

Report to Davis Expedition Fund: Scrophulariaceae of Nepal

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Summary. The expedition with the support of the Davis Expedition Fund was held in Nepal in August 2016, and targeted all species of flowering plants with a particular focus on Scrophulariaceae s.l. (including Plantaginaceae and Orobanchaceae). A total of 357 herbarium sheets were collected, of which 108 were 15 species of Scrophulariaceae. This material forms an important basis to determine the distribution of figworts in Langtang National Park, as well as to clarify the evolutionary processes in a rich and unique flora of Nepal.

Introduction. Petr Kosachev is a Sibbald Trust Fellow working on the revision of 10 genera of the Scrophulariaceae Juss. s.l. (in the traditional sense) for the upcoming 7 volume Flora of Nepal. According to a literature review of the Scrophulariaceae in South Asia (Bentham, 1835; Hooker, 1885; Pennel, 1943; Yamazaki, 1962, 1971; Hara et Yamazaki, 1982; Yamazaki, Kitamura, 2005; Amano, 2008) it was expected that 40 species from 10 genera were likely to be found.

Three genera (*Phtheirospermum*, *Leptorabdos*, *Sopubia*) are represented in the flora of Nepal by a single species and *Bacopa* and *Verbascum* each have 2 species. These genera have different origins. *Verbascum* is clearly an introduction to Nepal, while *Bacopa* has a south-eastern origin, inhabiting the subtropics of the Himalayas. Revision of the remaining 5 of the genera for the Flora of Nepal will clarify distribution patterns within Nepal and ecological characteristics of these species.

Ancient Mediterranean *Kickxia* born in Flora of Nepal represented by 3 species (Press et al., 2000) is found in northwestern of Nepal, but the characters used to describe it are ambiguous and it is in need of a critical review.

Mimulus is a genus of East Asian origin, with species found in the central and eastern parts of Nepal (Yamazaki, 1962; Yamazaki, Kitamura, 2005).

Scrophularia and *Veronica* are the most diverse of these genera, with 8 and 16 species respectively, and are indigenous to Nepal. The genus *Scrophularia* of the species described from the territory of Nepal (Bentham, 1835) and has a limited distribution in the Himalayas. After examining the herbarium in E, I cite as a new species for the flora of Nepal - *S. edgeworthii*, which has limited distribution in the Himalayas and has not previously been reported from Nepal.

Tribe Veroniceae with more than 500 species is a group that emerged in the QTP-Himalayan range from the early divergent members such as *Lagotis* and *Wulfeniopsis* (Surina et al., 2014). *Lagotis* has its centre of origin in the region (Li et al. 2014; Buhk et al., 2015), as does *Veronica* subsection *Canae* (Buhk et al., 2015).

The alpine genus *Lagotis* is represented by 3 species in the phylogeny which was presented by Chinese scientists (Li et al. 2014), but in Nepal it studied not enough. Recently, T. Yamazaki (1971) described *L. nepalensis*. As a result of our research in the herbaria at K, BM and E, it was found that there is a new species in Nepal (previously named as the *Lagotis geniculiflora* R.R. Mill ined.) which is close to *L. kunawurensis*.

Fieldwork methodology. The collecting in the field followed standard techniques but extra care was taken to photograph details of the flowers and fruits, which will subsequently be pickled in alcohol.

Herbarium collections were preserved in the field by using alcohol and later dried at the National Herbarium Kathmandu (KATH), the main counterpart. The first set was left in Kathmandu (KATH) and duplicates will be sent to the herbarium at the Royal Botanic Garden Edinburgh (E) and South-Siberian Botanical Garden (ALTB, Barnaul, Russia).

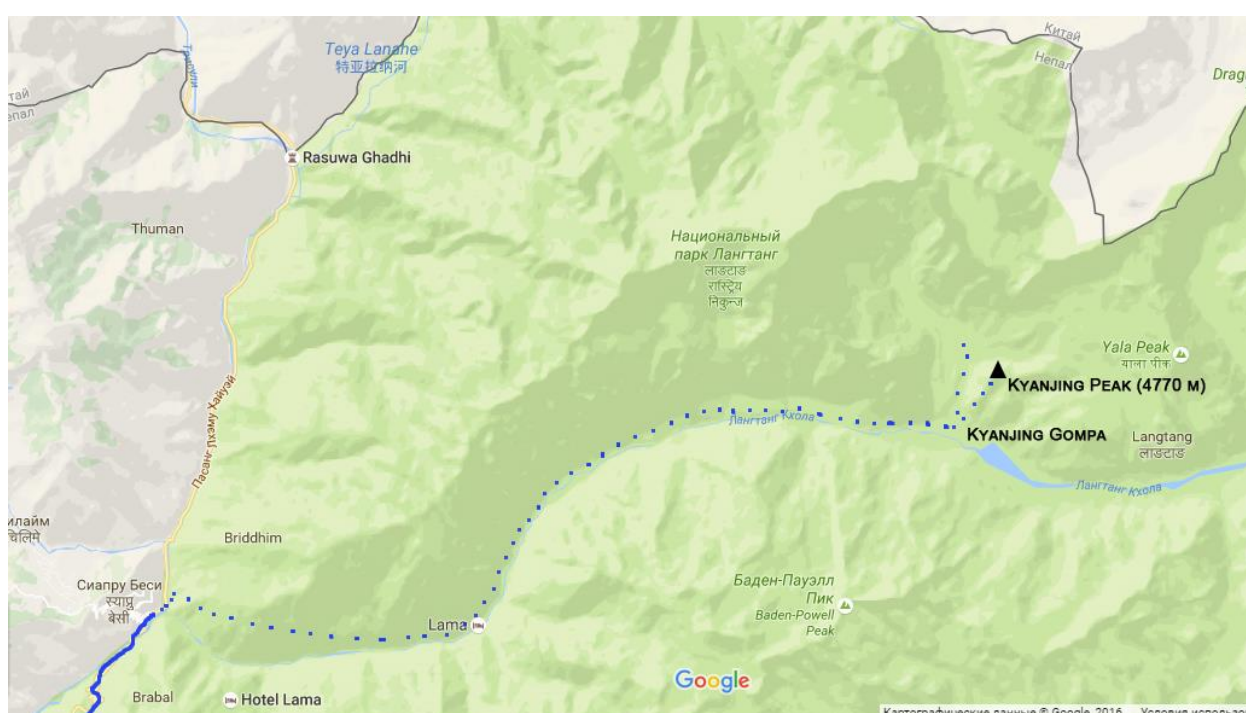


Fig. 1. The route of the expedition in the Langtang National Park

Sites and counterpart.

According to the plan, we visited the Langtang National Park. Our trip began in the village Shiaprubeshi at 1,400 meters above sea level. Here, the first species of Scrophulariaceae were collected (*Limnophila*, *Lindenbergia indica*, *Verbascum thapsus*, *Striga lutea*). The route went through forest along the Langtang River to the village of Kiangsiapu (3800 m above sea level). The bulk of the Scrophulariaceae collections were made here (*Scrophularia urticifolia*, *S. elatior*, *Veronica cana*, *Euphrasia* sp. (2 species), *Pedicularis* (4 species), *Mazus surculosus*, *Verbascum thapsus*, *Plantago* - 3 species). In the vicinity of Kiangsiapu we spent 2 days and worked on Mount Kiangsiapu-peak (4770 meters above sea level), and went on the glacier moraine mountains Langtang-lyrua where an additional 3 species of Scrophulariaceae were collected (*Pedicularis sculliana*, *Veronica cephalodes*, *Veronica ciliata*).

The companions throughout the expedition and subsequent work in the Herbarium of Kathmandu were Dr. Shandesh Bhattarai (Nepal Academy of Science and Technology), Tirtha Pandey (researcher at the National Herbarium of Kathmandu and Plant Laboratories - KATH).



Fig. 2. Team Research figwort on the mountain Kiangsiapu-peak (4700 m): from left to right - Tirtha Pandey, Petr Kosachev, Shandesh Bhattarai.

Results.

A total of 357 were collected herbarium sheets. Of these, 15 species and 108 herbarium sheets were Scrophulariaceae (sensu lato).

Some types are presented in the pictures below.

In addition, I was able to work 2 days in the Herbarium of Kathmandu. set of isotypes and paratypes has been found a new species for science *Lagotis geniculiflora* R.R. Mill et Kosachev (not yet described).

In the herbarium were found three additional species which had not previously been reported from Nepal: *Scrophularia edgewortii*, *Lagotis crassifolia*, *Mimulus szechuanensis*. The samples of all species will be included in on-going revisions, described used in biogeographical and evolutionary analyses.



Fig. 3. *Lindenbergia indica*, *Scrophularia urticifolia*

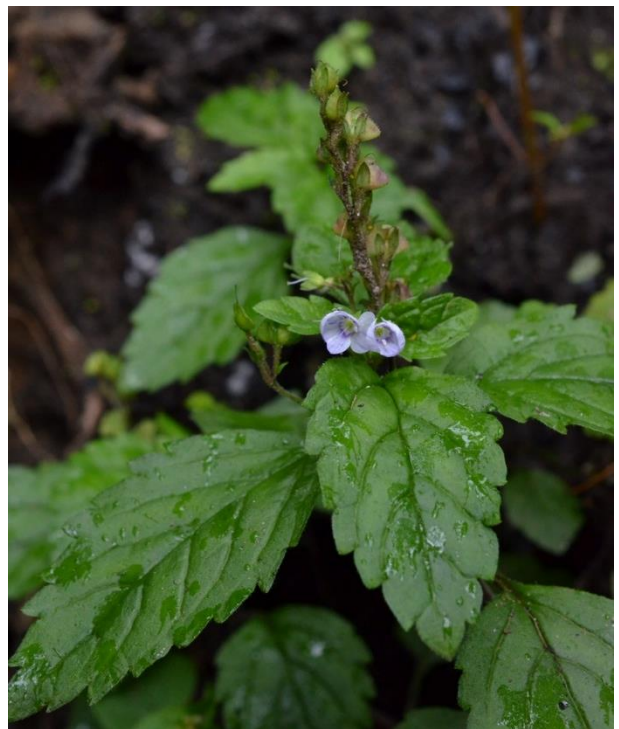


Fig. 4. *Scrophularia elatior*, *Veronica cana*



Fig. 5. *Veronica cephalodes*, *Pedicularis sculliana*

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| Budget | RUB/NR | EURO | GBP |
|--|--------------------------|---------------------|-----------------|
| Ticket | 90000 RUB | | |
| trekking shoes Lowa Sirkos GTX | 9945 RUB | | |
| trekking shoes Mammut Pacific crest GTX | 8964 RUB | | |
| Uppers Freetime Gaiter (Long Cover) | 1392 RUB | | |
| Sleeping bag | 4190 RUB | | |
| Lamp Трофи ТК 35 | 965 RUB | | |
| Portable Charger | 1590 RUB | | |
| Knife tourist | 350 RUB | | |
| Tranfer Aeroport (Barnaul-Nowosibirsk-Barnaul) | 2000 RUB | | |
| Trousers Schoefl 2 | 6500 RUB | | |
| | 125896 total RUB | 1792.3 Euro | |
| Rein coat | 900 NR | | |
| Sigg Bottle | 400 NR | | |
| Jaket 2 | 5500 NR | | |
| Map 2 | 600 NR | | |
| Rope, polyethylene, zip bags | 1260 NR | | |
| Sunglasses | 800 NR | | |
| Metanol | 650 NR | | |
| Langtang National Park Permit | 3390 NR | | |
| Transacton - Cash withdrawal | 5500 NR | | |
| Expedition (travel by jeep, bus, accommodation | 88088 NR | | |
| Thamel Grant Hotel 14 Nights | 38700 NR | | |
| Cash/Pos Receipt | 4000 NR | | |
| Tirtha | 37500 NR | | |
| Shandesh | 17625 NR | | |
| | 204913 total NR | 1719,27 Euro | |
| Sefa Hotel 1 Night (Stambul) and transfer Aeroport | | 63 Euro | |
| | | 3574,57 Euro | 3110 GBP |
| Medical supplies and vaccinations | | | 400 GBP |
| Total | | | 3510 GBR |
| Гостиница Thamel Grant Hotel 14 Neight | 34500 NR + 42 \$ | | |
| Оплата Тиртхе (11 дней по 25 \$ + 10000 NR) | 275 \$ + 10000 NR | | |
| Оплата Шандеш | 100 \$ + 5000 NR + 75 TL | | |
| Cash/Pos Receipt | 40 \$ | | |



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| 02.10.2016 | 119.65651 |
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