portant, therefore, to find out when the maximum average density, or what is practically the same thing, the maximum barometric weight of this stratum, occurs, and more especially to see whether it coincides with the epoch of minimum temperature, which, as a rule, occurs in January throughout India.

The following table, in which I have calculated the mean monthly barometric weight of such a stratum in different part of the country, will show that the maximum invariably occurs in January, that is to say, it *coincides* with the epoch of minimum temperature. Two bars placed underneath a figure indicate the maximum pressure or weight of the year; one bar, the secondary maximum at the hill-stations in the spring.[1]

Stations.	Elevation above sea-level in feet.	Mean monthly barometric pressure in inches.						
		October.	November.	December.	January.	February.	March.	April.
Leh	11,538	19·714	·707 *	·728	·553	·571	·656	·630
Lahore	732	29·144	·262	·332	·243	·237	·107	28·962
Stratum between—thickness	10,806	weight 9·430	·555	·604	·690	·666	·451	·332
Chakrata	7,052	23·332	·356	·352	·304	·313	·325	·309
Roorkee	887	28·965	29·102	·150	·108	·050	28·965	·853
Stratum between—thickness	6,165	weight 5·633	·746	·798	·804	·737	·640	·544
Darjeeling	6,912	23·436	·472	·449	·382	·368	·364	·363
Goalpara	386	29·461	·593	·641	·610	·544	·459	·383
Stratum between—thickness	6,526	weight 6·025	·121	·192	·228	·176	·095	·020
Ranikhet	6,069	24·108	·180	·158	·079	·070	·055	·070
Lucknow	369	29·503	·651	·696	·641	·596	·481	·348
Stratum between—thickness	5,700	weight 5·395	·471	·538	·562	·526	·426	·278
Wellington	6,200	24·217	·245	·256	·208	·226	·246	·247
Madras	22	29·847	·922	·965	·944	·921	·895	·843
Stratum between—thickness	6,178	weight 5·630	·677	·709	·736	·695	·649	·596

* To avoid repetition, I have merely given the decimals after the first column. In every instance of omission the last prefixed integer is to be supplied.

Without going any deeper into the matter, it must, I think, be generally admitted that the preceding facts not only dispose of Mr. Broun's objection to the idea that pressure and temperature are related, because the epoch of maximum atmospheric pressure on the plains of India generally *precedes* that of minimum temperature, but also show how abortive any attempt to base inductions regarding a secular variation in solar heat, upon the results of comparing the annual range of monthly mean pressure, or even the mean annual pressure, for a number of years in succession in different parts of India, must necessarily prove, unless they be duly taken into consideration.

With reference to Mr. Broun's conclusions alone, the following modifications should be attached, according to the results of my investigation.

1. The annual oscillations of monthly mean pressure and monthly mean temperature bear an exceedingly *variable* ratio to one another in India, such variation being a function partly of the altitude, and partly of the distance from the coast.

2. Non-coincidence of the critical epochs of monthly mean pressure and temperature, cannot be rigorously employed as an argument against the hypothesis, hitherto generally accepted, of a causal connection between them.

E. DOUGLAS ARCHIBALD

Insect Galls Buds

INSECT galls are held to be "excrescences"; a "diseased condition of vegetable tissue"; and they are supposed to result from the "injection of a fluid," or from some "secretion." The student may most easily begin an investigation of galls with the dissection of those produced by the turnip-weevil (*Curculio pleurostigma*) on the bulb of the Swede. The roots of Swedish turnips are frequently covered with hundreds of irregular spherical warts, from ·03 to ·75 of an inch in diameter, growing either singly or crowded together in clusters. These warts are regarded by M. Woronin (*Plasmodiophora brassicæ*, Pringsheim's *Jahrb.* xi. B. p. 548) as resulting from the fungus which he has discovered to be the cause of club-rooting in cruciferous plants. I believe that on this point M. Woronin has been misled. The true clubs produced by his fungus are entirely distinct from these root-nodes. Under favourable conditions the root-nodes have been found to give rise to tufts of leaves; a fact which I can confirm by many examples presently growing in my possession. Dissection of these nodes, on Swedes, shows that they contain none of the plasma and spores which constitute the bulk of the true clubs. They are, in fact, tuberculated buds arising directly from medullary rays in the root to which they are attached. These can be traced through the enveloping parenchyma into the nodes, where they are seen to give rise to masses of contorted and branching leaves. The nodules within the bark of the beech, hazel, and other trees, are of the same character as those on the turnip. The medullary nexus of these nodules sometimes comes straight from the centre of the tree into the node, and sometimes runs along like a cord under the outer layers of the bark, entering the node by the end.

Let a dissection now be made of one of the weevil galls on the bulb of the turnip. The second or third slice will show the outer foliations, exactly similar to those of the root buds. When the centre has been reached, where the maggot will be found, there will also be found a vascular pencil running up from a medullary ray in the bulb, and bearing on its top a bud of the same description as that produced by a ray running out from a root. The insertion of the ovipositor brings a medullary ray into action, producing a tuberculated bud, and it is only the bud which the larva feeds upon. The growth of a bud is an intelligible cause of the growth of a gall, but we can infer nothing from the injection of a fluid.

All insect galls are in reality leaf-buds, or fruit-buds. They are not mere amorphous excrescences. The vascular lines which would form leaves can easily be followed up the structure of the oak-leaf galls. And in cases where the egg has been deposited in the tissue of a young branch the cap of the gall is sometimes surmounted by a leaf two or three inches long. But in the large blue Turkish galls many lacunæ occur where the fleshified leaves have not filled up the spaces between them. The morphology of the hollow woody shell, and its inclosures of starch, &c., found in the interior of these galls I hope to work out by and by. It is a curious fact that various microscopic fungi are matured in the interior of imperforate galls.

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[1] In selecting the particular station on the plains to be used in each case, I have endeavoured as far as possible to fulfil two requisites: (1) proximity to the hill-station, (2) low elevation above sea-level.