ANATOMY OF NEW CEPHALASPIDEA

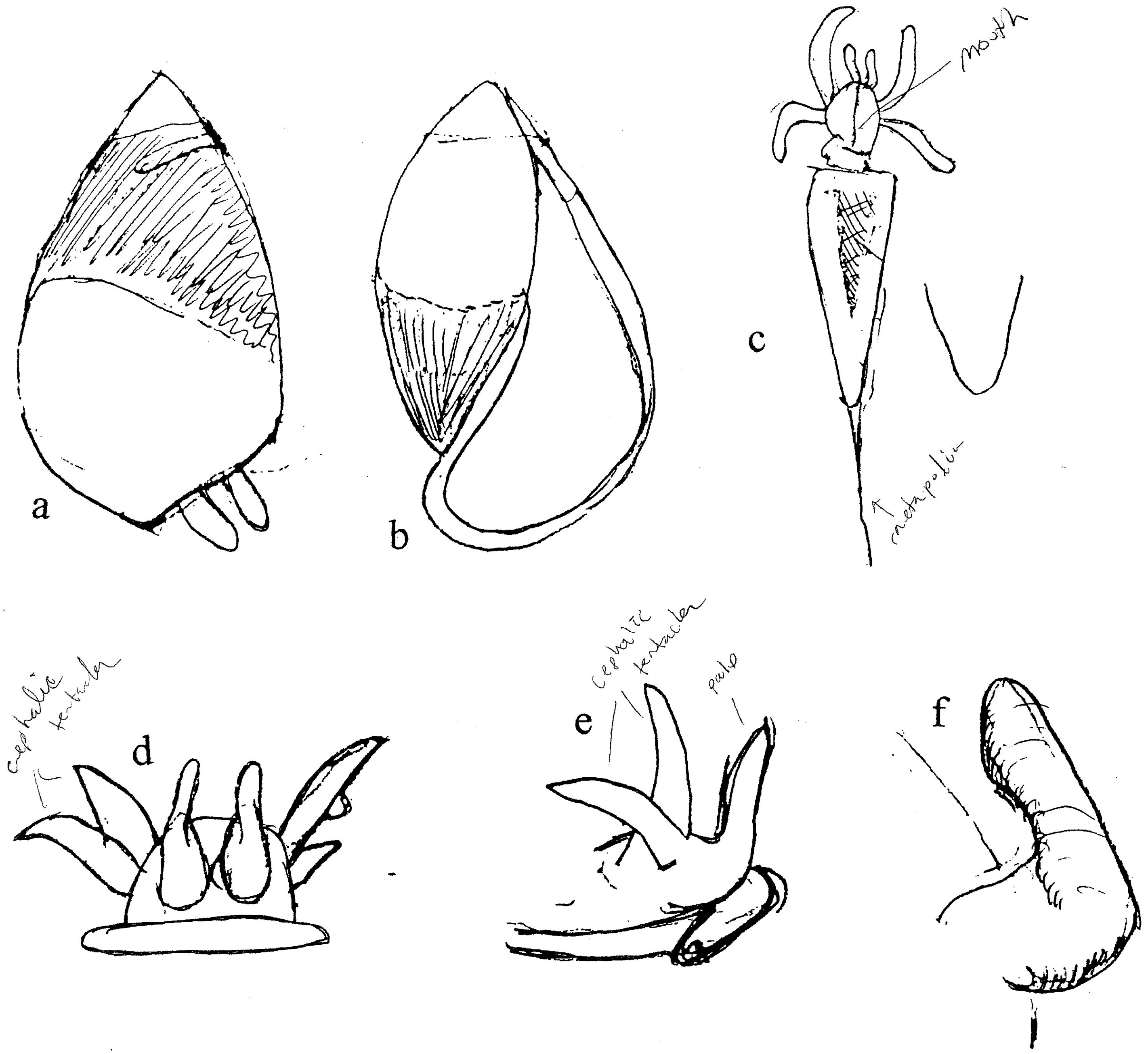
While most molluscan taxonomists ignore the soft bodies of their specimens, it is often the case that fleshy parts have many features which aid greatly in identification. These characters allow for the correct identication of damaged specimens with incomplete shells (often the case in screened material).

Paraplustrum sp. A

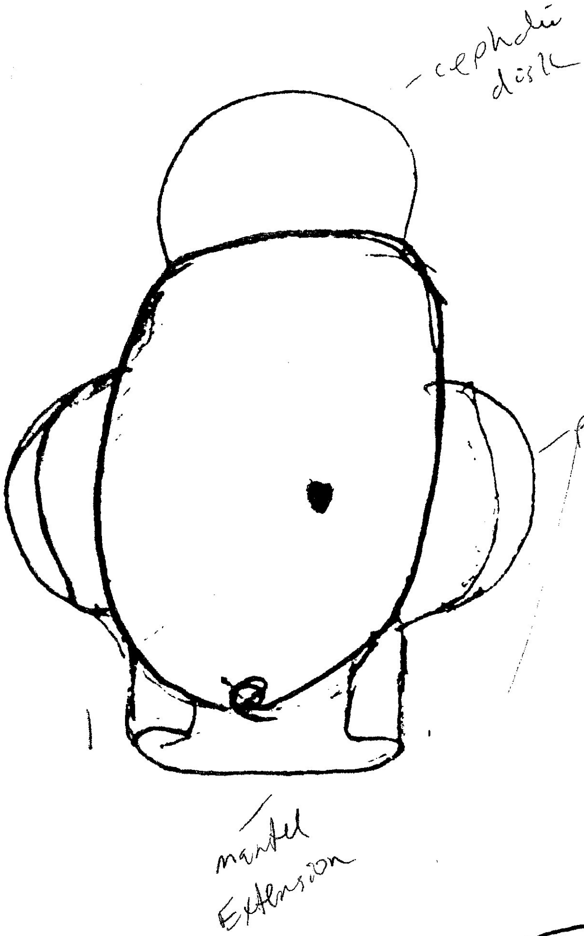
The **head** and its appendages are quite unique in comparison to other opisthobranchs. The center frontal portion of the head has a pair of **palps**(?) with swollen bases and digitiform distal ends. Posterolateral to each palp is a pair of **cephalic tentacles** whose bases are next to each other, and in one instance the bases were united.. The anterior foot margin is extended on both sides into **propodial lobes** (which may be hidden by contraction). I have been unable to find eyes, but it would not be surprizing if they possessed them.. The **metapodium** or posterior end of the foot is extended into a long thread-like structure, also often hidden through contraction, but its exact position in life is unknown.

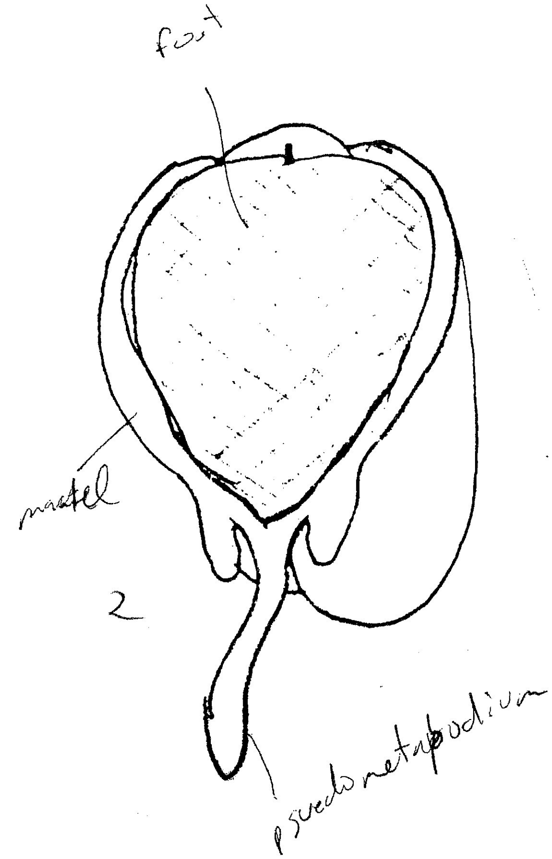
Bullomorpha sp. A

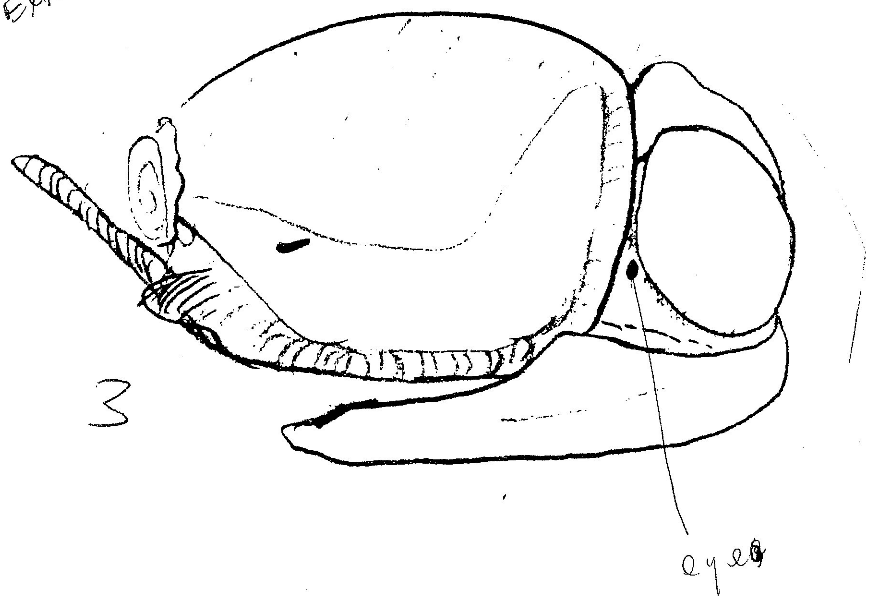
The **foot** is broadly cuneate and tapering posteriorly; it possesses two **parapodial lobes** which broadly flare out at the sides of the body. The **cephalic lobe** or disc is dorsally attached to the anterior end of the shell and usually protrudes even in contracted specimens. The **eyes** are positioned on the body just posterior to the base of the cephalic lobe and on either side of the mid-line of the dorsum. The **mantle** has a thickened edge anteriorly and dextrolaterally (mainly following the lip of the shell. At the rear the mantle flares out into a **posterior mantle lobe**; of which the central portion is elongated into a **pseudo-metapodium** that coils into the involute spire. There is always a black, heavily **pigmented spot** on the mantle on the right side of the animal just forward of the posterior lobe. There is a **spermatothecal groove** on the dorsal surface of the right-hand parapodial lobe.



Parvaplustrum sp. A, FIGURES a-f. [a] dorsum with liver dark; [b] ventrum with dark liver, note thickened lip of mantle; [c] underside of head and foot with long threadlike metapodium, note contracted metapodium; [d] frontal view of head; [e] side view of head with one palp and two cephalic tentacles; [f] palp, lateral view.







Bullomorpha sp. A , FIGURES 1-3: *Fig.* 1: Dorsal view with shell, pigmented spot showing through; *Fig.* 2: Ventral view; *Fig.* 3: View of right side of animal. no shell.

Radula formula

6-7, 1, 0, 1, 6-7

Cephalaspidea and gizzard plates

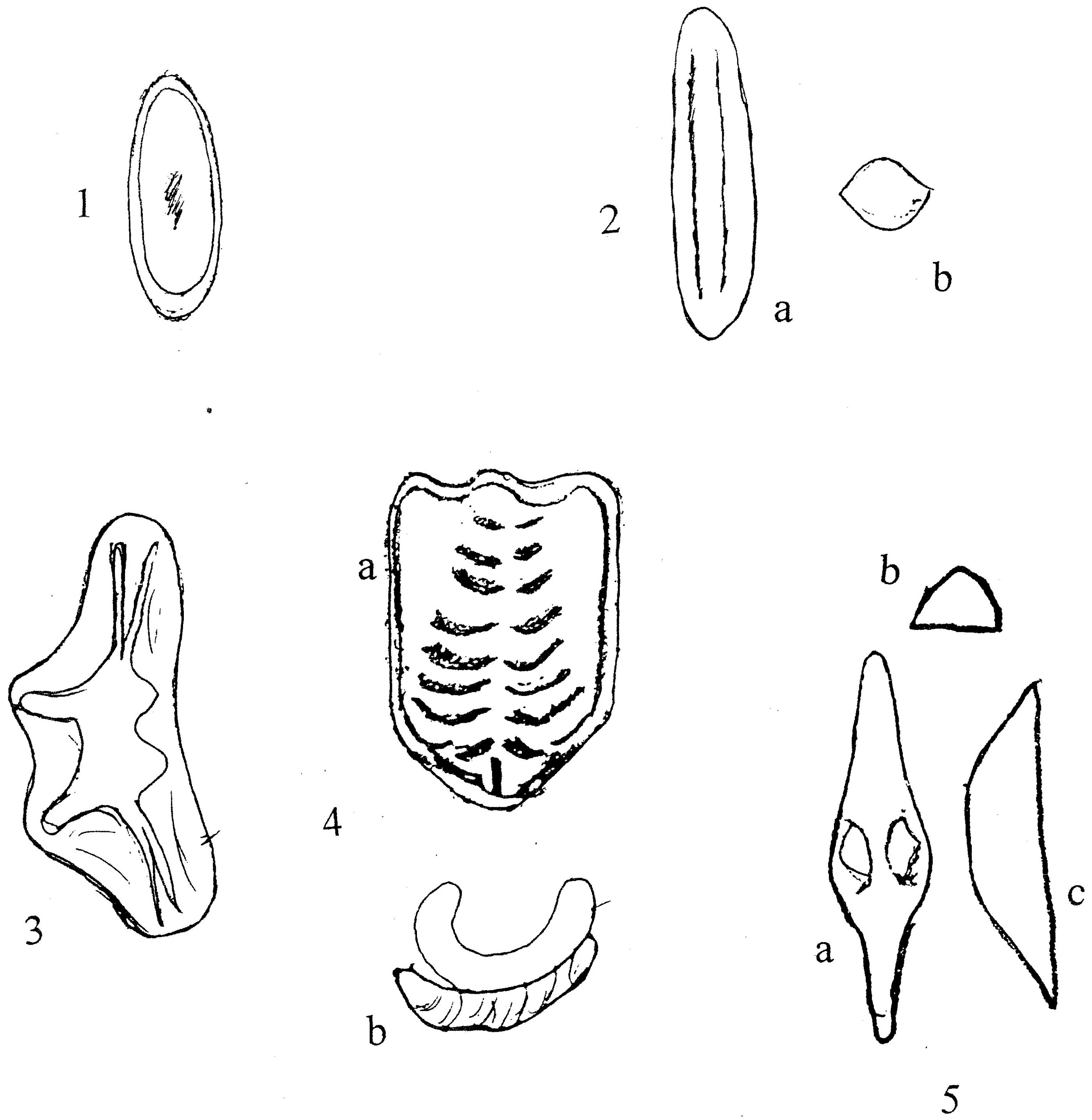
Many genera of Cephalaspideans posses gizzard plates and it is unfortunate that their exact relevance to taxonomy at higher levels will remain nebulous until more work is done. Somewhere along the length of the digestive tract, and posterior to the buccal bulb, the heavily reinforced sac which contains the gizzard plates can be found. The buccal bulb contains the radula, which is generally not that difficult to find and prepare for the microscope. Far easier to find, however, are the gizzard plates.

There are usually three plates composed of a tough, horny material that is dark and translucent. Each plate abuts the other two on its inner grinding face, while its back is embedded in the tough ligaments of the sac. The presence or absence of gizzard plates is most certainly of importance at the generic level i.e. all the species in a genus are alike in having or not having plates; usually their general shapes indicate a genus and the species are hard to differentiate except by very subtle variations. In genera such as *Cylichna* and *Philine* there are three equal (in size and shape) plates that are elongate, ovoidal, and flattened. In *Acteocina* and *Tornastra* (= *Acteocina*, in part) there are two equal paired plates and a third small plate of varied shape. In *Bulla* and *Haminaea* the three equal plates have their ends curled backward and their faces are adorned with a series of ridges for extra grinding efficiency. The shapes must reflect both the food item and the exact masticatory movements employed. Three equal, simple plates would seem to be the primitive condition with asymmetrical teeth (and masticatory patterns) arising later.

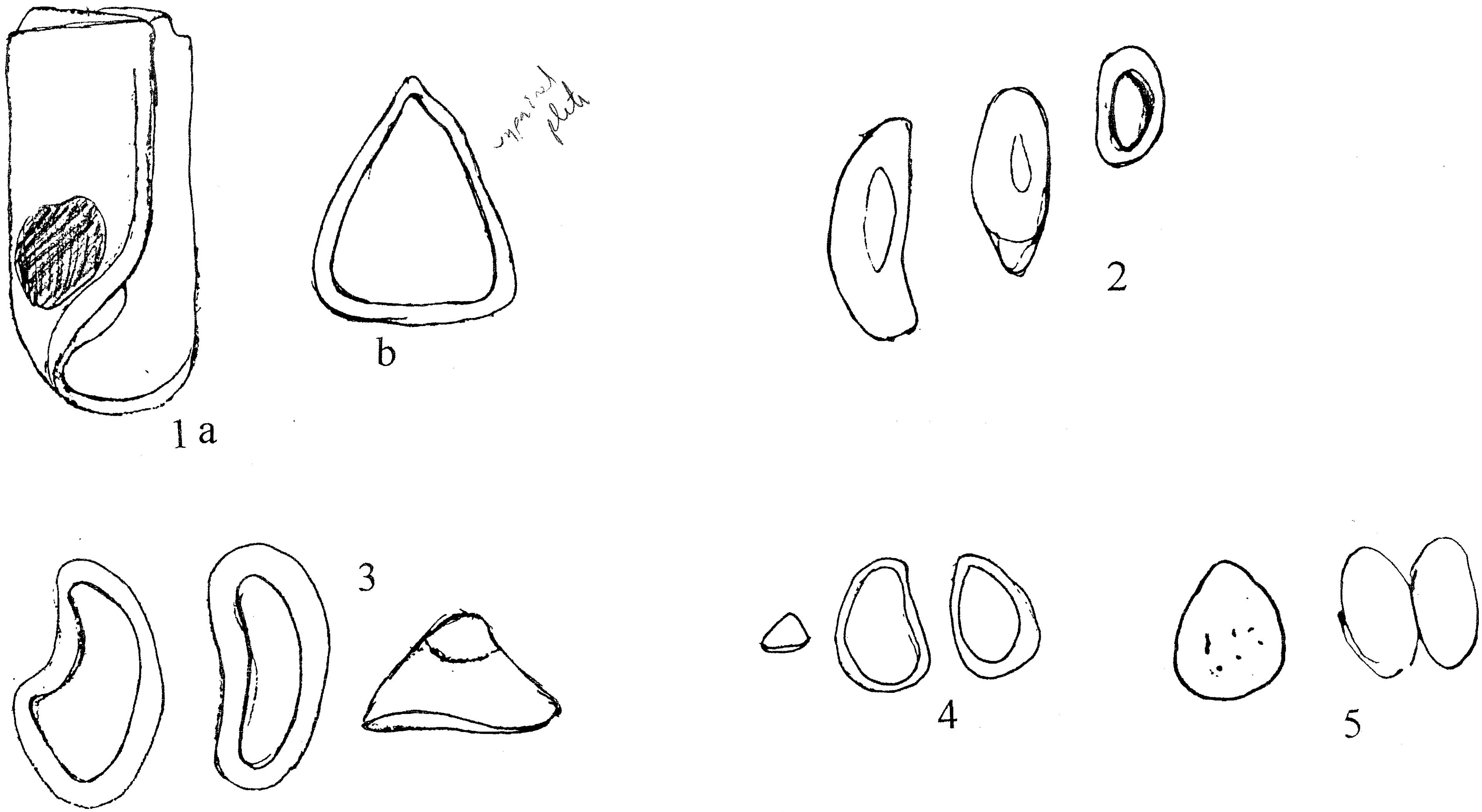
Locating gizzard plates

In benthic surveys, the most frequently encountered specimens are preserved rather than live animals, and therefore what follows refers to dead, contracted specimens. You will need a binocular microscope, very fine forceps and a small sharp scalpel.

Usually for the genera *Cylichna, Tornastra, Bulla, Haminaea, etc.*, the gizzard sac is located just below the shell under the portion of the body whorl adjacent to the anterior part of the aperture. If this region of the shell is broken away, at least the uppermost gizzard plate will become apparent and the entire sac can be lifted out using only forceps and digging a little. With inspection it can be seen where the plates separate and a few careful scalpel cuts will cut the binding ligaments exposing the individual plates. The plates in *Bulla* and *Haminaea* are so large and obvious almost any cut though the animal is sufficient to expose them. In *Philine* spp. the sac is along the midline of the body and a simple incision through the center will cut through flesh and then encounter the sac which can be teased out with forceps.



FIGURES 1-5. *Fig.* 1: *Cylichna diegensis*, size 0.9 x 0.4 mm, grinding face; *Fig.* 2: *Philine* sp. A, size 0.86 x 0.24 mm, [a] grinding face, [b] cross section; *Fig.* 3: *Bulla gouldiana*, size 5 mm in length, grinding face with central callous; *Fig.* 4: *Haminaea* spp. (generalized), size 1.8 x 1.3 mm, [a] grinding face with transverse ridges, [b] side view of plate with translucent, cartilaginous "backing plate".; *Fig.* 5: *Philine auriformis*, size 3.1 mm in length. [a] gringing face, [b] cross section, [c] side view.



FIGURES 1-5: *Fig* 1: *Acteocina inculta,* [a] dark area shows general location of gizzard plates; [b] unpaired gizzard plate; *Fig.* 2: *Tornastra cf. cerealis*, ala Marcus via MacLean, size 0.4-0.8 mm in length; *Fig.* 3: *Acteocina harpa*, size of longest plate about 0.6 mm; *Fig.* 4: *Tornastra cerealis/culcitella/eximia*, according to McLean, size unknown; *Fig.* 5: *Sulcoretusa xystrum*, size about 0.16 x 0.32 mm.