

# AQUATIC VEGETATION OF LAHUL

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LAHUL is a trans-Himalayan division of the Kangra district, Punjab, lying between the north latitude  $30^{\circ} 8'$  and  $32^{\circ} 59'$  and east longitude  $76^{\circ} 49'$  and  $77^{\circ} 50'$  and is surrounded on the north by Ladakh, on the east by Spiti, on the south by Kulu and Bara Bangahal, and on the west by what was till recently Chamba State. Roughly rectangular in shape, it covers an area of 1,761 sq. miles and contains the head waters of the Chenab river. The country is made up mainly of three valleys—the valley of the Chandra river, the valley of the Bhaga, and the valley of the united Chandra-Bhaga or Chenab. Its form is that of a trough or basin, bounded on all sides by high mountains covered with snow. On the north lies the main Himalayan range, with a mean elevation of more than 18,000 ft. On the south it is shut in by the mid-Himalayan range of Pir Panjal, with a mean elevation of more than 17,000 ft. On the east, Lahul is separated from Spiti by a ridge, the Kunzom Range, 4-5 miles long and 15,000 ft. high, which connects the ends of two high spurs thrown out by the main Himalayas and Pir Panjal. On the west, it is bounded by a lofty offshoot from the Pir Panjal, which advances to meet the main range, leaving only a narrow gap through which the waters of Chandra-Bhaga escape. The centre of the country, which may be designated as the Chandra-Bhaga watershed, is occupied by a triangular mass of mountains, which unite with the northern and eastern ranges at the Baralacha Pass. The peaks rise here to 21,000 ft. and the numerous lateral valleys are all filled with glaciers. It has been described as "one great ice-bed broken here and there by lofty heights of impassable rock and snow".

Botanically Lahul is interesting on account of its high elevation and the great dryness of its climate even during the growing season, which lasts roughly from April to September. The bed of the river Chenab in Lahul does not fall anywhere below 9,000 ft. The valleys of Chandra and Bhaga throughout their length are above 10,000 ft. in height. The surrounding lofty mountain

ranges cut off the monsoon currents. The summer rainfall in most places does not exceed 5 in. Strong winds and insolation further heighten the aridity of the climate, which approaches that of the Tibetan plateau. The alpine flora over large tracts of Lahul, therefore, is of the desert type. It was described by G. E. T. Aitchison in 1869.<sup>1</sup> Trees are absent except for the willows and Lombardy poplar, planted near villages where irrigation facilities are available, and a tree juniper between Kyelang (10,500 ft.) and Jispa (11,500 ft.). In addition to these, one can only occasionally see *Pinus excelsa* Wall. and *Betula utilis* D. Don. Shrubs also are only a few in number. Most of the approximately 300 species recorded by Aitchison are herbs. Aquatic plants have not been recorded at all, so far, from Lahul.

From this wild and desolate country of alps and ice, three lakes have been reported. One of these, Chandra Tal, about three quarters of a mile long, lies on the left bank of Chandra opposite the Palamo Pass on the Kunzom Range. This has not been visited by any botanist, but its water has been described as "fresh and very clear". It has most probably no macroscopic vegetation. The other two lakes are on the Bhaga, a small one just on the top of the Baralacha Pass and the second, Suraj Tal, about a mile below. Neither of them have any aquatic flowering plants.

The present observations on the aquatic vegetation of Lahul have been made at places other than these lakes during the course of an expedition in the month of September 1949, for selecting a suitable site for the proposed High Altitude Research Station. Lahul was entered via the Rohtang Pass (13,050 ft.) and the itinerary included Koksar (10,500 ft.), Sissoo (10,500 ft.), Gondhla (10,150 ft.) in the Chandra Valley, Rangcha Gali (14,950 ft.) on the Chandra-Bhaga watershed, and Kyelang (10,400 ft.), Jispa (11,500 ft.), Darcha (11,500 ft.), Patseo (12,464 ft.), Zingzingbar (14,000 ft.)

1. *Jour. Linn. Soc. Lond. Bot.* 10: 69-101.

and Baralacha La (16,047 ft.) in the Bhaga Valley. Aquatic plants were studied, while on the march, chiefly from three situations.

The first plants to attract our attention in this connection were marsh plants growing by the sides of streams and water channels, which curiously enough abound in this arid country. The higher ranges of Lahul are all covered with glaciers. From these flow down into the Chandra and Bhaga Valleys numerous streams, some large and some small. They rush down at very steep gradients, sometimes almost vertically downwards, to join the river below. A few among them, however, between 10,000 and 11,000 ft., touch nearly level ground and flow along comparatively gentle slopes. Their water is harnessed for purposes of irrigation and distributed by rough channels, made perhaps generations ago. The banks of such streams and water channels are found densely crowded with luxuriant growth of marsh marigold (*Caltha palustris* Linn., in fruit in September) and a tall robust balsam (*Impatiens* sp.) with pink flowers. Such vegetation is pretty common between Sissoo, Gondhla and Kyelang. Taking the form of narrow green belts on an otherwise barren landscape, it is a very striking feature of the lower reaches of the valleys of both Chandra and Bhaga. Along some channels, there is a pure growth of *Caltha palustris* (FIG. 1). These generally run on almost level ground. Other channels show a pure growth of the pink-flowered balsam (FIG. 4). These usually run along gentle slopes and have a swifter current of water. At still other places the two species, marsh marigold and the balsam, are found growing mixed together. The distribution appears to be largely determined by the speed of the water current.

Going along the mule track in Lahul, at several places between 10,000 and 12,500 ft. water is found just oozing out from the rocks. There is hardly any flow, but the rocks and earth are wet and occasionally dripping. *Veronica beccabunga* Linn. is the characteristic plant of such places.

Truly aquatic vegetation was observed only at two places, first at Darcha in a moving stream and secondly in a lake near Sissoo. Darcha is the highest village in Lahul, situated at an elevation of approximately 11,500 ft. in the Bhaga Valley, about 17 miles above Kyelang. Just below it, Bhaga is joined on the right by a stream

from Zangskar and on the left by Melang Nal or Yotse — all of them together forming a sort of crossway. Crossing Zangskari Chu, the track runs for some distance along its bed. Here is seen a gently moving stream of cold water with a luxuriant growth of aquatic plants (FIG. 3). The stream is fairly broad but shallow, the water being only about 6 in. deep. In winter, it must be all frozen up. The centre of the stream was found covered with *Potamogeton pectinatus* Linn., with its narrow filiform leaves swaying beautifully in the current and spikes of flowers coming to the surface. On the sides grew *Ranunculus nalans* C. A. Mey. with yellow flowers and *Veronica beccabunga* Linn. with small pink flowers. For a distance of half a mile or so, even though the stream was choked with plants, these were the only three species observed growing in it.

The lake at Sissoo (FIG. 5) is situated in the bed of the Chandra river at an altitude of about 10,000 ft., parallel with the main stream. It is approximately 450 yds. long and 100 yds. wide. From the Sissoo Rest House, it appears as a sheet of water with scattered tufts of green, and one has to descend about 500 ft. from the main track to reach it. The lake has a sandy bed. The water is clean, so that the bed of the lake is clearly visible. The depth of water is variable and extends up to about 5 ft. The vegetation shows that the lake must have been there for a pretty long time. Even in summer the temperature of the water is very low. In winter it must be all frozen.

The dominant plant of this lake is *Polygonum amphibium* Linn., a species which extends from America right through Europe and North Asia to the Western Himalayas. It is recorded in India from Kashmir and Kumaon, up to a height of 6,400 ft. Here it is seen at an altitude of nearly 10,000 ft. Where the water is deep, the plants assume the floating form. The stems become greatly elongated due to a lengthening of the internodes and the leaves float on the surface of the water (FIG. 5). The red spikes of flowers, however, rise erect even from such floating shoots. Where the water is shallow, plants of *Polygonum amphibium* grow erect, forming dense groups (FIG. 2). It is such growth which appears from a distance as green tufts scattered in the clear water of the lake.

Other plants found in the lake are:

(1) *Potamogeton indicus* Roxb. This is very similar in habit to the floating form of *Polygonum amphibium*, but possesses also submerged membranous leaves, longer and narrower than the floating leaves. It is common in the plains of India, Burma and Ceylon and is already known to ascend the Himalayas up to 9,000 ft.

(2) *Potamogeton perfoliatus* Linn. It is a widely distributed species with entirely submerged leaves and has been recorded already from Tibet, from a height of 14,000 ft.

(3) *Potamogeton lucens* Linn. It is another widely distributed species with only submerged translucent leaves, but has not been recorded before from such an altitude. In Kashmir and Kumaon, it is known to go up to nearly 6,000 ft.

(4) *Naias* sp. This was without flowers. It shows considerable resemblance to *Naias graminea* Del., but does not match exactly with it.

(5) A sedge. This is abundant at the periphery of the lake, but being without flowers, it was not possible to identify it.

The above record of water plants from Lahul is interesting, because this region is known chiefly for the aridity of its climate, and Aitchison who enumerated the flora of this region completely missed them. Further, the present record extends considerably the known upper limit of some of the species of flowering plants found in the Himalayas.

I take this opportunity to express my thanks to Mr. M. B. Raizada, Systematic Botanist, Forest Research Institute, Dehra Dun, for help in identifying the plants.

#### EXPLANATION OF PLATES

##### PLATE 1

1. *Caltha palustris* Linn., growing along gently moving water channels between Sissoo and Gondhla, altitude 10,500 ft.

2. *Polygonum amphibium* Linn., growing erect in shallow water, in the lake near Sissoo, altitude 10,000 ft.

3. Aquatic vegetation of a shallow stream flowing near Darcha, altitude 11,500 ft. *Potamogeton pectinatus* Linn., with long narrow leaves occupies the centre, while *Veronica beccabunga*

Linn. and *Ranunculus natans* C. A. Mey. grow at the sides.

##### PLATE 2

4. *Impatiens* sp., with pink flowers, growing along water channels at Sissoo, altitude 10,500 ft. A few cultivated willow trees are seen in the background.

5. A general view of the lake near Sissoo, altitude 10,000 ft. *Polygonum amphibium* Linn., with erect flowering spikes, is seen floating in the foreground.



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