

No. 2. — *A Second Supplement to the Fifth Volume of the Terrestrial Air-Breathing Mollusks of the United States and Adjacent Territories.* By W. G. BINNEY.

THE following pages contain a list of the Locally Introduced Species, the Universally Distributed Species, and the Central and Pacific Province Species, with such additional information relating to them as I have obtained since the publication in this Bulletin (Vol. XI. No. 8) of the first Supplement.

In a future Supplement, I propose to follow with the species of the Eastern Province.

Thus in this revision of the subject the species will be arranged geographically, not systematically.

LOCALLY INTRODUCED SPECIES.

Zonites cellarius, MÜLL.

Also found living in Portland, Oregon (Dore), and St. Louis.

Limax maximus, LIN.

Also, New Bedford and Cambridge, Mass., and New Haven, Conn.

Limax flavus, LIN.
agrestis, LIN.

Stenogyra decollata, LIN.

Arion fuscus, MÜLL.

Also, New Bedford, Mass. (Thomson).

Fruticicola hispida, LIN.

Also, Gay Head, Martha's Vineyard, Mass. (Thomson).

Fruticicola rufescens, PENNANT.

Also, Naushon, Buzzard's Bay, Mass. (Thomson).

Fruticicola Cantiana, MONTAGU.

Plate I. Fig. 13.

Quebec, Canada (F. R. Latchford).

I am indebted to the discoverer for specimens preserved in spirits which furnished the following notes.

Genital system complicated with accessory organs in the form of vaginal prostates, one long, narrow, flagellate, tapering at apex, four short, cylindrical, bluntly terminating. Genital bladder very large, oval, on a narrow duct. Penis sac stout, tapering above into a flagellate extension, at the commencement of which the vas deferens enters.

Jaw low, wide, ends attenuated, blunt: over twelve flat, broad, crowded ribs, whose ends denticulate either margin.

Lingual membrane with 40-1-40 teeth. Centrals tricuspid; laterals bicuspid; marginals also bicuspid without the inner cutting point being bifid.

Turricula terrestris, CHEMN.

Tachea hortensis, MÜLL.

Pomatia aspersa, MÜLL.

Also, San José, Cal.

Besides the above, that have more or less firmly established themselves here, various species have from time to time been noticed living, but the individual or colony has died out. Some of these are:—

<i>Zonites cultellatus</i>		See Vol. V. p. 135
<i>alliarius</i>		“ “ 135
<i>Stenogyra octona</i>		“ “ 196
<i>Bulimulus obscurus</i>		“ “ 212
<i>Pupa marginata</i>		“ “ 213
<i>Helix depicta</i>		“ “ 256
<i>Pisana</i>		“ “ 256
<i>arbustorum</i>		“ “ 256
<i>lactea</i>		“ “ 257
<i>variabilis</i>		“ “ 257
<i>Bulimus acutus</i>		“ “ 399
<i>Succinea putris</i>		“ “ 430
<i>amphibia</i>		“ “ 430

UNIVERSALLY DISTRIBUTED SPECIES.

For all of these see Vol. V.

Patula striatella, ANTHONY.
Microphysa pygmæa, DRAP.*
Helicodiscus lineatus, SAY.
Vallonia pulchella, MÜLL.
Pupa muscorum, LIN.
Zonites nitidus, MÜLL.

Zonites arboreus, SAY.
 indentatus, SAY.†
 minusculus, BINN.
 viridulus, MKE.
 miliun, MORSE.
 fulvus, DRAP.

* See below, page 35.

† See Supplement I. for *Zonites subrupicola*.

CENTRAL PROVINCE SPECIES.

Macrocyclus Vancouverensis, LEA.

A species of the Pacific Province, confined to the vicinity of the coast range in California. Above Lat. 49° it passes the Cascade Mountains, reduced in size, and ranges southeasterly into Idaho and Montana. I have actually received it from the Cœur d'Alène Mountains, Idaho: Umatilla Co., E. Oregon: Walla Walla, E. Washington Territory.*

Macrocyclus Hemphilli, W. G. BINN.

Weston, Umatilla Co., E. Oregon. A species of the Oregon region.

Limax montanus, INGERSOLL.

Also near Salt Lake City, Utah (H. Hemphill).

Zonites Whitneyi, NEWCOMB.

Also Emigrant Cañon, near Salt Lake City, Utah (Hemphill).

Zonites nitidus, MÜLL.

Near Santa Fé, New Mexico. A universally distributed species.

Zonites arboreus, SAY.

A universally distributed species. Actually found also at Franklin, White Bird Creek, Idaho: White Pine, Austin, Nevada: near Salt Lake City, Provo, Weber Cañon, Utah. (Hemphill.)

Zonites viridulus, MENKE.

A universally distributed species. Found also in Utah (Hemphill).

Zonites indentatus, SAY.

A universally distributed species.

* It must be borne in mind that changes are constantly being made in the boundaries of the newer States and Territories. I use the names as now accepted, 1886.

Zonites minusculus, BINNEY.

Universally distributed.

Zonites milium, MORSE.

Not actually received from the Central Province, but no doubt existing there, as it has been found over the Eastern and Californian Provinces. Probably a universally distributed species.

Zonites fulvus, DRAP.

A universally distributed species, received from numerous localities in Utah, Nevada, and Colorado.

Vitrina Pfeifferi, NEWC.

A species of the California Province. I have received it also from Logan Cañon, Weber Cañon, St. George, and Salt Lake City, Utah; Austin and White Pine, Nevada: White Bird Creek, Idaho. (Hemphill.)

Patula solitaria, SAY.**Plate I. Fig. 10.**

A species of the interior region of the Eastern Province. I have received it also from White Bird Creek, Idaho; Walla Walla, Washington Territory; Weston, Oregon (Hemphill); in addition to the localities given in Vol. V. These last two points are about twenty-five miles apart, at the foot of the Blue Mountains, one hundred and fifty miles from the Dalles.

The specimen figured, which is unusually elevated, is from Salmon River Mountains, Idaho (Hemphill). A uniformly brown specimen with narrow white band was also found.

One of the most unlooked for and interesting facts in the geographical distribution of our land shells is the westward range of *P. solitaria*, reaching through the Central Province into the Pacific Province to within a few miles of the Pacific Ocean. (See extracts from Mr. Hemphill's letter on pp. 27, 28.)

Patula strigosa, GOULD.**Plate II.**

This is the most variable species found in North America. The original specimen (see Pl. XXVI. a), found on or near the Pacific Coast at Puget Sound by the naturalists of the Wilkes Exploring Expedition, is large, almost discoidal, with widely open umbilicus. It could not possibly occur to me that there were any relations between it and the small, globose, narrowly umbilicated, highly

elevated shell which I described from what was then Nebraska as *Helix Cooperi*. (See Vol. IV. Pl. LXXVII. Fig. 11.) Equally confident was Dr. Newcomb that the small, carinated, lenticular shell described by him from Nevada as *Helix Hemphilli* was new to science. Subsequently, Dr. Gabb described as *Helix Haydeni* what appeared to be a distinct species with heavy revolving ribs. More recently authors less acquainted with the group have added to the synonymy by describing under the names of *H. militaris* and *H. Bruneri* what appeared to them to be new species. When the researches of Mr. Hemphill and others had brought large numbers of specimens from many localities in the Central Province, it became evident that what had appeared distinct species were connected by intermediate forms, and therefore should be considered varieties only. Even *Helix Idahoensis* also seemed to be but an aberrant form of the same protean species. Then came the explorations of Mr. Hemphill in Utah, bringing to light several more well-marked varieties, constant in their respective localities, several of which would be recognized by most naturalists as good species. Mr. Hemphill has distributed these as var. *Wasatchensis*, *Oquirrhensis*, *Newcombi*, *Gouldi*, *Binneyi*, *albofasciata*, *castanea*, *Utahensis*, *Gabbiana*, *multicostata*,—names printed in his catalogue, though as yet unaccompanied by descriptions or figures.

I here propose treating separately each of these marked varieties. It must be borne in mind that in each form there is found considerable variation in size, in elevation of spire, and breadth of umbilicus.

The geographical range of the group is very great. Though *Idahoensis*, *Haydeni*, and most of Mr. Hemphill's varieties are restricted to narrow limits, the forms usually referred to *strigosa* and *Cooperi* have been found from the Lake of the Woods to the Rocky Mountains in the British Possessions on the north, to numerous localities in New Mexico and Arizona on the south. The eastern boundary is the main range of the Rocky Mountains, but in Wyoming and Dakota (as now constituted) it is found more easterly, even in the Black Hills at longitude 104° in the southwestern corner of Dakota, the original locality of *Cooperi*. It was not, however, found by Mr. Hemphill at Helena, Montana, nor nearer to it than a point two hundred miles south on the road to Salt Lake City. On the west, it ranges to the Sierra Nevada and Cascade Mountains, and passes the latter even to the Pacific Ocean, though the specimens collected from time to time west of the Cascades in Washington Territory and Oregon may have been individuals brought down by the Columbia River from the regions east of the Cascades, or colonies descended from such. I doubt the species being really an inhabitant of the Pacific Region.

It was Mr. Hemphill who called my attention to this explanation of the presence in the Pacific Province of Central Province species. I cannot do better than quote his words: "I have no evidence of *Patula strigosa* having crossed the summit of the main range of the Sierra Nevada to the westward and entered the Pacific Province. The Cascade range of mountains in Oregon is, as you are aware, a continuation of the Sierra Nevada. It crosses the

Columbia River between the Dalles and Portland, and continues its northerly course on the west side of the Columbia. Numerous spurs, however, break off from the main range, and pass north through East Oregon into Utah and Idaho. One of these spurs, called the Blue Mountains, shoots off the Cascades near Mt. Hood, and runs nearly parallel with the Columbia, forming the eastern boundary of its valley, and is about forty miles from the river, and terminates about abreast of the mouth of Salmon River, Idaho, and on the south side of Snake River. On the north side of Snake River these mountains have local names, but are known by the general name of Bitter Root Mountains. They include Salmon River Mountains, etc. By tracing the course of Snake River and its tributaries you will see it drains the northern part of the great central basin, and when it cut its way through these mountains it very likely drained the great system of lakes that once covered a great part of this central basin. Now the mountain ranges in this portion, northeast, are the metropolis of *strigosa* so far as we know at present; and it is not improbable that many individuals, and quite likely whole colonies, of that species are sometimes carried into the streams by rains and floods, and are borne away on the waters towards the Pacific Coast. Occasionally some of the specimens must find or make a lodgement along the banks of the streams, and if the conditions are favorable a colony will spring up and perhaps spread over the neighborhood. The banks of the Columbia between the Dalles and the mouth of Snake River, a distance of one hundred and fifty miles, are destitute of timber, and are covered for several miles back with loose drifting sand, quite unfavorable to the existence and spread of land shells. The locality where I found the variety *castaneus* was on the bank of the Columbia near Celilo, about fifteen miles above the Dalles, on the east side of the Cascades, but on the west side of the Blue Mountains. This colony must have sprung from specimens brought down the stream by floods. At a subsequent visit it had disappeared. It may be possible some colonies will yet be found on the banks of the river below the Cascades. Very likely the original *strigosa* may have come from some colony planted in this way."

These same remarks will apply to *Patula solitaria*, the group of *Triodopsis Mullani*, and *Mesodon ptychophorus*. In treating each separate form of the species, I propose to follow the suggestion of Mr. Hemphill, as he has had so much better opportunities than any one else to appreciate their variations. He suggests arranging the group, whether considered as varieties or as distinct species, in three series according to the modifications of the sculpture of the shells: A. Shell transversely ribbed. B. Shell smooth or with rough striæ. C. Shell longitudinally ribbed.

A. SHELL TRANSVERSELY RIBBED.**Var. Idahoensis, NEWCOMB.****Plate II. Fig. 12.**

In the comparison of the various forms here given, I call this a variety. I am, however, convinced of its specific weight.

The transverse ribs in this are few, separated, and stout. There are twenty-four upon the body whorl of one individual. It has as yet been found only in Idaho. I give a new figure of a Salmon River Mountain specimen.

Var. Binneyi, HEMPHILL.**Plate II. Fig. 13.**

Box Elder County, Utah (H. Hemphill). (See p. 31.)

This variety has strong rough wrinkles rather than decided ribs, about fifty on the first whorl of one individual. Some individuals have a decided, erect tubercle within the peristome near its junction with the parietal wall of the aperture. There are no revolving bands of color.

This is the first of a remarkable series of varieties or species found by Mr. Henry Hemphill in the region of Great Salt Lake, Utah. I will here give his own description of the habitat of these forms:—

“I commenced collecting at or near Ogden, Utah, and almost the first shell I picked up was the variety I call *Wasatchensis*. (See p. 34.) This pretty and interesting shell I found living among quartzite boulders, in crevices sufficiently large to afford cool and moist retreats during the active summer season, and safe places for hibernating during the cold winter months. This shell seems to be confined in its range to a very limited area, for I did not find a single specimen either dead or living outside of a little plat containing an acre of ground. I have often admired this shell, and think it one of the most interesting varieties I found in Utah, as it combines the characters of *Idahoensis*, *Haydeni*, and *Hemphilli*, as well as of *Cooperi*. Not only on this account is it interesting, but because it is found living on or near the dividing line between the *Idahoensis* group and the *Haydeni* group.* North of Ogden you will see I found all the transverse-ribbed varieties, and south of Ogden all the longitudinal ribbed varieties were found, with the exception of the variety of *strigosa*, just assuming the *Haydeni* sculpturing (near Logan). Not a single transverse-ribbed specimen occurred south of Ogden. Whether this is merely accidental, or whether there are some local causes on either side of this line which influence this change in sculpturing, I cannot say. I only point to the fact, and that it seems a little strange that *Wasatchensis* should be found just on this line.

“In the gulches near Ogden, and also on the mountain slopes among rocks and leaves, I found the typical *strigosa* and *Cooperi*, as well as a number of small shells.

* That is, the transversely ribbed and longitudinally ribbed groups.

"From Ogden I went to Salt Lake City, and thoroughly explored all the cañons, gulches, and other favorable places which I could reach in a day's walk. This only resulted in the finding of the typical *strigosa* and *Cooperi*, both large and small.

"I next went to Provo, Utah, fifty miles south on the same range of mountains, and there also I found only the typical *strigosa* and *Cooperi*, large and small.

"I then returned to Salt Lake City, and crossed the valley to the west, camping on the west side of a range called the Oquirrh Mountains. Here commenced a series of finds that was quite exciting and very interesting to me. At the foot of the mountain my attention was attracted to a pile of detached rock, usually a good place for snails. After a few moments' work among these stones I was rewarded by finding quite a number of specimens of the variety I call *Utahensis*. (See p. 33.) This has the form of *Hemphilli*, but is destitute of the revolving ridges of *Haydeni*. The specimens were all constant in sculpturing, but varied very much in size and somewhat in form. I next went up the side of the mountain a short distance to another pile of stones (limestone), and here I found the variety I call *Oquirrhensis*. (See p. 34.) This has quite prominent revolving ribs, more developed than in the typical *Hemphilli* from White Pine, Nevada. This colony was also constant in sculpturing, but varied very much in size, and also in form. I next went along the mountain side, and crossed a little ravine, and commenced raking among the leaves and brush on the steep slope of the mountain. Here I found a colony of the typical *Haydeni*, constant in sculpturing, but as in the case of the other colonies, variable in size and form. Following up this ravine to near the summit of the mountain, I found a few isolated specimens of *Haydeni* under stones. Near the summit I found two specimens of *Cooperi*. I then returned to the bushes where I found *Haydeni*, and after some further work there passed along the side of the mountain a very short distance to another ravine with low bushes covering its sides. Here among the leaves I found a colony of the variety I call *Gabbiana*. (See p. 34.) This is a coarse, rough *Haydeni*, with the revolving ribs nearly or quite obsolete. This variety also maintained its peculiar sculpturing, but varied again in size and form. Continuing my course along the mountain side, I came to another ravine which I followed up a short distance to a perpendicular precipice about fifty feet high, barring farther progress. At the foot of this limestone wall I found another colony of one of the smaller forms, elevated like *Cooperi*, with the revolving ribs nearly obsolete. Here, then, were five colonies of the same species, apparently, living on the same mountain slope, within a short distance one of the other, each colony maintaining its peculiar sculpturing, but varying in size and form.

"In due time I returned to Salt Lake City, where I remained a few days to prepare my specimens.

"Returning to Ogden, I explored the mountains farther to the north than on my first visit, which resulted in finding the variety I have called *Newcombi*. (See p. 32.) This colony I found living among bushes on the steep sides of a gulch facing the north, a spot of continual shade. The specimens, both banded and plain, were quite numerous; but beyond the space of about fifty yards not an individual could be found either above or below. I also found on a rocky point two or three specimens of *Haydeni*, nearer Ogden, on the north side of the city.

"From Ogden I went to Brigham City, and quite thoroughly explored all that vicinity. Here I found a colony of the small albino *strigosa*, with and without the tooth on the peristome. This colony occupied a pile of rocks at the foot of the mountain, shaded by bushes, dead leaves, and the débris washed down the mountain. I did not find this variety elsewhere, nor was a single

banded specimen found among them. The typical and also albinos of *strigosa* and *Cooperi* occurred in this vicinity.

"I continued my course northward from Brigham City, pitching my tent on the banks of Bear River. The valley here was considerably broken by the mountain spurs, through one of which the river had cut its way, leaving high rocky cliffs on either side, with scattered clumps of bushes along the river and on the edges of the bluffs. Everything seemed favorable here to the existence of snails. My first find was near the edge of the bluff, in cattle tracks and small shady holes in the ground, of the white variety I call *Binneyi*. (See p. 29.) These were all plain white. They were quite plentiful just on the brow of the bluff and the slope towards the river. The next I found was in a clump of bushes among leaves and brush. These I have called variety *albofasciata*. (See p. 32.) The body of the shell is clouded, with the broad, revolving white band at the periphery. Some of this variety are beautifully clouded beneath. None in these bushes were white.

"I next went up to the rocky cliffs about three miles from my camp, and here among bushes I found the plain white varieties, *Binneyi*, with and without the denticle on the peristome. I worked my way among the bushes and rocks to the foot of the cliffs, and here on a mossy, grassy slope, directly at the foot of a high cliff, I found a colony of the ribbed variety *castaneus*. (See p. 32.) This spot is continually shaded by the tall cliff, the sun never shining on it. Most of this colony are faintly marked with the broad white band of *albofasciata*, but a few are plain chestnut-colored. I next crossed a small ravine to another cliff, where a small patch of wild rye was growing very luxuriantly. It was about fifty feet square, directly beneath a little gully in the cliff above, where the melting snows of spring and heavy summer rain formed a little rivulet, pouring over the cliff and irrigating the rye. In this patch I found a very prolific colony of the small interesting variety I have called *Gouldi*. (See p. 32.) So plentiful were they, that I picked up by actual count one thousand in about two hours. No large specimens were associated with them, while the little fellows strayed but a short distance from the rye. No typical *strigosa* were found in this vicinity; all were ribbed.

"From here I went to Logan, Utah, where I found the variety with microscopic revolving ribs, beginning of *Haydeni*, among stones at the head of a gulch quite high on the mountains. The typical *strigosa* and *Cooperi* were found here also.

"I next went to Franklin, just across the Utah line in Idaho, where I found the thin, frail, iron-stained variety of *strigosa*, among red sandstones.

"You will see by this account that nearly all of these colonies were separated, though some of them were but a few yards apart. While the typical *strigosa* and *Cooperi*, large and small, seem to range over the whole region where I collected, Ogden seems to be the dividing line between the transverse-ribbed varieties and the longitudinal-ribbed varieties. No transversely ribbed specimens were found south of Ogden; but a few *Haydeni* and the Logan variety (beginning of *Haydeni*) are all that belong to the *Haydeni* group that I found north of it, excepting a keeled variety found on the mountains of Salmon River, Idaho. Whether there is any meaning in this I cannot say. The field is so large,* many years will be required to work it up thoroughly. I have no doubt other varieties will be found."

* In another of Mr. Hemphill's letters he writes: "The little spot in Utah where I found my Utah series is probably the only one that we may say is worked up in the whole of the great basin of Utah, Nevada, Montana, and Idaho. The field is very large, and there are many ranges of mountains passing through it that must yield some nice things, and no doubt many more varieties of *strigosa* are just waiting for the catcher."

Var. Newcombi, HEMPHILL.**Plate II. Fig. 8.**

Near Ogden, Utah (H. Hemphill). (See *ante*, p. 30.)

This variety has numerous separated, rough, heavy, transverse ribs (forty-four on the first whorl of one individual), and two widely separated, revolving bands of color. It varies, as usual in the group, in size and globoseness. Some want the revolving band.

Var. multicostata, HEMPHILL.**Plate II. Fig. 6.**

Box Elder County, Utah (H. Hemphill).

On one specimen I counted over seventy coarse rib-like striae to the first whorl. There are two revolving bands of chestnut on all the individuals received from Mr. Hemphill. Two have the denticle on the peristome.

Var. Gouldi, HEMPHILL.**Plate II. Figs. 5, 16.**

Banks of Bear River, north of Brigham City, Utah (H. Hemphill). (See p. 31.)

One individual has sixty-two rough wrinkles on the first whorl. There are two revolving bands of color. The specimen figured (Fig. 16) is the largest sent me by Mr. Hemphill, others being smaller by one half, and some being very much depressed (Fig. 5). Among the thousand specimens collected, none were large.

Var. albofasciata, HEMPHILL.**Plate II. Figs. 3, 4.**

Same vicinity as the last. (See p. 31.)

The body of the whorl is clouded, with a broad, revolving white band at the periphery, and white around the umbilicus. Some individuals are white with two revolving bands of color. On one there are about seventy rough wrinkles to the first whorl. Some have a toothlike process on the peristome (Fig. 4). The variety differs, as usual in the group, in the elevation of the spire and in size.

Var. castaneus, HEMPHILL.**Plate II. Figs. 11, 14.**

Box Elder County, Utah (see p. 31): also Celilo, 15 miles from the Dalles, Oregon.* (Hemphill.)

* Probably a colony brought down by the Columbia. It was not found on a subsequent visit.

This variety differs somewhat in the sculpturing. The wrinkles are usually less developed than in the previously mentioned varieties, but on a few individuals are coarser. Those from Eastern Oregon are almost smooth. The principal characteristic of the variety is its color, which is uniform chestnut, excepting around the umbilicus. A few like the one figured have a double revolving white band.

This closes the series of transversely ribbed varieties.

B. SHELL SMOOTH OR STRIATE.

In this section Mr. Hemphill suggests including the typical *strigosa* (see Pl. XXVI.^a), a large, flattened, widely umbilicated, almost discoidal form, and the typical *Cooperi* (Vol. IV. Pl. LXXVII. Fig. 11), a small, elevated, globose, narrowly umbilicated shell, as well as the innumerable varieties of size and form and coloring which exist, some of which I have figured in Vol. IV. In none of these variable forms do we find either transverse or revolving ribs.

Some individuals are of a dirty white, but usually two revolving chestnut bands are present: others, retaining the bands, are mottled with light or dark horn-color, or more or less completely banded or uniformly colored with light or dark chestnut. Within the peristome on some is a decided denticle, such as I have already described above for other varieties of the group. (Pl. II. Fig. 4.)

One colony from Eastern Oregon is peculiar in form. (Pl. II. Fig. 10.)

This restricted form of *strigosa*, including *Cooperi*, is found over all the wide region indicated for the species on p. 27. The Arizona localities from which I have received it are Logan, near Phoenix: Pine Creek, below Natural Bridge: Huachuca Mountains.

Var. *Utahensis*, HEMPHILL.

For locality, see *ante*, p. 30. This is a rough, coarse, carinated *strigosa*, figured in Terr. Moll., V. p. 158, Fig. 66. The peristome is sometimes continuous by a heavy raised callus connecting its terminations. It is sometimes smaller and more elevated.

C. SHELL LONGITUDINALLY RIBBED.

Var. *Hemphilli*, NEWCOMB.

Plate II. Fig. 15.

This form seems widely distributed. It was originally found by Mr. Hemphill at White Pine, Hamilton, Nevada. Mr. Hemphill believes it will be found all through the mountains bordering on both sides of the Snake River Valley, Salmon River Mountains, Idaho. He also found it at various points in Utah

and Colorado. The original specimen figured in Vol. V. being immature, I here give (Pl. II. Fig. 15) one of a mature individual. Above (p. 31), are noticed specimens from Logan, Utah, showing the gradual change from *strigosa* to *Hemphilli*.

The variety *Hemphilli* is characterized by minute revolving striae, and is decidedly carinated.

Var. *Oquirrhensis*, HEMPHILL.

Plate II. Fig. 12.

Oquirrh Mountains, Utah (H. Hemphill). (See p. 30.)

This form has quite prominent, revolving ribs, more developed than in the typical *Haydeni*. The aperture is oblique, the ends of the peristome approached and joined by a heavy callus. There is a strongly developed carina. Albino individuals were found.

H. Bruneri, Ancey, is a synonym of *Oquirrhensis*.

Var. *Gabbiana*, HEMPHILL.

Plate II. Fig. 9.

Near Salt Lake City (H. Hemphill). (See p. 30.)

As described by Mr. Hemphill above, this variety is a coarse, rough *Haydeni*, with the revolving ribs nearly or quite obsolete. Like all the other varieties, it varies in size and shape. The ends of the peristome are nearly approached, and often continuous.

Var. *Haydeni*, GABB.

Utah (H. Hemphill). (See p. 30.)

This well-known form has the revolving ribs most developed of all. For figure see Terr. Moll., V. p. 159.

Var. *Wasatchensis*, HEMPHILL.

Plate II. Fig. 7.

Wasatch Mountains, Utah (H. Hemphill). (See p. 29.)

This is the most peculiar variety, with coarse revolving striae and ribs (sometimes wanting), rough transverse wrinkles, decided carina crenellating the sutures, ends of peristome approached: the umbilicus is very narrow: the shell is elevated, often pyramidal: apex acute. Albino individuals were also found. With its peculiar pyramidal spire and small umbilicus it combines the sculpturing peculiar to several of the other varieties. (See p. 29.)

Patula striatella, ANTHONY.

This species, including *Cronkhitei*, has also been found in Wyoming and at Ogden Cañon, Utah : Nevada : Colorado. (Hemphill.)

Patula Horni, GABB.

Also Logan, Arizona.

Microphysa Ingersolli, BLAND.

Plate III. Fig. 5.

A better figure than that in Vol. V. is here given.

Also found by Mr. Hemphill at Weston, Umatilla Co., Oregon : Mount Nebo, Wasatch Mountains, Logan Cañon, Utah. Also found by Mr. Ernest Ingersoll near Lawrence, Kansas, on the banks of the Kaw.

Microphysa pygmæa, DRAP.

Admitted as a universally distributed species (see p. 24), though not actually as yet received from the Central Province. Sharing the peculiarity of jaw with all our species of *Microphysa*, I have placed it in that genus.

Microphysa conspecta, BLAND.

Plate III. Figs. 4, 6.

Living specimens received from Dr. J. G. Cooper have enabled me to ascertain that this species has the jaw characteristic of *Microphysa*. My figure, drawn by camera lucida, gives the sixteen plates as they became actually disarranged under pressure, showing them to be separated and not forming one solid piece as in most of the genera. The central plates are not imbricated, and appear lightly connected. The other plates appear to overlap laterally on their outer sides. The jaw is low, wide, slightly arched, the ends scarcely attenuated, blunt.

There are 12-1-12 teeth on the lingual membrane. Centrals with long and narrow base of attachment : reflection small, with three cusps, the middle one much the largest, all bearing short cutting points. Laterals same, but bicuspid. Marginals low, wide, with two broad cusps, each bearing a broad, bifid cutting point. The centrals and laterals are quite like those of *Pupa*.

A species of the Pacific Province also.

Helicodiscus lineatus, SAY.

A universally distributed species, found over the Central Province, as stated in Vol. V. Specimens collected at Oakland, California, and in Idaho by Mr. Hemphill, quite want the revolving lines.

Polygyrella polygyrella, BLAND.**Plate I. Figs. 6, 7; Plate VI. Fig. 8.**

Also in Deer Lodge Valley, Montana (Hemphill).

The genital system (Pl. III. Fig. 8), as would be anticipated, is characterized by the length of all the organs. The penis sac (*p. s.*) is long, narrow, cylindrical, receiving the vas deferens at its blunt apex, and bearing the retractor muscle just below. The genital bladder (*g. b.*) is long, narrow, pointed above and below; its duct is long and narrow. The testicle and ovary are long and narrow.

Triodopsis Levettei, BLAND.**Plate I. Fig. 15.**

See Supplement to Vol. V. p. 154.

Also seventy miles southeast of Tucson, in the Huachuca Mountains, Arizona. A species of the Central Province rather than of the Texas Region, as suggested in "Manual of American Land Shells."

Triodopsis Mullani, BLAND.

I am convinced by larger suites of specimens that I was wrong in referring (Vol. V. p. 333) this species to *Mesodon devius*. The group is very puzzling, and some confusion has resulted from my treatment of it. It must, therefore, be considered that *Triodopsis Mullani*, Bland, as described and figured by him is a distinct species confined to the regions east of the Cascades in Northern Idaho. It is very globose, with a decidedly tridentate aperture. (See Vol. V. p. 338, Fig. 222, and Man. Amer. Land Shells, p. 119, Fig. 87, for a copy of Bland's original description.) The shell I describe below as *T. Sanburni* is somewhat nearly related to *Mullani*, but has its aperture much more contracted by the teeth on the peristome and the more developed parietal tooth. *T. Harfordiana* is the form which in Terr. Moll., V. (309, Fig. 203) I mistook for *Polygyra Harfordiana* (see Suppl. p. 151). It is a small shining shell, flattened, with larger umbilicus and less developed teeth. *Triodopsis Hemphilli* is a much larger, coarser, russet-colored shell, scarcely umbilicated, with a small parietal tooth, and a slight approach only to the lamellar dilatation of the inner edge of the peristome so characteristic of the typical *devius*; no denticle on the outer edge of the peristome. All these forms show the scars on the epidermis, though no hairs were present in my fresh specimens. Besides these well-marked forms are found individuals, not associating with them, which seem to connect *Harfordiana* with *Mullani* (see Terr. Moll., V. Fig. 221, and the following, Pl. I. Figs. 6, 7). The typical *Mesodon devius* is confined to the Pacific Province. See Terr. Moll., IV. Pl. LXXIX. Fig. 13; V. Fig. 220. It is a very distinct species, as yet not noticed in the Central Province.

Triodopsis Sanburni.**Plate I. Fig. 9; Plate III. Fig. 3.**

Shell narrowly umbilicated, globose, depressed, thin, sparsely hirsute, with distant, scarcely perceptible wrinkles of growth, yellowish horn-colored; whorls five and one half, slightly convex, the last hardly descending, beneath convex; aperture oblique, lunate, trilobed, with a heavy, prominent, blunt parietal tooth; peristome white, broad, reflected, almost covering the umbilicus, thickened, bearing on its right margin a large squarely truncated denticle, on its basal margin a stout, bluntly pointed denticle, the two denticles separated by a small, rounded sinus. Greater diameter, 11 mm.; lesser, 10 mm.; height, 5 mm.

Kingston, Northern Idaho (J. Rand Sanburn).

Lingual membrane as usual in the genus. Teeth 26-1-26, with about eight laterals on either side, the ninth tooth having its cutting point split, the eleventh in another membrane: centrals with slightly developed side cusps and decided cutting points: laterals like the centrals, but bicuspid: marginals long, low, with two very wide, blunt cusps, the inner much the larger, both bearing long, oblique, irregularly bifid or trifid cutting points. (Pl. III. Fig. 3.)

Genital system with no accessory organs. Penis sac long, cylindrical, somewhat attenuated at its apex, where it receives the vas deferens and retractor muscle: genital bladder long, narrow, suboval: duct to genital bladder stout below, gradually tapering above. The same arrangement is found in the genitalia of the typical *devius*.

This shell, found in quantities living by Mr. Sanburn, shows no variation excepting slightly in size. There are no individuals showing a transition to forms of *Mullani*. It is nearly allied to that species as described by Mr. Bland. It is, however, much less globose, and has its aperture very much more contracted by teeth. The parietal tooth is not long and curving, but erect and of equal width to its bluntly truncated top. The upper tooth on the peristome, opposite, not above, the parietal tooth, is also erect and bluntly truncated. The lower peristome tooth is bluntly triangular. The sinus between the two parietal teeth is small and rounded.

I have described the shell as hirsute, though no hairs were found on the scars which surely bore them.

The general appearance of the shell is that of *T. Hopetonensis*.

Triodopsis Harfordiana.**Plate I. Figs. 6, 7.**

Shell umbilicated, depressed, thin, shining, sparsely hirsute, greenish horn-colored, wrinkles of growth not prominent; whorls four and a half, hardly convex, the last scarcely descending, deeply grooved behind the peristome, hardly convex beneath; aperture very oblique, lunate, trilobed, with a small

parietal tooth; peristome narrow, scarcely reflected, bearing two distant, slightly developed denticles. Greater diameter, $8\frac{1}{2}$ mm.; lesser, 8 mm.; height, 3 mm.

Triodopsis Harfordiana, W. G. BINNEY, not of J. G. COOPER, Terr. Moll., V. 309, figure only, not description: Pl. VIII. Fig. R, lingual dentition.

Mesodon devius, var., W. G. BINN., Man. Amer. Land Shells, 118, Fig. 88.

Salmon River, Idaho (H. Hemphill).

Genitalia unobserved.

Lingual dentition (under erroneous name of *Triodopsis Harfordiana*). See Terr. Moll., V. l. c.

This is the shell formerly mistaken by me for *Polygyra Harfordiana*. It is a small, very much depressed, shining shell, with open umbilicus and slightly developed teeth. Its surface is scarred as if it had been hirsute. Though much more depressed, it has the general appearance of a tiny *T. tridentata*.

Triodopsis Hemphilli.

Plate I. Fig. 17.

Shell imperforate, globosely depressed, coarse, slightly wrinkled, russet-colored, sparsely hirsute; whorls five and a half, convex, the last globose, slightly descending; aperture very oblique, lunate, with a short, narrow, slightly curving parietal tooth; peristome white, broad, thickened, revolute, usually quite concealing the umbilicus, bearing on its basal margin an elongated, lamellar toothlike process. Greater diameter, 17 mm.; lesser, 14 mm.; height, 7 mm.

Kingston, Northern Idaho (J. Rand Sanburn).

The surface is scarred as if hirsute when quite fresh.

The shell, by its coarser texture, closed umbilicus, and lamellar peristome denticle, is more nearly allied to the typical *Mesodon devius* than to *Mullani*, *Harfordiana*, or *Sanburni*. Though common at the locality given above, it is not variable, nor have I received it from other points.

Lingual membrane of the same character as in *T. Sanburni*.

Genitalia as in the last-named species.

Mesodon ptychophorus, A. D. BROWN.

Plate I. Figs. 3, 16.

Shell with umbilicus almost concealed, globose, with coarse, distant striæ of growth, thick, of a dull russet-color; spire elevated, apex acute; whorls five, convex, the last swollen below, rapidly descending; aperture oblique, subcircular, parietal wall with light callus; peristome white, thick, narrow, reflected, with a thickening scarcely approaching a tooth-like process on its basal margin, its

termination almost entirely concealing the small umbilicus. Greater diameter, 19 mm. ; lesser, 15 mm. ; height, 11 mm.

Var. MAJOR. Six full whorls, umbilicus less concealed. Greater diameter, 22 mm. (Fig. 3.)

Helix ptychophora, A. D. BROWN. See Vol. V. p. 355.

Arionta Townsendiana, var., W. G. BINN. l. c. Suppl., Pl. IV. Figs. E, F. —
Man. Amer. Land Shells, p. 128, Figs. 101, 102.

Deer Lodge Valley, Montana: the large variety was found by Mr. Hemphill along Salmon River, Idaho: Bitter Root Mountains, Umatilla Co., Oregon: Weston, Oregon, to the Dalles. The range westwardly through the Cascades has been already explained above (see p. 28).

Formerly I was disposed to believe this to be a variety of *Arionta Townsendiana*, but the larger number of specimens received from various localities has convinced me of its being distinct. It is a true *Mesodon*, very much like *M. clausus*. It is a smaller shell than *Townsendiana*, more globose, less widely umbilicated, with more circular aperture; the sculpturing lacks the transverse striæ and malleations of the *Ariontæ*.

For genitalia, jaw, and lingual dentition, see Terr. Moll., V.

To my knowledge, *Arionta Townsendiana* has not been found east of the Cascade Mountains.

Mesodon Columbianus, LEA.

Plate I. Fig. 5.

A species of the Pacific Province as well as the Central Province. Also received from Cœur d'Alène Mountains, Idaho: Deer Lodge Valley, Montana. (H. Hemphill.)

One Cœur d'Alène Mountain specimen with parietal tooth is figured.

The form found at these Central Province localities is the variety called *labiosa* by Gould. It is more globose than the type, has a more circular aperture, without the horizontal basal margin or toothlike thickening to the peristome. The latter is extremely broad, grooved, not flattened. It must be remembered that this toothed form is not the *armigerus*, Ancey, which will be treated under the Pacific Province species.

Vallonia pulchella, MÜLL.

A universally distributed species. Also at various points in Utah (Hemphill).

Pupa muscorum, LIN.

Plate III. Fig. 11.

Universally distributed.

The shell figured, which appears to me identical with this species, was sent to me by Mr. Ancey as *P. sublubrica*, from White Pine, Nevada.

Pupa Blandi, MORSE.

A northern region of Eastern Province species. Also found at Ogden and in the Wasatch Mountains, Utah (Hemphill).

Pupa corpulenta, MORSE.

Ogden Cañon, Utah, with two parietal teeth (Hemphill).

Pupa Arizonensis, GABB.**Plate III. Fig. 10.**

I give a figure of *Pupa hebes*, Ancey, drawn from a specimen sent me by Mr. Ancey. To me it seems identical with *Arizonensis*.

Pupa hordeacea, GABB.**Pupa alticola, INGERSOLL.****Plate III. Fig. 9**

A better figure of an authentic specimen is given here. Wasatch Mountains, Utah (Hemphill): Ouray, Colorado (Ingersoll).

Vertigo ovata, SAY.

A universally distributed species.

Ferussacia subcylindrica, LIN.

Also from various points of Utah, Idaho, and Nevada.

A species also of the northern region of Eastern Province.

Succinea Haydeni, W. G. BINN.

Also, Salt Lake City, Utah. A species of northern region.

Succinea Sillimani, BLAND.**Succinea lineata, W. G. BINN.**

Also in Idaho. A northern region species. As *S. chrysis* it is also described from Alaska. (See Man. Amer. Land Shells, p. 473, Fig. 515; and below, p. 46.)

Succinea Stretchiana, BLAND.

Also at Elko, Nevada.

Succinea avara, SAY.

A northern region species. (See Vol. V. p. 420.)

PACIFIC PROVINCE SPECIES.

I have not included the species from the extreme northern regions, which more properly belong to the fauna of Asia. Such are:—

Pupa arctica WALL.

columella, BENSON.

Succinea turgida, WEST.

annexa, WEST.

Vallonia asiatica, NEVILL.

Pupa edentula, DRAP.

signata.

muscorum, var. **Lundstromi**.

columella, var. **Gredleri**.

Krausseana, REINH.

See Man. Amer. Land Shells, pp. 473, 474.

Macrocyclus Vancouverensis, LEA.

A dark reddish variety was found in Alaska by Mr. Dall.

Macrocyclus sportella, GLD.**Macrocyclus Voyana, NEWC.**

A variety *simplicilabris* has been noticed by Ancey (Le Naturaliste, IV. pp. 110, 111).

Macrocyclus Hemphilli, W. G. B.

See also p. 25. Found also at Freeport, W. Terr.

Macrocyclus Duranti, NEWC.

Haplotrema has been suggested as a subgeneric name for this species (Ancey, l. c.) on account of its simple peristome.

Zonites Whitneyi, NEWC.

See also p. 25.

Zonites nitidus, MÜLL.

Zonites arboreus, SAY.

Zonites cellarius, MÜLL.

See p. 23.

Zonites indentatus, SAY.

Zonites viridulus, MKE.

Portland, Oregon (Hemphill) : Victoria, British Columbia (Rev. G. W. Taylor).

Zonites milium, MORSE.

Zonites chersinellus, DALL.

See Supplement I.

Zonites fulvus, MÜLL.

Vitrina Pfeifferi, NEWC.

See page 26.

Limax campestris, BINN.

Limax Hewstoni, J. G. COOP.

Limax hyperboreus, WESTERLUND.

See Man. Amer. Land Shells, p. 473.

A species collected in Arctic America by the "Vega." I am indebted to Mr. Dall for a specimen from Commander Island, Siberia.

Jaw arched, smooth, with median projection. Lingual membrane with about 42-1-42 teeth. Centrals tricuspid : laterals bicuspid, twelve in number on each side: marginals about thirty in number on both sides, aculeate, simple, without bifurcation or side spur. Fig. 516 of Man. Amer. Land Shells shows a central tooth with its adjacent lateral and three extreme marginals of Mr. Dall's specimen.

From Seattle, Washington Territory, I have received a small *Limax* similar in outward appearance to *hyperboreus*, and with similar dentition.

See Westerlund, Sibirien Land och Sötvatten Mollusker, p. 21.

Prophysaon Hemphilli, BL. & BINN.

Prophysaon Andersoni, J. G. C.

It is a true *Prophysaon*, though described originally as an *Arion*.

The lingual membrane has 30-1-30 teeth, with about 12 perfect laterals. Centrals tricuspid : laterals bicuspid : marginals with one long, stout, oblique inner cutting point, and one outer, short, blunt, sometimes bifid cutting point. Resembling that of *P. Hemphilli*.

Jaw low, arcuate, ends blunt; with numerous (over 15) irregularly developed, broad, stout ribs, denticulating either margin.

Animal small, long, and slender, dirty white with dark reticulations: an indistinct dark-colored circle around the mantle near its edge, and a dark band running longitudinally from the rear of the mantle to the tail on each side of the centre of the back.

Reticulations foliated as in *Prophysaon Hemphilli* and in the figure of *Arion foliolatus*. The mantle covered with minute tubercles, not foliated.

The animal extends itself into a long cylindrical worm-like body, with obtuse ends. Length when fully extended, 60 mm.

The synonymy of this species is as follows:—

Arion Andersoni, J. G. Coop., formerly *Prophysaon Hemphilli*, var., W. G. B.,
T. M. V.

Prophysaon Andersoni, J. G. C., in letters.

Ariolimax Columbianus, GOULD.

Ariolimax Californicus, J. G. Coop.

Ariolimax niger, J. G. Coop.

Ariolimax Hemphilli, W. G. B.

Ariolimax Andersoni, W. G. B.

Formerly I supposed this species to be *Arion Andersoni*, of Dr. Cooper. Learning that Dr. Cooper's species is a *Prophysaon*, I still retain for this the specific name *Andersoni*, W. G. B.

Arion foliolatus, GLD.

Still a doubtful species, known only by the original figure and description.

Binneya notabilis, J. G. Coop.

Also found by Mr. Orcutt fifty miles from St. Quentin Bay, Lower California.

Hemphillia glandulosa, BL. & BINN.

Patula striatella, ANTH.

Mariposa, California.

Patula pauper, MOR.

Patula asteriscus, MORSE.

Tacoma, W. Territory.

Patula solitaria, SAY.

Plate I. Fig. 10.

This can hardly be considered a species of the Pacific Province, though colonies have been found west of the Cascades. (See pp. 27, 28.)

The specimen figured was found by Mr. Hemphill at White Bird Creek, Salmon River, Idaho.

Microphysa Lansingi, BLAND.

Microphysa pygmæa, DRAP.

See p. 35.

See p. 35. *Microphysa conspecta*, BL.

Microphysa Stearnsi, BL.

See Supplement I. p. 147. Found also in Alaska.

Helicodiscus lineatus, SAY.

Vallonia pulchella, MÜLL.

San Diego, California.

Gonostoma Yatesi, J. G. COOP.

Polygyra Harfordiana, J. G. COOP.

Triodopsis loricata, GLD.

Stenotrema germanum, GLD.

Mesodon Columbianus, LEA.

The true *M. Columbianus* is correctly described and figured in Terr. Moll., II. and III. It is very readily distinguished by its peristome, the basal margin of which is horizontal in its direction, with a slight thickening or projection before it reaches the base of the shell. It does not appear to range as far southerly as California. Northerly it has been found to 59° latitude.

The form called *labiosa* by Dr. Gould (see Vol. II.) is recognized by its very circular aperture, its widely reflected, sinuous peristome, sharp on its outer edge, not flattened on its face. Its upper surface is elevated as in *Columbianus*. It is sometimes toothed. Originally found in the region of Astoria, Mr. Hemphill has collected it at Kalama on the Columbia River, forty miles below Portland, and also from Deer Lodge Valley, Montana, and in the Cœur d'Alène Mountains, Idaho. (See p. 39.)

My Figs. 4, 5 of Plate I. show the toothed variety from Idaho and an enlarged view of the epidermis. It is less hirsute than *armigerus*.

The form called *armigerus* by Ancy (Le Naturaliste) is the one common in California, ranging as far south as 37° 20'. I have figured it on Pl. I. Fig. 12, as well as an enlarged view of the epidermis. It is the most densely hirsute of the group. It is a more globose shell below than the typical form. The peristome is narrow, much less developed; the parietal tooth is long and narrow, sometimes wanting. It has much the appearance below of a large *Stenotrema germanum*, with which species I have confounded it rather than with *Columbianus*. I have no doubt it will eventually be considered a distinct species.

Mesodon devius, GLD.

As restricted (see p. 36), this species seems to be confined to the Oregon region.

Aglaja fidelis, GRAY.
infumata GLD.

Aglaja Hillebrandi, NEWC.
Arionta arrosa, GLD.

Arionta Townsendiana, LEA.

As restricted (see p. 39), this species seems confined to the Oregon region.

Arionta exarata, PFR.**Arionta Californiensis, LEA.**

As proposed in Man. Amer. Land Shells, I unite under this specific name the various forms described as —

- Helix vineta*, VAL. (See Vol. IV. for a facsimile of figure.)
Nickliniana, LEA. (See Vol. III. Pl. VI. Fig. *a*.)
arboretorum, VAL. (See Vol. IV. Pl. LXXXVI. Fig. 13.)
nemoraviga, VAL. (See same, Pl. LXXIX. Fig. 11.)
anachoreta, W. G. B. (See same, Pl. LXXVI. Fig. 5.)
ramentosa, GLD. (See Vol. V.)
Parkeri, TRYON.
reticulata, PFR. (See Vol. V.)
Bridgesi, NEWC. (See Vol. V.)

I have figured, in Man. Amer. Land Shells, Fig. 109, a large umbilicated form, probably very near to Newcomb's type of *H. Bridgesi*, a small umbilicated form (Fig. 168), a larger imperforate form (Fig. 111), and a figure of a shell received under the name of *Diabloensis* from Dr. Cooper (Fig. 113).

Arionta intercisa, W. G. BINN.

I am now convinced that *redimita* is a variety of this species.

Arionta Ayersiana, NEWC.
tudiculata, BINN.
Mormonum, PFR.

Arionta Traski, NEWC.
Carpenteri, NEWC.
Dupetithouarsi, DESH.

Arionta sequoicola, J. G. C.

An enlarged view of the sculpturing of this species is given in Man. Amer. Land Shells (Fig. 127).

Arionta ruficincta, NEWC.
Gabbi, NEWC.

Arionta Kelletti, FORBES.
Stearnsiana, GABB.

Euparypha Tryoni, NEWC.

The allied species *E. levis*, Pfr., recently collected by Mr. Orcutt in Lower California, has a genital system (Pl. III. Fig. 2) very near that of *E. Tryoni* (see Vol. V. Pl. XIV. Fig. *c*). I did not detect the organ 2 in *levis*. The

jaw is high, arched, with blunt ends : six ribs on the anterior surface, denticulating either margin. The lingual membrane (Pl. III. Fig. 1) is long and narrow : teeth 38-1-38, with about nine laterals on either side, the tenth tooth having the inner cutting point bifid : centrals and first laterals without side cusps and cutting points : marginals low, wide, with two distinct cusps, each furnished with bifid cutting points.

Pomatia aspersa, MÜLL.

See p. 24.

Glyptostoma Newberryanum, W. G. B.

Ferussacia subcylindrica, LIN.

Received also from Washington Territory.

Pupa Rowelli, NEWC.

Pupa Californica, NEWC.

Pupa muscorum, LIN.

A variety *Lundstromi*, Westerlund, has been described from Alaska.

Succinea Sillimani, BL.

Succinea rusticana, GLD.

Stretchiana, BL.

Nuttalliana, LEA.

Hawkinsi, BAIRD.

Succinea chrysis, WESTERLUND.

Alaska. This is the well-known yellowish variety of *S. lineata*, often found at far northern points. An authentic specimen is figured on p. 473 of Man. Amer. Land Shells.

Succinea Oregonensis, LEA.

Succinea avara, SAY.

Received also from California.

Veronicella olivacea, STEARNS.

Onchidella borealis, DALL.

Onchidella Carpenteri, W. G. B.

EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1. *Mesodon armigerus*.
“ 2. Same : epidermis enlarged.
“ 3. *Mesodon ptychophorus*, *var. major*.
“ 4. *Mesodon labiosus*.
“ 5. Same : epidermis enlarged.
“ 6, 7. *Triodopsis Harfordiana*.
“ 8. *Mesodon armigerus*.
“ 9. *Triodopsis Sanburni*.
“ 10. *Patula solitaria*.
“ 11. *Triodopsis Mullani*.
“ 12. *Polygyrella polygyrella*.
“ 13. *Fruticicola Cantiana*.
“ 14. *Polygyrella polygyrella*.
“ 15. *Triodopsis Levettei*.
“ 16. *Mesodon ptychophorus*.
“ 17. *Triodopsis Hemphilli*.

PLATE II.

- Fig. 1, 2. *Patula Idahoensis*.
“ 3. *Patula strigosa*, *var. albofasciata*.
“ 4. *Patula strigosa*, *var. albofasciata* : toothed.
“ 5. *Patula strigosa*, *var. Gouldi*.
“ 6. *Patula strigosa*, *var. multicostata*.
“ 7. *Patula strigosa*, *var. Wasatchensis*.
“ 8. *Patula strigosa*, *var. Newcombi*.
“ 9. *Patula strigosa*, *var. Gabbiana*.
“ 10. *Patula strigosa*, *var.*
“ 11. *Patula strigosa*, *var. castanea*.
“ 12. *Patula strigosa*, *var. Oquirrhensis*.
“ 13. *Patula strigosa*, *var. Binneyi*.
“ 14. *Patula strigosa*, *var. castanea*.
“ 15. *Patula strigosa*, *var. Hemphilli*.
“ 16. *Patula strigosa*, *var. Gouldi*.

PLATE III.

- Fig. 1. Lingual dentition of *Euparypha levis*.
“ 2. Genital system of same.
 a. genital bladder.
 b. penis sac.
 c. vas deferens.
 d. vaginal prostate.
- Fig. 3. Lingual dentition of *Triodopsis Sanburni*.
“ 4. Jaw of *Microphysa conspecta*.
“ 5. *Microphysa Ingersolli*.
“ 6. Lingual membrane of *Microphysa conspecta*.
“ 7. Same of *Fruticicola Cantiana*.
“ 8. Genital system of *Polygyrella polygyrella*.
 a. genital bladder.
 b. penis sac.
 c. vas deferens.
 d. retractor muscle.
- Fig. 9. Pupa *alticola*.
“ 10. Pupa *Arizonensis*.
“ 11. Pupa *sublubrica*.
“ 12. Pupa *hebes*.



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