal., *T. paucifolius* Müll. Hal.]

On soil bank of disturbed area, vicinity of Situ (Lake) Patenggang, 1500 m, *Yong Kien–Thai 7616*.

BRYACEAE

Brachymenium nepalense Hook.

Common, epiphytic on tree ferns, stems and branches of shrubs and roadside trees, along the road to crater, and in the tea plantation adjacent to Situ (Lake) Patenggang, from 1500–2000 m, *Indah Wahyuni 17*; *Kanjana Wongkuna 1925*; *Lesley C. Lubos 291, 292, 317*.

Orthodontium infractum Dozy & Molk.

On tree trunks in a shaded ravine, about 1 km from the crater of Mt. Patuha, 2000 m, *Kanjana Wongkuna 1948*; *Lesley C. Lubos 295, 299*; *Monica Suleiman 4161*; *Yong Kien–Thai 7572*. The plant was discovered in a large population, occupying an area from the base to about human breast height of a big tree (diameter at breast height about 50 cm), and

all plants were with sporophytes.

Pohlia flexuosa Harv. [syn. *P. hampeana* Broth., *P. leucostoma* (Bosch & Sande Lac.) M. Fleisch.]

On soil, along the road to crater and in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 –1700 m, *Indah Wahyuni 9*; *Kanjana Wongkuna 1954*.

Rosulabryum billarderi (Schwägr.) J.R. Spence [syn. *Bryum ramosum* (Hook.) Mitt.]

On ground in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Indah Wahyuni 24*.

BUXBAUMIACEAE

Diphyscium longifolium Griff. [syn. *D. rupestre* Dozy & Molk.]

On rock in montane forest along the road to crater, 2000 m, *Indah Wahyuni 13*; *Kanjana Wongkuna 1950*; *Lesley C. Lubos 313*; *Musyarofah Zuhri 13*.

CALYMPERACEAE

Exostratum blumii (Nees ex Hampe) L.T. Ellis [syn. *Exodictyon blumii* (Nees ex Hampe) M. Fleisch.]

On tree base in disturbed forest adjacent to Situ (Lake) Patenggang, 1500 m, *Luong Thien Tam & Ng Aik Min 84*.

Syrrhopodon tjibodensis M. Fleisch.

On fallen branch in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Fadzilah Ag. Kanak 25*.

CRYPHAEACEAE

Schoenobryum concavifolium (Griff.) Gangulee [syn. *Acrocryphaea concavifolia* (Griff.) Bosch & Sande Lac.]

Common in open area, on tea branches on trunks of big trees planted in tea plantation in Rancabali, 1700 m, *Monica Suleiman 4189*; *Yong Kien–Thai 7576*.

DICRANACEAE

**Bryohumbertia subcomosa* (Dix.) J.–P. Frahm

On rotten logs, root stumps, forest floor, especially abundant in the disturbed forest surrounding the crater of Mt. Patuha, from 2000–2200 m, *Fadzilah Ag. Kanak 21*; *Kanjana Wongkuna 1926*, *1937*; *Lesley C. Lubos 314*; *Mohd. Rawiyani 1*; *Yong Kien –Thai 7562*.

This new record, more commonly known as *B. walkeri* (Mitt.) J.–P. Frahm, is a pantropic moss species that common to high elevation area, especially in slightly disturbed forest of the Malesian region (Frahm, 1989); thus discovery of this species in Java was to be expected. The genus *Bryohumbertia* is separated from its closely related genus, *Campylopus* by its straight and long seta about 2–3 cm tall.

Campylopus aureus Bosch & Sande Lac.

On ground and soil bank by roadside, along the trail to the summit of Mt. Patuha, 2100 m, *Lesley C. Lubos 310*, *311*, *330*.

Campylopus comosus (Schwägr.) Bosch & Sande Lac. [syn. *C. caudatus* (Müll. Hal.) Mont.]

Common, on ground and soil bank by roadside, along the road to crater, 2000 m, *Kanjana Wongkuna 1938*.

Campylopus sp.

On rock by roadside, along the road to crater, 2000 m, *Indah Wahyuni 11*; *Musyarofah Zuhri 11*.

Campylopus umbellatus (Schwägr. & Gaudich. ex Arn.) Paris [syn. *C. blumii* (Dozy & Molk.) Bosch & Sande Lac.]

Common, on rock, ground and soil bank by roadside, along the road to crater and in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 –2000 m, *Indah Wahyuni 1*, *23*; *Musyarofah Zuhri 10*.

Dicranella coarctata (Müll. Hal.) Bosch & Sande Lac.

On root stumps and soil bank, abundant in the disturbed forest surrounding the crater, from 2000–2100 m, *Musyarofah Zuhri 9*.

Dicranodontium sp.

On root stumps and soil bank, abundant in the disturbed forest surrounding the crater, from 2000–2100 m, *Indah Wahyuni 6*; *Musyarofah Zuhri 18*.

Dicranoloma braunii (Müll. Hal.) Paris

On trunks and branches of roadside and forest trees, along the road to crater, 2000 m, *Lesley C. Lubos 296*; *Monica Suleiman 4154*, *4162*; *Nurlisma Junita 2*, *6*.

Dicranoloma brevisetum (Dozy & Molk.) Paris

On tree trunks, in montane forest along the road to crater, 2000 m, *Indah Wahyuni 04*; *Monica*

Suleiman 4158, 4167; *Musyarofah Zuhri 8*.

Dicranoloma sp.

On trunks and tree branches, in montane forest along the road to crater, 2000 m, *Lesley C. Lubos 329*; *Monica Suleiman 4160*; *Nurlisma Junita 9*.

Holomitrium vaginatum (Hook.) Brid. [syn. *H. javanicum* Dozy & Molk.]

On fallen branch of tall tree that grows in a disturbed forest patch adjacent to Situ (Lake) Patenggang, 1500 m, *Yong Kien–Thai 7591*. When dry, the plant has a Potiaceous outlook with strongly curved and inrolled branch leaves. It can be recognized by its Dicranaceous alar cells that are hyaline or orange in colour. The commonly present filiform propagules at upper leaves is a useful character to recognize this plant.

Microdus miquelianus (Mont.) Besch.

On ground in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Yong Kien–Thai 7597*.

Sclerodontium pallidum subsp. *celebesiae* (Broth.) H.A. Crum [syn. *Leucoloma celebesiae* Broth., *L. javanicum* Broth. ex Fleisch., *L. uncinatum* Fleisch.]

On soil bank by roadside, along the road to crater, 2000 m, *Nurlisma Junita 1, 3*; *Yong Kien–Thai 7546*. The plant can be recognized by its numerous branches that appeared subsecund to secund branches when dry, branch leaves lanceolate and bordered by a slender limbidium all around the leaf margin. In addition to this, the laminal cells are distinctly coronate–papillose. The above characters suggest a close relationship of this plant with the genus *Leucoloma*, although the often branched stems are not common in latter genus. This geographical subspecies has only been reported from Java, Sulawesi and Lombok; whereas subspecies *pallidum* has a wider distribution range, known from Australasia, Pacific Islands to near Antartic region (Kerguelen Islands) (Crum, 1986).

FISSIDENTACEAE

Fissidens bryoides var. *schmidii* (Müll. Hal.) R.S. Chopra & S.S. Kumar [syn. *F. schmidii* Müll. Hal.]

On soil bank by roadside, along the road to crater, 2000 m, *Kanjana Wongkuna 1935*.

Fissidens ceylonensis Dozy & Molk.

Common, on soil bank and cut slope by roadside, along the road to crater, 2000–2000 m, *Indah Wahyuni 10, 12*; *Kanjana Wongkuna 1947*; *Musyarofah Zuhri 1*.

Fissidens crenulatus Müll. Hal.

On rotten branch at a secondary forest adjacent to Situ (Lake) Patenggang, 1500 m, *Fadzilah Ag. Kanak 28*.

Fissidens geppii M. Fleisch.

On soil bank in full shade, in montane forest along the road to crater and a disturbed forest patch adjacent to Situ (Lake) Patenggang, 1500–2000 m, *Indah Wahyuni 21*; *Kanjana Wongkuna 1965*; *Musyarofah Zuhri 2*; *Yong Kien–Thai 7608*.

**Fissidens gymnogynus* Besch.

On soil bank in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Kanjana Wongkuna 1960*. This newly recorded species was formerly known from East Asiatic countries, with its southernmost extension to Thailand and the Philippines; the current finding further expands its distributional range and represents the southern most location of this plant. The plant can be recognized by its distinctly crisped branch leaves (when dry) with costa ceased short distant below the leaf tips, and distinctly mammillose lamina cells.

Fissidens javanicus Dozy & Molk.

On wet soil bank by a fast flowing stream that flows into Situ (Lake) Patenggang, 1500 m, *Kanjana Wongkuna 1959*.

Fissidens nobilis Griff.

On wet soil bank by a fast flowing stream that flows into Situ (Lake) Patenggang, 1500 m, *Indah Wahyuni 22*; *Kanjana Wongkuna 1972*; *Musyarofah Zuhri 3*.

**Fissidens polypodioides* Hedw. (syn. *F. areolatus* Griff.)

On wet soil bank by a fast flowing stream that flows into Situ (Lake) Patenggang, 1500 m, *Kanjana Wongkuna 1966*. This new species to Java is a large member of the genus, and is often collected in moist habitats near streams or rivers at higher elevation area in the Malesian region (Iwatsuki & Mohamed, 1987; Eddy, 1988). The species is easily recognized by its large plant size reaching to 5–7 cm tall, the broad–lingulate leaf with mucronate apex, and distinctly mamillose upper leaf cells.

Fissidens cf. *taxifolius* Hedw.

On wet soil bank by a fast flowing stream that flows into Situ (Lake) Patenggang, 1500 m, *Kanjana Wongkuna 1968*.

FUNARIACEAE

Entosthodon physcomitrioides (Mont.) Mitt. [syn. *E. javanicus* Dozy & Molk.]

On soil bank and cut slopes, in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Indah Wahyuni 18, 19*. The plant collected in this survey has a nearly hemispherical operculum with a very short beak, and branch leaves with distinctly differentiated border. Other than that, the plant fits well with the description of *E. physcomitrioides* by Ochi (1968).

HOOKERIACEAE

Actinodontium adscendens Schwägr.

On trunks of roadside trees, along the road to crater, 2000 m, *Lesley C. Lubos 326*. A handsome moss with two long costae; together with the character of large rhomboid to long–hexagonal mid–leaf cells this easily separates the species from other members of the genus.

Calyptrochaeta remotifolia (Müll. Hal.) Z. Iwats., B.C. Tan & Touw [syn. *Eriopus remotifolius* Müll. Hal.]

On rotten log in montane forest along the road to crater, 2000 m, *Fadzilah Ag. Kanak 12*.

Chaetomitrium ciliatum Bosch & Sande Lac.

On branches of tea–bushes, in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Fadzilah Ag. Kanak 22, 29*; *Lesley C. Lubos 324*; *Luong Thien Tam & Ng Aik Min 86*; *Monica Suleiman 4176*.

Chaetomitrium aff. *lanceolatum* Bosch & Sande Lac.

On trunk of understorey trees growing by roadside, along the road to crater, 2000 m, *Nurlisma Junita 17*.

Chaetomitrium orthorrhynchum (Dozy & Molk.) Bosch & Sande Lac.

Common, on branches of tea–bushes, in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Nurlisma Junita 33*.

Chaetomitrium sp.

On tree branches, in montane forest along the road to crater, 2000 m, *Nurlisma Junita 18*.

Cyclodictyon blumeanum (Müll. Hal.) Kuntze

On rock in deep shade, in montane forest along the road to crater, 2000 m, *Luong Thien Tam & Ng Aik Min 39*. A creeping moss species characterized by the presence of leaf border, distinctive double costae and large leaf cells. Although the plant is widely distributed in Malesian region, it always occurs in small populations.

Distichophyllum nigricaule Mitt. ex Bosch & Sande Lac.

On soil bank in montane forest along the road to crater, 2000 m, *Luong Thien Tam & Ng Aik Min 63*.

Distichophyllum nigricaule var. *cirratum* (Renauld & Cardot) M. Fleisch.

On soil bank in montane forest along the road to crater and a disturbed forest patch adjacent to Situ (Lake) Patenggang, 1500–2000 m, *Kanjana Wongkuna 1946*; *Yong Kien–Thai 7568*.

Hookeria acutifolia Hook. & Grev.

On soil bank in deep shade, in montane forest along the road to crater, 2000–2100 m, *Kanjana Wongkuna 1941*; *Luong Thien Tam & Ng Aik Min 58*; *Monica Suleiman 4174*; *Yong Kien–Thai 7567a*.

Hookeriopsis utacamundiana (Mont.) Broth.

On rotten branch in montane forest along the road to crater, 2000 m, *Monica Suleiman 4169a*.

HYPNACEAE

Ectropothecium buitenzorgii (Bél.) Mitt.

Common, on cut slope and soil bank by roadside, along the road to crater, 2000–2100 m, *Luong Thien Tam & Ng Aik Min 27, 30*; *Nurlisma Junita 26*.

Ectropothecium sp.

On trunks and branches of roadside trees, along the road to crater, 2000–2100 m, *Lesley C. Lubos 322*; *Nurlisma Junita 12*.

Isopterygium albescens (Hook.) A. Jaeger

On soil in a disturbed forest patch adjacent to Situ (Lake) Patenggang, 1500 m, *Yong Kien–Thai 7596*.

Isopterygium bancanum (Sande Lac.) A. Jaeger

On humus covering rock and decaying logs in deep shade, in montane forest along the road to crater, 2000 m, *Fadzilah Ag. Kanak 30*; *Luong Thien Tam & Ng Aik Min 57*; *Mohd. Rawiyani 4*.

Isopterygium gracilisetum (Hornsch. ex Schwägr.) A. Jaeger

On climber, in a tea plantation in Rancabali,

1600 m, *Yong Kien–Thai 7571*. The plant is characterized by having a long–acuminate leaf apex and a very long seta, attaining 3 cm in length. The latter character is most useful in separating this species from the other related *Isopterygium* species.

Vesicularia dubyana (Müll. Hal.) Broth.

On wet rock in shaded area along river adjacent to Situ (Lake) Patenggang, 1500 m, *Yong Kien–Thai 7610*.

HYPNODENDRACEAE

Hypnodendron reinwardtii (Schwägr.) Lindb. ex A. Jaeger & Sauerb.

On tree trunks in montane forest along the road to crater, 2000 m, *Lesley C. Lubos 328*; *Monica Suleiman 4168*.

HYPOPTERYGIACEAE

Hypopterygium vriesei Bosch & Sande Lac.

On wet rock by a fast flowing stream that flow into Situ (Lake) Patenggang, *Luong Thien Tam & Ng Aik Min 83*.

Lopidium struthiopteris (Brid.) M. Fleisch.

On tree trunks, in montane forest along the road to crater, 2000 m, *Lesley C. Lubos 307*.

LEUCOBRYACEAE

Leucobryum sanctum var. *arfakianum* (Müll. Hal. ex Geh.) A. Eddy

On soil and thick humus covering rock in a shaded ravine, about 1 km from the crater of Mt. Patuha, 2100 m, *Indah Wahyuni 14*.

Leucobryum sanctum var. *sanctum* (Nees ex Schwägr.) Hampe

On soil and humus covering rock in a shaded ravine, about 1 km from the crater of Mt. Patuha, 2100 m, *Kanjana Wongkuna 1943*; *Yong Kien–Thai 7567b*.

METEORIACEAE

Aerobryopsis wallichii (Brid.) M. Fleisch.

Common, on soil bank along the road to crater, and branches of shrubs or tea–bushes in the tea plantation adjacent to Situ (Lake) Patenggang, from 1500–2000 m, *Lesley C. Lubos 320*; *Luong Thien Tam & Ng Aik Min 73*; *Monica Suleiman 4182*; *Nurlisma Junita 24, 27, 35*. A large member of Meteoriaceae, often in extensive populations especially at high elevations, either epiphytic or on soil banks. The species is polymorphic and varies in size and leaf length; generally it can be recognized by its unipapillose (occasionally with two papillae), long–linear and thick–walled middle laminal cells.

Barbella flagellifera (Cardot) Nog. [syn. *B. pendula* fo. *rufescens* M. Fleisch., *B. pendula* fo. *brunescens* M. Fleisch.]

Hanging on the branches of shrubs or tea–bushes, in the tea plantation adjacent to Situ (Lake) Patenggang, from 1500–1600 m, *Lesley C. Lubos 323*; *Luong Thien Tam & Ng Aik Min 80*; *Monica Suleiman 4180*; *Nurlisma Junita 25, 38*; *Yong Kien–Thai 7602*.

Cryptopapillaria fuscescens (Hook.) M. Menzel [syn. *Papillaria fuscescens* (Hook.) Jaeger]

Common, on branches of understorey trees growing by roadside, along the road to crater, and in a tea plantation by Situ (Lake) Patenggang, 1500–2000 m, *Fadzilah Ag. Kanak 18*; *Luong Thien Tam & Ng Aik Min 23*.

Floribundaria floribunda (Dozy & Molk.) M. Fleisch.

Common, on branches of roadside tree along the road to the crater, and branches of tea–bushes in the tea plantation adjacent to Situ (Lake) Patenggang, 1500–2000 m, *Fadzilah Ag. Kanak 20*; *Nurlisma Junita 30*.

Meteorium polytrichum Dozy & Molk.

Common, on stems and branches of tea–bushes in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Lesley C. Lubos 321*; *Nurlisma Junita 28*; *Yong Kien–Thai 7581*.

MNIACEAE

Plagiomnium succulentum (Mitt.) T.J. Kop. [syn. *Mnium succulentum* Mitt.]

On wet rock along river adjacent to Situ (Lake) Patenggang, 1500 m, *Yong Kien–Thai 7611*.

NECKERACEAE

Homaliodendron flabellatum (Sm.) M. Fleisch.

On trunks of roadside trees, along the road to crater, 2000–2100 m, *Lesley C. Lubos 300, 305*; *Nurlisma Junita 10, 15, 16*.

Thamnobryum ellipticum (Bosch & Sande Lac.) Nieuwl. [syn. *Thamnium ellipticum* (Bosch & Sande Lac.) Kindb.]

On wet rock along river adjacent to Situ Patenggang Lake, 1500 m, *Yong Kien–Thai 7615*. A species restricted to extremely wet habitats, often on periodic submerged rock of a river. The plant is usually dull in colour, with oblong branch leaves that are often narrow at the base. In addition to this, the leaf is characterized by having single, stout costa that always ends at a short distance below leaf tip.

ORTHOTRICHACEAE

Macromitrium angustifolium Dozy & Molk.

On trunks of big trees planted in a tea plantation in Rancabali, 1600 m, *Yong Kien–Thai 7582*, *7587*, *7595*.

Macromitrium blumei Nees ex Schwägr.

On tree trunks and fallen branches, in a tea plantation in Rancabali, 1600 m, *Yong Kien–Thai 7588*, *7605*.

Macromitrium fasciculare Mitt.

On stems and branches of tea–bushes in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Lesley C. Lubos 327*; *Monica Suleiman 4181*, *4191*; *Yong Kien–Thai 7592*.

Macromitrium orthostichum Nees ex Schwägr.

On stems and branches of tea–bushes in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Monica Suleiman 4190*, *4197*; *Nurlisma Junita 34*; *Yong Kien–Thai 7577*, *7593*.

Macromitrium salakanum Müll. Hal.

On branches of tea–bushes and fallen branches in disturbed forest adjacent to Situ (Lake) Patenggang, 1500 m, *Kanjana Wongkuna 1952*; *Lesley C. Lubos 318*; *Nurlisma Junita 31*.

POLYTRICHACEAE

Pogonatum cirratum (Sw.) Brid.

On soil bank and cut slope in shaded area, along the road to crater, 2000–2100 m, *Indah Wahyuni 2*, *8*; *Kanjana Wongkuna 1929*; *Monica Suleiman 4172*, *4173*; *Musyarofah Zuhri 7*.

Pogonatum neesii (Müll. Hal.) Dozy

On boulder, soil bank and cut slope of exposed area, in the tea plantation and along the road to crater, 1500–2000 m, *Indah Wahyuni 20*; *Kanjana Wongkuna 1930*, *1955*; *Monica Suleiman 4195*; *Musyarofah Zuhri 6*.

POTTIACEAE

Anoectangium aestivum (Hedw.) Mitt. [syn. *A. euchloron* (Schwägr.) Mitt.]

On base of big tree planted opposite the tea plantation's guest house in Rancabali, 1500 m, *Yong Kien–Thai 7585*. An easily overlooked plant because of its small size. The plant usually grows in thick cushions in rock crevices at elevation above 2500 m (Norris & Koponen, 1989; Eddy, 1990) but in this survey it was found in short cushions in the crevices of rough bark at tree base, very close to ground and a rather low elevation, *viz*. 1500 m.

Oxystegus cuspidatus (Dozy & Molk.) P.C. Chen [syn. *Trichostomum cuspidatum* Dozy & Molk.]

On soil bank along the road to crater, and base of tea–bushes, in the tea plantation adjacent to Situ Patenggang Lake, 1500–2000 m, *Indah Wahyuni 03*; *Musyarofah Zuhri 5*; *Yong Kien–Thai 7600*.

Weissia sp.

On rock at exposed area, in the tea plantation adjacent to Situ (Lake) Patenggang and along the road to crater, 1500–2000 m, *Kanjana Wongkuna 1927*, *1957*.

PTEROBRYACEAE

Garovaglia sp.

On branches of tea–bushes, in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Lesley C. Lubos 325*; *Nurlisma Junita 36*, *37*.

Pterobryopsis crassicaulis (Müll. Hal.) M. Fleisch.

On branches and trunks of big trees planted in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Monica Suleiman 4188*; *Nurlisma Junita 32*.

Trachyloma indicum Mitt.

On trunks of roadside trees, along the road to crater, 2000–2100 m, *Lesley C. Lubos 303*; *Nurlisma Junita 11*,*13*; *Yong Kien–Thai 7554*.

PTYCHOMNIACEAE

Glyphothecium sciuroides (Hook.) Hampe

On trunks of roadside trees, along the road to crater, 2000 m, *Lesley C. Lubos 293*, *301*, *302*; *Monica Suleiman 4153*, *4156*; *Nurlisma Junita 4*.

Hampeella pallens (Sande Lac.) M. Fleisch.

On trunks of roadside trees, along the road to crater, 2000 m, *Monica Suleiman 4164*; *Nurlisma Junita 11*. This unique plant can easily recognized by its glossy appearance with its more or less distichously arranged branch leaves, which are strongly asymmetric with acute apices.

RACOPILACEAE

Racopilum cuspidigerum (Schwägr.) Ångström

On fallen branch in a secondary forest adjacent to Situ (Lake) Patenggang, 1500 m, *Fadzilah Ag. Kanak 24*.

RHIZOGONIACEAE

Pyrrhobryum latifolium (Bosch & Sande Lac.) Mitt. [syn. *Rhizogonium badakense* M. Fleisch., *R. latifolium* Bosch & Sande Lac.]

On tree trunks, in montane forest along the road to crater, 2000 m, *Musyarofah Zuhri 14*.

Pyrrhobryum spiniforme (Hedw.) Mitt. [syn. *Rhizogonium spiniforme* (Hedw.) Bruch]

Common, on tree trunks and fallen logs, along the road to crater, 2000 m, *Fadzilah Ag. Kanak 14, 15*; *Indah Wahyuni 5, 15*; *Lesley C. Lubos 298, 308, 312*; *Musyarofah Zuhri 15*; *Nurlisma Junita 8, 22*.

SEMATOPHYLLACEAE

Acroporium diminutum (Brid.) M. Fleisch.

On trunks and tree branches, in montane forest along the road to crater, 2000 m, *Lesley C. Lubos 304*; *Monica Suleiman 4165*; *Nurlisma Junita 14, 19*.

Acroporium rufum (Reinw. & Hornsch.) M. Fleisch.

On trunks and fallen twigs, as well as on soil banks in partially shaded area by roadside, along the road to crater, 2000–2100 m, *Lesley C. Lubos 295*; *Luong Thien Tam & Ng Aik Min 50*; *Mohd. Rawiyani 2*; *Monica Suleiman 4157*; *Nurlisma Junita 5*; *Yong Kien–Thai 7547*.

Acroporium stramineum (Reinw. & Hornsch.) M. Fleisch.

On soil banks and tree trunk in partially shaded area by roadside, along the road to crater, and on tea branches by Situ (Lake) Patenggang, 1500–2000 m, *Luong Thien Tam & Ng Aik Min 24, 48*; *Monica Suleiman 4155, 4195*.

Acroporium strepsiphyllum (Mont.) B.C. Tan

On rocks, rotten logs, trunks and tree branches, in montane forest along the road to crater, 2000 m, *Fadzilah Ag. Kanak 1, 2, 3, 4*; *Lesley C. Lubos 297*; *Monica Suleiman 4159*; *Nurlisma Junita 7*.

Macrohymenium strictum Bosch & Sande Lac.

On fallen branch, in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Fadzilah Ag. Kanak 30*.

Pseudohypnella verrucosa (Dozy & Molk.) M. Fleisch.

On rock and rotten branch, in deep shaded area in montane forest along the road to crater, 2000 m, *Luong Thien Tam & Ng Aik Min 38*; *Monica Suleiman 4169b*. A rare handsome moss, growing in deep shade and easily overlooked. The plant is characterized by its oblong leaf with almost obtuse apex, and the fascinating leaf cells which are decorated by many tall, branched papillae.

Sematophyllum subpinnatum (Brid.) E. Britton

Common in open area, on trunks of big trees planted in tea plantation in Rancabali and adjacent to Situ (Lake) Patenggang, 1500–1700 m, *Lesley C. Lubos 319*; *Luong Thien Tam & Ng Aik Min 69*; *Nurlisma Junita 29*; *Yong Kien–Thai 7572*. The plant is very variable in size, with plant habit and leaf features that might be confused with *Meiothecium microcarpum* (Harv.) Mitt., a species common in lower elevation. However the present of a double peristome in all specimens examined is the key character to distinguish this plant from members of *Meiothecium* which are characterized by possessing a single peristome.

Trichosteleum sp.

On rotten log in montane forest along the road to crater, 2000 m, *Luong Thien Tam & Ng Aik Min 57*.

Warburgiella sp.

On rotten log in montane forest along the road to crater, 2000 m, *Fadzilah Ag. Kanak 17*.

TRACHYPODIACEAE

Diaphanodon blandus (Harv.) Renauld & Cardot [syn. *D. javanicus* Renauld & Cardot]

On trunk of tree fern and branches of tea–bush, in the tea plantation adjacent to Situ (Lake) Patenggang and in Rancabali, 1500–1600 m, *Yong Kien–Thai 7571, 7599*.

A plant with dimorphic young and mature stages, as represented by two specimens collected in

this study. The young plant is densely mat–forming, with many short branches that are tightly arranged on the stem, and the stem branched very often in short intervals. The mature plant, on the other hand, has long, flagelliform branches and stems that sparsely branched. Fortunately, the leaf characters are more or less consistent in both stages, and are useful in recognizing the species.

Trachypus bicolor Reinw. & Hornsch.

On soil bank and cut slope, along the road to crater, 2000–2100 m, *Luong Thien Tam & Ng Aik Min 33*, *35*; *Yong Kien–Thai 7551*.

Trachypus humilis Lindb.

On stems and branches of tea–bushes in the tea plantation adjacent to Situ (Lake) Patenggang, 1500 m, *Nurlisma Junita 23*; *Yong Kien–Thai 7603*.

THUIDIACEAE

Thuidium cymbifolium (Dozy & Molk.) Dozy & Molk.

On base of roadside trees, along the road to crater, 2000–2100 m, *Lesley C. Lubos 309*; *Nurlisma Junita 20*.

Thuidium pristocalyx (Müll. Hal.) A. Jaeger [syn. *T. glaucinoides* var. *verrucosum* M. Fleisch, *T. glaucinum* (Mitt.) Bosch & Sande Lac.]

Common, on rock and base of roadside trees and tea–bushes, found along the road to crater and in the tea plantation, 1500–1900 m, *Fadzilah Ag. Kanak 8*; *Lesley C. Lubos 294*, *306*; *Luong Thien Tam & Ng Aik Min 26*, *70*; *Yong Kien–Thai 7548*.

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Dissochaeta vacillans (Blume) Blume

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Dissochaeta inappendiculata Blume

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