

this. Wild oysters are also found on ledges and boulders at the half-tide mark along the entire river bank for a distance of two miles. A few of these fail to survive the exposure in winter but where *Fucus* fronds cover them completely and they are not molested they often grow to six inches in length. In these situations they are subjected to protracted low temperatures during the winter months and a short season for the growth of the "spat". The water temperature in the month of September drops to the vicinity of  $15^{\circ}$  C. by the 30th. In the middle of October the temperature is down to  $12^{\circ}$  C. and by the middle of November down to  $8^{\circ}$  C. The density of the water varies between 1.015 and 1.0225. The "spat" first appeared, or perhaps more correctly, were first discovered on the twelfth of October. At this time they were about 6.5 mm. in diameter. On November 23 they were again measured and were about 11.5 mm. Notes and specimens taken at this time were only for idle curiosity and are not absolutely reliable.

The only enemies beside man that I know of are the boring sponge and *Urosalpinx cinerea*. Inquiry and repeated examination have failed to discover the presence of the starfish or any of the commensal crabs and I believe they fail to ascend the river as far as the Durham beds. The beds are entirely self-propagating. No attention is ever paid to the need of the "spat"; and clean shells or stones for their attachment have never been placed in the river. I have never heard of the oysters having been taken for commercial purposes, but many are gathered for "home consumption".

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#### THE NEW MEXICAN EXPEDITION OF 1914—ASHMUNELLA.

BY H. A. PILSBRY AND JAS. H. FERRISS.

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[Continued from p. 16.]

#### ASHMUNELLA TETRODON P. & F.

In the type lot the diameter varies from 12.8 mm. with  $5\frac{1}{4}$  whorls to 15 mm. with  $5\frac{1}{2}$  whorls. This is the usual range of variation in size. In stations 75 and 71 all are rather small, in the former from 12 to 14 mm.—mostly about 13 mm., and at



71 from 11.3 to 13 mm. The smallest have barely 5 whorls. Probably some local condition dwarfs all the individuals in these stations.

In several stations, 70, 71, 72, 73, there are very beautiful albino specimens of a transparent marguerite-yellow tint among the dark ones. See first two figures within second row, representing an albino and one of the darkest examples, from station 72.

Compared with *A. proxima* Pils. of the Chiricahua range, this species differs as follows: It is less depressed. The peripheral angle becomes weak and then nearly or quite disappears at the last part of the whorl where it is more swollen above. There is a furrow behind the lip up to the suture, and the *upper lip is reflexed*, while in *A. proxima* the upper lip is straight, not expanded, and there is a whitish triangular patch and no gutter above the end of the outer lip. *A. proxima* has one more whorl. The aperture is larger in *A. tetrodon* when specimens of the same diameter are compared. *A. tetrodon* is less depressed and less angular than *A. pilsbryi*, which further differs by its papillose surface.

All of these colonies in the box of Dry Creek Canyon were found in company with *Oreohelix barbata* Pils. The colonies farther up the stream had also *A. mogollonensis* for company.

In color and teeth, *A. tetrodon* is much the same as the Cave Spring *A. danielsi*, with the addition in this of a parietal lamella.

Dry Creek is dry at the crossing of the Silver City and Mogollon road. Six miles above it becomes a large and beautiful trout stream, boxed in for two miles so closely and roughly that the banks are not used for grazing purposes, and are never disturbed. Twenty snail colonies were found in the rock slides during a hasty search of these, two or three more miles above. Above the box shells were found in the grass and weeds also. In nearly every instance the colonies differed in size and in the character of the teeth. Some had no teeth (var. *inermis*); others, as with *A. heterodon* Pils., of the Huachucas, ran from no teeth to four, with all the variations between (var. *mutator*).

In the colony at Station 60 there are some individuals differing from typical *tetrodon* by having the parietal tooth reduced



(pl. 1, figs. 3, 3a). These are partly transitional to var. *mutator*.

The following two are named as sub-species in order that we may have a convenient means of referring to them. They intergrade, but their modification has been as great as that usually distinguishing species of *Helicidæ*.

ASHMUNELLA TETRODON MUTATOR n. subsp. Pl. 1, figs. 3 to 6.

In color, shape and sculpture this subspecies is like *A. tetrodon*. As in that species, the upper lip is well reflected from the insertion out; former resting stages are often marked by an opaque light streak on the base. In the typical colony there is no parietal tooth and the lip-teeth are much reduced; there are vestiges of the long tooth within the outer margin, and of the two teeth of the basal margin, but in many individuals of the typical colony these vestiges are exceedingly weak, hardly noticeable. There are about  $5\frac{1}{2}$  whorls.

Height 6.25, diam. 14 mm.	} Station 60.
Height 6.9, diam. 13.8 mm.	
Height 6, diam. 12.5 mm.	
Height 7, diam. 14 mm., whorls $5\frac{1}{2}$	} Station 61.
Height 8, diam. 15 mm., whorls $5\frac{2}{3}$	

*Locality*.—Station 80 (1914), in Dry Creek Canyon, Socorro Co., N. M. Also Stations 60, 61, 62, 68, in the same canyon. 6,000–7,000 feet elevation.

This is very abundant in some places, where large series of fresh “bones” were taken, but living ones were rare. It is one of those lawless species, such as we have described from the Huachucas—a species which has been caught in the act of losing its teeth. Its affinities are clearly with *A. tetrodon* of the same canyon, and there seems to be no decided break between the most fully toothed *mutator* and the *tetrodon* with smallest teeth.

The specimen described as type of *mutator* is from a colony in which no specimens have a parietal tooth. Varying forms from this colony (Station 80) are represented in Fig. 5, all being perfectly adult shells. Similar are those from Stations 61, 62, 68.

In the lot from Station 60 all the shells are rather distinctly



striate. The most fully toothed example (pl. 1, figs. 3, 3a) agree with *A. tetrodon*, except that the parietal tooth is smaller. There are other examples, with all of the teeth smaller than in *tetrodon*, and still others, found with them (No. 60 A) have the lip-teeth very small, partly wanting, the parietal tooth either wanting or minute (pl. 1, figs. 4). This is the only instance where almost fully toothed *tetrodon* and *mutator* occur in the same colony ; but without transitional individuals.

Lots from Stations 67 (pl. 1, figs. 6, four *adult* shells) and 78 vary from shells having four small teeth (like the *tetrodon* from Station 60) to shells having only weak rudiments of teeth. The lots from these stations therefore connect *tetrodon* and *mutator*, and cause us to rank the latter as a variety of the former. The varying condition of the teeth in different colonies may be briefly indicated in a few, to give an idea of this variation.

Station 78. In nineteen examples, 10 were toothless ; 2 had a full set of teeth and a lamella ; 3 had a lamella and thickened in both lip positions ; 1 had a lamella only ; 4 had three " pimples " upon the lip in place of teeth, no lamella ; 1 had a " pimple " at the basal position. Diameter 12 to 14.5 mm.

Station 61. Eight had a full set of teeth and lamella ; 13 had teeth upon the lip in different degrees of development. 1 had a lamella only, 6 were toothless. Diameter 13.4 to 15.2 mm.

Station 62. In 75 shells 12 had a lamella and a full set of teeth, varying from mere " pimples " to fully developed teeth, 28 had a full set of teeth on the lip only, also varying as much in development, 19 with one or two basal teeth, only 12 without teeth. Nearly all were dead or broken shells. Diameter 14.6 to 11.4 mm.

Station 67. Coarser growth-lines and striations more distinct ; not guttered deeply back of the lip ; angulation more pronounced, umbilicus enlarged in the last half of last whorl. Spire more elevated than the two preceding colonies. Diameter  $12\frac{1}{2}$  to 14 mm.

In a lot of 125 (dead and broken) 34 had a lamella and the full set of teeth, 54 had three teeth upon the lip, 6 had a basal tooth only, and 11 were toothless.

Station 68. Same as the preceding, but smaller and smoother. Nine were collected alive. These measured 7 mm. in alt. and



12.6 in diameter. Two or three were toothless, the other had 3 teeth upon the lip.

ASHMUNELLA TETRODON INERMIS n. subsp. Pl. 1, fig. 7.

Larger than the other forms, biconvex, indistinctly angular above the middle in front, the periphery becoming rounded on the last third of a whorl. There are  $5\frac{1}{2}$  to 6 convex, closely-coiled whorls, the last descending a little in front, guttered behind the lip, swollen behind the gutter. Surface lightly marked with growth-lines, without spiral striæ. The aperture has no teeth, or in some specimens shows extremely weak traces of them. The lip is reflexed, the edge recurved, but it is very narrow.

Height 8, diam. 17.5 mm.

Height 7.3, diam. 15 mm.

*Locality*.—Station 69, Dry Creek. Also Station 63, where it is rare.

This is a smaller and especially more depressed shell than *A. mogollonensis*, differing, moreover, by the noticeable peripheral angle in front and the absence of spiral incised lines. While it seems at first rather absurd to connect this form with *A. tetrodon*, yet except by its greater size it does not differ in any important respect from the least toothed of the variety *mutator*. We regard it as a final stage in the degeneration of teeth, like *Ashmunella esuritor* in the Chiricahuas.

At first glance it seems to be without teeth, but it carries a suggestion of teeth in the slight thickening of the lip in the outer margin and a mere pimple at the basal position. Two in twenty-four had two "pimples" at the basal position. Seven had none. One with a "pimple" also had the mere suggestion of a parietal lamella. Parietal callus thin and colorless. One or two varix-streaks in every specimen, usually at or near the end of the penultimate whorl.

This colony and the next seem farthest removed from the typical *tetrodon*. At this station also were found a few of the full-toothed form of *tetrodon*, but without transitional specimens.

Station 63. Growth-lines deeper than in Station 69. Shell more depressed, larger. Three in six had the suggestion of a basal tooth.



Two largest—Height 8, diam. 19 mm.

Height  $8\frac{1}{2}$ , diam. 16.5 mm.

Two smallest—Height 7, diam. 16.4 mm.

Height 8, diam. 15.6 mm.

ASHMUNELLA DANIELSI n. sp. Pl. 2, figs. 1.

The shell is similar to *A. tetrodon* in shape, luster and color ; but it differs in the following characters. The fine spiral lines, when the surface is perfectly preserved, are numerous and distinct. *There is never any trace of a parietal tooth.* The two teeth of the basal margin are closer together, and the inner one is much smaller than the outer, the umbilicus is a trifle smaller. Finally, the callous rim strengthening the lip of the young, in resting stages, is not absorbed, but remains visible as an internal varix, producing an opaque streak in the adult, visible externally on the base, or if the surface is dulled, it may be seen by holding the shell up to the light.

Height 7, diam. 14.5 mm. ;  $5\frac{1}{2}$  whorls.

Height 7, diam. 13.3 mm. ;  $5\frac{1}{2}$  whorls.

*Locality.*—Cave Spring Canyon (near the south fork of Whitewater Creek, Range 19 West on the parallel of  $33^{\circ} 20'$ , U. S. G. S. Topographic Map, Mogollon Quadangle). Socorro Co., New Mexico.

This species is remarkable for retaining large lip-teeth while the parietal tooth has totally disappeared, showing that these teeth are not connected in inheritance, though from the diminution of all together in *A. t. mutator* a connection would be supposed to exist. The large series taken at stations 57, 58, 59 show very little variation. As in *A. tetrodon*, the basal teeth are yoked together, by a callus resembling the letter U.

About seventy of these were collected in the lower station (56) of Cave Spring Canyon, a large number broken by the mice. Elevation about 7,000 feet. This canyon is about two miles north, running parallel with the Little Whitewater. No other large shells were found there.

Station 57. About two miles farther up the canyon on large slides, one-half mile below Kitt's new mine and cabin, were *Ashmunellas* in unlimited numbers, in company with *Oreohelix*



*barbata* Pils. A stiff shower during the night brought them out upon the rocks, and with sycamore shade in plenty they remained active during the following forenoon. The teeth upon the lower margin were smaller than at Station 56, lip more rounded, but no other difference of importance was noted. Compared with the former station, one example measured 7.4 mm. alt., 15 diam. Smaller examples were found than in the former colony. Two of these measured, alt. 6.2, diam. 13.5 mm.; alt. 6.4, diam. 13.4 mm.

Sections 58, 59. Above the cabin, in a branch of the canyon north of east, and in the rocks around and above Cave Spring, were found shells smaller in diameter but otherwise unchanged. Three of this colony measured:

Height 6.6, diam. 13.6 mm.

Height 6.8, diam. 12.6 mm.

Height 6.8, diam. 12.4 mm.

These stations were at an altitude above 8,000 feet, the high point of the range. The upper two miles of this canyon was left unexplored.

(*To be continued.*)

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#### NOTES

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Mr. Frank C. Baker announces that he has resigned his position as Curator and Acting Director of the Chicago Academy of Sciences. His address for the summer will be 1555 Highland Avenue, Rochester, N. Y.

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VIVIPARUS MALLEATUS REEVE IN MASSACHUSETTS:—In April, 1914, Mr. William J. Clench brought in two specimens of the above species for determination, collected in Muddy River, a small stream dividing Boston from Brookline. Shortly afterwards a third specimen was found by Mr. Kendall Foster. At the time I was inclined to consider it a recent introduction from some aquarium, as the animals were dead when found and probably killed by the cold, being unable to stand the winter. On Nov. 2, 1914 a fourth specimen was found by Mr. P. S. Remington. On April 1, of this year four specimens were again



Pilsbry, Henry Augustus and Ferriss, James H. 1915. "The new Mexican Expedition of 1914–Ashmunella (continued)." *The Nautilus* 29, 29–35.

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