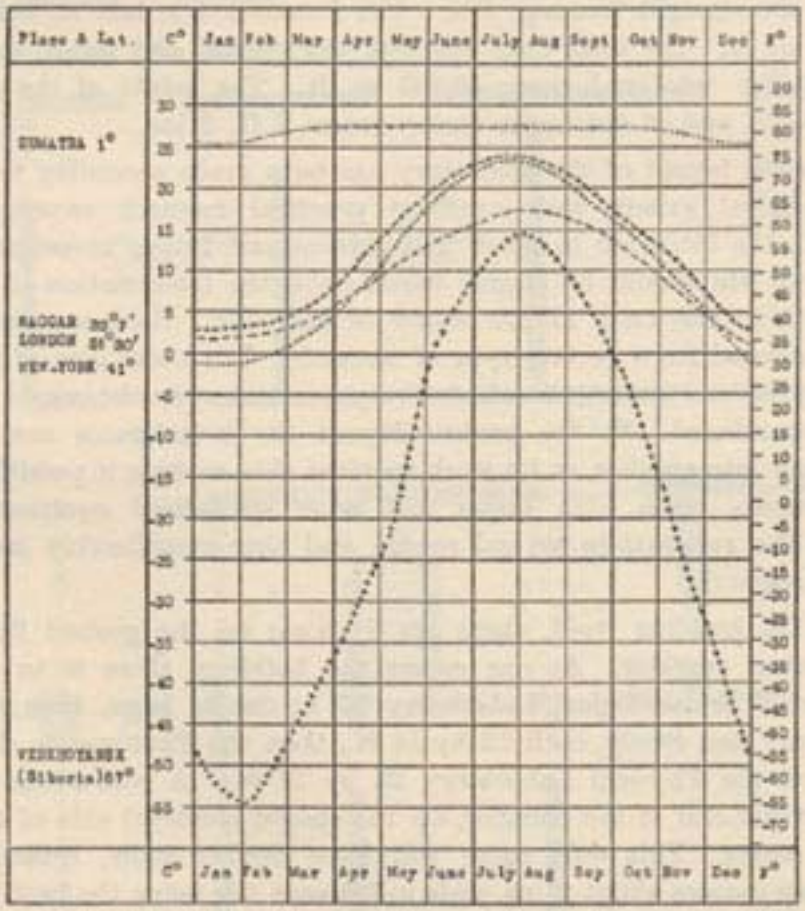
GENERAL VIEW OF THE HEADQUARTERS AND MEDICAL RESEARCH LABORATORIES AT NAGGAR, KULU, PUNJAB, INDIA.

GENERAL VIEW OF THE NEW BUILDING FOR MEDICAL RESEARCH.

THE INSTITUTE'S NEW BUILDING FOR MEDICAL RESEARCH AT NAGGAR

IN accordance with its programme in the field of medicinal and biochemical research the Institute had to expand its premises at Naggar and early in 1932 commenced the building of a biochemical laboratory, where this research is to be conducted. The new building, with the exception of its inner technical installation and equipment, was completed by the end of the same autumn. The construction was made possible thanks to a donation of a friend of the Institute in New York, who desires to remain anonymous.

For the benefit of those who know little of North-Western India, it should be mentioned that the Beas Valley, in which Naggar is situated, lies in the



western part of the Great Himālayan Range, the glaciers of which surround the upper Beas from three sides (N., E., and W. within ten miles by airline), the nearest highest peaks of the Range being 21,760 and 23,050 ft. above sea-level,

straight to the East from Naggar, 33 and 65 miles respectively by airline. The range on the slope of which Naggar is situated, has peaks 13,500 to 14,500 ft. high (which is higher than Mt. Jungfrau in the Bernese Alps), with a pass—Chandarkhani P.—12,200 ft. leading into the Malana Valley. This pass is less than six miles by road from Naggar. Despite the high altitudes, vegetation grows up to 19,000 ft. in the summer, this being more than 3,000 ft. higher than the Mont Blanc! The Latitude of Kulu is that of Morocco. The given table shows the mean temperatures in C°. and F°. of Naggar for each month, as compared with the most extreme and normal temperatures of the world.

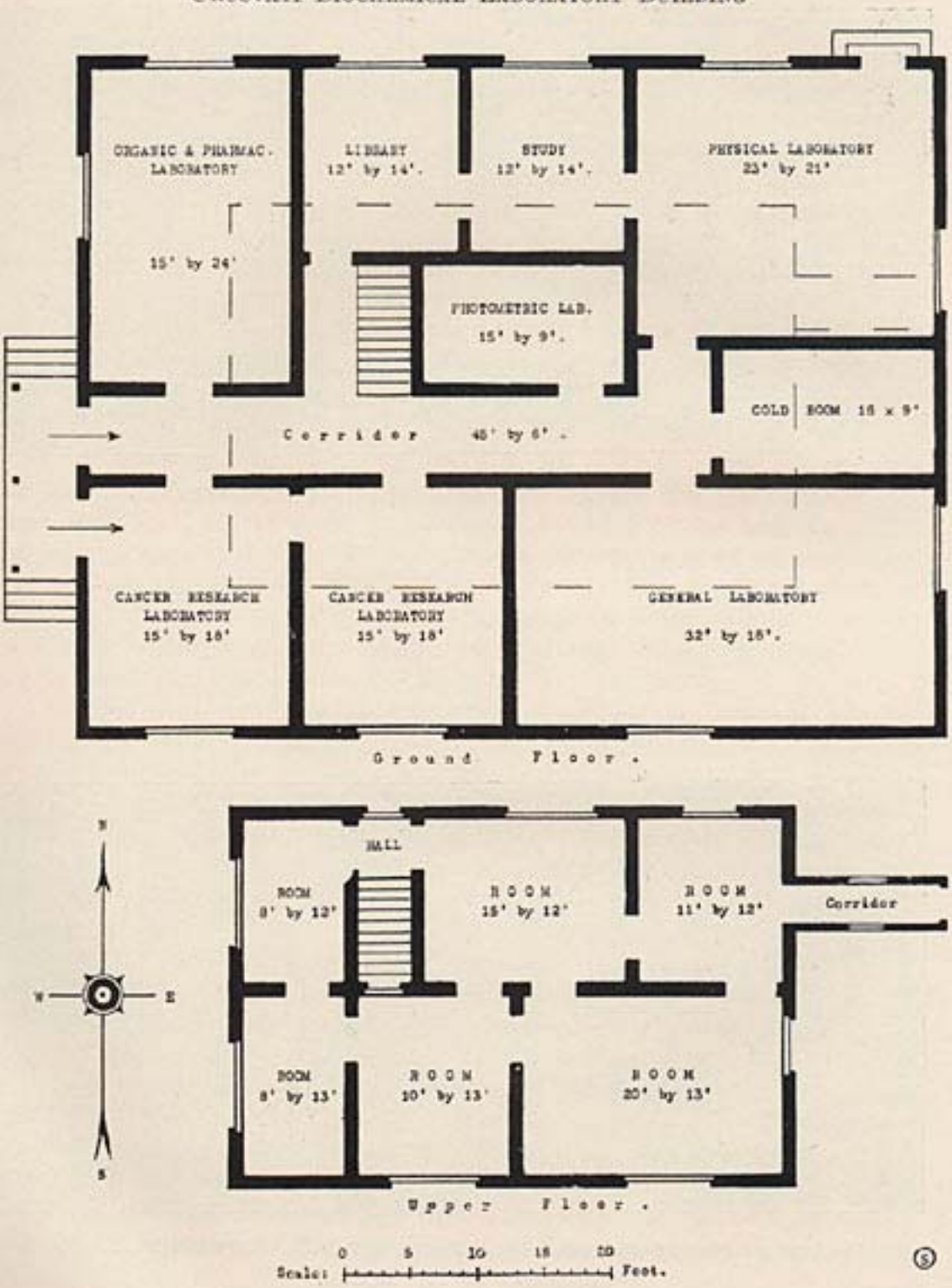
To the North of Kulu lies Lahul, to the West Chamba State, to the East Spiti and to the South Mandi State and Bashahr.

The actual height of the Laboratory building above sea-level is 6,220 ft. The building lies to the East of the Institute's Headquarters and is separated from these headquarters by a passage four yards wide, both the buildings running in one straight frontage line. The foundation is laid on solid rock and is 64 ft. by 51 ft.; the total floor space of the ground and upper floors is 4,076 sq. ft. and the total wall space 10,523 sq. ft. The height of the ground floor rooms is 10½ ft. and of the upper storey rooms 9 ft. 3 ins.

The general layout of the laboratory has been made according to suggestions of a biochemical expert with excellent practical research experience in this matter, with the intention in mind that present and future investigations of the phenomena of life should be largely based upon the interrelation of the various sciences, rather than on a narrow study of one only. Each separate room has thus been planned for a certain type of research. The older idea of arranging in a laboratory several rooms, in which every research scientist works by himself, has been abandoned. In the present layout the investigator can move from one laboratory into another, as his work requires, thus making it possible to provide every laboratory room with better and more specialized equipment, without duplicating the apparati in several rooms, and thus considerably improving the quality of research.

As to the building itself, there are 9 rooms on the ground floor, situated along a central corridor. As one enters the building, there is to the left the Organic and Pharmacological Laboratory 15 by 24 ft. large, then the entrance to the Library and Study, each 12 by 14 ft., then the Photometric darkroom, 15 by 9 ft., and the Physical Laboratory 23 by 21 ft. A cold room 16 by 9 ft. is at the further end of the corridor, on the coolest (eastern) side of the building, facing the rocks. This cold room will have double walls, ceiling and floor, leaving an air camera about 2 ins. wide in-between (air being the best isolator) and will be cooled by an electric refrigerating plant. A thermostat will regulate the temperature to be kept permanently at 5°C., which is the best for this kind of work.

URUSVATI BIOCHEMICAL LABORATORY BUILDING



The earthquake proof dhajji diwar construction.

A view of the new building from the N.E., showing bridge leading to the rocks.

To the right of the corridor are two rooms for Cancer Research, each 15 by 18 ft. and the spacious General Laboratory 32 by 18 ft. large.

The laboratories will be heated by thermostatically controlled electric radiators, one under every window, automatically preventing the temperature from falling below the required point. The ideal temperature for such laboratories is 20°C. (68°F.), with variation from 15°C. to 25°C. being tolerable but higher temperatures being exceedingly objectionable, as no work involving biological material could then be carried out accurately. The refrigerating plant in its essentials consists of an electric motor driving a pump, a cooling liquid and a system of piping. This refrigerating liquid may be carried a considerable distance, thus providing refrigeration for all those rooms of the laboratory where a regulation of temperature is essential.

The ventilation of the rooms will be carried out by exhaust fans, probably the De Botezat type will be used and separate exhaust fans will have to be used for the hoods, preventing obnoxious gases in certain chemical work from finding their way into the rooms.

As we succeeded in obtaining 20 and 24 ft. iron girders, and thus could considerably strengthen the ceilings, the erection of the upper storey became possible, and six more rooms could be added to the building. This upper floor is connected by a wooden staircase with the ground floor corridor, and the rooms are 20 ft. by 13 ft., 15 ft. by 12 ft., 11 ft. by 12 ft., 10 ft. by 13 ft., 8 ft. by 13 ft., and 8 ft. by 12 ft. large. A glass corridor from one of the upper rooms leads to a bridge, which having a span of about 20 ft. takes one across to the rocks to the East.

All rooms have extremely large windows, admitting the maximum possible amount of light from the outside. The ground floor windows are seven feet wide and five feet high, having nine glass panes 16 ins. by 20 ins., thus admitting 20 sq. ft. of outside light. The three large General, Physical, and Organic laboratories have each two such windows. The indoor lighting will be electric.

The construction is in wood and stone, covered with plaster and whitewashed. This method of construction is known here as the dhajji diwar construction and has proved to be the best, if not even the only, method of construction that resists earthquakes, which used to be quite frequent in this region. Most of the Government buildings in Dharmsala for instance, are built in this style and have proved to be the best. It is interesting that in its essential principle this mode of building rather resembles the steel structure of modern skyscrapers, with the difference of course that wooden beams are used instead of steel girders. Thus the wisdom of the people in its own way found the best solution, how to give the utmost binding strength and rigidity with the local material available. The walls can be seen on the attached photographs, showing how the vertical beams are bound by horizontal beams, and the resulting squares are fortified with a diagonal cross, making the skeleton structure perfectly stress and strain resisting

on the same principle as the triangular girder construction. All corners and joints are then strengthened by steel bolts and iron hooks and the open triangular spaces are then filled with large stones and binding material, and the walls plastered inside and outside and whitewashed. This actually makes the whole wall become one solid piece.

Over a hundred trees were required for the wooden part of the construction and for seasoning timber for making furniture for the laboratory. Since the Forest Department was not in a position to sell us trees nearer than mixed unselected forest plots at Devi-di-Jhir and Patha-Nali (beyond and above Bundrole), a distance of 11 miles and on the opposite side of the Beas River, we express our thanks to Mr. W. H. Donald for selling to the Institute trees at our own selection from his forests at Ghordrour and Kalaunti. The carriage was made on coolies. Most of the trees were blue pine (local name 'kail', *Pinus excelsa*), but for windows and doors and furniture, deodar wood (local name 'kelo', *Cedrus Libani Deodara*) was used. Ceiling and floors, wherever the latter were not laid in large stone slabs, were made in spruce (local name 'rai', *Picea Morinda*). The timber had been purchased already in 1931 and had been stocked to season. Stone was available from nearby rocks and about twenty-two thousand cubic feet were used. The large square stone slabs (four square feet each) for flooring are also to be had nearby and about half a thousand of these were required. The roofing took over 350 corrugated iron sheets which together with other material, like bolts, screws, instruments, etc. had to be brought on lorries from Amritsar and Lahore, a distance of 300 miles from Naggar.

The maximum number of workmen employed at a time was 72. The head carpenters were from Hoshiarpur, and the rest of carpenters, masons, coolies, etc. were employed locally. Naturally every detail of construction, planning, outlay, levelling, measuring, etc. had to be personally directed and minutely supervised.

The clearing of the site for the laboratory necessitated further the removal of the old servants' quarters and kitchen, and new servants' quarters 40 ft. long by 13½ ft. wide, were constructed to the N.-E. of the laboratory on a plot of land also donated by Prof. de Roerich for this purpose. The servants' quarters have four rooms, 12 ft. by 9½ ft., with a window and door each. A veranda runs along the whole length of the quarters. A new kitchen has also been constructed, adjoining the Institute's Headquarter building.

It remains now to install the laboratory equipment and fixtures and to fit the water supply and electric light and power. Thanks to the advantageous situation in the hills, it is possible to derive electric power from a nearby mountain stream, which can be conducted in a channel to give a hundred feet drop, thus providing for about 80 kw. of electricity. A survey of the spot has already been made and found by experts to be fully suitable. Estimates for the hydro-electric plant are expected as well as the granting of the necessary land and water rights. The turbine and generator will be located on the Chhaki river,

hardly four furlongs from the Institute's buildings and current will be transmitted by overhead lines. It is planned to install at 110 V. A.C. current, three phase, fifty cycles. The consumption of the electric room heaters, chemical heaters, thermostats, pressure pump, refrigerating plant and electric motor is estimated at 55 kw., the balance being required for lighting of all the buildings, motors for carpenters' workshops, stoves, fans, driers, etc. and for possible expansion in the future. A converter will be installed to change part of the current for D.C.

Whilst it is impossible in this short article to dwell on the biochemical side of the Laboratory work to be carried out (particulars of preliminary collections for which are mentioned elsewhere in this Journal, and particulars of the laboratory research work will follow in later issues of the Journal when the work will have been started), but it is interesting to mention here, that though considerable biochemical and botanical research work is being carried out in India by able scientists in the laboratories at Dehra Dun and at Calcutta, etc., our Institute is the first to establish such modern up-to-date laboratories right up in the mountains, where research work can be conducted on the spot under ideal conditions (with nurseries and plantations) on l i v i n g m o u n t a i n herbs and plants. Why the properties of medicinal plants growing on altitudes are different, is not in the competency of the writer to discuss here, but it would seem that already the very much lower atmospheric pressure (for example on 15,000 ft. above sea-level 427 mm. (16·8 ins.) as compared to 760 mm. (29·9 ins.) at sea-level) and the different composition of the atmosphere must have a considerable influence on plant life, its cell structure, plant nutrition, etc.; and no doubt these are only few of numerous other influences and conditions.

THE SECRETARY.