

FIGURE 55.—SEM micrographs of posteromedial portion of buccal floor and pharynx in dorsal view for *Crossodactylus* species (left) and *Crinia tasmaniensis* (right). Scale lines = 400 μm and 100 μm , respectively. Note variation in amount of papillation on buccal floor. *Crossodactylus* is unusual in having a fringe on posterior ventral velum. *Crinia* (and *Pseudophryne*) are exceptional among tadpoles examined in medial convergence of their 4th filter plates.

stream or flowing-water tadpoles—*Crossodactylus*, *Hylodes*, *Megaelasia*, *Paratelmatobius*, *Proceratophrys appendiculata*, *Pseudopaludicola*; macrophagous carnivores—*Ceratophrys*, *Lepidobatrachus*; subaerial tadpoles—*Cycloramphus izecksohni*, *Thoropa*; non-feeding tadpoles—*Adnomera*, *Cycloramphus stejnegeri*, *Eleutherodactylus*. *Rhinoderma darwini* may be included in this last group although its tadpoles could conceivably receive some nutrition from the ingestion of mucus secreted by the brooding adult.

Not all larvae show such a good match between predicted habitat/ecology based on morphological features with actual habitat preferences. Larvae of *Mixophyes* and *Taudactylus* are stream dwellers, but do not show all the internal oral features predicted for stream forms. In contrast, *Crinia* and *Pseudophryne* larvae are reported to live in ponds, but have morphological features more suggestive of stream forms. The *Heleophryne* tadpole is internally quite unlike most stream-associated neobatrachian larvae. However, it closely resembles, internally and externally, the torrent-adapted *Ascaphus* larva and shares some features, such as reduced buccal papillation, with the neobatrachian torrent-adapted *Amolops* (Ranidae).

The suite of features observed in *Crossodactylodes* was

understandable only by knowing that the tadpoles lived in bromeliads. We would not have predicted that habitat based on the internal oral anatomy alone. Other arboreal tadpoles however, do have morphological features indicative of dietary specialization, most commonly macrophagy (Lannoo et al., in press).

Within *Leptodactylus*, *L. knudseni* and *pentadactylus* were notably distinct from the other typical pond larval *Leptodactylus* examined (e.g., Figure 53a,b). Apparently, the more specialized morphologies of *knudseni* and *pentadactylus* correlate with facultative carnivory (Heyer et al., 1975); but again, this dietary capability was not predictable to us based on larval anatomy that we examined.

Pleurodema nebulosa stood out in the morphological analysis as being very different from other *Pleurodema* or, for that matter, leptodactyloid pond larvae in general. For example, secretory ridges on the ventral surface of the ventral velum are absent in this species (Figure 60). When the specimens were being examined, we did not recall the larval habitat or diet of *P. nebulosa* and were unable to predict where the larvae might live or what they might eat, aside from the observation that it did not seem to be a typical pond tadpole. Mares et al., (1977)

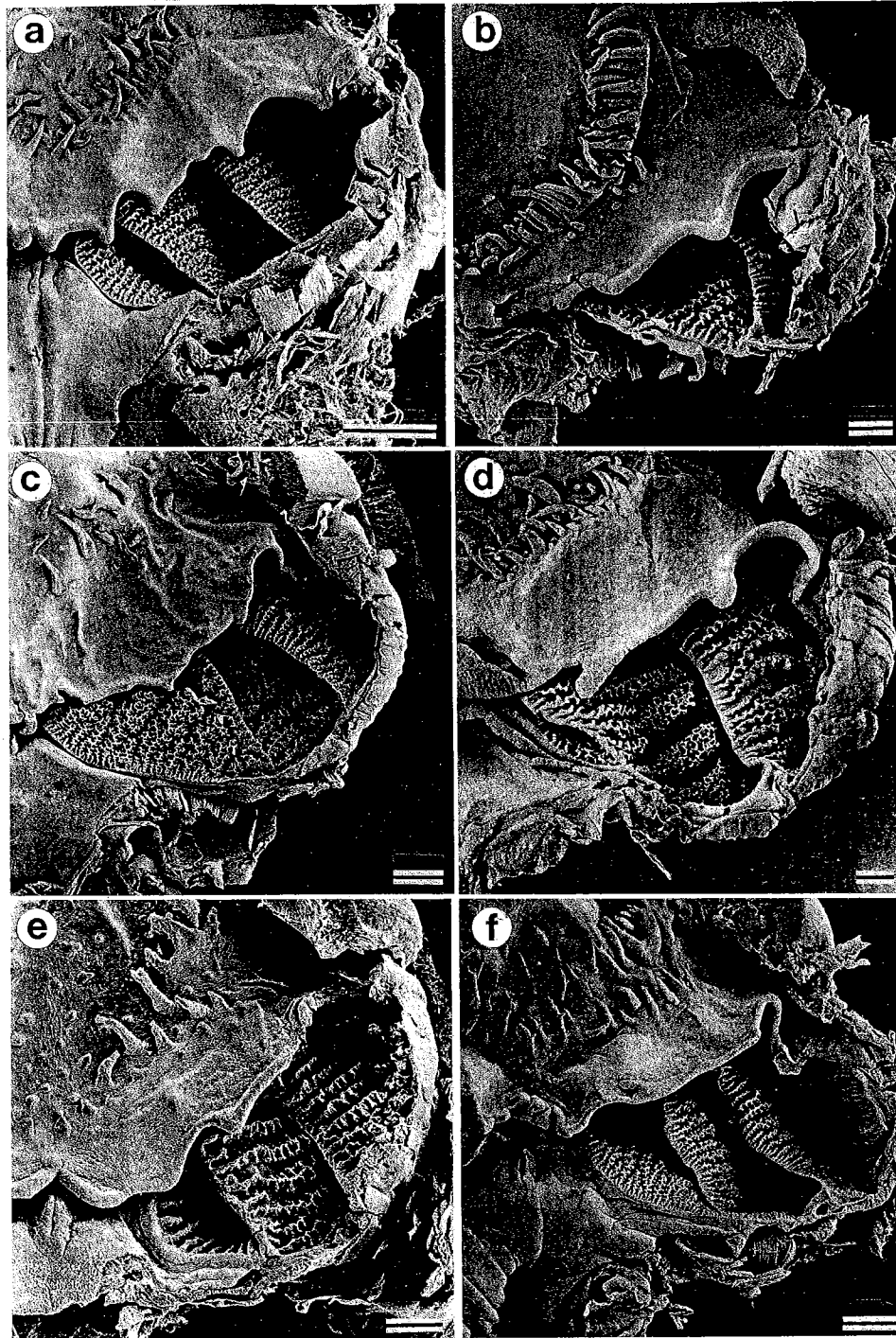


FIGURE 56.—SEM micrographs of branchial baskets in dorsal view for selected leptodactyloid larvae: (a) *Atelognathus reverberii* (scale line = 1 mm); (b) *Paratelmatoobius* (scale line = 200 μ m); (c) *Pleurodema brachyops* (scale line = 400 μ m); (d) *Pleurodema cinerea* (scale line = 200 μ m); (e) *Heleioporus* species (scale line = 400 μ m); (f) *Platyplectron ornatus* (scale line = 400 μ m). All are right branchial basket except for b, which is a left basket printed in reverse to orient with other figures. Note that tadpoles vary in height and orientation of filter plates and filter-mesh density. There may be two (e.g., b,c,d) or three (e.g., a,e,f) major filter cavities visible in this view. Interspecific variation in *Pleurodema* branchial morphology is great (e.g., c,d) compared to species in other genera.

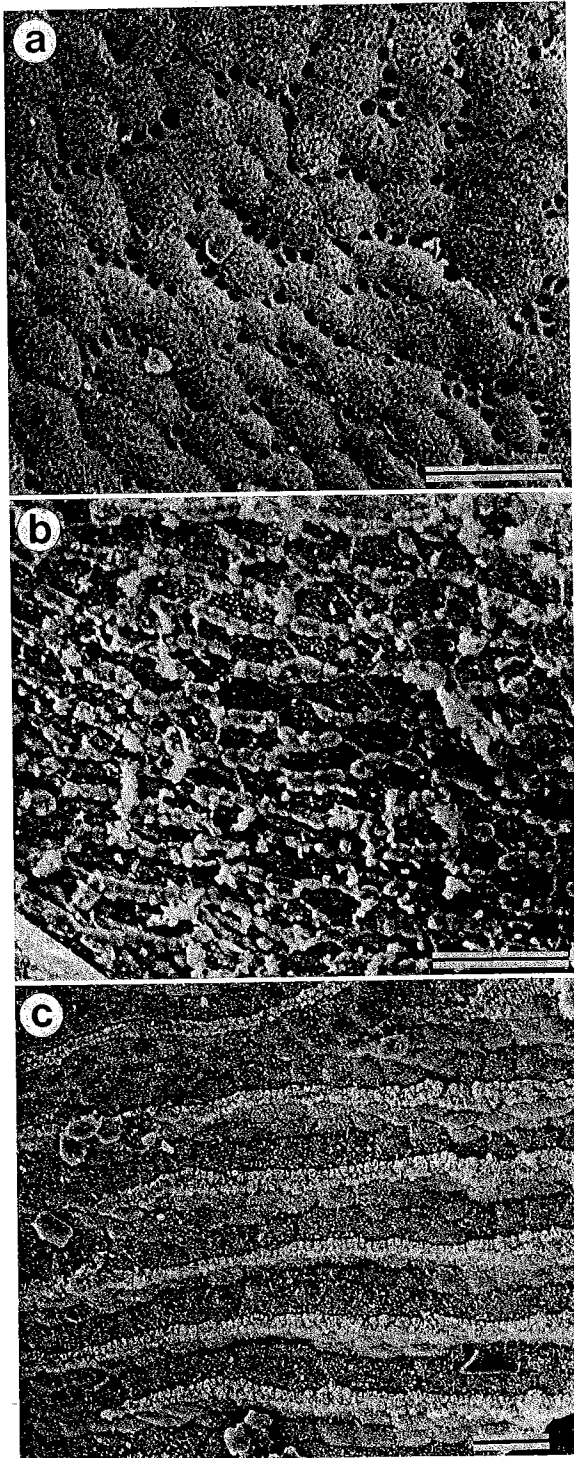


FIGURE 57.—SEM micrographs of secretory tissue in branchial food traps: (a) *Heleophryne natalensis*; (b) *Crinia tasmaniensis* and (c) *Hylorina sylvatica*. All scale lines = 20 μm . Note that secretory cells are numerous in all three species but are not organized into ridges in *Heleophryne*. Absence of ridges is a feature that *Heleophryne* shares with most archeobatrachian genera; however, whether it is a primitive feature in this leptodactyloid genus is not known. *Crinia* and *Hylorina*, as representative tadpoles of Australian and American leptodactyloid radiations, both show the ridged pattern.

commented at length on the convergence of *P. nebulosa* with *Scaphiopus* of the North American deserts. Both have very short larval periods, breed in very ephemeral desert ponds, are carnivorous, and if stressed, cannibalistic. *Pleurodema nebulosa* clearly is not an obligate carnivore like *Lepidobatrachus*, since it retains most of the suspension feeding structures (such as gill filters) seen in generalized tadpoles. On the other hand, the absence of secretory pits and secretory ridges on the branchial food traps certainly correlates with a macrophagy. Presumably, *P. nebulosa* and *Scaphiopus*, compared to other pond larvae, have specialized in terms of being able to feed on large, individual food items at the expense of efficiency in entrapping small, microscopic particles. Interestingly, besides lacking secretory ridges in the branchial food traps, both *P. nebulosa* and *Scaphiopus* (Wassersug, 1980) share a peculiar feature: a convex shape to the free lateral margins of the ventral velum. While both *P. nebulosa* and *Scaphiopus* have a rather well-developed filter-mesh apparatus, the mesh is much finer in *Scaphiopus*. Buccal papillation differs as well in these two taxa.

Heleioporus has too low a filter-mesh density for typical microphagous pond tadpoles. Although *Heleioporus* larvae occur in ponds, their natural diet is unknown; thus, we do not consider *Heleioporus* a typical pond tadpole.

The tadpoles of *Megistolotis* have been associated with both streams and ponds (rocky pools) in nature, yet can be cannibalistic in the laboratory. Nevertheless, we found that the internal oral anatomy is typical of pond larvae.

Leptodactyloid larvae collectively seem to embrace most specializations for habitat and diet found in anurans. However, this diversity does not hold up when considered on a continental basis. Africa has but one genus of leptodactyloid and all species have stream-adapted larvae. The American leptodactyloids lack at least two major tadpole types that were identified previously: oophagous arboreal larva (Lannoo et al., in press); and the obligate, microphagous suspension feeder (Wassersug, 1980). Concerning the former type, arboreal dendrobatids and hylids seem to have filled this niche in Central and South America. Concerning the latter, American leptodactyloids generally co-occur with pipids and microhylids, most of which have specialized microphagous larvae. Phyllomedusine hylids also are common in the Neotropics in association with leptodactylids and they also have tadpoles particularly adapted for midwater microphagy (Wassersug, 1980). Pipids and phyllomedusine treefrogs are absent in Australia, and microhylids are a minor part of the Australian herpetofauna, both in terms of numbers of species and geographic distribution. It is puzzling that *Taudactylus*, which occurs in stream habitats, has the extremely narrow secretory ridges in the branchial food traps that typically characterize obligate, microphagous, suspension feeders (Wassersug and Rosenberg, 1979). As we have examined only a small portion of the myobatrachids, we do not know the full extent of the

