

separators. The pump; siphon; fire-engine. Pressure of water; artesian wells; use of a head of water. Density; flotation. Mechanics in everyday life: levers, pulleys, steam. Physics: expansion of solids, liquids, and gases when heated; magnetic compass. Solutions. Solvents: water, alcohol. Crystals. Common elements and compounds: sulphur, iron, common salt, soda, saltpetre, mercury, tin, zinc, lead. Distillation; filtration. Fire. Candle. Coal-gas. Tar. Kerosene and kerosene-lamps. Sun, moon, planets, stars, meteors, comets. Tides. Eclipses. The seasons. The sea and the seashore. Outdoor studies in geography. Land-measuring. Natural-history calendars; weather-calendars; astronomical calendars; &c.

Some of these subjects may be taken in junior classes; others are suitable only for senior classes; others, again, may be taken twice, three times, or even oftener in the school course—at first in a simple manner, afterwards in a way suited to the more mature powers of observation of older children. Natural-history calendars of a simple character might be kept as early as S2. Weather-calendars might begin in S4. (The school should be equipped for this purpose with a thermometer, maximum and minimum by preference, and a rain-gauge; also, if possible, with a barometer.)

Of course, no school will attempt all the topics that are suggested above. Lessons will be arranged for various schools according to the tastes and acquirements of the teachers, and should in all cases have immediate reference to the local surroundings.

#### ELEMENTARY SCIENCE IN COUNTRY SCHOOLS.

The following rough notes are given as an indication of the topics from which there may be selected subjects for a course of lessons suitable for the upper classes of a country school.

*Preliminary Work.*—It is presumed that in the earlier standards lessons on objects will have been given with the purpose of teaching children to observe carefully and intelligently the simpler facts of animal and plant life as it may be seen around them, and that these lessons will have been grouped systematically so as to include, for instance, some of the following subjects: Man, rabbit, sheep, cow, horse, pig, dog, cat; fowl, duck, pigeon, sparrow, lark, blackbird, starling, one or more of the native birds of New Zealand; frog; eel, trout, rock-cod, sole; crab, crayfish, snail, oyster; spider, butterfly, beetle, &c.; bean, pea, sow-thistle, oat or wheat, ryegrass, cocksfoot, potato, rose, lily, sunflower, carrot, turnip; fern; moss, mushroom, mildew, yeast; gorse or broom; New Zealand flax; willow, oak, white-pine, red-beech (commonly called "birch"); apple, plum, orange, gooseberry, strawberry; cabbage, radish, mustard; tomato; common trees and other plants found in the neighbourhood of the school.

In S4 this work will be continued and still further systematized, and the children may begin, if they have not done so already, to keep nature-calendars and weather-calendars.

In their geography lessons the children will also learn from actual observation the simplest and most striking facts about rivers and the work of water on the earth's surface; clouds, rain, dew; cardinal points; the direction of winds; drawing of plans; height of the sun at different times of the day and year.

The drawing of plans may extend to the mensuration of squares and rectangles as set forth in the elementary course of physics suggested above.

Some such experiments and observations as the following may also be made. [The actual experiments and the work of caring for the plants, &c., should be done by the children individually.]

Raise seedlings of beans and peas in small pots or shallow dishes in sand and in garden-soil, planting seeds every two or three days; also raise other seedlings between two sheets of blotting-paper on a glass plate or in a saucer. Soak a few seeds also in water, and put a few into dry sand. Compare the seedlings raised. Observe the method of germination and growth. Note the parts of the seedlings—rootlets, root-hairs, stem, leaves, plant-hairs, &c. Raise in like manner seedlings of vegetable-marrows, mustard or radish, cabbage, sunflower, oat or wheat, and ryegrass. Observe the seeds after some days' growth. Moisten some fine wheaten flour, knead it, and then wash out all the white powder (nearly all starch), and show the gluten. By crushing seeds of flax, sunflower, rape, between dry blotting-paper show that some seeds contain oily matter. What has become of these things in the seedlings? Suspend seedlings of various kinds so that only the root-hairs just dip into water. Note what happens after a few days.