the hot weather. Note arrangement of seeds in capsule of poppy; how are these distributed? Take small quantity of starch (half a teaspoonful), drop into about half a pint of boiling water, allow to cool, and add few drops of iodine-solution—liquid becomes a deep blue. Examine (*a*) seeds of broad-bean, garden-pea, scarlet-runner, &c.; also (*b*) wheat, oat, and maize grains. Soak in water for a few hours and note in (*a*) seed-covering, two cotyledons, and plantlet; and in (*b*) covering, embryo, and store of food separated from embryo by scutellum. In (*a*) food is stored in cotyledons; in (*b*) in one end of fruit and away from embryo. Test for starch in all seeds and grain examined. Examine potato, onion, crocus, iris, &c., for storage of food in stems; and carrot, turnip, mangold, &c., for storage of food in roots. Germinate bean and pea seeds, also maize and wheat grains, by placing in damp sawdust or between pieces of damp flannel; observe from time to time, and note the various steps in process. Sketch appearance of seed or grain from day to day. Note difference in modes of growth of the two types of plants. Take four pickle-bottles, A, B, C, and D, and operate with same seeds in each. Place seeds in A, cork and seal up securely. In B place a few layers of blotting-paper, moisten, drop in seeds, cork, and seal as before. Treat C as B, but leave bottle uncorked, and moisten blotting-paper from time to time. Boil some water (to remove air), allow this to cool, and with it fill up D, drop in seeds, cork, and seal up. Arrange bottles side by side in dark place, and examine daily. If experiment is successful, seeds in A should not germinate at all; in B seeds will germinate and go on growing until air be exhausted; in C germination and growth will be carried on vigorously; and in D very little growth will be observed. Cover two lots of seeds with damp sawdust, and place one lot in cool and one lot in warm atmosphere; note results. Fit up small box with glass front, fill with fine moist soil; bury seeds to various depths, being careful to place them against glass so that process of germination and growth can be observed. Note results, and determine most suitable depths for various kinds of seed. Take a plant of convenient size, weigh carefully; heat strongly in a metal vessel for some time, weigh again. The organic matter has been driven off; difference in weight will represent inorganic or mineral matter in plant. Place some garden-mould over a strong flame and raise to red heat, weighing carefully before and after operation; as in former experiment organic matter will be driven off and inorganic matter left. The terms "elements" and "compounds" may here be illustrated and explained. Prepare oxygen from chlorate of potash and manganese-dioxide, hydrogen from granulated zinc and hydrochloric or sulphuric acid, carbon-dioxide from marble and some acid, and ammonia from ammonium-chloride and lime, and ascertain by experiment properties of these gases. For details of preparation consult some work on elementary chemistry. Remove oxygen from air by burning phosphorus on water under a closed bell jar, and ascertain proportions of oxygen and nitrogen in air. Here again it may be necessary to refer to some work on elementary chemistry. Obtain a tumbler of lime-water and breathe into it through a piece of fine glass tubing; liquid quickly turns milky in appearance owing to presence of carbonate of lime; carbonic dioxide expelled from lungs has united with lime in water to form carbonate of lime or chalk. Expose to air some lime-water in a saucer; at end of a few hours surface will be covered with a thin film of carbonate of lime. Where has the carbonic dioxide come from? Burn a candle in closed bottle; observe that flame soon goes out; why? Pour in some lime-water; shake up; note results. Germinate some seeds in a bottle, and ascertain that carbonic dioxide is given off. Take two bottles, A and B, and fill with water; into A pour small quantity of red ink or eosin solution; into B drop some pieces of carmine or some black ironsand. Place a small rooted plant in each bottle. At the end of a few hours remove plants, cut the stem and branches across at various heights from the roots and note the results. (1) The solid matter must be dissolved before it can be absorbed; (2) the solution travels up through the woody part of stem. Cut the end off a potato-tuber so as to form a base on which it will stand; hollow out the tuber, half fill it with water in which some sugar has been dissolved, and place it in an upright position in a vessel containing water; note the rise of the liquid inside the tuber. Reverse the process, placing the sugar-solution in the vessel and the pure water in the tuber, and note the result; in each case the lighter liquid will pass into the denser. Insert through cork of pickle-bottle a stem bearing leaves, allowing the cut end of stem to enter the water in bottle. Fit a piece of cardboard over neck of bottle, and allow a tumbler to rest on this so as to cover the stem. Place the whole in the sunlight, and note the drops of water collecting on the inner surface of the tumbler. Fit a leaf carefully into an air-tight cork of pickle-bottle, and allow end of leaf to enter water in bottle. Insert through the cork a small piece of glass tubing bent once at right angles; this must not reach the water. Apply lips to tube and exhaust the air over the water. Note bubbles of air arising from end of leaf-stalk. Place bunch of watercress in vessel of water charged with carbonic dioxide, cover with inverted funnel, the smaller end of which must be below the surface of the water; fill narrow test-tube with water and invert it over neck of funnel; expose whole to sunlight for some hours; test the gas which has collected in test-tube by inserting glowing splinter, and ascertain that it is oxygen. Repeat experiment, but place whole in dark; note result. Boil a leaf for a few minutes in water, then immerse it in alcohol for some time; note colour of the liquid. Remove it from liquid, wash well, and place in weak solution of iodine; note bluish colour, showing presence of starch. Cover portion of leaf of growing plant with tinfoil or cork for day or two; apply starch test and note result. Experiments may also be made to show that presence of carbonic dioxide is necessary for formation of starch. Notice weathering of rocks and gradual formation of soil. Explain and illustrate, as far as possible, action of heat and cold, air, water, and plants, and work done by earthworms. Ascertain by experiments the properties of sand and clay—*e.g.*, sand is composed of small angular grains, will not bind together, and is unable to hold moisture. Clay consists of exceedingly fine particles, which readily bind when wet; in this condition is compact and feels smooth and greasy; when saturated is impermeable to water, and retains moisture for a long time. Work out the life-history of one or more insects. Make a collection of the insect pests found in the neighbourhood. In what ways are these most readily destroyed or kept in check?