evergreen shrubs out of doors or even bought in the markets, as celery, cabbage, etc. Roots may likewise come from the markets, stems and buds abundantly from the trees out of doors, and towards spring the latter may be forced to open in warm rooms. Far too little use is made of these easily obtained materials. By the time the vegetative organs have been studied the first Apetalæ will be in bloom, and if the students have been properly taught to use eyes and hands the Apetalæ will present no difficulties; later come other wild flowers, and all is easy.

Allow me, in conclusion, to sum up the points of this paper. In the laboratory teaching of large classes, the first essential is a recognition of the fact that nothing can replace individualism in teaching and that a sufficient number of assistants should be employed. These assistants must be intending teachers, given some pedagogic instruction, supplied with a uniform plan of work, but left very free in the details of their modes of reaching the students. Classes should be divided into sections with fixed hours and containing not more than thirty men, over each of which one assistant has entire charge until the end of the term. As an aid to uniformity of plan and to answer the innumerable legitimate questions which arise in laboratory work, as well as to supply technical nomenclature, weekly printed guides, fitted to the exact work being done, should be supplied to each student. Lectures and laboratory work should be kept together and follow such a course that the vegetative organs upon which material is at all times available should be studied in the winter, and the reproductive organs in the spring or summer.

So much for a general plan; each teacher must vary it in adaptation to his own needs.

W. F. Ganong.

Smith College.

MAGNETISM AND THE WEATHER.

Much time has been devoted to the study of magnetic and meteorologic observations with the hope of establishing a definite connection between the two. The results thus far have been almost entirely negative, although a connection has been found with auroras, and the diurnal range of air pressure is now believed to be a thermo-electric phenomenon, allied to the diurnal range in the swings of the magnetic needle. There are certain well established facts that have been ascertained regarding magnetism that almost always stand at the base of all such investigations, although it is admitted that magnetic phenomena are extremely complex, and those of the weather are far more so.

1. The three principal magnetic conditions or fluctuations are as follows: (a) The diurnal change due to some combined solar and terrestrial action. (b) Magnetic storms, which are peculiar and sharp disturbances, generally originating in the sun. These often occur at three or four successive rotations of the sun.

(c.) A gradual change in magnetism from one day to the next. These are quite singular, and have been studied more than any other conditions in the hope of establishing some relation with our weather.

2. In studies of magnetism strenuous and long continued efforts have been made to establish a regular recurring period depending upon the rotation of the sun. It is easy to see that if there were such regular period its discovery would be of the profoundest significance. The results of such studies, however, have been far from satisfactory. It is known that sunspots have a different period of rotation, according as they are near or far from the equator, and this fact is enough to show the extremely dubious nature of an attempt to fix on any definite period for recurring solar effects. It is not at all surprising that more than a

score of periods have been determined from 25.5 to 27.5 days, depending somewhat upon the data employed and upon the method of its manipulation. It is very certain that, if any one will take the 'horizontal force,' for example, and arrange the observations in intervals of 26 days (the best thus far found) he will quickly find that, judging from the disturbed days, there is absolutely no fixed interval. These disturbed days would seem the very best material for such studies, as they are very definite. These days will occur for three or four rotations most beautifully, but after that the disturbance disappears and no more will appear along that line for a score of rotations.

In the same way one will very quickly find, in using the data and leaving out the disturbed days, that there is absolutely no recurring period of 26 days or any fraction of that interval. Sometimes by grouping ten rotations one will find a fairly good fluctuation, but the very next group of ten rotations will make 'hodge podge' of the previous group. This would seem an extremely important point to settle, as months have been devoted to fruitless efforts in trying to determine such a period.

3. The fluctuations under (c) above are simultaneous over the whole earth, as has been shown by the records at Batavia, India, Los Angeles, Cal.; St. Petersburg and Tiflis, in Russia; Vienna, Austria; Washington, D. C., and Zikawei, China. One is struck at once by the wonderful regularity of these fluctuations over the whole Northern Hemisphere. Making allowance for the difference of time and for disturbed days, the fluctuations are found to be exactly the same at each station, and the record at a single station will answer perfectly for comparison with any supposed related meteorologic phenomenon.

4. After thirteen years of study and careful discussion I am satisfied that the pressure of the air, or perhaps the fluctuations of the dew point, are by far the best to use for determining a possible connection with magnetism. I am also perfectly satisfied that, except in the cases specified above, there is no direct relation between magnetic and meteorologic phenomena, and this is also the outcome of the exhaustive studies in England and on the continent. I am also satisfied that there is an indirect relation, but the phenomena are so extremely complex that it has proven impossible to determine it up to the present.

5. In all studies of this character, and in all attempts at determining coincidences between such phenomena, one will always find a most valuable check by cutting up the long list of rotations into groups of 7, 10 or 14 rotations in each. If these separate groups do not show a thread running through them, or fluctuations common to all and continually recurring, he may be satisfied that there is nothing in it. There is a peculiar and well-nigh unaccountable fascination in arranging and summing groups of figures in the hope that something may come, but continuous effort will show that there is something back of it all which is not understood, and no headway can be made by direct comparisons.

H. A. HAZEN.

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SIMILAR INVENTIONS IN AREAS WIDE APART.

As a contribution to the much disputed question of the occurrence of similar inventions in areas wide apart, I desire to call the attention of readers to the device for weaving of which I have found abundant examples in the Pueblo country, in the New England States, and in Finland.

The apparatus consists essentially of a small rectangular frame-work in which are placed a series of perpendicular slats perforated in the middle. It has the appearance