



Biodiversity Information Management in Bhutan

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Hanoi, Vietnam



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Ministry of Agriculture and Forests
Thimphu, Bhutan*



Bhutan Biodiversity Portal (www.biodiversity.bt)

Launched on 17th Dec, 2013

- Consortium-based approach to documenting and managing biodiversity information.
- Banks on citizen participation/collective effort and knowledge.
- Online repository of all the biodiversity groups according to taxonomic groups.
- Difficulty for one single agency/org. to study and document.
- Lack of easy access to information.
- Register to contribute and participate, copyright lies with you or your agency.
- **Portal App for iOS and Android available!**
- Outreach through Facebook page



Key features

- Species page- curated data
- Observation page- user contributed
- Map page- curated data set
- Document- user contributed
- Activity/discussion
- Groups- area or biodiversity component based.
- User registration



Cheirostylis sheriffii



The System



- ✓ Open access common platform – anyone can become a registered member.
- ✓ Can download and upload biodiversity data and information – can generate information for research, reporting, projects, learning, etc.
- ✓ Citizen-based consortium online repository – can fulfil one's data requirement and contribution upon developing the required features.
- ✓ New feature are updated every year to catch up with the data demand and supply.
- ✓ Understand biodiversity dynamic through space and time, and document Bhutan's rich biodiversity through citizen's participation.
- ✓ Centralized data repository system in place to make biodiversity data easily accessible.
- ✓ Depends on the user contributions and requirement of the end users.
- ✓ Develop interactive linkages between amateurs and the scientists under a single window.
- ✓ Aims at educating and creating awareness to the students, general public and the future generations.



The Partners

Currently, the following national agencies are the founding members of this consortium-based initiative, with the National Biodiversity Centre as the Secretariat to the consortium. However, as we progress, we foresee and welcome involvement of many more partners to this initiative and the consortium, both national and international.



National Biodiversity Centre



Information and Communication Services, Ministry of Agriculture and Forests



College of Natural Resources, Royal University of Bhutan, Lobeysa



Department of Forests and Parks Services represented by:



Ugyen Wangchuck Institute of Conservation and Environment

- [The Portal](#)
- [Biodiversity of Bhutan](#)
- [Technology](#)
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Current status *(as of 5th June 2017)*

- Total Observations: **47,320**
 - **493** observation data without ID! (1%)
 - **260** aquatic observations
 - 1% without ID

➤ Species: **2,758** curated species pages

➤ Documents: **76**

➤ Registered users: **843**

Title A review of the genus *Garra* Hamilton 1822 of Bhutan, includin...

Type Journal Article

Description Seven species of *Garra* are herein accounted for in Bhutan. Thr...

Attribution R.J. THONI, D.B. GURUNG, R.L. MAYDEN

Sangay Dema

Title An annotated checklist of fishes from Bhutan

Type Report

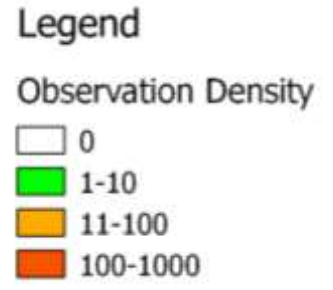
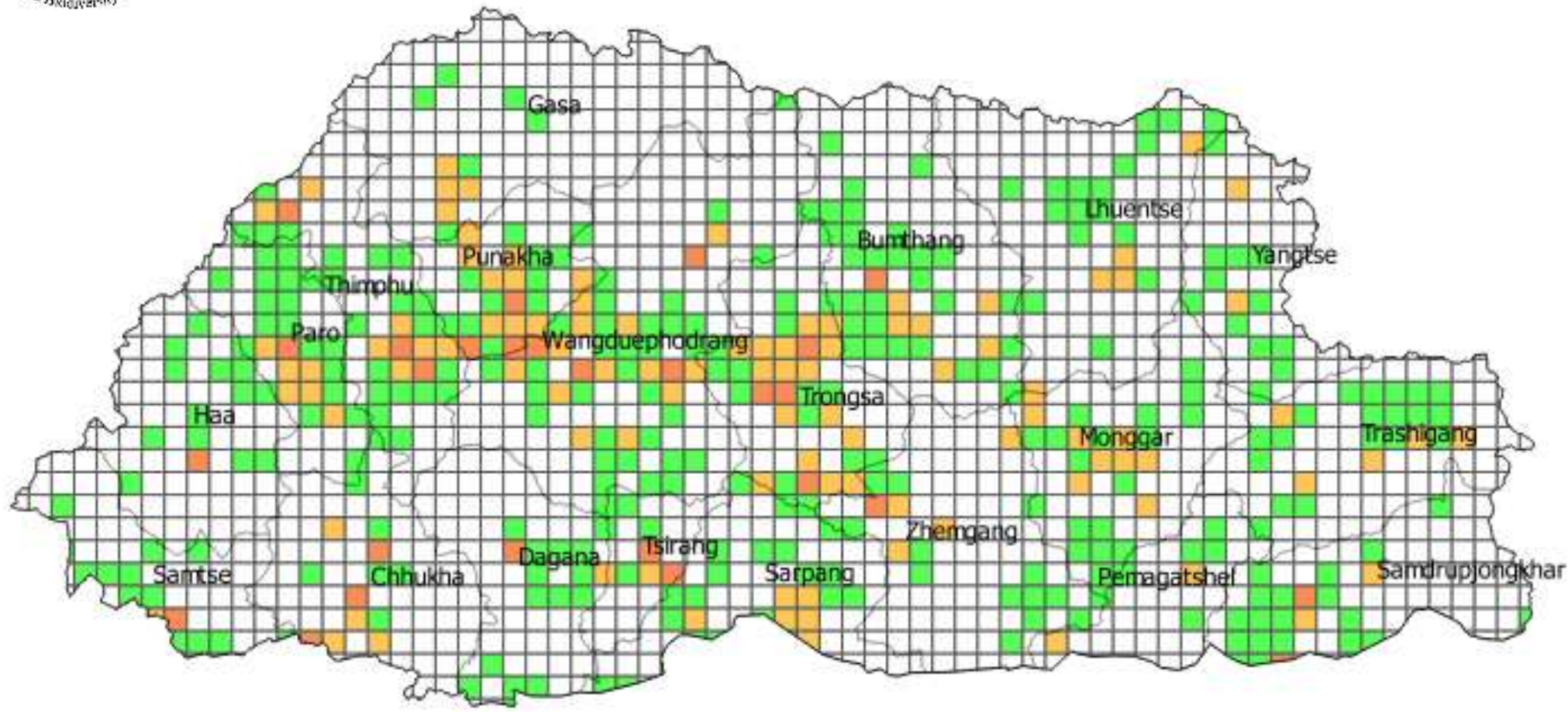
Description Journal of Threatened Taxa | www.threatenedtaxa.org | 26 Oct...

Attribution Dhan Bahadur Gurung, Sangay Dorji, Ugyen Tshering, Jigme T...

Kinley Tshering



Observations (Grid)



260 observations found in Aquatic [X] Habitats

Last Updated Share Download

38 List Grid



Amolops Accepted Na Toad From The Him... Duttaphrynus hima... Ibidorhyncha struth...



Garra annandalei H... Staphylinidae Elmidae Tadorna ferruginea...



Zaitveia bhutanica Elmidae Gara lissorhynchus Phalacrocorax carb...



Xenophris piscator Tadpole Garra bimaculacauda Garra parastenorhy...



Post to Groups

Taxon Browser

BBP Taxonomy Hierarchy

- Animalia
- Bacteria
- Chromista
- Fungi
- Plantae

Search for taxon < > Search

Species Distribution



Refresh list to map bounds Reset Maximum 1000 points displayed. Zoom in to show more points.

Species Groups



Observation for Aquatic biodiversity: 260



Last Updated ▾ Share Download

12 ▾ List Grid



Euphorbia griffithii ... *Rhododendron arbo...* *Quercus semecarpif...* *Usnea* Accepted Name



Marchantia Accepted *Fagopyrum* Accepted *Berberies* *Bambusa* Accepted Na



Rhododendron rhab... *Ceratostigma griffit...* *Benthamidia capitat...* *Pleione hookeriana ...*



Taxon Browser

BBP Taxonomy Hierarchy ▾

- Animalia
- Bacteria
- Chromista
- Fungi
- Plantae

Search for taxon < > Search

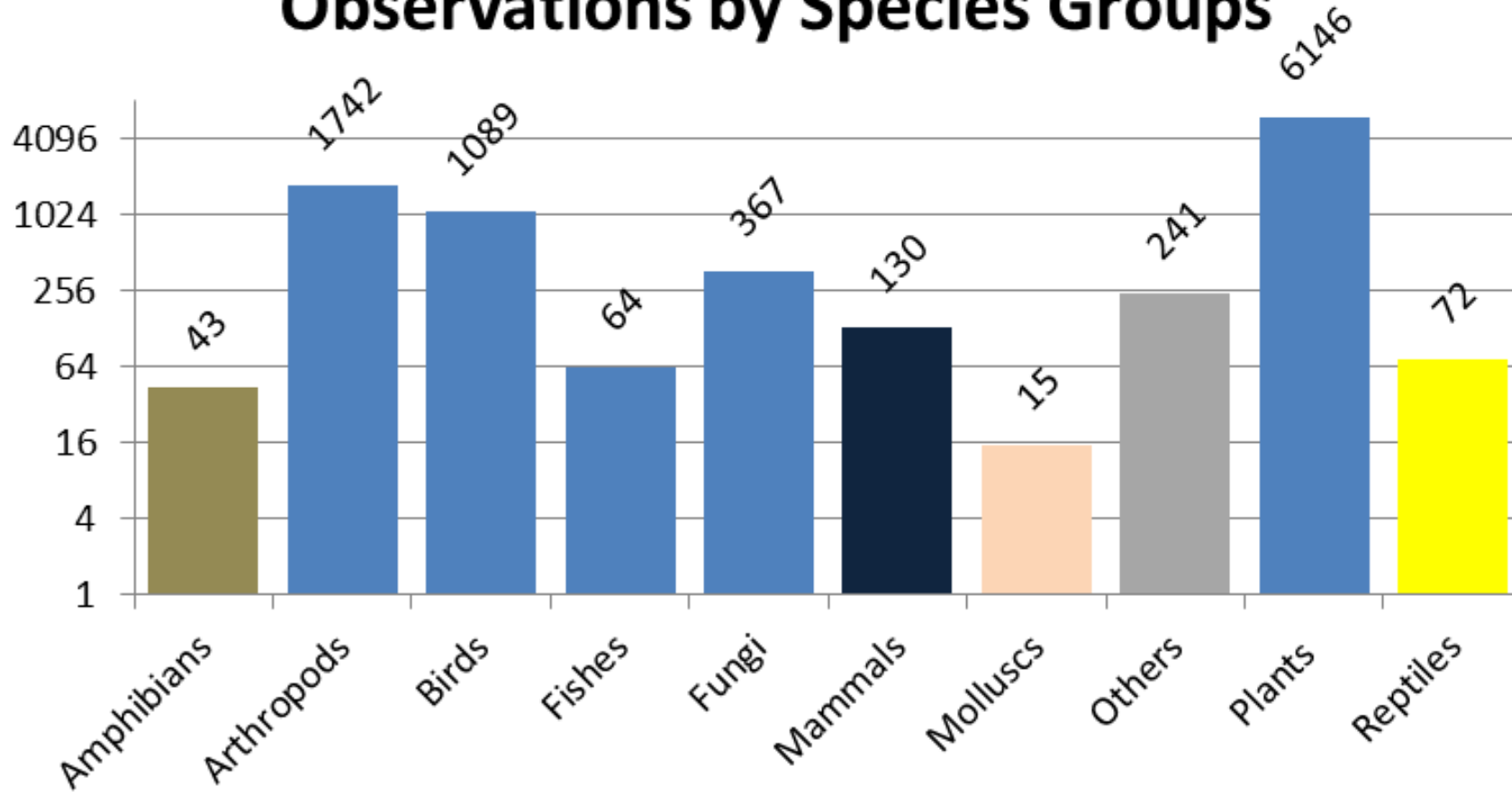
Species Distribution

Google Map Data Terms of Use

Refresh list to map bounds Reset
Maximum 1000 points displayed. Zoom in to show more points.

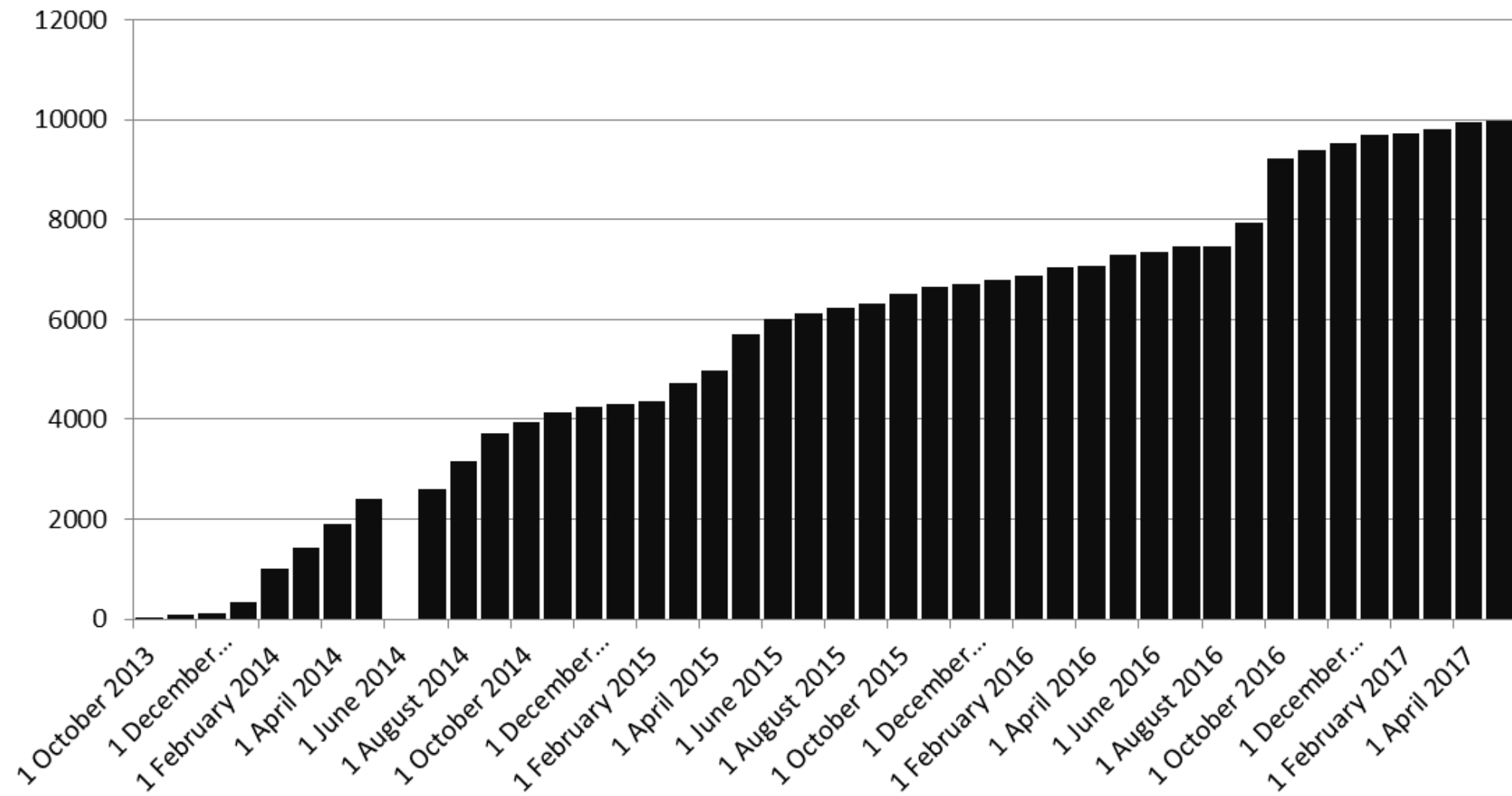
Observation for Plants:
9,053

Observations by Species Groups



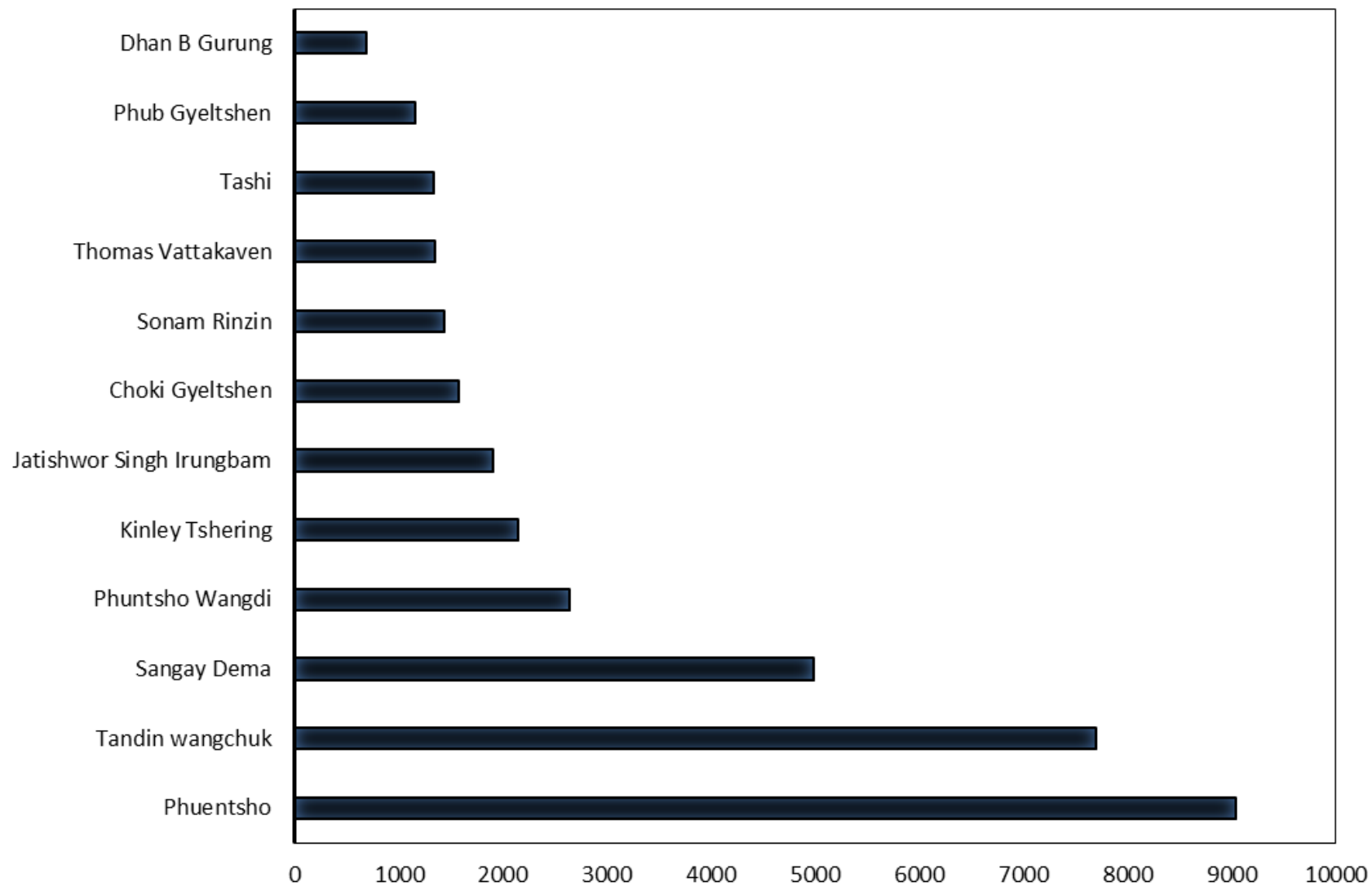
Row Labels	No. fields populated
Animalia	194
Bacteria	0
Chromista	0
Fungi	478
Plantae	10592
Grand Total	11264

Observation growth



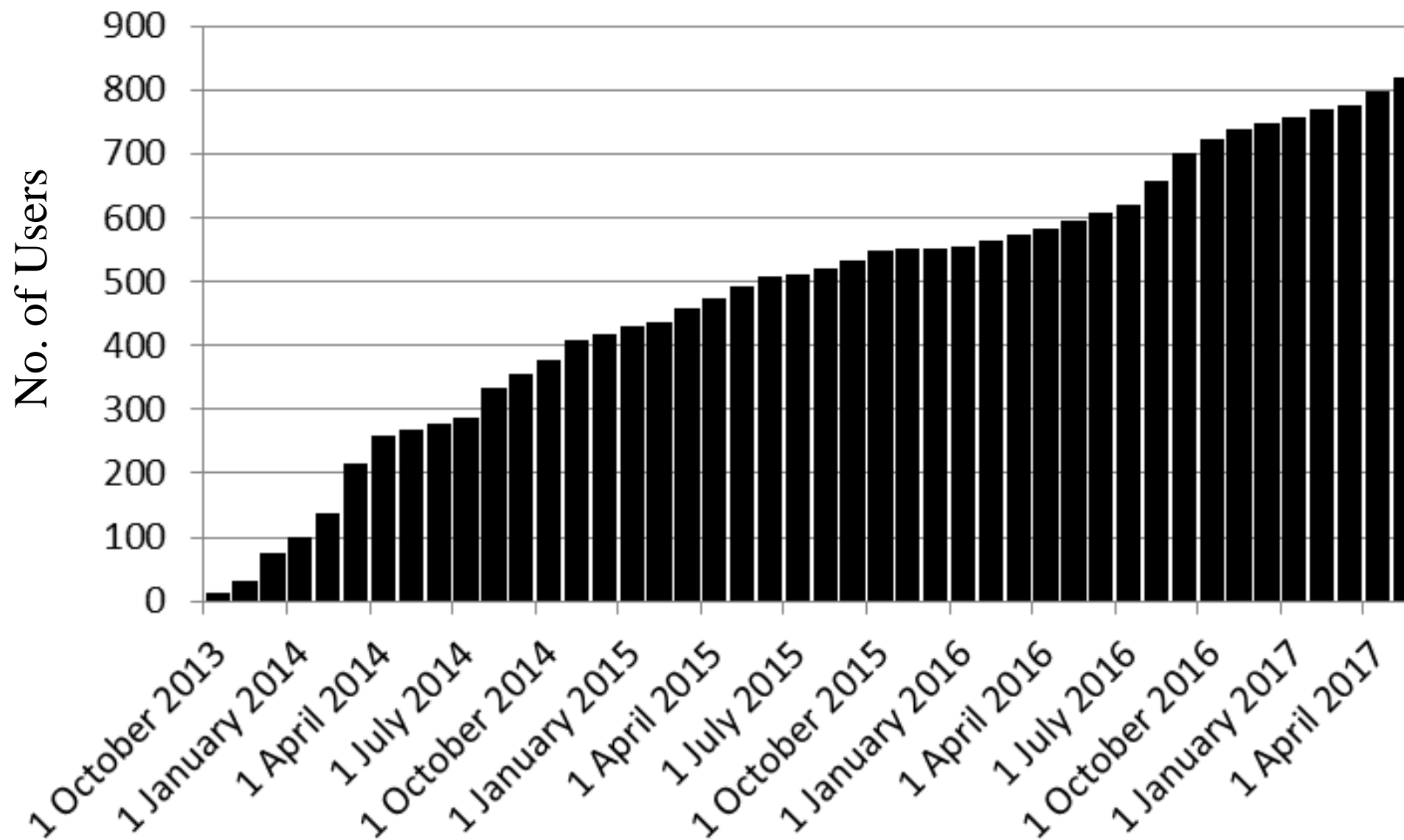


ACTIVITY COUNT



User	Observations
 Tandin wangchuk	2120
 Phuentsho	1656
 BBP Admin	1070
 Jatishwor Singh Irungbam	537
 Tenzin DENDUP	390
 Phuntsho Wangdi	378
 Sonam Rinzin	282
 Phub Gyeltshen	243
 Karma Lhundup	196
 Tashi Phuntsho	192

Cumulative user growth in the portal





Challenges faced

- Inactive curators probably due to time constraint
- Data held by agencies or individuals or key data holders
- Lack of incentives to curators and registered contributors – fund constraint
- Good quality photographs or videos withheld
- Internet fluctuations and technical (server) problems
- Lack of capacity
- Limited resources



Glimpse of Awareness programs



Feedbacks from users

#	Institution Name	Year
1.	Jigme Dorji National Park	2014
2.	Royal Manas National Park	2014
3.	Sherubtse College (Royal University of Bhutan)	2014
4.	Jigme Singye Wangchuck National Park	2014
5.	Eastern Bhutan staffs of Ministry of Agriculture and Forests	2014
6.	Sakteng Wildlife Sanctuary	2014
7.	College of Natural Resources	2014
8.	College of Natural Resources	2015
9.	Royal Thimphu College	2015
10.	Gaeddu College of Business Studies	2016
11.	Wangdue Forest Division	2016
12.	Sarpang Forest Division	2016
13.	Tingtibe Forest Range	2016
14.	Royal Thimphu College	2017
15.	Paro College of Education	2017
16.	Jigme Dorji National Park	2017
17.	Forests Rangers (plant taxonomy training)	2017

- Technical problems (internet and server)
- Time constraint
- Lack of incentives
- Lack of active curators to determine species ID
- Some prefer Facebook over portal – many active users in social media
- Lack of awareness in certain institutions
- Lack of motivation/interest
- Lack of curators for some biodiversity groups such as aquatic biodiversity, bryophytes, lichens, etc.



Biodiversity Stats

- Mammals: **ca. 200** (Mammals of Bhutan, 2004)
- Vascular plants: **5,603** (Flora of Bhutan 2002; Biodiversity Action Plan of Bhutan, 2009)
 - Orchids: **469** (Flora of Bhutan 2002; A Century of New Records of Orchid in Bhutan, 2017)
 - Endemic plants: **144** (Endemic Plants of Bhutan, 2015)
 - Mosses: **282** (Long, 1994)
 - Pteridophytes: **411** (Pteridophytes of Bhutan, 2009)
 - Lichens and Lichenicolous fungus: **287** (NBSAP, 2014; Aptroot & Fiejen, 2002)
- Fungus: **350** (Fungi of Bhutan, 2010)
 - Insect-fungi: **>100** (Mata *et al.*, 2010)
- Herpetofauna: (Wangyel, 2014)
 - Amphibians: **61** species
 - Reptiles: **124**



Paphiopedilum venustum



- Butterflies: **586** (Singh, 2014); **ca. 800** (Wangdi *et al.*, 2014)
- Moths : **69** (Singh, 2014) **>4,000** (estimated macro-moths & micro-moths, Naturalis Biodiversity Centre, Netherlands)
(Research ongoing – National Biodiversity Centre Bhutan, Naturalis Biodiversity Centre Netherlands & Ugyen Wangchuck Institute of Conservation & Environmental Research Bhutan)
- Fresh water insects: **1,107** (WCP & WWF, 2012) (Few researches ongoing - WWF-Bhutan)
- Fish: **109** (Fishes of Bhutan, 2015)
- Birds: **ca. 700** (NBSAP, 2014)
- Dragonflies (Odonata): **85** (Dorji, 2014); **84** (Mitra, 2014) (Research ongoing – National Biodiversity Centre Bhutan, Naturalis Biodiversity Centre Netherlands & Sherubtse College Bhutan)



Libellago lineata



Glimpse of New Species & New Records in Bhutan

➤ At least **353** new species are discovered in the eastern Himalayas (1998-2008):

The discoveries include: **242** plants, **16** amphibians, **16** reptiles, **14** fish, **2** birds and **2** mammals, and at least **61** new invertebrates (WWF 2009)

- **Moths:** *Salassa bhutanensis*, *Leopa diffunoccidentalis*, *Antherea rubicund*, *Actias parasinensis*. (Moths of Bhutan, 2012); *Clanis hyperion* (Singh, 2014); *Notodonta dedmazai* sp. nov., (Schintlmeister, 2013); *Clanis hyperion* (Singh & Kitching, 2014).
- **Mosses:** *Bazzania bhutanica* (Long, 2009) (**Rediscovered**)
- **Dragonflies (Odonata):** *Aristocypha (Rhinocypha) cuneate* (new record); *Anisopleura bella* (Dorji, 2014). *Ariocnemis clauseni*, *Ceriagrion* sp., *Himalagrion exclamation*, *Lestes praemorsus*, *Perissogomphus stevensi*, *Brachydiplax sobrina*, *Neurotemis intermedia atalanta*, *Anax indicus*, *Tramea basilaris*. (New Records) (Mitra, 2014).

- **Dragonflies & Damselflies** continued:

Eleven new records of dragonflies and damselflies viz. *Aciagrion pallidum*, *Anisopleura lestoides*, *Megalestes irman*, *Gynacantha incisura*, *Gynacantha khasiaca*, *Gynacanthaeschna sikkima*, *Lamelligomphus risi*, *Somatochlora daviesi*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Tholymis tillarga* (Kalkman & Gyeltshen, 2015).

Megalestes gyalsey (New species - Gyeltshen & Kalkman 2017) and **two** *Cephalaeschna* spp.(new record but unidentified – Kalkman & Gyeltshen,?)



Male *Cephalaeschna triadica*
(Kalkman & Gyeltshen, 2015)



- **Fishes:** *Parachiloganis bhutanensis* (Gurung, 2014); *Garra arupi*, *Garra birostris*, *Garra lissorrhynchus* (New records by Thoni *et al.*, 2016); *Garra bimaculacauda* & *Garra parastenorrhynchus* (New species; Thoni *et al.*, 2016).
- **Butterflies:** *Bhutanitis ludlowi* (rediscovered; Harada *et al.*, 2012).
- **Plants:** *Meconopsis bhutanica* (Yoshida, 2012). **Orchids:** 100 new records (A Century of New Records of Orchids in Bhutan, 2017) **Mollusc:** *Truncatellina bhutanensis* (Gittenberger *et al.*, 2013) (study ongoing Naturalis Biodiversity Centre, The Netherlands)
- **Mammals:** *Trachypithecus geei* (Wangchuk, 2002)
- **18** globally threatened **birds** (NBSAP, 2014)
- **27** globally threatened **mammals** (BAP, 2009)



Meconopsis bhutanica
(Yoshida, 2012)



- **Insects:** *Ceratocystis bhutanensis*, **11** new species of black flies eg. *Gomphostilbia* spp., *Montisimulium* spp., *Nevermannia* spp., *Simulium* spp. (*Simulium bhutanense*) and one new record of black flies (Takaoka & Somboon, 2008).

Two new species of Fruit flies viz. *Dacus (Mellesis) dorjii*, *Dacus (Mellesis) fletcheri* (Drew & Romig, 2007).

Seven new species of potter wasps eg. *Zethus dolosus*, *Delta esuriens*, *Pareumenes quadrispinus acutus*, *Delta conoideum*, *Eumenes gibbosus*, *Labus pusillus* (Nidup, et al., 2016).

Seven new records of carpenter bees (Hymenoptera) viz. *Xylocopa (Platynopoda) latipes*, *Xylocopa (Platynopoda) magnifica*; *Xylocopa (Cyaneoderes) acutipennis*, *Xylocopa (Orbitella) aestauns* & *Xylocopa (Zonohirsuta) collaris* (Dorji & Nidup, 2016).

Five new record of Cicadas (Hemiptera) viz. *Hueschys sanguinea*, *Polyneura ducalis*, *Tanna thalia*, *Haphsa sulaiyai* & *Talainga binghami* (Dorji, 2016).



Haphsa sulaiyai (Dorji, 2016)



- **Reptiles and Amphibians:** ca. **13** new species recorded – eg. *Euphlyctis cyanophlyctic*, *Fejervarya peirrei*, *F. teraiensis*, *F. nepalensis*, *Xenophyrus*, *X. glandulosa* and many more. (Wangyel, 2013); *Tylototriton verrucosus* (Wangyel *et al.*, 2012).

Ten new records of Snakes: *Ramphotyphlops braminus*, *Python bivittatus*, *Lycodon fasciatus*, *Lycodon aulicus*, *Lycodon jara*, *Rhabdophis subminiatus*, *Chrysopelea ornata*, *Dendrelaphis tristis*, *Naja naja* & *Trimeresurus albolabris*. (Wangyel, 2012)

Two new records of lizards: *Gekko gecko* & *Sphenomorphus maculatus* . (Wangyel, 2012)



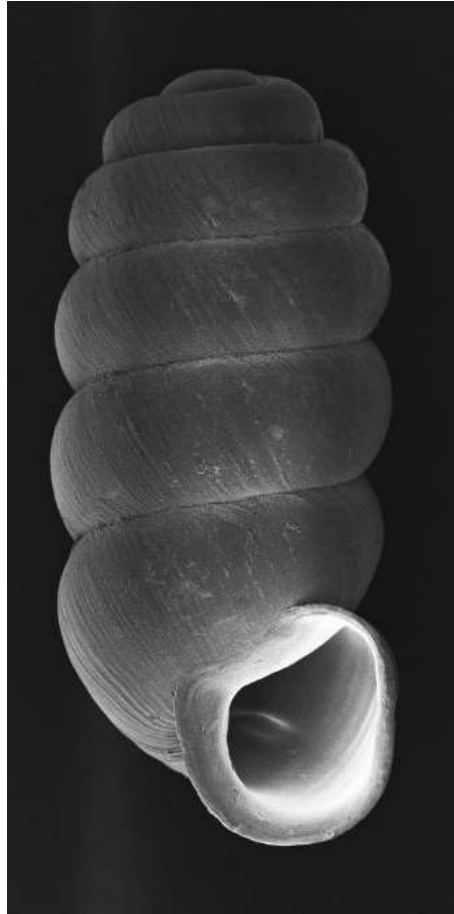
Chrysopelea ornata
(Wangyel, 2012)



Lycodon jara
(Wangyel, 2012)

Many more new species and records are Expected!

Bhutanese snails, the smallest one:
Truncatellina bhutanensis spec. nov.
(Gastropoda, Pulmonata, Vertiginidae)



0.8 × 1.8 mm

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Truncatellina bhutanensis

Gittenberger, Leda & Sherub, 2013

Holotype

167. Bhutan, district Paro, S-slope E of limestone quarry NW of Dobji Dzong; 2300 m alt.; 27°17'N 89°31'E; E. Gittenberger & Pema Leda leg., 7.iv.2013.

Moths



Introduction:

Vespidae is a cosmopolitan family of order Hymenoptera popularly known as wasps. This group consists of social (Vespinae) and solitary (Eumeninae) wasp. The larva is fed by adult females on masticated insects or glandular secretions by social wasp. In solitary species, adults are usually predator of the caterpillars of other insects like beetles. They play significant role in ecosystem and is considered as good bio-indicator. Because of their predatory habit they are also good biological control of pests. Besides, wasps also act as good pollinating agent. Social wasps build their own papery nest and solitary often nest in soil, pre-existing cavities or in mud nest (mud dauber and Potter wasp) which they build by themselves.

Family: Vespidae

Antenna of female (12 segments) and male (13 segments); eyes emarginated; legs of normal proportions, not very long or spiny; trochanters not divided, trochantellus absent; middle tibiae with 1 or 2 apical spurs; tarsal claws toothed, bifid or simple; wings longitudinally folded in repose; Forewing with 1st discoidal cell elongated, longer than the submedial cell; Hind wing with an anal cell and enclosed cells. A sting issuing from the tip of gaster without sheaths.

Subfamily: Vespinae (Hornets)

Claws simple; Mandibles large with an expanded apical margin; Apical margin of clypeus broadly truncate or concave and emarginated medially, ending in two sharp or blunt lateral lobes; Larger, stouter species building nest consisting of several combs on a horizontal plane and wrapped by papery envelope.

Subfamily: Eumeninae (Potter wasps)

Claws bifid, middle tibia with 1 spur; Mandibles long and usually crossing when at rest; Hind wings with an anal lobe; Parategula present; Propodeal spiracle circular; Solitary or Eusocial, making earthen pot-like cells, predatory, storing caterpillars or larvae. Some make nest in furrows or in wood cavities.

Head small and large ocelli; nocturnal

Head large and ocelli normal; diurnal

Petiole length never shorter than mesosoma

Propodium with longitudinal fovea; dentiform projections above valvulae

Second submarginal cell truncate posterobasally

Petiole abruptly swollen apically



Provespa barthelemy



Vespa mandarinia



Vespa analis



Delta conoideum



Delta pyriforme pyriforme



Delta esuriens



Pareumenes quadrispinosus



Zethus dolosus



Labus pusillus

Thorax black, head black to red, without yellow maculation; gaster brown with tergite 2 yellow

Head, thorax and gaster black to brown, marked with reddish or yellow

Second submarginal cell acute posterobasally



Vespa affinis indosinensis



Vespa affinis affinis



Vespa tropica leefmansii



Vespa basalis



Vespa volutina nigrithorax



Vespa bicolor



Eumenes punctatus



Eumenes gibbosus



Eumenes architectus

Lady Beetles



Coccinella septempunctata



Oenopia sexareata



Oenopia kirbyi



Oenopia sauzeti



Harmonia eucharis



Harmonia sedecimnotata



Coelophora bissellata



Propylea dissecta

National Herbarium

- Serves as a national reference centre on flora of Bhutan
- Provide facilities for visiting botanists & conservationists
- More than 15,000 collections
- Collections include Angiosperms, Gymnosperms, Pteridophytes and Byrophytes.



Royal Botanical Garden Serbithang

- Established in 1999
- *Ex-situ* conservation of native plants of Bhutan.
- Showcase nation's floral wealth to Bhutanese and outsiders.
- Promote environmental education and awareness on biodiversity to biodiversity lovers and students.
- Also acts as a recreational site for the public.





Questions & discussion

Thank you!

