of fat in the outermost layer of cells of the cotyledon and the absence of starch there; likewise the presence of starch in the inner tissues and the absence of fat.

The food reserve in the cocoanut lasts about a year after germination has begun. During this time the plant gets much of its nutriment from the soil and the air. The proportion of water diminishes from the cotyledon to the tips of the leaves and there is a corresponding increase in the amount of solid matter. The substance of the cotyledon, the stem and the roots, contains much more mineral matter than is to be found in the endosperm and the leaves. The problems of nutrition in this plant which are suggested by these observations have not yet been attacked, but they will no doubt afford some very interesting facts at some future date.

THE EUROPEAN EDIBLE SNAIL.

BY M. A. BIGELOW.

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The value of the European edible snail (*Helix pomatia*) for observation on the living animal, as well as for anatomical study, deserves to be more widely known to teachers of biology and nature study than appears to be the case at present. I know of no animal which is at once so available, so easily kept living in the laboratory until needed for class work, and so interesting to pupils of all grades. These snails are now regularly imported from France and Germany, and may be found in the provision markets of the large cities during the cooler months, *i.e.*, from about October 15 to April 1. In New York they may be ordered from C. Perceval, dealer in table delicacies and fine provisions, 100 Sixth avenue. They usually cost about \$1.25 per hundred. The Brooklyn Biological Supply Co., 333 Halsey street, Brooklyn, supplies them in small quantities. Less than two dozen in a package may be sent by mail.

These snails are brought from Europe in the dormant or winter condition, the aperture of the shell being sealed by the temporary plate (epiphragm) of calcified mucus. In this condition they may be packed, shipped, and stored for months in dry sawdust or "excelsior." The snails may be purchased in autumn and the stock kept in some *cool, dry* place until they are wanted for class study, perhaps in late spring. When active snails are needed, it is only necessary to put them in a warm, wet place on grassy sod, moss, sand, or sawdust; under the influence of the moisture the epiphragm soon softens and the head and foot emerge from the shell. The emergence may be hastened by first removing the epiphragm.

The active snails may be kept so for months in a simple vivarium which consists of a shallow box or bucket covered with coarse wire netting and having the bottom covered with grassy sod or coarse sand. I prefer the sand because it may be washed in running water occasionally, which is desirable in case the vivarium is kept in the school room. The snails may be fed with lettuce, cabbage and other vegetables.

Perhaps the most convenient way to handle the living snail in the class-room is to allow it to crawl on a plate of glass to which the foot soon firmly adheres. All external parts and movements are then easily seen from any desired point of view. Lettuce leaves may be placed near the mouth and the process of feeding observed through the glass; and in the same way the remarkable muscular movements of the foot may be seen. If the snails are sluggish when wanted for class study, stimulate them by repeated dipping into lukewarm water.

These snails are best killed for anatomical study by drowning in water which has been boiled to expel the air and kept tightly covered until cooled. Then put the snails into the water, cover tightly, and after about thirty hours they will be found more or less stupefied in an expanded condition. Select those which are quite stupified and place them one by one in water heated as hot as the hand will bear, quickly smooth out wrinkles in the foot, press upon the bases of tentacles to extend them, and having arranged the parts as natural as possible, drop the animal into 5 per cent formaline. With a little practice 80 per cent of the snails can be killed and hardened in a very life-like condition of expansion. After

hardening for a few days in the formaline, the visceral mass of some individuals may be easily twisted out of the shell, but usually the columellar muscle clings so firmly that it is necessary to chip the shell with forceps in order to remove it.

A METHOD FOR COLLECTING AMOEBÆ.

BY S. O. MAST.

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Amoeba is an animal of such vital importance in the study of biology and so difficult to collect in numbers large enough for class use, that, I trust, anything that may be said to facilitate their collection will be of interest to readers of SCHOOL SCIENCE.

Until this year in collecting amoeba, we simply scraped the surface ooze from the bottom of a spring hole near our college laboratory, with a small net of coarse cotton, and put it into pint fruit jars. In working with such collections, it was noticed that as soon as the ooze settled amoebæ were found on or near its surface; consequently it was thought that if taller vessels of the same capacity were used so as to make the surface of the ooze in them comparatively smaller, the animals would be found in proportionally larger numbers. In order to test this idea, ooze was collected in pint jars and after it had thoroughly settled, the surface of the ooze in the jars was lifted with a large pipette and put into test tubes and again allowed to settle. In this way amoebæ were concentrated to such an extent that as many as fourteen were found in a single drop taken from the surface of the ooze in the test tubes, while usually several drops taken from the surface of the ooze in the jars had to be examined to find a single animal.

If the animals are not to be used at once, it is well to put a few fibers of spirogyra or some other aquatic plant into each test tube. By so doing amoebæ were kept in good condition for over a week.