angle, the distal ends being directed downward in both cases. Thus there is seen to be a striking analogy, if not homology, between bud and basal polyp. The formation of supernumerary tentacles and other structures is common in this species, so it may be possible to regard the bud as a supernumerary and precociously developed basal polyp.

Notes on the anatomy of Acmœa testudinalis, Müller: M. A. WILCOX.

The following points were made:

1. There is probable, though not conclusive evidence in favor of a winter migration to deeper water.

2. The inner face of the mantle is uniformly clothed with cilia borne, not continuously, but in patches some 20–30 μ apart.

3. Subepidermal glands are situated at the mantle margin. Unlike those described by Haller in a similar position, they are unicellular. Whether they contribute to the formation of the shell is uncertain.

4. The inner face of the mantle also bears subepidermal glands which are scattered and are probably unicellular mucous glands.

5. Animals killed by agents which produce strong contraction, exhibit folds of the mantle which lie parallel to the foot and contain blood spaces. These seem entirely similar to those described by Haller in *Lottia (acmœa) punctata* but in *A. testudinalis* are artefacts.

6. Both mantle tentacles and those borne on the head are richly provided with sense cells of Flemming.

7. The cephalic tentacles have each a large axial cavity which communicates with the cavity of the head. The wall surrounding the tentacular cavity consists of connective tissue in which longitudinal muscle fibres are imbedded and the tentacle, therefore, is intermediate between the ordinary solid prosobranch tentacle and the invaginable tentacle of the stylommatophora.

8. The chief nephridium closely resembles that of Patella, except that the portion which lies on the left side in *A. testudinalis* extends forward to the pericardium and probably communicates with it. The greater portion of this nephridium corresponds to what Haller describes as part of a coelom.

Locomotion in Solenomya and its relatives. G. A. DREW.

These forms burrow rapidly in mud or sand. The extremity of the foot is provided with two muscular flaps that may lie side by side or be spread apart. When the flaps lie side by side the extremity of the foot is wedge shaped, and the foot can easily be thrust into mud or sand. When the flaps are spread apart they form a very effective anchor. With the foot thrust into the mud and the flaps spread, a contraction of the retractor foot-muscles results in drawing the shell into the mud up to the position of the spread flaps. From this position another thrust can be made.

Beside burrowing, Solenomya swims quite rapidly. The thick elastic cuticle extends past the calcareous portion of the shell, along its ventral borders to a distance fully equal to one-fourth the entire width of the shell. The margins of the mantle have united ventrally, leaving a small posterior opening through which water can be forced, and a larger anterior opening through which the foot can be protruded. The region of the united margins of the mantle is occupied by a rather broad longitudinal muscle that spreads out around the anterior and posterior openings to form sphincters. The radial pallial muscles are also strongly developed. These extend from the calcareous margins of the shell to the free margins of the cuticle.

When the foot is protruded nearly to its full extent, and the pallial muscles are relaxed, the anterior opening is much larger than the foot, and through it water can freely enter the mantle chamber. When the foot is partially retracted and the sphincter muscle around the anterior opening contracts, this channel is entirely obliterated. A strong contraction of both longitudinal and radial pallial muscles, and a further retraction of the foot, fold the mantle and the elastic cuticle into the mantle chamber. At the same time the contraction of the adductor muscles bring the calcareous margins of the shell nearer together, and the mantle chamber is nearly obliterated. As the anterior opening has been closed, the water contained in the mantle chamber is driven through the small posterior opening. Relaxation of the pallial muscles and protrusion of the foot again affords ample opportunity for water to enter the mantle chamber, and the elastic cuticle expands this chamber to its greatest capacity.

By means of the jets thus formed animals frequently swim some feet before settling to the bottom.

Most lamellibranchs possess the power of sending jets of water from the mantle chamber, but they generally depend upon forcibly shutting the shell. Pecten and others swim by means of currents produced in this way, but with most it seems to do little more than free the mantle chamber of dirt. Other forms such as the soft clam, *Mya*, send very strong jets out of their siphons, and depend upon the contraction of muscles in the mantle as well as on closing the shell, to do it.

Until something further is known about the life and feeding habits of Solenomya, we can hardly expect to know the full significance of this mode of expelling water. Very possibly the jets are of value in cleaning the mantle chamber and burrow, and the animal has made use of them secondarily as a means of locomotion.

The ciliary mechanism in the branchial chamber of the pelecypoda: J. L. KELLOGG.

The fact is well known that minute particles of matter suspended in water, whether they are to be used as food or not, are, upon coming in contact with the surface of the gills; driven forward and transferred to the inner surfaces of the palps. By these organs they are passed, in the same manner, to the mouth.

It is usually assumed that the animal is able to control this automatic process of filling the digestive tract only by closing the shell and thus preventing the ingress of water bearing suspended matter. There exists, however, a complex mechanism, differing in many respects in different species, by means of which suspended particles may be removed from the body, while water necessary for respiration (especially in active forms such as *Yoldia*) still continues to flow into the branchial chamber.

This mechanism in the common soft clam, *Mya*, may be described briefly as follows:

(1) There is to be found a complete ciliation of the inner surfaces of the mantle folds. Cilia drive foreign bodies from all points of these surfaces to vortices (one on either mantle fold), situated at the side of the opening for the foot in the fused mantle edge, anteriorly. The vortices are within reach of the palps, and food here collected may be taken by them. If the accumulated matter is not desired, the mass eventually falls upon a ciliated tract which carries it posteriorly along the ventral median line of the fused mantle edges, to a bay at the base of the branchial or *incurrent* siphon. From this point it is lost from the body, by the violent contractions of the adductor muscles, resulting in the discharge of the greater part of the water contained in the branchial cavity.

(2) The general ciliation of the surface of the visceral mass causes a movement of particles to a vortex opposite the base of the branchial siphon. Perhaps if desirable, this material upon the surface of the