

THE FERNS OF GILGIT, BALTISTAN, AND LADAK

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Most of the region covered by this paper is north of the Indus River and comprises the northernmost part of the British Indian Empire. It is north of the main Himalayan chain; the chief mountains are the Karakorums. Renato Pampanini (1930) in *La Flora del Caracorum* lists only five ferns and two species of *Equisetum*. I have visited parts of this region, and have obtained records of 25 additional ferns from this little known part of Central Asia.

The Karakorum Mountains form a massive barrier with passes 18,000 feet or more in height, shutting off practically all intercourse between Kashmir and the territory to the north. In this region are the largest glaciers outside of the arctic and here is to be found Mt. Godwin Austen, the second highest mountain in the world.

Gilgit, or more correctly, the Gilgit Agency, is just west of Baltistan and outside of Kashmir proper. The Gilgit Cantonment is a little less than 5000 feet in altitude and much lower than the rest of the area, which is very high and extremely rugged.

Ladak and Baltistan are the two chief divisions of the country to the north of the main range of the Himalayas in Kashmir State. They are both drained by the Indus and its tributaries. In the *Flora of British India* (Hooker 1872-1896) this region is called Western Tibet. Baltistan used to be called Little Tibet. In this paper the Deosai region south of Skardu is included in Baltistan, and Dras as part of Ladak.

The Indus at Skardu, the chief village in Baltistan, is about 7600 feet above sea level, while at Leh, the capital of Ladak, it flows at 11,000 feet. The whole country is mountainous. There is very little rain; the average at Leh is 2.7 inches a year. There is, however, much snow, which falls in the winter on the high mountains. There is little rain or snow in the main valleys. It is not a good country for ferns and none of the ferns in this list is abundant except *Cystopteris fragilis*. There are no real forests but in favorable places juniper forms trunks of good size without attaining much height.

Little work has been done on the ferns of Kashmir and the territory to the west. In the *Journal of Botany* for 1896 C. W. Hope published a list of 27 ferns which had been gathered by Gen. W. Gatacre on the Chitral Relief Expedition. Chitral is on the Afghan frontier southwest of Gilgit. His report includes a few ferns from lower levels. Most of the ferns here recorded grow at altitudes of from 8000 to 12000 feet, while a few grow even higher. They are chiefly temperate or alpine forms, except for *Ceterach officinarum* and

Cheilanthes persica, which are Mediterranean ferns growing at the eastern extremity of their range in the hot, dry, Indus valley.

The most useful work for those interested in the ferns of North India is C. W. Hope's "Ferns of Northwestern India," published in parts in the *Journal of the Bombay Natural History Society* from 1899 to 1904. Many of the records which follow are to be found in this work.

In spite of the inaccessibility of the region it has been visited by a good many explorers, beginning with William Moorcroft in 1820. Pampanini (1930) gives an excellent list of the visitors who collected plants, together with a bibliography and an account of the routes followed. The only omission I notice is the failure to mention the name of J. E. Winterbottom in connection with the Tibetan Boundary Delimitation Commission of 1847-1848.

Most of the specimens mentioned are in the Dehra Dun Herbarium of the Imperial Forestry Research Institute in North India and in the Royal Botanic Gardens at Kew. Many of them are in the Gordon College Herbarium at Rawalpindi in North Punjab.

I have omitted *Equisetum diffusum*, which I reported from Ladak in 1917, for I now consider it to be *E. arvense*. According to Pampanini, Wallich had a specimen of *Pteris longifolia (vittata)*, which Moorcroft gathered in Ladak. I suspect an error, for no one else seems to have found it above 6500 feet. It grows farther down the Indus near Mt. Nanga Parbat in the hot zone.

OPHIOGLOSSACEAE

BOTRYCHIUM LUNARIA (L.) Sw. Karakorum Mts., *Clarke*; W. Tibet, *Falconer*.

POLYPODIACEAE

CYSTOPTERIS FRAGILIS (L.) Bernh. The only fern common throughout, from 7000 to 14000 feet.

DRYOPTERIS BLANFORDII (Hope) C. Chr. Baltistan, 12000-13000 feet, *Duthie*. Cited by Hope.

DRYOPTERIS ODONTOLOMA (Moore) C. Chr. Gilgit, in 1847, 10000 feet, *Winterbottom*. Cited by Hope.

DRYOPTERIS RAMOSA (Hope) C. Chr. Dras Valley, 10000 feet, *Duthie* 11677.

DRYOPTERIS BARBIGERA (Moore) Kuntze. Mitsahoi, Ladak Road, 11000 feet, *Stewart* 13451.

DRYOPTERIS BRUNONIANA (Wall.) O. Kuntze. Ascent Mir Panzil Pass to the Deosai Plains, 12000 feet, *Stewart* 19994.

DRYOPTERIS LINNAEANA C. Chr. Gilgit, *Winterbottom*; near Parkutta, Indus Valley, Baltistan, 8000 feet, *Stewart* 20915.

DRYOPTERIS LEVINGEI (Clarke) C. Chr. Gilgit, Herb. Dehra Dun.

POLYSTICHUM LONCHITIS (L.) Roth. Gilgit, *Duthie*. Cited by Hope.

POLYSTICHUM LACHENENSE (Hk.) Bedd. Gor, Gilgit, 15000 feet, *Tanner*.

POLYSTICHUM PRESCOTTIANUM (Wall.) Moore. Sai, Gilgit, *Tanner*; Parkutta to Tolti, 8000 feet, Baltistan, *Stewart* 20928; Chunagund, Ladak, 9000 feet, *Stewart* 21053.

POLYSTICHUM THOMSONI (Hook.) Bedd. Tarkiti, 8000 feet, Indus Valley and Shyok Valley, Baltistan, *Thomson*; Mir Panzil Pass, 12000 feet, *Stewart 20005*.

ATHYRIUM FILIX-FEMINA (L.) Roth. Ascent Mir Panzil Pass, 12000 feet, *Stewart 19945a*. Approaches var. *retusa* Clarke.

ATHYRIUM RUPICOLA (Hope) C. Chr. Near Bagicha, Indus Valley, 8500 feet, near waterfall, *Stewart 20980* (Det. Morton).

ASPLENium VIRIDE Huds. Gilgit, *Tanner, Giles*; Mitsahoi, Ladak Road, 11000 feet, *Stewart*.

ASPLENium TRICHOMANES L. Gilgit, 5500 feet, *Tanner*; Satpura Nullah, Baltistan, 10000–11000 feet, *Duthie*. Herb. Dehra Dun.

ASPLENium SEPTENTRIONALE (L.) Hoffm. Gilgit, Herb. Dehra Dun.

ASPLENium RUTA-MURARIA L. Shingo Valley, Baltistan, 10000–11000 feet, *Duthie*; Kangi Nullah, Ladak, 13500 feet, *Koelz 2828*.

ASPLENium FONTANUM (L.) Bernh. Gilgit, *Tanner, Giles*; Baltistan, 10000–11000 feet, *Duthie*; 7600 feet, *Winterbottom*.

ASPLENium VARIANS Hook. & Grev. Near Skardu, Baltistan, *Thomson*; near Bagicha, Indus Valley, Baltistan, 8500 feet, *Stewart 21002*.

CRYPTOGRAMMA BRUNONIANA Wall. Ascent Mir Panzil Pass to Deosai, 13000 feet, *Stewart 19986*.

CRYPTOGRAMMA STELLERI (Gmel.) Prantl. Karakorum Mts., 12500 feet, *Clarke*; Chunagund, Ladak, 9500 feet, *Stewart 21059*.

CETERACH OFFICINARUM DC. Gilgit, 8000 feet, *Tanner*, Herb. Dehra Dun.

CHEILANTHES PERSICA (Bory) Mett. Gilgit, 7000 feet, *Tanner*; Skardu, Baltistan, 8000 feet, *Stewart 20428*; Above Kuru, Shyok Valley, *Stewart 20860* and *Kiris 20891*.

CHEILANTHES DALHOUSIAE Hook. Near Bagicha, Baltistan, 8500 feet, *Stewart 20961, 21003*.

ADIANTUM CAPILLUS-VENERIS L. Kangi Nullah, Ladak, 12500 feet, *Koelz 2821*; Kuru to Kiris, Shyok Valley, 8000 feet, *Stewart*.

PTERIDIUM AQUILINUM (L.) Kuhn. Gilgit, *Giles*. Herb. Dehra Dun.

POLYPODIUM CLATHRATUM Clarke. *Duthie*, Herb. Dehra Dun.

EQUISETACEAE

EQUISETUM ARVENSE L. Khalotse to Lamayuru, Ladak, 9500 feet, *Stewart 438a*; Shimsa Kharbu, Ladak, *De Terra* and *Hutchinson*, Herb. New York; Dras Valley, *Osmaston*, Herb. Dehra Dun.

EQUISETUM RAMOSISSIMUM Desf. Common in Baltistan and Ladak.

LYCOPODIACEAE

LYCOPODIUM SELAGO L. Gilgit, 12000 feet; Burzil Pass, near Deosai, *Koelz 9410*.

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