



RESEARCH ARTICLE - ANTS

A Checklist of Ants (Hymenoptera: Formicidae) in Pakistan

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Abstract

The present paper provides an updated checklist of the ants (Hymenoptera: Formicidae) of Pakistan. These include seven of the 21 known extant subfamilies with 103 valid ant species in 35 genera. Five species are reported for the first time from Pakistan: *Cardiocondyla wroughtonii* Forel, 1890; *Crematogaster biroi* Mayr, 1897; *Ooceraea biroi* (Forel, 1907); *Pseudoneoponera rufipes* Jerdon, 1851 and *Strumigenys godeffroyi* Mayr, 1866. Images to scientifically validate new faunal records from Pakistan and facilitate prompt identification are provided. Among the newly recorded species, three species viz., *C. wroughtonii*; *O. biroi* and *S. godeffroyi* are considered as tramp species having the cosmopolitan distribution. Notes about type localities, depositories and distribution in Pakistan are provided to each species record. The list provides a synthesis of the regional taxonomical work carried out until now and will serve as a baseline survey for future studies.

Introduction

Pakistan occupies 882,000 sq. km, lying between 24 and 37 degrees north and 61 and 75 degrees east. The country straddles three of the world's eight biogeographic realms: IndoMalayan, Palearctic, and AfricoTropical and four of Earth's ten biomes: desert, temperate grassland, tropical seasonal forest and mountain (Cox & Moore, 1993). Almost 80% of the total land area of the country is represented by mountainous arid and semi-arid regions, which support abrupt changes in altitude generating many changes in species composition within short distances (Anwar & Shank, 2002). The country has rich biodiversity and is signatory to virtually all the important international biodiversity agreements (GOP, 1999). Still, estimates on biodiversity are far from conclusive. In addition to this, serious issues like deforestation, overgrazing, soil erosion, waterlogging, continuing loss of

forest habitat, are posing major threats to the biodiversity of the country (Baig & Al-Subaice, 2011). An efficient workable strategy should be to conserve, attain sustainable levels of biodiversity and prioritise keystone species groups for drafting of conservational strategies.

Ants are one of the major keystone species, representing about 30% of terrestrial faunal biomass globally, and evolved as one of the most species-rich and ecologically diverse group of social insects (Andersen & Majer, 2004). Ants perform numerous functions as predators, prey, detritivores, mutualists, herbivores, aid in nutrient mineralization; its movement and distribution, communiton, soil aggregate formation, seed dispersal and tunneling (Folgarait, 1998; Pfeiffer et al., 2013) and as such are essential for proper functioning of most terrestrial ecosystems and resulting ecosystem services (Del Toro et al., 2012). Ants are more sensitive than other insects to ecosystem change and are often



used in environmental monitoring studies to assess ecosystem change on biodiversity (Paknia & Pfeiffer, 2011). Ants are also useful in natural areas restoration efforts because of their fast response to changes in habitat quality (Andersen et al., 2006; Gibb et al. 2015).

Little information is available on the ants of Pakistan with a most comprehensive account been a 115 years old compilation of Bingham (1903). The study stands outdated in modern context due to several taxonomic regroupings, unrecognized synonymies and other zoogeographical confusions. Compilation of Menozzi, (1939), of the Italian expedition led by S.A.R. il Duca di Spoleto in Himalayan and Karakorum is much pertinent to the present study. The study was carried in the entire Himalayan belt of which, now parts are governed by India, Pakistan and China separately. Most of the Pakistan ant records are from Gilgit–Baltistan region during this expedition. Other papers pertinent include Forel (1904); Donisthorpe (1933); Wilson (1955); Brown (1959);

Eidmann (1942); Mani and Singh (1962); Dlussky (1965); Pisarski (1967); Collingwood (1982). Recent contributions focused on systematic accounts and species enumeration include those of Seifert (1992, 2003, 2008); Radchenko and Elmes (1999, 2001, 2010); Ward (2001); Aslam et al. (2006); Li-zhong (2006); Csösz et al. (2007); Seifert and Schultz (2009); Yamane (2009); Umair et al. (2012); Wetterer (2009, 2012); Laciny et al. (2015); Bharti et al (2016); Bodlah et al. (2016); Janicki et al. (2016); Bodlah et al. (2017a); Bodlah et al. (2017b); Seifert et al. (2017); Guénard et al. (2017).

Recognizing the importance of ants as major ecosystem players and scatter of the available literature, we herewith provide a first ever comprehensive account of the regional ants of Pakistan. The paper summarises all the old and new information available on the group. The paper provides baseline data against which futuristic faunal changes could be assessed with respect to perturbations and will also help to frame future conservation programs.

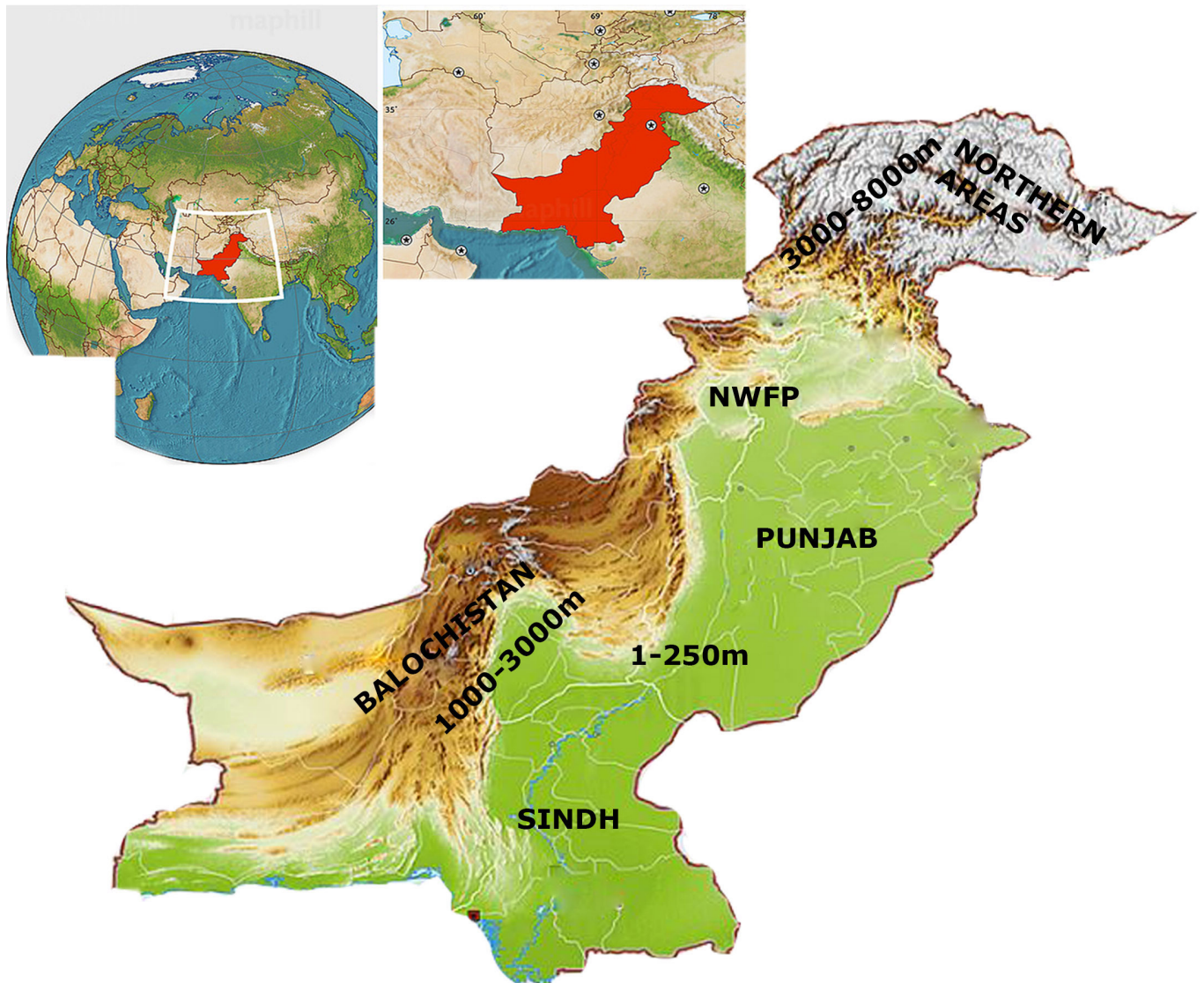


Fig 1. Map of Pakistan.

Material and Methods

The checklist is based on available literature, museum collections and recent ant collection across various localities of Pakistan. New ant records from Pakistan were studied under Labomed CZM6 microscope. Images were prepared with a digital camera (Amscope 18 megapixels, model number MU1803) attached with same microscope using Helicon Focus stacking software and later cleaned in Adobe Photoshop CS6 software. Specimens were identified upto genus and species levels, using most recent relevant literature. Names of described species presented are in accordance with the most recent classification following AntWeb (2019). Genera and species names are arranged in alphabetical order following each subfamily, to make easier the search for a given taxon. References of original descriptions and local distribution are listed for all species. The acronyms used for collections are listed below:

AMNH - American Museum of Natural History, New York
 ANIC - Australian National Insect Collection, Canberra, Australia
 BMNH - Natural History Museum, London, United Kingdom
 FMNH - Field Museum of Natural History, Chicago
 HNHM - Hungarian Natural History Museum, Budapest, Hungary
 MHNG - Muséum d'Histoire Naturelle, Geneva, Switzerland
 MNHN - Muséum National d'Histoire Naturelle, Paris, France
 MSNG - Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy
 MSNM - Museo Civico di Storia Naturale, Milano, Italy
 MZPW - Museum of the Zoological Institute of the Polish Academy of Sciences Warsaw, Poland
 NHMB - Naturhistorisches Museum, Basel, Switzerland
 NHMW - Naturhistorisches Museum, Wien, Austria
 NMNL - National Museum of Natural History Naturalis, Leiden
 OUMNH - University Museum of Natural History, Oxford, United Kingdom
 PUAC - Punjabi University Patiala Ant Collection, Punjab, India
 SMNG - Senckenberg Museum für Naturkunde Görlitz, Görlitz
 UNK - Unknown depository of type material
 ZISP - Zoological Institute, Academy of Sciences, St. Petersburg, Russia
 ZMHB - Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

Results

DOLICHODERINAE

Chronoxenus myops (Forel, 1895)

Bothriomyrmex myops Forel, 1895: 471. TL: South Konkan, Maharashtra: India [Lectotype: MHNG].
 Distribution: Kashmir (Menozzi, 1939: 338).

Tapinoma melanocephalum (Fabricius, 1793)

Formica melanocephala Fabricius, 1793: 353. TL: Cayenne, French Guiana [Type: UNK].
 Distribution: Karachi (Wetterer, 2009: 25).

Tapinoma wroughtonii Forel, 1904

Tapinoma wroughtonii Forel, 1904: 26. TL: Jhelum valley, Jammu and Kashmir: India [Syntype: MHNG].
 Distribution: Jhelum valley, Kashmir (Forel, 1904: 26; Menozzi, 1939: 338); Gor, Gilgit-Baltistan (Eidmann, 1942: 249).

DORYLINAE

Aenictus sagei Forel, 1901

Aenictus wroughtonii var. *sagei* Forel, 1901a: 469. TL: Dharamsala, Himachal Pradesh: India [Lectotype: MHNG].
 Distribution: Torkham, Peshawar (Pisarski, 1967: 377).

Dorylus fulvus (Westwood, 1839)

Typhlopone fulva Westwood, 1839: 219. TL: North Africa [Holotype: OUMNH].
 Distribution: Peshawar (FMNHINS0000045249: AntWeb, 2019).

Dorylus labiatus Shuckard, 1840

Dorylus labiatus Shuckard, 1840: 319. TL: India [Syntype: OUMNH].
 Distribution: Islamabad, Rawalpindi (Aslam et al., 2006: 86).

Lioponera longitarsus Mayr, 1879

Lioponera longitarsus Mayr, 1879: 667. TL: [Ostind.]: India [Syntype: NHMW].
 Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 703).

Ooceraea biroi (Forel, 1907) Figures (2-4)

Cerapachys (Syscia) biroi Forel, 1907: 7. TL: Singapore [Lectotype: MHNG].



Figures 2-4. *Ooceraea biroi* (Forel, 1907): (2) Head, frontal view; Habitus (3) dorsal view; (4) lateral view.

Material examined. Pakistan, Islamabad, Kachnar Park Forest area, 33°40.602'N 73°04.574'E, 603 m.a.s.l., 65 (workers), 20.xi.2015, 25 (workers), 24.viii.2016, 25 (workers), 12.ix.2017, under stone, leg. M.T. Rasheed.
Distribution: Pakistan (new record).

FORMICINAE

Camponotus buddhae Forel, 1892

Camponotus buddhae Forel, 1892a: 238. TL: Lahoul front Tibet, Himachal Pradesh: India [Syntype: MHNG].
Distribution: Askole, Gilgit–Baltistan (Menozzi, 1939: 315); Nanga Parbat, Gilgit–Baltistan (Eidmann, 1942: 251).

Camponotus compressus (Fabricius, 1787)

Formica compressa Fabricius, 1787: 307. TL: Tharangambadi, Tamil Nadu: India [Type: UNK].
Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 703).

Camponotus confucii Forel, 1894

Camponotus confucii Forel, 1894: 396. TL: Kanara, Karnataka: India [Syntypes: MHNG].
Distribution: Rawalpindi (Umair et al., 2012: 702).

Camponotus japonicus Mayr, 1866

Camponotus japonicus Mayr, 1866a: 885. TL: Japan [Syntype: NMNL].
Distribution: Turbaling, Gilgit–Baltistan (Eidmann, 1942: 251; Yasumatsu & Brown, 1957: 47); Islamabad, Rawalpindi (Umair et al., 2012: 703).

Camponotus oblongus (Smith, 1858)

Formica oblonga Smith, 1858: 21. TL: [Birmah] Myanmar; [Holotype: BMNH].
Distribution: Rawalpindi (Umair et al., 2012: 702).

Camponotus sericeus (Fabricius, 1798)

Formica sericea Fabricius, 1798: 279. TL: Senegal [Type: UNK].
Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 702).

Camponotus socrates Forel, 1904

Camponotus socrates Forel, 1904: 27. TL: Jhelum valley, Jammu and Kashmir: India [Syntypes: MHNG].
Distribution: Kashmir (Forel, 1904: 29).

Camponotus sylvaticus basalis Smith, 1878

Camponotus basalis Smith, 1878: 9. TL: Sindh valley, Jammu and Kashmir: India [Holotype: UNK].
Distribution: Tolti Kharmang, Gilgit–Baltistan (Menozzi, 1939: 315); Turbaling, Gilgit–Baltistan (Eidmann, 1942: 251).

Camponotus sylvaticus paradichrous Emery, 1925

Camponotus sylvaticus var. *paradichroa* Emery, 1925: 101. TL: Himalaya: India [Type: UNK].
Distribution: Askole, Braldu, Gilgit–Baltistan (Menozzi, 1939: 315; Mani & Singh, 1962: 84).

Camponotus variegatus dulcis Dalla Torre, 1893

Camponotus mitis var. *dulcis* Dalla Torre, 1893: 243. TL: Bhamò [Birmanian]: Myanmar [Syntype: MSNG].
Distribution: Razmak, Waziristan (CASENT0906973: AntWeb, 2019).

Cataglyphis aenescens (Nylander, 1849)

Formica aenescens Nylander, 1849: 37. TL: Russia [Type: UNK].
Distribution: Makran, Balochistan (Brown, 1959: 229).

Cataglyphis cugiai Menozzi, 1939

Cataglyphis (Monocombus) cugiai Menozzi, 1939: 323. TL: Suru valley, Kargil, Jammu and Kashmir: India [Holotype: MZPW].
Distribution: Askole, Blukro, Braldu, Bunji, Dassu, Nanga Parbat, Panmah, Skardu, Talichi, Gilgit–Baltistan (Menozzi, 1939: 326; Eidmann, 1942: 255; Mani & Singh, 1962: 84).

Cataglyphis setipes (Forel, 1894)

Myrmecocystus viaticus R. *setipes* Forel, 1894: 401. TL: Nusseerabad, Rajpootana: India [Syntype: MHNG].
Distribution: Gor, Gilgit–Baltistan (Eidmann, 1942: 254); Kalat, Makran, Pasni, Quetta, Balochistan; Sindh (Brown, 1959: 229).

Formica clara Forel, 1886

Formica rufibarbis var. *clara* Forel, 1886: 206. TL: [Damas] Damascus: Syria [Syntype: MHNG].
Distribution: Pakistan (Seifert & Schultz, 2009: 263).

Formica cunicularia Latreille, 1798

Formica cunicularia Latreille, 1798: 40. TL: Fumel: France [Neotype: SMNG].
Distribution: Kashmir (Menozzi, 1939: 343); Bunji, Chamuri, Gilgit–Baltistan (Eidmann, 1942: 252); Chamuri, Nanga Parbat (Mani & Singh, 1962: 85).

Formica fusca Linnaeus, 1758

Formica fusca Linnaeus, 1758: 580. TL: Sweden [Type: UNK].
Distribution: Karakorum (Menozzi, 1939: 343).

Formica gagates Latreille, 1798

Formica gagates Latreille, 1798: 36. TL: Limousin, Brive: France [Neotype: MNHN].
Distribution: Chamuri, Hauptlager, Nanga Parbat (Eidmann, 1942: 253).

Formica pamirica Dlussky, 1965

Formica subpilosa subsp. *pamirica* Dlussky, 1965: 30. TL: Darvaz Mountain Ridge, Highway to Horog: Tajikistan [Holotype: ZISP].
Distribution: Alay valley, base of Amu Darya (Dlussky, 1965: 30).

Formica picea Nylander, 1846

Formica picea Nylander, 1846: 917. TL: Helsinki: Finland [Lectotype: FMNH].
Distribution: Karakorum (Menozzi, 1939: 343); Askole, Baltoro, Braldu, Panmah, Gilgit–Baltistan (Mani & Singh, 1962: 85).



Figures 5-7. *Strumigenys godeffroyi* Mayr, 1866 (5) Head, frontal view; Habitus (6) dorsal view; (7) lateral view.

***Formica sanguinea* Latreille, 1798**

Formica sanguinea Latreille, 1798: 37. TL: France [Type: UNK].
Distribution: Karakorum (Menozzi, 1939: 344).

***Formica truncorum* Fabricius, 1804**

Formica truncorum Fabricius, 1804: 403. TL: Czechoslovakia [Holotype: UNK].
Distribution: Doyan, Gor, Gilgit-Baltistan (Eidmann, 1942: 253).

***Lasius alienoflavus* Bingham, 1903**

Lasius alienoflavus Bingham, 1903: 341. TL: Himalayas: India [Syntypes: AMNH].
Distribution: Bara Gali, Chikar, Chopal, Kawai Kaghan, Murree, Nathia Gali (Collingwood, 1982: 290).

***Lasius alienus* (Foerster, 1850)**

Formica aliena Foerster, 1850: 36. TL: Lousberg, Aachen: Germany [Syntype: NHMW].
Distribution: Chokpiong, Dassu, Gund, Gilgit-Baltistan; Quetta, Balochistan (Menozzi, 1939: 312); Naran, Kaghan (Collingwood, 1982: 285); Islamabad, Rawalpindi (Umair et al., 2012: 703).

***Lasius brunneus* (Latreille, 1798)**

Formica brunnea Latreille, 1798: 41. TL: France. [Type: UNK].

Distribution: Lahore (Wilson, 1955: 51); Kalan, Swat (Collingwood, 1982: 286).

***Lasius carniolicus* Mayr, 1861**

Lasius carniolicus Mayr, 1861: 51. TL: Laibach: Yugoslavia [Holotype: NHMW].

Distribution: Askole, Braldu, Gilgit-Baltistan (Menozzi, 1939: 313; Wilson, 1955: 191); Naran (Collingwood, 1982: 292).

***Lasius himalayanus* Bingham, 1903**

Lasius himalayanus Bingham, 1903: 340. TL: Himalaya: India [Syntypes: MHNG].

Distribution: Shigar, Gilgit-Baltistan (Menozzi, 1939: 313); Chitral, Hazara, Lahore (Seifert, 1992: 8).

***Lasius hirsutus* Seifert, 1992**

Lasius (Lasius) hirsutus Seifert, 1992: 41. TL: Chitral, Madaglasht: Pakistan [Syntypes: MHNG].

Distribution: Chitral, Madaglasht (Seifert, 1992: 41).

***Lasius lawarai* Seifert, 1992**

Lasius (Lasius) lawarai Seifert, 1992: 38. TL: Dir, Lawarai-Pass: Pakistan [Holotype: MHNG].

Distribution: Dir, Lawarai-Pass; Chitral, Madaglasht; Hazara, Naran; Swat, Kalam, Malam Jabba, Miandam, Utrot (Seifert, 1992: 38); Lawarai-Pass (CASENT0911182: AntWeb: 2019).

***Lasius niger* (Linnaeus, 1758)**

Formica nigra Linnaeus, 1758: 580. TL: Europe [Type: UNK].

Distribution: Askole, Baltoro, Biaho, Braldu, Panmah, Payu Urdukas, Tsok, Gilgit-Baltistan (Menozzi, 1939: 313); Nathia Gali (Wilson, 1955: 76); Naran, Kaghan valley (Collingwood, 1982: 287).

***Lasius wittmeri* Seifert, 1992**

Lasius (Lasius) wittmeri Seifert, 1992: 39. TL: Pahalgam, Jammu and Kashmir: India [Holotype: NHMB].

Distribution: Naran, Kaghan valley (Seifert, 1992: 39).

***Lepisiota frauenfeldi* (Mayr, 1855)**

Hypoclinea frauenfeldi Mayr, 1855: 378. TL: [Syracus], Sicily: Italy; Attica: Greece [Syntypes: ZMHB].

Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 702).

***Lepisiota frauenfeldi integra* (Forel, 1894)**

Acantholepis frauenfeldi Var. *integra* Forel, 1894: 411. TL: Dharamsala, Himachal Pradesh: India [Syntype: MHNG].

Distribution: Talichi, Gilgit-Baltistan (Eidmann, 1942: 249).

***Lepisiota lunaris* (Emery, 1893)**

Acantholepis lunaris Emery, 1893: 250. TL: Colombo: Sri Lanka [Syntypes: MSNG].

Distribution: Margund, Sindh valley (Menozzi, 1939: 312).

***Lepisiota sericea* (Forel, 1892)**

Acantholepis frauenfeldi var. *sericea* Forel, 1892b: 41. TL: Mussoorie, Uttarakhand: India [Syntype: MHNG].

Distribution: Dassu, Gangam, Gārhi, Gilgit–Baltistan (Menozzi, 1939: 312); Makran, Nodiz; Sindh, Thatta (Brown, 1959: 229).

***Paratrechina longicornis* (Latreille, 1802)**

Formica longicornis Latreille, 1802: 113. TL: Bangkok: Thailand [Neotype: ANIC].

Distribution: Pakistan (AntMaps: 2019).

***Plagiolepis balestrierii* Menozzi, 1939**

Plagiolepis balestrierii Menozzi, 1939: 310. TL: Karakoram: India, Pakistan [Syntypes: MSNM].

Distribution: Askole, Braldo, Chongo, Kro Brok, Parkutta, Shigar, Skardu, Gilgit–Baltistan (Menozzi, 1939: 312; Mani & Singh, 1962: 85).

***Plagiolepis pontii* Menozzi, 1939**

Plagiolepis pontii Menozzi, 1939: 309. TL: Panmah valley, Suru valley, Jammu and Kashmir: India [Syntypes: MSNM].

Distribution: Panmah, Gilgit–Baltistan (Menozzi, 1939: 310).

***Polyrhachis grisescens* Emery, 1895**

Polyrhachis simplex var. *grisescens* Emery, 1895: 483. TL: Lower Burma, Pegu Yoma: Myanmar [Syntype: MSNG].

Distribution: Kohat (CASENT0217772: AntWeb, 2019).

***Polyrhachis hodgsoni* Forel, 1902**

Polyrhachis hodgsoni Forel, 1902a: 289. TL: [Moulmain] Mawlamyine: Myanmar [Syntype: MHNG].

Distribution: Islamabad (Umair et al., 2012: 702).

MYRMICINAE***Aphaenogaster beelsoni* Donisthorpe, 1933**

Aphaenogaster (Attomyrma) beelsoni Donisthorpe, 1933: 24. TL: Kotkhai, Simla, Himachal Pradesh: India [Holotype: BMNH].

Distribution: Kalala, North-West Frontier Province (Donisthorpe, 1933: 24).

***Aphaenogaster sagei* (Forel, 1902)**

Stenammas (Aphaenogaster) sagei Forel, 1902b: 221. TL: Lahoul front Thibet, Himachal Pradesh: India [Syntype: MHNG].

Distribution: Askole, Gilgit–Baltistan (Menozzi, 1939: 296); Kaghan valley, Khyber Pakhtunkhwa (CASENT0280946: AntWeb, 2019).

***Aphaenogaster smythiesii* (Forel, 1902)**

Stenammas (Aphaenogaster) smythiesii Forel, 1902b: 222. TL: Mandali, N. W. Himalaya: India [Syntype: MHNG].

Distribution: Quetta, Balochistan (Menozzi, 1939: 296).

***Cardiocondyla mauritanica* Forel, 1890**

Cardiocondyla nuda var. *mauritanica* Forel, 1890a: lxxv. TL: Gabés, Tunisia [Syntype: MHNG].

Distribution: Madyan, Swat (Seifert, 2003: 249; 2008: 45; Wetterer, 2012: 990; Seifert et al., 2017: 339).

***Cardiocondyla wroughtonii* (Forel, 1890) Figures (8-10)**

Emeryia wroughtonii Forel, 1890b: cxi. TL: Poona: India [Syntypes: BMNH, MHNG].



Figures 8-10. *Cardiocondyla wroughtonii* (Forel, 1890) (8) Head, frontal view; Habitus (9) dorsal view; (10) lateral view.

Material examined: Pakistan, Islamabad, Trail 5 Forest area, 33°45.247'N 73°05.146'E, 631 m. a.s.l., 5 (workers), 20.ii.2015, leaf litter, 5 (workers), 05.iv.2017, soil nest, 11 (workers), 14.x.2017, leaf litter, leg. M.T. Rasheed; Rawalpindi, Forest area Murree 33°51.008'N 73°19.162'E, 1158 m a.s.l., 4 (workers), 20.iv.2015, flowering plants, leg. I. Bodlah; Rawalpindi, Forest area Kotli Sattian, 33°41.902'N 73°30.612'E, 1261 m a.s.l., 9 (workers), 05.xi.2016, leaf litter, leg. I. Bodlah; Rawalpindi, Forest area Osia, 33°43.255'N 73°02.150'E, 1482 m a.s.l., 6 (workers), 19.x.2016, leaf litter, leg. M.T. Rasheed; Islamabad, Forest area Pir Sohawa, 33°78.82'N 73°10.69'E, 1482 m a.s.l., 12 (workers), 23.viii.2016, nursery plants, leg. I. Bodlah; Rawalpindi, Forest area Neela Sand, 33°95.16'N 73°22.007'E, 923 m a.s.l., 10 (workers), 04.vi.2017, soil nest, leg. A. G. Fareen; Rawalpindi, Forest area Neela Sand, 33°51.008'N 73°19.162'E, 1482 m a.s.l., 10 (workers), 25.ix.2017, soil nest, leg. A. G. Fareen; Islamabad, Kachnar Park Forest area, 33°40.602'N 73°04.574'E, 603 m. a.s.l., 1 (worker), 31.viii.2017, tree bark, leg. M.T. Rasheed. Distribution: Pakistan (new record).

***Crematogaster biroi* Mayr, 1897** Figures (11-13)

Crematogaster biroi Mayr, 1897: 428. TL: Colombo [Ceylon]: Sri Lanka [Syntype: HNHM].

Material examined. Pakistan, Islamabad, Forest area Pir Sohawa, 33°78.82'N 73°10.69'E, 1482 m a.s.l., 15 (workers), 11.iv.2016, tree bark, leg. I. Bodlah; Rawalpindi, Forest area Neela Sand, 33°9.516'N 73°22.007'E, 923 m a.s.l., 5 (workers), 09.v.2016, tree bark, leg. A. G. Fareen; Rawalpindi, Forest area Murree 33°51.008'N 73°19.162'E, 1158 m a.s.l., 12 (workers), 08.vi.2015, tree bark, leg. A. G. Fareen; Islamabad, Kachnar Park Forest area, 33°40.602'N 73°04.574'E, 603 m. a.s.l., 10 (workers), 26.iii.2017, soil nest, leg. M.T. Rasheed.

Distribution: Pakistan (new record).

***Crematogaster himalayana* Forel, 1902**

Crematogaster himalayanus Forel, 1902b: 202. TL: Dharamsala, Himachal Pradesh: India [Syntype: MHNG].

Distribution: Rakhiot-Tal, Nanga Parbat (Eidmann, 1942: 247).

***Crematogaster rothneyi* Mayr, 1879**

Crematogaster rothneyi Mayr, 1879: 685. TL: Calcutta, West Bengal: India [Syntype: NHMW].

Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 702).

***Crematogaster subdentata kaschgariensis* Forel, 1901**

Crematogaster inermis R. kaschgariensis Forel, 1901b: 63. TL: Maralbaschi am Kaschgar-Darja: China [Syntype: MHNG].

Distribution: Kashmir (Menozzi, 1939: 335).

***Leptothorax acervorum* (Fabricius, 1793)**

Formica acervorum Fabricius, 1793: 358. TL: Denmark [Type: UNK].

Distribution: Chogo, Thla Brok, Urdukas, Gilgit-Baltistan (Menozzi, 1939: 302).

***Meranoplus bicolor* (Guérin-Méneville, 1844)**

Cryptocerus bicolor Guérin-Méneville, 1844: 425. TL: Pudicherry, Tamil Nadu: India [Type: UNK].

Distribution: Kohat, Rawalpindi (Schödl, 1998: 372); Islamabad, Rawalpindi, (Umair et al., 2012: 701); Kohat (CASENT0217854: AntWeb, 2019).

***Messor himalayanus* (Forel, 1902)**

Stenammina (*Messor*) *barbarum* r. *himalayanum* Forel, 1902b: 221. TL: Jammu and Kashmir: India Syntypes: MHNG].

Distribution: Chongo, Gārhi, Gund, Hoto, Karal Marfo, Gilgit-Baltistan; Quetta, Balochistan (Menozzi, 1939: 297); Turbaling, Gilgit-Baltistan (Eidmann, 1942: 245).

***Messor instabilis* (Smith, 1858)**

Atta instabilis Smith, 1858: 163. TL: N. India: India [Syntype: BMNH].

Distribution: Gārhi, Skardu, Gilgit-Baltistan (Menozzi, 1939:



Figures 11-13. *Crematogaster biroi* Mayr, 1897 (11) Head, frontal view; Habitus (12) dorsal view; (13) lateral view.

297); Astore, Bunji, Gilgit-Baltistan (Eidmann, 1942: 246).

***Messor reticuliventris* Karavaiev, 1911**

Messor barbarus subsp. *reticuliventris* Karavaiev, 1911: 67. TL: Firusa: Turkmenistan [Syntype: MHNG].

Distribution: Quetta, Balochistan (CASENT0281594: AntWeb, 2019).

***Monomorium indicum* Forel, 1902**

Monomorium salomonis r. *indicum* Forel, 1902b: 213. TL: Tiruchirappalli, Tamil Nadu: India [Syntype: HNHM].

Distribution: Kalat, Makran, Nodiz, Balochistan; Thatta, Sindh (Brown, 1959: 229).

***Monomorium longi* Forel, 1902**

Monomorium longi Forel, 1902b: 211. TL: Garo Hills, Meghalaya: India [Syntype: MHNG].

Distribution: Islamabad (Umair et al., 2012: 701).

***Monomorium luisae* Forel, 1904**

Monomorium luisae Forel, 1904: 25. TL: Jhelum valley, Jammu and Kashmir: India [Syntype: MHNG].

Distribution: Kashmir (Forel, 1904: 25; Menozzi, 1939: 336).

***Monomorium sagei* Forel, 1902**

Monomorium sagei Forel, 1902b: 211. TL: Dharamsala, Himachal Pradesh: India [Syntype: MHNG].

Distribution: Karakorum (Menozzi, 1939: 336); Baltistan (Pisarski, 1967: 395).

***Monomorium schurri* Forel, 1902**

Monomorium schurri Forel, 1902b: 212. TL: Ootacamund, Nilgiris, Tamil Nadu: India [Syntypes: BMNH, MHNG].

Distribution: Islamabad, Rawalpindi, (Umair et al., 2012: 701).

***Myrmica aimonissabaudiae* Menozzi, 1939**

Myrmica aimonissabaudiae Menozzi, 1939: 286. TL: Karakorum, Gund (Sindh): Pakistan [Lectotype: MSNM].

Distribution: Askole, Dassu, Doyan, Gol, Gund, Kushumul, Olthingthang, Parkutta, Shigar, Skardu, Tolti, Gilgit-Baltistan; Quetta, Balochistan (Menozzi, 1939: 289; Eidmann, 1942: 245; Mani & Singh, 1962: 85); Karakorum (Weber, 1947: 464); Shogran, Kaghan valley; Kalam, Changla Gali, Madaglasht, Naran (Radchenko & Elmes, 2001: 249; Bharti et al., 2016: 963); Gund (Sindh) (CASENT0904554: AntWeb, 2019).

***Myrmica brancuccii* Radchenko, Elmes and Collingwood, 1999**

Myrmica brancuccii Radchenko, Elmes and Collingwood, 1999: 30 in Radchenko and Elmes, 1999. TL: Utrot: Pakistan [Holotype: BMNH].

Distribution: Chitral, Lawarai, Utrot (Radchenko & Elmes, 1999: 30; 2001: 260; 2010: 106; Bharti et al., 2016: 964); Utrot (CASENT0900337: AntWeb, 2019).

***Myrmica cachmiriensis* Forel, 1904**

Myrmica smythiesii r. *cachmiriensis* Forel, 1904: 23. TL: Sindh valley, Jammu and Kashmir: India [Holotype: MHNG]. Distribution: Askole, Chokpiong, Hoto, Shimtsa, Tsok, Gilgit-Baltistan (Menozzi, 1939: 292; Mani & Singh, 1962: 85); Changla Gali, Sobodan Gali (Bagh), Shogran, Kaghan valley (Radchenko & Elmes, 2001: 251, 2010: 108; Bharti et al., 2016: 964).

***Myrmica ordinaria* Radchenko and Elmes, 1999**

Myrmica ordinaria Radchenko & Elmes, 1999: 41. TL: Seven Spring, Pahalgam, Jammu and Kashmir: India [Holotype: BMNH].

Distribution: Kalam (Radchenko & Elmes, 1999: 41; 2001: 252; 2010: 209; Bharti et al. 2016: 967).

***Myrmica pseudorugosa* Bharti, 2012**

Myrmica pseudorugosa Bharti, 2012: 12. TL: Kaghan valley, Gittidas: Pakistan [Holotype: PUAC].

Distribution: Gittidas, Kaghan valley (Bharti, 2012: 12; Bharti et al., 2016: 967; ANTWEB1008037: AntWeb, 2019).

***Myrmica rigatoi* Radchenko and Elmes, 1998**

Myrmica rigatoi Radchenko and Elmes, 1998: 18. TL: Changla Gali: Pakistan [Holotype: MSNM].

Distribution: Changla Gali, Hazara Durgu Gal (Radchenko & Elmes, 1998: 18; 1999: 41; 2001: 256; 2010: 225; Bharti et al., 2016: 968; CASENT0904551: AntWeb, 2019).

***Myrmica vittata* Radchenko and Elmes, 1999**

Myrmica vittata Radchenko and Elmes, 1999: 33. TL: Bumburet: Pakistan [Holotype: BMNH].

Distribution: Bumburet, Kalam (Radchenko & Elmes, 1999: 33; 2001: 260; 2010: 319; Bharti et al., 2016: 970; CASENT0900334: AntWeb, 2019).

***Myrmica wardi* Radchenko and Elmes, 1999**

Myrmica wardi Radchenko and Elmes, 1999: 38. TL: Leh, Jammu and Kashmir: India [Holotype: BMNH].

Distribution: Chitral valley (Radchenko & Elmes, 1999: 38; 2001: 252; 2010: 320; Bharti et al., 2016: 971).

***Myrmica wittmeri* Radchenko and Elmes, 1999**

Myrmica wittmeri Radchenko and Elmes, 1999: 38. TL: Mahri, Himachal Pradesh: India [Holotype: NHMB].

Distribution: Kalam (Radchenko & Elmes, 1999: 38; 2001: 255; 2010: 326; Bharti et al., 2016: 971).

***Myrmecaria brunnea* Saunders, 1842**

Myrmecaria brunnea Saunders, 1842: 57. TL: India [Type: UNK]. Distribution: Marghalla Hills, Islamabad (Yahya et al., 2009: 251).

***Paratopula ceylonica* (Emery, 1901)**

Atopomyrmex ceylonicus Emery, 1901: 114. TL: Negombo: Sri Lanka [Syntypes: DEIC, MSNG].

Distribution: Rawalpindi (Umair et al., 2012: 701).

***Pheidole indica* Mayr, 1879**

Pheidole indica Mayr, 1879: 679. TL: Calcutta, West Bengal: India [Lectotype: NHMW].

Distribution: Gārhi, Gilgit-Baltistan (Menozzi, 1939: 286); Torkham, Peshawar (Pisarski, 1967: 386).

***Pheidole mus* Forel, 1902**

Pheidole mus Forel, 1902b: 174. TL: Kanara, Karnataka: India [Syntypes: MHNG].

Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 701).

***Pheidole nietneri* Emery, 1901**

Pheidole nietneri Emery, 1901: 118. TL: Bandarawela, Sri Lanka [Syntypes: UNK].

Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 700).

***Pheidole pronotalis* Forel, 1902**

Pheidole pronotalis Forel, 1902b: 173. TL: Sri Lanka [Syntypes: MHNG].

Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 701).

***Pheidole roberti* Forel, 1902**

Pheidole roberti Forel, 1902b: 183. TL: Kanara, Karnataka: India [Syntypes: MHNG].

Distribution: Bunji, Gilgit-Baltistan (Eidmann, 1942: 247).

***Pheidole sagei* Forel, 1902**

Pheidole sagei Forel, 1902b: 174. TL: Dharamsala, Himachal Pradesh: India [Syntypes: MHNG, MSNG].

Distribution: Gārhi, Gilgit-Baltistan (Menozzi, 1939: 297).

***Pheidole singaporensis* Özdikmen, 2010**

Pheidole singaporensis Özdikmen, 2010: 804. TL: Singapore [Syntypes: BMNH, OUMNH].

Distribution: Pakistan (Li-zhong, 2006: 263).

***Stenammina jeriorum* DuBois, 1998**

Stenammina jeriorum DuBois, 1998: 248. TL: [Malan Jabba] Malam Jabba: Pakistan [Holotype: BMNH].

Distribution: Malam Jabba (DuBois, 1998: 250; Liu & Xu, 2011: 737; CASENT0900947: AntWeb, 2019).

***Stenammina kashmirensis* Baroni Urbani, 1977**

Stenammina kashmirensis Baroni Urbani, 1977: 415. TL: Yusmarg, Jammu and Kashmir: India [Holotype: NHMB].

Distribution: Naran, Kaghan valley (DuBois, 1998: 248; Liu & Xu, 2011: 737; CASENT0900947: AntWeb, 2019).

***Strumigenys godeffroyi* Mayr, 1866** **Figures (5-7)**

Strumigenys godeffroyi Mayr, 1866b: 516. TL: Samoa [Syntype: NHMW].

Material examined. Pakistan, Rawalpindi, Forest area Kotlisatian, 33°41.902'N 73°30.612'E, 1261 m. a.s.l., 25 (workers), 12.iv.2016, 50 (workers), 21.vi.2017, under stone, leg. A. G. Fareen.

Distribution: Pakistan (new record).

***Temnothorax desioi* (Menozzi, 1939)**

Leptothorax (Leptothorax) desioi Menozzi, 1939: 303. TL: Karakorum, Askole (Braldu): Pakistan [Syntype: MSNM].

Distribution: Askole, Baltoro, Bolta, Boorgi Nullah, Dumultar, Panmah valley, Payu, Karal Marfo, Shiniltalmoosa, Tsok, Gilgit-Baltistan (Menozzi, 1939: 297; CASENT0904558: AntWeb, 2019); Turbaling, Gilgit-Baltistan (Eidmann, 1942: 245).

***Temnothorax pamiricus* (Ruzsky, 1902)**

Leptothorax pamiricus Ruzsky, 1902: 478. TL: Pamir: Russia [Lectotype: MSNG].

Distribution: Askole, Bardumal, Biaho, Burdwan, Chongo, Hoto, Korophon, Kro Brok, Payu, Gilgit-Baltistan (Menozzi, 1939: 303).

***Tetramorium nursei* Bingham, 1903**

Tetramorium nursei Bingham, 1903: 181. TL: Quetta, N.W. Frontier: Pakistan [Syntype: BMNH].

Distribution: Quetta, Balochistan (Bingham, 1903: 181; Bolton, 1977: 93; Li-zhong, 2006: 273; CASENT0901103: AntWeb, 2019).

***Tetramorium salvatum* Forel, 1902**

Tetramorium salvatum Forel, 1902b: 235. TL: [N. Indien], India [Syntype: MHNG].

Distribution: Kalash (CASENT0280890: AntWeb, 2019).

***Tetramorium smithi* Mayr, 1879**

Tetramorium smithi Mayr, 1879: 673. TL: Calcutta, West Bengal: India [Syntypes: BMNH, NHMW].

Distribution: Islamabad, Rawalpindi (Umair et al., 2012: 702).

***Tetramorium sulcinode* Santschi, 1927**

Tetramorium caespitum var. *sulcinode* Santschi, 1927: 53. TL: [Ssemiretschie, Ssukuluk Est de Pichpek], Kazakhstan [Lectotype: NHMB].

Distribution: Sirani (Csösz et al., 2007: 33).

***Trichomyrmex glaber* (André, 1883)**

Holcomyrmex glaber André, 1883: 345. TL: India [Syntype: MNHN].

Distribution: Rawalpindi (Umair et al., 2012: 700).

***Trichomyrmex scabriceps* (Mayr, 1879)**

Holcomyrmex scabriceps Mayr, 1879: 672. TL: Calcutta, West Bengal: India [Syntypes: BMNH, NHMW].

Distribution: Rawalpindi (Umair et al., 2012: 700).

PONERINAE

***Diacamma scalpratum* (Smith, 1858)**

Ponera scalprata Smith, 1858: 84. TL: N. India: India [Lectotype: NHMW].

Distribution: Sindh (Laciny et al., 2015: 90; CASENT0915970:



Figures 14-16. *Pseudoneoponera rufipes* (Jerdon, 1851) (14) Head, frontal view; Habitus (15) dorsal view; (16) lateral view.

AntWeb, 2019).

***Leptogenys hystericus* Forel, 1900**

Leptogenys hystericus Forel, 1900: 311. TL: Belgaum: India [Syntype: NHMB].

Distribution: Islamabad, Rawalpindi (Rasheed et al., 2018: 13033).

***Odontoponera denticulata* (Smith, 1858)**

Ponera denticulata Smith, 1858: 90. TL: Singapore [Holotype: BMNH].

Distribution: Pakistan (Yamane, 2009: 7).

***Pseudoneoponera rufipes* (Jerdon, 1851) Figures (14-16)**

Ponera rufipes Jerdon, 1851: 119. TL: Malabar, Kerala: India [Type: Lost].

Material examined. Pakistan, Rawalpindi, Forest area Kotlisanian, 33°41.902'N 073°30.612'E, 1261 m. a.s.l., 3 (workers), 31.vii.2016, under stone, leg. A. G. Fareen; Islamabad, Trail 5 Forest area, 36°14.359'N 74°30.037'E, 639 m. a.s.l., 5 (workers), 02.iii.2017, 6 (workers), 15.iv.2017, under stone, leg. M.T. Rasheed; Rawalpindi, Forest area Modeih Syedan, 33°41.902'N 73°30.612'E, 1261 m. a.s.l., 7 (workers), 09.iv.2016, leg. A. G. Fareen; Islamabad, Forest area Pir Sohawa, 33°78.82'N 73°10.69'E, 1047 m. a.s.l., 4 (workers), 09.v.2017, under stone, leg. A. G. Fareen.

Distribution: Pakistan (new record).

PROCERATIINAE

***Proceratium confinium* de Andrade, 2003**

Proceratium confinium de Andrade, 2003: 248 in Baroni Urbani and de Andrade, 2003. TL: Surat, Malkandi: Pakistan [Holotype: MHNG].

Distribution: Malkandi Kaghan (Baroni Urbani & de Andrade, 2003: 249; CASENT0911253: AntWeb, 2019).

PSEUDOMYRMECINAE

***Tetraaponera allaborans* (Walker, 1859)**

Pseudomyrma allaborans Walker, 1859: 375. TL: Sri Lanka [Syntypes: BMNH].

Distribution: Islamabad, Rawalpindi (Bodlah et al., 2016: 1029).

***Tetraaponera nigra* (Jerdon, 1851)**

Eciton nigrum Jerdon, 1851: 112. TL: Malabar, Kerala: India [Type: Lost].

Distribution: Sindh (Ward, 2001: 635); Islamabad, Rawalpindi (Bodlah et al., 2016: 1029).

***Tetraaponera rufonigra* (Jerdon, 1851)**

Eciton rufonigrum Jerdon, 1851: 111. TL: Malabar, Kerala: India [Type: Lost].

Distribution: Lahore (Ward, 2001: 650; CASENT0752675: AntWeb, 2019).

Discussion

A total of 103 species of ant, belonging to 35 genera in seven subfamilies are known to occur across vast areas of Pakistan. The seven subfamilies include: Dolichoderinae, Dorylinae, Formicinae, Myrmicinae, Ponerinae, Proceratiinae and Pseudomyrmecinae. Among these, Myrmicinae is most diversity with 15 genera and 48 species followed by Formicinae with 8 genera and 39 species; Dorylinae 4 genera and 5 species; Ponerinae 4 genera and 4 species; Dolichoderinae 2 genera and 3 species; while Proceratiinae and Pseudomyrmecinae are represented by single genus with one and 3 species respectively. The most diverse genera in terms of species are *Camponotus* (10), *Lasius* (9), *Myrmica* (9), *Formica* (8), *Pheidole* (7), *Temnothorax* (6), *Monomorium* (5), followed by others. Two subfamilies; Formicinae and Myrmicinae together contribute more about 85% to the regional ants. Like rest of the flora and fauna of the country (GOP, 1999), the rate of endemism in ants is also very low. Of the known species from the region only seven species are considered to be endemic. These include: *Lasius hirsutus* Seifert, 1992; *Lasius lawarai* Seifert, 1992; *Myrmica pseudorugosa* Bharti, 2012; *Myrmica rigatoi* Radchenko and Elmes, 1998; *Myrmica vittata* Radchenko and Elmes, 1999; *Stenammina jeriorum* DuBois, 1998 and *Proceratium confinium* de Andrade, 2003.

The species list generated here cannot be complete, as the widespread ants present in neighboring countries of Pakistan with similar climatic conditions should be there. However, we hope that it will facilitate future discovery, and conservation of ants in Pakistan.

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Author Contributions

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Imran Bodlah - Survey, collection, identification and data handling.

Ammara Gull e Fareen - Survey, collection and identification.

Aijaz Ahmad Wachkoo - Data mining, manuscript write up and species confirmation.

Xiaolei Huang - Data analysis, macrophotography, manuscript review and editing.

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