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THE NAUTILUS.

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THE NAVAJO NATION.

BY JAS. H. FERRISS.

(*Concluded.*)

In northeastern Arizona sandstone and shale of different periods are the prevailing types, geologically. The Carrizo range and a small country about sixty miles north of Holbrook, Arizona, and a few needles thrust through the desert floor here and there belong to the igneous group. Less than one-tenth is limestone, and in character of little worth to the snail industry.

Vegetation is not so plentiful or varied in character as in the region lying southward to the Mexican border, but much of the material is new to collectors, and some of the species new to science. At an elevation between 6,000 and 7,000 feet juniper (*J. monosperma*) and pinyon (*P. edulis*), and up to 8,500 feet yellow pine (*P. ponderosa*), quaking asp, spruce and oak prevail, with columbines, phlox, aconitum, larkspur in the usual mountain profusion. Ferns are rare.

W. N. Clute, editor of the American Botanist, and the present writer, both of Joliet, Ill., were invited to join the class of 1919. They needed no urging. The good ship Ford, chafing at its Tucson anchorage was in line at Flagstaff July 1. Leaving the Lowell Observatory with the Normal School faculty and several pleasant people, a run was made over to Grand View, on the Grand Canyon, about 70 miles, to organize, get acquainted and make a fresh start. It is one of the best views of the

canyon. The auto parties camp here, but the hotel, now owned by W. R. Hearst, is idle. The forest rangers' camp is nearby but otherwise there is no settlement here at present. *Sonorella coloradoensis* (Stearns) was found at the type locality. Scenery, fine air and the yellow-blooming century-plant (*Agave utahensis*) were of particular interest.

Tuba City was our next camp, and it was necessary to return to the San Francisco Mountains, 14 miles from Flagstaff to cross the Painted Desert. This is the fourth time we have passed this range with a peak of 12,794 feet and everlasting snow. Surely Oreohelix is up there in the quaking asps, but no conchologist has made a track so much as on the foothills.

At Cameron (Tanner) crossing was made over the canyon of the Little Colorado on a suspension bridge built by the government. There was but a thread of water in the muddy flats one or two hundred feet below. A little scratching here during the luncheon hour did not turn up anything in the rocks or drift. The road was fairly good and the autos hummed along merrily over wide stretches of black lava, pebbled agate, iron marbles and other geological curiosities, and at other stretches, for a change, painted canyon walls and miles of grotesque wind-made statues furnished entertainment. Although delayed four hours in starting we traveled 122 miles and went into camp early that day at Tuba. Purchased from the Mormons, this is now a government city of schools, agency buildings, an agricultural experiment station and a hospital.

Sand is the chief product of Tuba City, but springs are numerous and the fields of grain and the orchards were thrifty. At the boiling spring in our camp a new Pisidium and *Physa humerosa interioris*, n. subsp. were gathered. Also cases of the case-fly and a fair collection of dragon flies. A large scarlet species was the prize.

John Lee, of Mountain Meadow memory, was one of the founders of Tuba. Later he established Lee's Ferry on the Colorado, and later again at Mountain Meadow met his Waterloo. On the rocks of Moenkoppi Wash is the village of Moenkoppi. The homes and stores of these ancient cliff-dwellers were closely inspected by the class, also their fields of corn,

orchards and vineyards, hundreds of acres. School diplomas, photographs and three-colored illustrations decorated their walls, and clocks and sewing machines seemed home-like. They are neat housekeepers, hospitable and surely happy.

These so-called Quaker Indians, the Hopis, and also the more or less war-like Navajos, Utes and Piutes, with a few goods bought from the traders—salt, sugar, baking powder and calico—live as they have always lived. They are farmers with fields of grain, alfalfa and vegetables in the low spots of the desert; operators in live stock, manufacturers of blankets, pottery and jewelry. The estimate of 1912 gave this nation 330,000 horses, 33,000 cattle, 1,500,000 sheep. They dress in styles of their own, in dwellings cling to their ancient architecture and keep their blood pure Indian. The Hopi has permanent dwellings, four and five stories high, and perhaps may be the original inventor of the Philadelphia sky-scraper apartment. The Navajo with his solitary and temporary hogan of sticks and mud, the Ute and Piute with tepees of skin or canvas, follow their flock to the herding grounds, all at peace, one with another, really not knowing tribal boundaries. There may be a two-thousand-dollar auto in the front door yard of Mr. Navajo if the ground is that level. The remainder of the family surplus may be invested in government bonds, a banner with a star in gold hanging from a door that is something like a muskrat home, but they make their own moccasins and calico breeches, and some of them still think they can whip the United States. Since we broke camp one of those cockey white men, prospecting for minerals against Indian instructions, was found lying by a water hole on our trail and the signs of his taking-off were Navajo.

The Hopi is a model Indian. He saves his money, never had a quarrel with Uncle Sam, and without government bounties has made his own living. A trader told us that when a Navajo sold him ten dollars worth of wool he traded out the full amount and asked for nine dollars more of credit, but the Hopi left a quarter and took home nine seventy-five in cash.

The Navajo refused to dig for pottery, as the flu had given them a scare; but we liked them and their splendid horses were

kindly, well-broken and intelligent. Without a guide or guidance they carried us for miles over naked sandstone where there was not a scratch to mark the trail. Saddles of Navajo make are in good taste and stand up well with the best of the saddler's art.

"Boy, boy," came from a group of smiling Hopis at Tuba, pointing to cavalry pantaloons as the girls climbed into cars. The dogs barked, and with the government veterinarian in his own Ford to lead us, the sand flew over the dunes to Kaibito. Here Wetherill and his horses had been waiting for three days. The cars were stored in the trader's wool house, and two days later we threw down the shovels and anchored those horses and mules in the junipers of Endische Springs at the south foot of Navajo Mountain.

There had been little opportunity for collecting, but while watering our stock at two branches of Navajo Creek the drift was found rich in small shells. The streams contained excellent drinking water and were twenty or thirty feet in width. A large amount of timber had been floated down from the mesas, but we were traveling fast. *Physa humerosa interioris* was found in the stream among the horsetails and water cress.

With the best of water spouting from the rocks, a beautiful view and a delightful climate we settled down into a permanent camp, began to feel acquainted and call each other by front names. These pupils and instructors were a splendid group of uncomplaining pottery diggers. Nearly every western state was represented. Their forebears had been pioneers from Plymouth Rock to California, and thus good sense and the square deal came just natural.

From the southern approach Navajo Mountain is an oblong dome, regular in form, longer east and west, without peaks or precipices, "rising four thousand feet above the flat floor of the Rainbow Plateau, an island in the midst of a sea of water-worn and wind-worn brilliantly colored sandstone," says Gregory. A nearer view and a little travel finds precipices in plenty. In fact so rough were the crags we found but one horse trail to the upper levels, and that ended at War God Springs about half way to the summit. Here at the springs is a fairly level bench

in the yellow pine about a mile in width along the southern and eastern slopes. The talus covered with quaking asp largely composed of heavy sandstone blocks is an ideal situation and *Oreohelix* was at home. The summit of about two hundred acres fairly level is heavily clothed in spruce, and over the top, under the precipices are occasional springs that feed the streams crossing the Rainbow trail below. Many fairy bowers, coves and valleys are hidden here for botanists and snail seekers. Here we found a new Phlox (*clutei*); *Oreohelix yavapai cummingsi* n. subsp. and *Gonyodiscus shimeki cockerelli* Pils. were found in their most robust form.

All of the mountain is sandstone, or so near it that shells and their hunters notice no difference. "Cretaceous sandstones cover the top and Jurassic (?) sediments constitute the flanks," to speak authoritively. The sandstone for the whole region is rather variable in character due perhaps to the several binding materials—lime, silicon, iron, manganese, etc. Many specimens were brought to camp, and Prof. Scott's verdict ran to sandstone with an occasional decree favorable to petrified wood.

Navajo Mountain has good soil for snail life, so fertile it is not probable that all the species were gathered. At a spring on the south slope known to us as the Red Rock Spring, *Oreohelix yavapai clutei* n. subsp. was discovered accidentally in the grass and rose bushes. *Succinea avara* was also here in the bogs. Among the rocks of a large canyon west of Endische Springs we found the bones of *Oleohelix yavapai neomexicana* Pils., but found no live ones. This canyon heads in a saddle near the main peak of the mountain and for convenience may be known as Big Pine Canyon until further orders. The north and northeast slopes were not fully explored although three of our party camped at War God Springs the better part of a week. The great rock slides of those slopes probably contain the best snaileries. Four Oreohelix tribes per mountain is a new record for Arizona.

Before returning home Mr. Wetherill and his Indians led the way to the War God Springs and then on foot to the top of the mountain for the view over the San Juan country, and then

around the base of the mountain on horseback to the Rainbow Bridge. On the mountain top an *Oreohelix depressa* came to the surface following a shower of rain, in every way almost identical to the shells found by Henderson and Daniels at stations 22 and 23, 1915, near Ogden, Utah. The forest rubbish about the springs was alive with Pupas and Zonitids and Vallonias. A few *Oreohelix yavapai neomexicana* Pils. were in the rock slides.

The outlook from the crest overlooked the Rainbow Bridge, the canyons of the San Juan, other canyons, bridges, caverns, domes, sunlights and shadows, white, brown, and all the reds and all the shades of the amethyst. Also the plateaus beyond the Grand Canyon, the Henry Mountains, 11,410 feet, the Blue, 11,445, Aquarius 10,100, LaSal 12,271. Also the white and black mesas and the Carrizo mountains to the south and east were in view.

The Rainbow Bridge is in the strict rainbow form and with some of its colors. But 30 feet in thickness, with its 309 of altitude and 208 width, in lightness of architecture it seemed something of steel. The average camera does not give an accurate estimate of sharp hillsides and scenery large as this bridge.

It rained a little these evenings, but the bridge kept us dry, and at a camp in Surprise Canyon blankets were spread in wind holes of the cliff. To imitate the swallows, heads and feet were made to peep out a little. At the bridge one of the party imitated the pack rats for a little while and for the first time in his desert experience made a complete collection of fleas. The chute of Zane Grey is an interesting feature of this trail, so narrow it seemed the walls in passing could be touched with either hand, and so high the passage was gloomy. Abduction Cliff and the balanced rock that exterminated the wicked band were true to photographs, one on the trail the other at Navajo Creek, thirty miles away.

In fiction, details in scenery and character should be true to life, though a little latitude may get through of a geographical character. We know Grey's Roaring River, and we camped for weeks at the corral he helped to build for Silver

Mine; we know his Painted Desert, and have struck his trail in so many places we know his details are accurate and well done.

Hon. David Rust, of Kanab, schooled at Leland Stanford University, an editor and twice a member of the Utah legislature, said the only fault "here is that Gray deals in ancient history." Well, so it is with many of us. We do not ask to have witchcraft, intolerance, superstition or any of those disgusting household remedies spread on the records.

David and his son, David Jordan, gave us a pleasant surprise at Endische Springs. They were cousins of mine and it was our first meeting. Our mothers' ancestors, Ezekiel Brown and wife and two sons were kidnapped by the New York Indians and kept in captivity nearly four years. Rust and Ferriss thus inherited their wild ways, and had much in common to talk about. Ferriss all his life, too, because of this family episode, has been tracking New York Indians, especially up and down Wall Street.

A couple of young boys from New York City, taking in the sights from Zion Park to Mesa Verda, were in the care of the Rusts, Arnold W. Kohler, Jr., and Chas. P. Schulzheimer. Though but seventeen they were live wires educationally and went off at the end of a few days with the hearts of us all. They saw a large yellow snail walking up the rocks at Rainbow Bridge, a *Sonorella*, perhaps, but we found only *Succinea avara*, *Physa humerosa interioris* and *Pupilla hebes*.

Loaded with pottery and other material historic, after a few weeks of toil we returned to Kaibeto, assisted by Navajos and their horses. Here we met John Lee, a grandson of the Lee Ferry John, who brought in a report that we were at Navajo Mountain in a starving condition and that the girls had worn out their shoes. The Lees may be a little peculiar, but in a sparsely settled country rumors seem to spring from the ground and spread remarkably fast.

It is a day's journey from Kaibeto to Marsh Pass via Red Lake, by auto or across country by horseback. The Dean and our Navajo friend Leslie made the journey on horseback, for there were ruins on the way. The main party returned to Red Lake and switchbacked to the Pass. The roads had been damaged by late rains and both parties were a day late.

The trader at Red Lake opened house for us and between the stores of the trader and our camp chest it was something like a return to civilization. The living room above the store was well equipped and the ladies took possession, the gentlemen making their nests in the sand-dunes.

These trading posts are constructed much on the plan of the old frontier forts. The buildings are strong, the counters high and sometimes screened, for in their trade discussions the Navajos may resort to direct action. A few traders have lost their lives in these disputes and some of their goods. One of these was an elder brother of Wetherill. We look back with much pleasure to the over night at Red Lake.

The road to Marsh Pass led through the Klethia valley. Lake reservoirs, fields and corrals by the road side, luxuriant sunflowers and fire-weeds promising greater agricultural development, is our recollection of the ride. Marsh Pass is a rocky cut between the Black and Skeleton Mesas. An abundance of firewood and water stored in natural cisterns make this a convenient camping place, and Leslie kept camp while the entire class on foot explored the ruins for a couple of days in Laguna Canyon.

It was a pleasing journey of six miles along the floor of the canyon with high cliffs and palisades to the noted Betatakin ruins of 148 rooms. A rain storm overtook the lagging snail party, and while they were crouching under overhanging cliffs they were given an exhibition of many bridal-veil falls breaking over the precipices. The forest dooryard at Betatakin was somewhat damp the remainder of the day, but the quaking asps and spruce were swarming with Pupillidæ, and here was found something new, *Pupilla hebes* mut. *albescens*. The damp collectors by a fire and protected by the city arch slept the sleep of the honest toiler and dried their clothing. The ladies descended ladders from the roofs and spread their blankets on the smooth sandstone flooring. The gentlemen slept on rocky shelving above the houses and the Dean, Casabianca to the core, stayed by the cooking beans and got wet.

"Betatakin is a homelike spot," is the first thought of the visitor. The arched cavern in the cliff is 400 feet in width,

460 in heighth, opening to the west, has an easy approach, a spring of excellent water at the base, a heavy forest and a wall five hundred feet or more high, and a small stream of water in front. It seems the most delightful and romantic of situations for village life. The ruins have been partially restored by the government, and our class for the coming summer propose to make it their home while exploring a number of newly-discovered ruins near by. Supplies will be assembled at Kayenta.

A return to the main branch of Laguna Canyon and a walk of eight or ten miles further from camp the following day in which the party was somewhat delayed and strung out by the ripe currants along the trail, brought us to the Keet-Seel ruins. This city has about the same number of rooms as Betatakin, the arch was about the same, but faced east. The forest was not as heavy, the water not as convenient, it had not been restored as it should be, and access was a little difficult. The approach is negotiated by steps cut in a deep slope of sandstone for about forty feet with a hand-rail laid flat on the surface for safety. Thus those who approach must come humbly on all fours. The pottery was a rich find at these ruins and there still remain many wagon loads of the broken material.

The probabilities are that the Hopis were compelled to leave these delightful homes against their will; that they were too easily penned up here by the war-like Navajos and their Apache cousins. At least the Hopis now live on the small and high mesas of the desert where they can see out in every direction, watch their flocks and fields and get a fair view of all who approach. Such is the theory. The decorations upon pottery, the architecture of dwellings and community buildings, with timber, corn and pumpkin rinds preserved these hundreds of years by the overhanging arches, are substantially the same as those now in use by the Hopis of Moenkopi and Walpi.

Upon the return journey bones of *Lymnæa* in the bed of the creek, in banks, washes and ant-hills above started an investigation, and it was found that these shells were imbedded in a streak of marl and peat soil sometimes a dozen feet below the canyon floor. Wetherill told us that thirty-five years ago the valley contained a chain of swamps fed by the stream. A sim-

ilar condition was found at Fredonia, Arizona, by Ferriss and Daniels in 1910. The older residents said that twenty-five years before the Kanab Wash was clothed with grass and there was merely a few damp spots here and there along the valley, that the cattle had cut a trail down the valley and this trail had been deepened year after year by the stream. In 1910 the water of Kanab Wash was 90 feet below the floor of the valley and a permanent stream was of such a volume as to be known as a river. A recent freshet had taken out the community dams storing water for domestic use at Kanab and Fredonia, and the village streets were still muddy from the disaster. Perhaps these two streams and many others had a big cut the same season and by the same freshet. We see much evidence of this cutting and also of some filling. Perhaps after a stream here is cut to the bed rock it again fills with brush wood and soil washed from above.

Lymnæa stagnalis appressa Say was found in the canyon peat and it may perhaps still be found alive in some of the ponds and lakes of the mesas. We saw the lakes but an auto party is too fast for pond snails. *Lymnæa* (*Galba*) *palustris* (Müll). *Lymnæa proxima* Lea, *Lymnæa* (*Pseudogalba*) *parva*, *Planorbis trivolvis* Say, and *Succinea retusa* Lea, now a stranger to the locality, were also gathered; but the material was in poor condition, the shades of night were coming fast, all alone in an Indian country and it had been a twelve-hour walk. It was ten before the camp fire was beckoning at Marsh Pass.

Wetherill came to escort us to his home at Kayenta the next morning, and then led us two more days on horseback through Monument Park where peaks, steeples and effigies more than a thousand feet high seem to stick up through the plateau floor. While waiting for the snake dance, nearly a week of delight in desert literature, paintings, photographs and evening lectures was our lot at this club-like home. It is something of a headquarters for the government explorers, and for all sorts of writers, artists and students who desire to know something of the Navajos.

The party divided here, one half returning home, the other going on to the snake dance at Walpi. The journey of two

days by auto was made in five, owing to weather conditions. We enjoyed the journey through the Chinlee valley where with government assistance thousands of acres of corn were under cultivation, and the side-winder rattler was added to our collection.

We also stumbled into Ganado, headquarters of the Hubbel string of trading posts established some forty years ago. Hon. Lorenzo Hubbell, its head, many years a representative of the territories of New Mexico and Arizona in Congress, was at home. Here was another museum of Indian baskets, blankets, paintings, desert books and the many things Indian we were looking for. Paintings of all the patterns in blankets used by the Navajos were on the walls, and one hundred at least of the original portraits in sepia of Indians by that best of artists, Elbridge Ayer Burbank.

Lorenzo Hubbell, Jr., of Oraibi, was a delightful acquaintance. In an empty Buick he overtook us the next morning after the Ganado visit. "Throw in a lot of those dunnage bags and some of those girls and I will help you the next ten miles; the road is rough that far," he said; and we went to it and built a bridge. When the flood from the cloudburst had passed we ran ahead into another cloudburst and built another bridge, the men folks, including Hubbell, pulled off their shoes, rolled up their pantaloons and waded through the mud and cactus for half a day in their bare feet, built bridges, dug out machines with shovels and their bare hands, pushed and slipped and tumbled until dark, and Hubbell stayed with us through it all. He was plainly that kind. When the cowboys and Indians saw him at a distance they grinned the width of their face, came up, slipped off their horses and shook hands heartily.

Humiliating to relate, an Indian boy with a burro was employed to pull out a car we could not push, and did it. On another occasion two men of our party, stuck upon the hillside of the San Juan, had their machine pulled over the top by a Najavo woman and her burro, with merely a rope around the donkey's neck.

The snake dance of the Hopis terminates an annual nine-day

religious ceremony, a prayer for rain. Here were seven hundred spectators from coast to coast, as interested and respectful as these deeply religious Indians themselves. About sixty or seventy live snakes were carried around the ring in the mouths of the priests, one snake at a time. Twenty or more of these exhibits were the common poisonous rattler—the side-winder or Edwards' massasauga (*Sistruris catenatus edwardsi* B. & G.), and the other the prairie rattler (*Crotalus confluentus* Say). No fangs were pulled, no persons bitten, no fainting, none were awe-stricken. There was no frenzy. Everybody cool and satisfied. Even those who paid a dollar for a watermelon or fifty cents for a loaf of bread ate calmly, politely and said nothing.

The party again divided at Holbrook, and at Galup Mr. Clute left for home and Cummings and Ferriss made a side trip to Montecello, Utah, via. the Ship Rock agency and Cortez, Colorado, thus avoiding the Ute Mountain and passing over the toes of Mesa Verde with its great ruins.

The Blue Range, known on some of the maps as the Altas Abajo, is about eight miles from Montecello. The walking is good and the lumber road lands one at the sawmill on the north fork of the Montezuma Creek, the very heart of the mountain range. These peaks are covered by thick groves of aspen and spruce with large open spaces of coarse grass and slides of sandstone fringed with wild currants and raspberries. Here again *Oreohelix y. cummingsi* was found abundant in the shale and also scattered among the rock slides and the aspens, with *O. cooperi* and *O. depressa*. At station 365 a few *cummingsi* were found approaching the albino form. At station 370 in tall grass *O. cooperi* was variable in size, also in the same environment in the vicinity of the copper mines, our Sta. 366. As a rule these were much smaller than those found in the aspens. The collecting conditions are ideal and this range should he further explored. In the few days given to the work collections were not made farther than a couple of miles from the sawmill in any direction. Some of the maps show that it is about forty miles from the sawmill to the Elk ridge on the west.

It was heart-breaking to leave without shaking hands with

the La Sal range, so convenient to Montecello, a stage running to the La Sal P. O. at the foot of the range. Then, too, there was the Carrizo range a short distance from where we crossed the San Juan at Ship Rock, but duty called us away from this new and prosperous agricultural section. (This is thrown in because the Dean had just harvested over 3,000 bushels of wheat from less than seventy acres of sage-brush land.)

September 13th the party again divided, Ferriss to Joliet and the Dean for Tucson, taking with him a couple of young Wetherills to the University, adding with his machine that much to our desert journey. The girls did their part like men, there was no sickness, no accidents, no great adventures and it was the most enjoyable picnic ever in the most country per acre ever.

Concerning the little ones: *Pupilla syngenes* Pils. and *syngenes dextroversa* P. & F. seek the well-drained hillsides where grass roots and spawls of stone lying upon the soil furnish shelter. So far they have not been gathered in deep forest conditions where pupas mostly congregate. The first of these was found alive in the grassy hummocks under the dry cliffs of the Black Mesa at Marsh Pass and again at Kayenta.

The other was associated with *Oreohelix y. clutei* in the rose bushes and grass at Red Rock Spring on the south slope of Navajo Mountain.

Gastrocopta pellucida hordeacella (Pils.), *Pupoides hordaceus* (Gabb) and *Gastrocopta cristata* (Pils. and Van.), of the plains, are seldom found alive. When dead shells appear in the ant-hills a little patience and some time may obtain a few live ones in the grass, chips of wood or surface stone in that vicinity. The great harvest of these (dead) has been found in the drift of streams draining the plains.

Thysanophora horni at Brownsville, Texas, is at home in leaf mold of the mesquit thickets, and has colors and bristles. In Arizona it is found under conditions so dry no other snail except *Succinea avara* will keep it company, but it thrives and is found in large numbers with the *Chænaxis* pupas in rock piles shaded by cliffs.

The *Thysanophora ingersolli* group keep company with the

Pupillidae, *Zonitoides*, *Gonyodiscus*, *Vallonia*, *Vitrina alaskana*, *Euconulus*, and *Cochlicopa lubrica*, in deep rock slides and damp forest rubbish.

Some of the others than those mentioned in this paper are here located from the notes: *Pupilla hebes* (Anc.), fossil beds of Laguna canyon; leaf mold Navajos and Blue Mountains and the Black Mesa at the Rainbow Bridge, in moss and horsetails (*Equisetum*).

Pupilla hebes mut. *albescens*, now published for the first time, in the aspens at the Betatakin ruins, abundant and variable, sometimes toothed, albino.

Pupilla blandi Morse, drift of Chinlee and wash near Adamana.

Gastrocopta ashmuni (St.), drift of a wash from the north, near Adamana, Arizona, and in the drift of a branch of the Chinlee near the Utah boundary.

Gastrocopta procera mcclungi (Hanna and Johnson), drift near Adamana.

Vertigo ovata Say, drift near Adamana and Navajo Creek near the Tso ranch, and fossil beds of Laguna Canyon.

Vertigo coloradoensis arizoniensis, Pils. & Van., fossil beds of Laguna Canyon, drift of Chinlee near Utah boundary.

Vertigo modesta insculpta Pils., War God and Two Springs, Navajo Mountain, Blue Mountain, Snow Spring near Montecello, Utah, drift of Navajo Creek near Tso ranch.

Vallonia gracilicostata Reinh., Blue Mountain and the fossil beds of Laguna Canyon.

Others collected that seem to be common to the region wherever conditions are favorable were the following: *Vallonia perspectiva* St. and *cyclophorella* Ckll., *Gonyodiscus cronkheitei anthonyi* (Pils.), *Zonitoides alachuana* (Dall), *arboreus* (Say), *Polita indentata umbilicata* (Ckll.), *Euconulus fulvus* (Müll), *Vitrina alaskana* Dall, *Cochlicopa lubrica* (Müll.), *Pupoides marginata* (Say), *Gastrocopta pilsbryiana* (St.), *Succinea avara* (Say).

ON THE EROSION AND THICKNESS OF SHELLS OF THE FRESH-WATER MUSSELS.

BY N. M. GRIER, PH. D., HOLLINS COLLEGE.

In connection with another investigation, I had opportunity to summarize what is apparently most of the literature dealing with these little discussed and connected phases of the ecology of the Naiades, and now wish to present it in the light of other points this investigation brought out.

Hey (1), compared shells of *U. pictorum* and *U. tumidus* from the Ouse and Foss Rivers in England. The Ouse River is a wide and deep stream with a great deal of mud and receives a variety of drainage material. Hey believed the erosion of the shells in it was due either to the dissolved CO_2 in the water, or the rapidity of the current, for in the Foss River, where conditions were generally opposite ones, they showed little such disfigurement or none. Shrubsole (2) states erosion in shells may be attributed to the low percentage of lime in the water, which he analyzed, and found to be positively correlated with this fact. Beauchamp (3), also, felt that erosion might be due to dissolved carbon dioxide, for he found that shells were considerably eroded in streams flowing through limestone formations; moreover dead shells in water containing an abundance of lime were similarly affected. March (4), however, states that shells from districts highly charged with CO_2 have thin shells, which are not eroded at the beaks, and was inclined to attribute this to the absence of humic acid, "which does not occur where limestone does; or the absence or excess of chalk." Cooper (5) states that badly deformed shells are found in water of excessive saltness, while Baker (6) noted in *Cardium*, a marine pelecypod, that thinness of shell seemed correlated with the saltness of the water. Finally, Rich (7) tells of some shells (*Unio complanatus*) from a soft-water lake in New York which were almost free from lime. Further on in this paper it will be shown that while the waters of Lake Erie contain more lime than those of the Upper Ohio Drainage, shells are comparatively thicker in the latter.

It is at once observed that more of the above writers ascribe

erosion of shells to the presence of CO_2 in the water. This is also confirmed in a way from the interpretation of geologic data, which gives evidence of the solvent power of "carbonic acid." Not only is CO_2 being continually liberated in nature in other ways, but there is hardly any doubt but that the interaction of humic acid often present in streams with lime may also produce CO_2. Thus the observation of Shrubsole, whose shells were collected from a drainage containing a diversified material, may plausibly fit in here. Of course the fact must never be excluded that coarser material carried along by the current also plays a part in the erosion of shells, but the consequences of such a factor may be intensified by the chemical reactions which already may have taken place. Most of the eroded shells I have examined come from streams having an abundance of gravel. Again, it is probable that in some cases an abundance of lime in a stream may neutralize the humic acid before the latter can produce any marked effect.

Later on, some evidence will be presented in support of March's contention to the effect that high $CaCO_3$ content of the water somehow inhibits absorption of material, preventing the shell from becoming as thick as it might. This, however, is only a phase of the well-established principle that living cells are able to control the absorption of substances used in their metabolism. Since it is admitted that the lime of shells comes from the water in which they live, there is reason to think there may be some correlation—positive or negative—between the amount of lime present and the thickness of the shells. Several investigators have indicated their probable attack of this problem, but so far there does not seem to be any published results.

Having already secured data on the thickness of the shell and reduced it to a convenient factor, (the thickness just superior to the pallial line directly beneath the umbo, divided by the height), I found a publication of the U. S. Geological Survey (8) which fortunately gave analyses of the water at the same or what seem to be reasonably adjacent points to where my material had been collected. All the localities concerned—collecting, and points where analysis of water was taken, are indicated in the data which appear to correlate for my conclusions in the table.

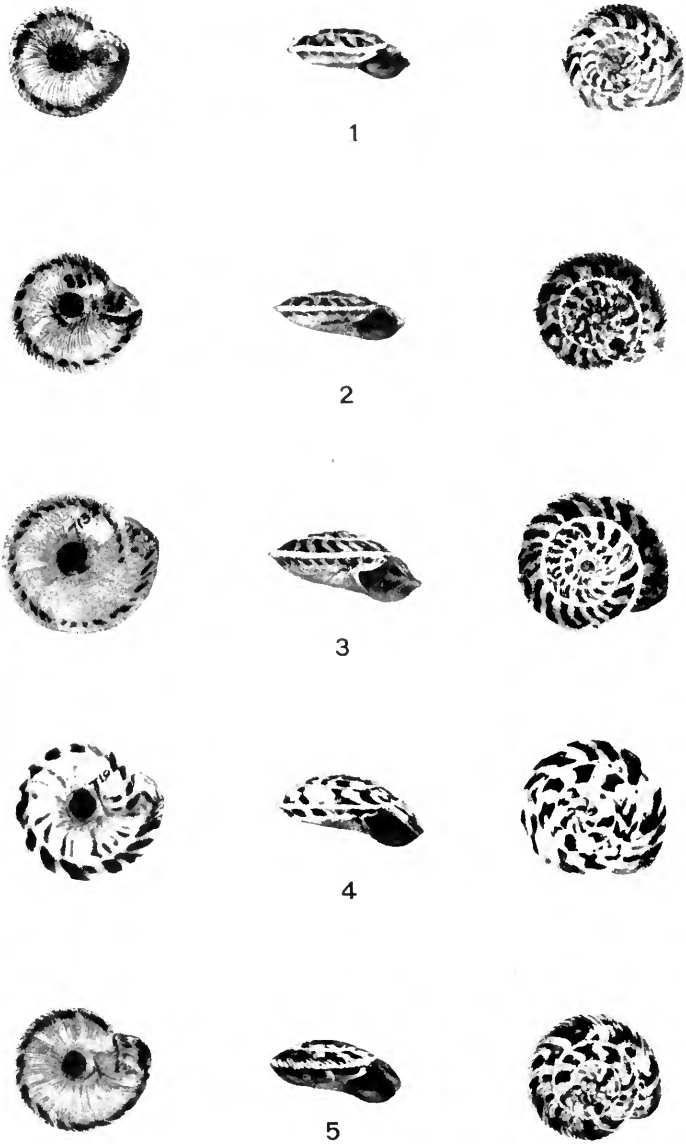
TABLE SHOWING RELATION OF $CaCO_3$ CONTENT OF WATER TO THICKNESS OF SHELL.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per million $CaCO_3$.	Stations at which analyses taken with remarks.
8	Fusconaia flava	Allegheny River	.0975	51.4	Parker, Tarentum.
8	Fusconaia flava	Ohio River	.1182	61	Natrona, Pittsburgh.
8	Fusconaia flava	Monongahela River	.142	72	McKeesport, Monongahela.
8	Fuscanaia flava parvula	Presque Isle Bay, Lake Erie	.121	90	Erie, Pa.
15	Amblema costata	Allegheny River	.1495	61	At nearest point, Meadville.
15	Amblema costata	French Creek	.1506	127	
15	Amblema costata	Allegheny River	.1495	51.4	
15	Amblema costata	Ohio River	.1986	61	
4	Amblema costata	Shenango River, Pulaski	.1477	47	Analysis at nearest point, Sharon.
44	Amblema costata	Conoquenessing	.1957	66	
15	Amblema costata eriganensis	Presque Isle Bay, Lake Erie	.1385	90	Erie, Pa.
4	Amblema costata eriganensis		.1221	90	Erie, Pa.
13	Pleurobema obliquum	Allegheny River	.1271	61	
13	Pleurobema obliquum	French Creek	.1205	127	
5	Pleurobema obliquum	Allegheny River, Warren, Hickory	.1117	54	Oil City, Warren.
5	Pleurobema obliquum	Allegheny Biver, Kelly	.1061	51	
9	Pleurobema obliquum	Kiskiminitas Drainage	.1142	50	Kiskiminitas and Conemaugh Rivers.
9	Pleurobema obliquum	Kelly, Allegheny River	.1144	51.4	Tarentum.
9	Pleurobema obliquum	Little Mahoning Creek	.1551	26	
9	Pleurobema obliquum	Kelly, Allegheny River	.1144	51.4	Exception.
9	Pleurobema obliquum	Shenango River, Clarksville	.1162	47	Analysis at adjacent points, Sharon and Greenville a greater alkalinity at lower station.

* Where no specific locality is stated, shells from nearest point on map to locality where analysis was made are to be considered.

TABLE—*Continued.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per million $CaCO_3$.	Stations at which analyses taken with remarks.
13	P. obliquum pauperculum	Presque Isle Bay, Lake Erie	.1146	90	Erie, Pa.
9	P. obliquum pauperculum	. . . . .	.1206	90	Erie, Pa.
15	Elliptio dilatatus	Kiskiminitas Drainage	.1235	50	Kiskiminitas River.
15	Elliptio dilatatus	Kelly, Allegheny River	.1256	51.4	Tarentum.
12	Elliptio dilatatus	French Creek	.1091	61	Exception.
12	Elliptio dilatatus	Kelly, Allegheny River	.1256	51.4	Tarentum.
8	Elliptio dilatatus	Little Mahoning Creek.	.1156	26	Exception.
8	Elliptio dilatatus	Kelly, Allegheny River	.1131	51.4	Tarentum.
4	Elliptio dilatatus	Loyalhanna River, Kiskiminitas Tributary	.135	50	Conemaugh and Kiskiminitas Rivers.
4	Elliptio dilatatus	Cheat River, Monongahela Tributary	.1216	35	Cheat River.
13	Elliptio dilatatus	Allegheny River	.1144	51.4	Tarentum.
13	Elliptio dilatatus	Ohio River	.1181	61	Pittsburgh.
21	Elliptio dilatatus	Shenango River	.0921	47	Average, Sharon, Greenville.
22	Elliptio dilatatus	Slippery Rock Creek	.1092	66	Connoquenessing.
5	Elliptio dilatatus	Greenville, Shenango River	.0952	47	Sharon.
5	Elliptio dilatatus	Shenango River.	.0901	47	Greenville.
21	Elliptio dilatatus sterkii	Presque Isle Bay, Lake Erie	.1104	90	Erie, Pa.
13	Elliptio dilatatus sterkii	. . . . .	.1320	90	Erie, Pa.
9	Lasmigona costata	French Creek	.0913	127	French Creek.
9	Lasmigona costata	Allegheny River	.0910	61	Parker.
7	Lasmigona costata	Quemahoning.	.0818	50	Kiskiminitas River, analysis.
7	Lasmigona costata	Kelly, Allegheny River	.0899	51.4	Tarentum.
3	Lasmigona costata	Shenango River, Clarksville, Sharpsville	.0963	47	Nearest points, Sharon and and Greenville, greater alkalinity further down stream.



GEO H. CLAPP: ON PYRAMIDULA

ACHATINELLA ELEGANS NEWC.

TABLE—*Continued.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per million $CaCO_3$.	Stations at which analyses taken with remarks.
3	Lasmigona costata	Shenango River, Harbor Bridge.	.1058	47	
7	Lasmigona costata	Presque Isle Bay, Lake Erie	.0853	90	Erie, Pa.
5	Anodonta grandis	Shenango River.	.0471	47	At nearest points, Anal., Greenville, Sharon.
5	Anodonta grandis	Wolfe Creek, Connoquenessing	.0630	66	Connoquenessing.
5	Anodonta grandis	Presque Isle Bay, Lake Erie	.1039	90	Erie, Pa.
6	Anodontoides ferussacianus	Linesville, Shenango River	.0518	47	Greenville.
6	Anodontoides farussacianus	Greenville, Sharpsville, Shenango River	.0517	47	Sharon.
6	Anodontoides ferussacianus	Presque Isle Bay, Lake Erie	.0550	90	Erie, Pa.
3	Paraptera fragilis	Edgeworth, Ohio River	.0531	61	Pittsburgh.
3	Paraptera fragilis	Beaver, Ohio River	.0500	51	Beaver Falls.
3	Paraptera fragilis	Presque Isle Bay, Lake Erie	.0455	127	Erie, Pa.
4	Proptera alata	Charleroi, Monongahela River	.0825	49	Monongahela.
4	Proptera alata	Neville Island, Ohio River	.1073	61	Pittsburgh.
8	Proptera alata	Allegheny River	.0991	51.4	Tarentum, Analysis.
8	Proptera alata	Ohio River	.1038	61	Pittsburgh.
8	Proptera alata	Presque Isle Bay, Lake Erie	.0848	90	Erie, Pa.
14	Eurynia recta.	French Creek	.1592	61	French Creek.
14	Eurynia recta.	Allegheny River	.1507	59	Parker.
17	Eurynia recta.	Allegheny River	.1621	51.4	Tarentum.
17	Eurynia recta.	Ohio River	.1675	61	Pittsburgh.
14	Eurynia recta.	Presque Isle Bay, Lake Erie	.1239	90	Erie, Pa.
12	Lampsilis luteola	French Creek	.1223	61	Exception, French Creek.
12	Lampsilis luteola	Allegheny River	.1508	61	Parker.
8	Lampsilis luteola	Greenville, Sharpsville, Shenango River	.1275	47	Average, Sharon, Greenville.

TABLE—*Concluded.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per millions $CaCO_3$.	Stations at which analyses taken with remarks.
8	Lampsilis luteola	Slippery Rock Creek.	.1185	66	Connoquenessing Creek.
8	Lampsilis luteola	Allegheny River	.1271	51.4	Natrona.
8	Lampsilis luteola	Monongahela River	.163	72	Monongahela.
8	Lampsilis luteola	Ohio River	.163	61	Pittsburgh.
6	Lampsilis luteola	Little Mahoning Creek	.1291	15	Little Mahoning Creek.
6	Lampsilis luteola	Monongahela River	.1606	49	Pittsburgh.
8	Lampsilis luteola rosacea	Presque Isle Bay, Lake Erie	.1171	90	Erie, Pa.
12	Lampsilis luteola rosacea		.1051	70	Erie, Pa.
6	Lampsilis ovata	Mosgrove, Allegheny River	.1049	51.4	Natrona.
6	Lampsilis ovata	Little Mahoning Creek.	.1001	15	Mahoning, Little.
12	Lampsilis ovata	Allegheny River	.1111	51.4	Natrona.
12	Lampsilis ovata	Ohio River	.1151	61	Pittsburgh.
9	Lampsilis ovata	Shenango River.	.1108	47	Average, Sharon, Greenville.
9	Lampsilis ovata	Slippery Rock Creek.	.1016	66	Connoquenessing Creek.
12	Lampsilis ovata canadensis	Presque Isle Bay, Lake Erie	.1038	90	Erie, Pa.
9	Lampsilis ovata canadensis	Presque Isle Bay, Lake Erie	.0909	90	Erie, Pa.

From the table the following conclusion may be drawn, qualified of course by the conditions under which the data is presented:

1. *In all or the majority of cases discussed from the Upper Ohio Drainage, it appears that the thickness of the shell is positively correlated with the percentage of lime in the water.*

2. *In all the cases of the species from Lake Erie, it appears that the thickness of the shell is negatively correlated with the percentage of* $CaCO_3$ *in the water.*

Why the shells of Lake Erie do not follow the type of correlation obtained for those from the Upper Ohio (should this appear perfectly substantiated), must be largely speculative at present, but the following facts are offered in the light of affecting the ultimate explanation. Walker, (9), has already indicated the general differences between the shells of L. Erie and their parent forms of the Upper Ohio. L. Erie shells are comparatively little eroded, shorter, greater relative degree of inflation, and in some species other characteristics indicating a depauperate type of growth. Certain characteristics of this type are so marked that it has been considered justifiable to assign certain L. Erie shells the rank of varieties (10). Possibly we may recognize the less relative thickness of L. Erie shells as a physiological variation keeping touch with the morphological ones. Dr. Walker in correspondence suggests that these differences as above described may be due to different physical conditions present in L. Erie such as the freedom from disturbance, lower temperature and greater alkalinity of the water. Baker recorded *Cardium* thinnest where the water had the greater saltiness. Comparative and representative analyses of L. Erie and Upper Ohio water show that the former has twice as great alkalinity, and in addition to the greater amount of $CaCO_3$ as already pointed out, a greater proportion of sodium and potassium sulfates, and a large quantity of magnesium carbonate and sulfate which are not reported from the Upper Ohio Drainage. These latter elements occur in sea water to a higher degree than is usually ever reported for fresh water, and their presence may account in the light of the observations I have given, for the effect brackish water seems to have in malforming and depau-

perating shells, although of course in this particular case the excess of $CaCO_3$ itself, may inhibit extended absorption of itself, or this be prevented by the presence of other compounds. In conclusion, I wish to express my obligation to Dr. A. E. Ortmann, on whose material at the Carnegie Museum these observations were made.

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A NEW ALASKAN CHITON.

BY WILLIAM HEALEY DALL.

SCHIZOPLAX MULTICOLOR n. sp.

Chiton depressed, broad, wider behind than in front, maroon varied with white streaks, with a rather wide girdle, the surface of which is covered with soft bristles like those of *Mopalia muscosa*, among which are sparsely scattered, irregularly disposed, longer translucent spicules; surface of the valves minutely uniformly reticulate under the lens, appearing smooth to the unaided eye; the mesial suture evident, the fifth valve widest, the

posterior valve very small with a subcentral inconspicuous vertex at the anterior third; anterior valve with nine, middle valves with two, posterior valves with two slits, the interior lines of which are marked by a row of minute pores; the middle of the valves on each side of the median suture conspicuously porous internally. Length in alcohol 8, maximum breadth 6 mm. U. S. Nat. Mus. Cat. No. 383018.

St. Paul Island, Bering Sea.

This differs from the type of the genus *S. brandtii* Middendorff in color, form, characters of the girdle and depression of the body; *S. brandtii* has nine slits in the posterior valve which is proportionately larger. If additional specimens confirm its peculiarities, *S. multicolor* may perhaps form a special subdivision of the genus.

A NEW SPECIES OF PYRAMIDULA FROM ALABAMA AND NOTES ON P. CUMBERLANDIANA WITH NEW VARIETIES.

BY GEO. H. CLAPP.

PYRAMIDULA PICTA n. sp. Pl. I, Fig. 4.

Shell thin, the color markings showing through, broadly umbilicate, the umbilicus dome-shaped, exhibiting all of the whorls to the apex and about one-fourth the diameter of the shell; whorls very convex above and below with a sharp *perfectly smooth, white* carina; apex delicately granulated for nearly a complete whorl before the ribs begin to show, first $2\frac{1}{2}$ whorls rounded then a distinct *ribbed* carina is formed and the ribbing continues, getting gradually weaker and finally disappearing on the penultimate whorl. There is a distinct impressed line above the carina on the upper whorls. Ribs weak and almost obsolete on the body whorl. Body color a delicate cream tint with irregular, chocolate-brown blotches which stop at the carina; below a row of squarish blotches immediately below the carina and a second row of narrow flame-like markings extending, faintly, into the umbilicus. Lip thin; aperture very oblique, much wider than high. Whorls 6.

Greater diameter $20\frac{1}{2}$, lesser $18\frac{3}{4}$, altitude 9 mm. Aperture 9×7 mm. Type.

Greater diameter 20, lesser $18\frac{1}{2}$, altitude 10 mm.

Greater diameter 18, lesser 17, altitude 10 mm. A very convex shell.

These shells, over 50 in number, were collected by the late Herbert H. Smith at a place called "Buck Creek Cove" or "No Business Cove," about 3 miles north of Anderson, Franklin Co., Tenn., in 1906. Types No. 7101 of my collection, paratypes in the collections of the Academy of Natural Sciences, Philadelphia, and of Dr. Bryant Walker, Detroit, Mich.

In shape, sculpture and markings, but particularly in the *perfectly smooth* carina, this species stands out from all others of the group; it is the most distinctly marked and richest in coloring of all of the *Pyramidulas*.

P. CUMBERLANDIANA (Lea). Pl. I, Figs. 1. Sewanee, Tenn.

The original description and figure of this species, Trans. Am. Phil. Soc., VIII, 229, pl. VI, fig. 61, are very good and agree exactly with the shells found at Sewanee, Tenn., by Bishop Elliott and later collectors. Lea's original locality was "Cumberland Mountains, near Jasper, Tenn.," which is about 20 miles southeast of Sewanee. I have not seen the type but if, as Dr. Binney says, the Sewanee shells are the same, both Lea and Binney failed to note that the ribs become *much stronger on the carina* giving a saw-tooth effect.

Dr. Binney, Terr. Moll., II, p. 216, gives the size as "Diameter three-fourths of an inch; axis one-fourth of an inch," or about 19×7 mm. W. G. Binney, Manual, p. 258, says: "Greater diameter 15, lesser 13 mm.; height 5 mm." Of 42 shells in my collection, over half of them from Sewanee, and two labeled "E. Tenn. (Elliott-Bland)" from the Redfield collection, the largest run from 16 to 17 mm. diameter. H. H. Smith collected a few typical shells at Paint Rock, Jackson Co., Ala.

At Woodville, Jackson Co., Ala., Mr. H. E. Sargent found a form of *cumberlandiana* with slightly weaker ribs above and below and with the upper whorls less shouldered, but it is hardly

distinct enough to be separated. The largest of the Sargent shells that I have seen measures, gr. diam. 18½, less. 16½, alt. 7 mm., whorls 5¾, umbilicus less than one-third of the diameter of the shell. A single shell collected by H. H. Smith in the same locality measures 19¾ × 8½ mm., whorls 6.

In *cumberlandiana* there is a single row of small, faint, squarish, brown markings just below the carina on the base; in the Woodville shells these spots are larger and much darker. Figs. 2. Woodville, Ala.

P. CUMBERLANDIANA ALABAMA n. var. Pl. I, Figs. 3. Gurley, Ala.

Differs from the type by its larger size, *much finer and flatter ribs* and more convex shape; carina white, sharp, but less pinched than in the type and the ribs on the carina much lower and less accentuated. Ground color lighter than in the Sewanee shells and markings darker. There is a single row of squarish flames just below the carina on the base. Umbilicus about one-fourth the diameter of the shell.

Gr. diam. 21¾, less. 19½, alt. 9½ mm. Aper. 9½ × 8 mm. Whorls 6. Type.

Gr. diam. 21¼, less. 18¾, alt. 10 mm. Aper. 9 × 7 mm. Whorls 6. Huntsville.

Collected by H. H. Smith in 1905 on Vincent Mountain, near Gurley and on Smithers Mountain, 5 miles N. W. of Huntsville, both in Madison Co., Ala. Types No. 7132 of my collection (Gurley) and paratypes in the collections of the Academy of Natural Sciences, Philadelphia, and Dr. Bryant Walker, Detroit, Mich.

P. CUMBERLANDIANA COLUMBA n. var. Pl. I, Fig. 5. Dove, Tenn.

Like the type in sculpture, color and markings, but *not pinched at the carina.* Heavily ribbed above and on the carina, but below the ribs are much finer, about 2.1. There is a single row of chocolate brown, diagonal markings immediately below the carina.

Gr. diam. 18½, less. 16½, alt. 8 mm. Aper. 7½ × 7 mm. Whorls 5.

Near Dove, Marion Co., Tenn., on "East slope of Battle Creek valley among rocks." Collected by H. H. Smith in 1906. Types No. 7100 of my collection, paratypes in collections of the Academy of Natural Sciences, Philadelphia, and Dr. Bryant Walker, Detroit, Mich.

Had this form been found in any other region it might equally well have been considered a variety of *alternata*, but being found in the region of *cumberlandiana* I think it best to make it a variety of that species.

ACHATINELLA HUNTING IN NORTHWESTERN OAHU.

We take the liberty of printing extracts from a letter received some time ago from Mr. Irwin Spalding of Honolulu, in explanation of the interesting photograph of living Achatinellas reproduced on plate II. As a general rule, these snails are found "sleeping" by day, on the under side of a leaf as in the picture, under loose bark, or in a knot hole. They are doubtless active chiefly by night.

Those who have used the monograph in the *Manual of Conchology* know that many species and color-races once abundant are now rare, some doubtless extinct. Dr. Newcomb and Mr. Gulick collected fine tree-shells in quantity where forests are now but a tradition, and their shells are often of color-patterns strange to the modern collector. It is most gratifying to learn that some of these long-lost species are being turned up at higher levels. Mr. Spalding writes as follows:

"So many good things have come my way along the land-shell line these last two months that I really don't know how to begin and tell you all about them. To start in with, I spent my three weeks vacation this year collecting on Oahu, started in at Opaeula and worked around through Waimea, Pupukea, Waialee, Kahuku, Leie, finally landing up at Hauula. Only 2367 *Achatinella* and *Amastra* for the trip, but here is the best of it all, found four of the supposed extinct species, *A. bulimoides; A. emersoni;* typical old-time, banded mottled *A. curta*, and last but not least, *A.* ——*?;* the latter to be seen in the ac-

companying photograph of six fine adults on a leaf [Plate II]. I will give you six guesses, if you guess their identity I will send you six. As I have hinted more or less where it comes from, I suppose you have guessed correctly at least once out of the six trials, so by bearer you have your shells [they are *Achatinelli elegans* Nc., from Hauula, long supposed to be extinct]. What do you think of that for a find? The first trip netted me 40, second 13, and the last 134, each trip representing as many different ridges. I consider this one of the best land-shell finds of the last dozen years or so.

"*A. bulimoides* is as good as extinct. The first day netted me 7, second day but one. They look very much, as Wilder says, like a reversed *rosea*. The two other species we struck in small colonies, collecting probably a hundred of each.

"I was greatly disappointed in the Waialee district, finding none of the old-timers reported from that section.

"In the fossil bed at Kahuku I found what Montague Cooke claims is a new species of *Amastra*, a form between *Leptachatina* and *Amastra*, small and cylindrical.

"I am glad that you have come to the conclusion that there are too many *Pterodiscus* named from Oahu. It was only a couple of weeks ago that I struck a locality west of Palikea in the Waianae Mts. Not the so-called Palikea where Thaanum found his *heliciformis*, according to the Manual. His locality is Green Peak, marked erroneously on maps as Palikea,—the same place where I found this species some six years ago. Palikea is the high peak northwest of Pohakea gap. Anyway I collected well up to a hundred of a species, samples of which I also send."

TURRITIDAE VS. TURRIDAE.

BY WM. H. DALL.

It is perhaps hardly worth while to spend much more space upon a question of so little real importance as that raised by Mr. Berry, yet as a final contribution I would point out that Prof. Foster admits that Turritidae is correctly formed and criticizes it only from the point of its meaning in classical Latin.

Criticism of meanings in zoological nomenclature has long been given up as hopeless, since zoological Latin is not classical but the colloquial patois of the 18th century.

The form *Turritidae* was the first used and therefore, other things being equal, is entitled to the preference. In the whole of zoological literature, except Adams' Appendix, until lately the Turrii combination does not occur in a single instance, while Scudder gives ten instances of the Turriti form. Even in English we say a castle is turrited and not Turried. *Turritus* means high, lofty or turrited. *Turritidae* is the family of the same. Finis!

LAND SHELLS FROM BEAVER COUNTY, PENNSYLVANIA.

BY E. G. VANATTA.

Mr. James B. Clark collected several packages of leaf mould on the Clydesdale Brick and Stone Company's farm in Beaver County near Ellwood City, about 39 miles north of Pittsburgh, Pa., from which I picked specimens of the species listed below.

The examination of the animal of *Euconulus sterkii* Dall, which is very abundant at this place, revealed a horn upon the tail and tricuspid lateral teeth, proving that this species is a *Guppya*. The microscopic sculpture of the shell is also like that genus.

Polygyra tridentata juxtidens Pils.
Polygyra profunda (Say).
Polygyra denotata (Fer.).
Polygyra pennsylvanica (Gr.).
Polygyra thyroidus (Say).
Polygyra albolabris (Say).
Polygyra zaleta (Binn.).
Polygyra hirsuta (Say).
Gastrocopta contracta (Say).
Columella edentula (Drap.).
Cochlicopa lubrica (Müll).
Haplotrema concava (Say).
Omphalina cuprea Raf.
Mesomphix inornata (Say).
Polita hammonis (Ström.).
Polita indentata (Say).
Paravitrea multidentata (Binn.).
Euconulus chersinus (Say).
Guppya sterkii (Dall).
Zonitoides arborea (Say).
Zonitoides minuscula (Binn.).
Striatura milium (Morse).
Pyramidula alternata (Say).
Gonyodiscus perspectiva (Say).
Punctum pygmæum (Drap.).
Succinea retusa Lea.
Carychium exile Lea.

NOTES.

DR. NORMAN MACDOWELL GRIER has been appointed Professor of Biology in Washington and Jefferson College, Washington, Pa.

DR. PILSBRY and DR. BARTSCH will represent the Academy of Natural Sciences and the National Museum respectively at the Pan-Pacific Scientific Congress to be held in Honolulu in August.

Communications intended for the September NAUTILUS should be sent to Mr. Johnson in Boston.

SHELLS FROM JAMESTOWN, NORTH DAKOTA.—On June 6th, 1912, I had an hour or two to wait for a train at Jamestown, which I improved by taking a stroll along the banks of "Jim" River in search of mollusks. It is not a likely-looking field for snails as there are only a very few scattering scrubby locust trees along the river banks, but the final count shows ten species, and as one of them is *Gastrocopta holzingeri agna* (Pils. and Van.) it may be well to put it on record, since the only other records for it I am aware of are in Kansas and southeastern Colorado. I am indebted to Mr. Bryant Walker and Dr. V. Sterki who carefully examined the specimens.

Vallonia costata (Müll).
Vallonia perspectiva Sterki.
Gastrocopta armifera (Say).
Gastrocopta holzingeri Sterki.
Gastrocopta h. agna (Pils. & Van.).
Cochlicopa lubrica (Müll).
Vitrea hammonis (Ström).
Pyramidula cronkheitei anthonyi Pils.
Succinea avara Say.
Succinea retusa Lea.—L. E. DANIELS.

SEX-CORRELATED COLORATION IN CHITON TUBERCULATUS.[1]—"In adult chitons of this species [in Bermuda] there is noticeable what appears at first sight to be a considerable diversity in the degree to which pigment, of a salmon-pink hue, is developed upon the foot and other soft parts exposed in ventral view. Somewhat less than half of the individuals have the foot, ctenidia, and other soft parts exposed in ventral view. Somewhat less than half of the individuals have the foot, ctenidia, and other soft parts of a pale buff color; in the remainder, the foot, head, ctenidia and mantle are to various degrees tinged with salmon-pink or startlingly vivid. This difference is most pronounced during late spring, but persists to some extent throughout the year. The pigmentation is not correlated in any way with size; individuals of any length from 3.4 to 9.2 cm. may be either pale buff or salmon-pink on the ventral surface, nor does the intensity of reddish pigmentation, when present, depend upon size. In dorsal view it is quite impossible to distinguish the two groups of animals, unless the plates be artificially separated to an extreme degree and not even then with any certainty.

"The differential coloration proves to be correlated with sex, in the sense that the soft parts of male chitons are never colored pink whereas those of maturing females invariably are, the intensity of the pigmentation depending to a large extent upon the state of maturity of the ovary, to a lesser extent, it seems probable, upon the quantity and the kind of the algal food available in differing environments.

"The color difference between the sexes of chiton is believed to be of special significance, for the following reasons, because the coloration of the soft parts of the female is directly traceable to metabolic activities associated with the growth of the ovary, and because it provides an example of secondary sexual coloration which has no conceivable utility, but is, on the contrary, so far as color is concerned, of a thoroughly accidental nature."
—W. J. CROZIER.

DYER ISLAND, BERMUDA.

[1] Extracts from a more extended discussion under this title in The American Naturalist, Jan.-Feb., 1920, pp. 84–88.

SHELLS OF ORLANDO, FLORIDA.—The following notes are from a letter received from Mr. C. H. Baker (July 21, 1915) of Orlando, Florida. As this is all the shells he could find in several years collecting near Orlando and Zellwood, Florida, it was thought advisable to put them on record.

In the original description of *Praticolella bakeri* Van., an A. was printed in Mr. Baker's name in place of an H. by mistake.

Specimens taken were mostly along shores of some large connected lakes or head of Ocklawaha R.

Praticolella bakeri Van. Proc. Acad. Nat. Sci., Philada., 1915, p. 196.

Praticolella jejuna Say.

Polygyra auriculata Say. Found but once and in one locality, several specimens. Not seen at all for five years or upwards.

Polygyra uvulifera Shutt.

Euglandina rosea Fer. No perfect specimens taken, pretty widely distributed but not common, quite elegant.

Planorbis duryi Weth. Frequent, and well distributed.

Planorbis scalaris Jay. Frequent, varying almost to the preceding.

Ampullaria depressa Say. Relatively large, handsome species, varying a good deal in coloring, common.

Viviparus waltoni Try. Our most abundant species, seldom found in original "mint" condition, varying much in coloring, somewhat handsome. Large mounds exist composed almost entirely of this shell (sepulchral mounds along inland waterways).

Gillia wetherbyi Dall. Quite rare, took but 1.

Unio buckleyi Lea. Quite generally distributed.

Anodonta gibbosa Say. Also common.—E. G. VANATTA.

PUBLICATIONS RECEIVED.

ON THE RELATIONS OF THE SECTIONAL GROUPS OF BULIMULUS OF THE SUBGENUS NAESIOTUS ALBERS. By William Healey Dall (Journ. Wash. Acad. Sci. X, No. 5, March 4, 1920). By cutting sections various differences in the axis were found, simple,

twisted or having internal nodules, etc. Combined with the external characters, a grouping into 14 sections is indicated. Dr. Dall believes that nothing in the land-shell fauna of the Galapagos group, which these snails inhabit, lends weight to the hypothesis that these islands were ever connected by land with the continent of South America. The snails "were probably transported originally to the Galapagos group by high winds while attached in a state of hibernation to dead leaves or similar light material."—H. A. P.

Fauna of the Hampden Beds and classification of the Oamaru System. By P. Marshall (Trans. and Proc. N. Zealand Inst., 1919, Vol. 51, pp. 226–250, pls. 15–17). Twenty-seven new fossil mollusks are described.

Some new fossil species of Mollusca. By P. Marshall and R. Murdoch (Trans. and Proc. N. Zealand Inst., 1919, Vol. 51, pp. 253–258, pls. 19–21). Nine new species are described.

Mollusca from Central America and Mexico. By Henry A. Pilsbry (Proc. A. N. S., Phila., 1919, pp. 212–223). 16 new species and several subspecies, mainly collected by Mr. A. A. Hinkley. The more interesting forms are *Averellia* (*Trichodiscina*) *hinkleyi* and a form of *Neritilia*, a genus new to the American mainland, found in Guatemala by Mr. Hinkley.

A Monograph of the Naiades of Pennsylvania, Part III. By A. E. Ortmann, Mem. Carnegie Museum, Vol. LI, No. 1, 1919.

This sumptious volume is a fitting envelope for its contents. Indeed the most serious criticism to be made is that it is too luxurious for convenient use, as the weight of the paper used makes the book too heavy to be held in the hand for reading, and necessitates the use of a table or reading desk when consulting it.

Beyond question this is the most philosophical and comprehensive study of the Naiad fauna of this country (or any other, for that matter) that has yet appeared. The elaborate compilation of all the records of the Pennsylvania fauna supplemented by the extensive and intensive collections made by the author leave but little to be added by later investigations, and the wealth of anatomical and ecological details will be a revelation to those who have not kept *au courant* with the trend of modern methods of scientific research. The excellent keys of both generic and specific characters add much to the practical value of the paper to the student.

In addition to the details of local distribution, the author has supplied complete summaries of the general distribution of each of the species treated so far as given in the literature, supplemented by the material in the Carnegie Museum; and his comments thereon at once reveal the inadequacy of our present knowledge to furnish a proper basis for an accurate and truly scientific study of the fundamental facts of the origin and distribution of the Naiad fauna of the country and raise many pertinent questions, which can not well be touched upon in this review, but which will undoubtedly excite discussion and increase the interest of American students in their local faunas.

This study of the fauna of Pennsylvania will be a model for others to imitate for many years to come.

The Naiad fauna of Pennsylvania as recognized by the author includes 58 species and 21 varieties. Of these seven species belong to the Atlantic fauna and two species and one variety, while characteristic of the Atlantic drainage, are clearly derivatives from western species. The remainder belong to the Mississippian fauna of Simpson.

The systematic arrangement of the various groups represented in the fauna is that which has been elaborated by the author in previous papers and represents the modern tendency to multiply genera. How far this is really advisable is a subject for serious consideration as practically the same results, so far as systematics are concerned, can be obtained the use of subgenera, which will sufficiently indicate the differences, while retaining not only the familiar names, but also the larger relationships,

which are apt to be lost sight of in the excessive elaboration of comparatively minor details into generic characters. (See Stone, Science, LI, pp. 427–429, 1920.)

The specific nomenclature adopted is that of the ultra-Rafinesque school and results in the changing of about one-fourth of the names in current use. But the last word has not yet been said in regard to Rafinesque's species. Indeed more than a year ago the author and the present writer undertook to make a careful study of the subject in accordance with the requirements of the International Code of Nomenclature, which is now about ready for publication and which it is hoped will go far towards definitely settling the nomenclature of the North American Naiades.

Barring the question of specific names there is much to praise and but little to criticize in the synonymy adopted.

It is possible that some of the conclusions reached by the author and based, perhaps, too much on local conditions may be subject to revision when an equally detailed study of the species throughout their entire range can be made.

The question of possible hybridization between closely allied species along the line of contact, when elsewhere the specific characters seem to be fixed is one that must necessarily be taken into consideration.

The author lays great stress upon his theory that small streams tend to produce a small, flat form which increases in size and rotundity as the river grows larger. While this is apparently true in many cases, there are exceptions, some of which are noted by the author. *Amblema elliotti* Lea is another notable one. The large, typical form from Othcalooga Creek, a small stream, is much larger than any *Amblema* from the Coosa. On the other hand, practically all of the species of the Great Lakes are dwarfed and much smaller than the same species from the comparatively smaller tributaries. It would seem that possibly other factors, such as temperature, food supply, chemical constituents of the water and other ecological conditions and not simply the size of the stream should be taken into consideration.

But all these are comparatively minor matters which do not detract from the worth of the monograph as a whole and which

will serve their purpose if they stimulate discussion and research.

Both the author and the Carnegie Museum are to be congratulated upon such a notable contribution to scientific literature. —BRYANT WALKER.

ONCHIDIIDAE FROM AUSTRALIA AND THE SOUTHWESTERN PACIFIC ISLANDS. By Rex W. Bretnall (Records of the Australian Museum, Vol. XII [Oct., 1919], pp. 303–323, pl. 38). An exhaustive systematic paper dealing largely with the anatomy of the various species.

A REVIEW OF THE AUSTRALIAN TUN SHELLS. By Charles Hedley (Records Australian Museum, Vol. XII, pp. 329–336, pls. 39–44). An interesting review of these large shells. Two new species, *Tonna cerevisina* (*T. variegata* Hedley not Lamarck) and *T. tetracotula* are described and figured.

NOTES ON ICELAND MARINE MOLLUSCA. By Hans Schlesch (Naturalist, Jan., 1920, pp. 19 and 20). This paper is based on notes from Gunmunder G. Bardarson's "Mollusca marina Islandiae" (Scientific Society of Iceland, 1919).

THE JOURNAL OF CONCHOLOGY, Vol. 16, No. 3, Jan., 1920.

List of officers and members, pp. 69–76.

Note on Cypraea bernardinae Preston, p. 76. By J. C. Melvill (= *C. lamarckii* var. *redimita*).

Reminiscences and practical hints on collecting. By E. Collier, pp. 77–85.

Brachypodella nidicostata nov. sp. from Venezuela. By Geo. C. Spence, p. 86.

Four new marine species from South Africa. By J. R. Le B. Tomlin, pp. 87–88.

The marine Mollusca from Sussex. By R. Winckworth, pp. 89–95.

Succinea oblonga Drapanaud. By Alan Gardiner, p. 95.

Notes on the Anatomy and Reproduction of Paludestrina stagnalis. By Capt. H. E. Quick, pp. 96–97.

Parthenogenesis in Paludestrina jenkinsi from brackish water. By H. E. Quick, p. 97.

Journal de Conchyliologie, Vol. 64, No. 3, Oct., 1919.

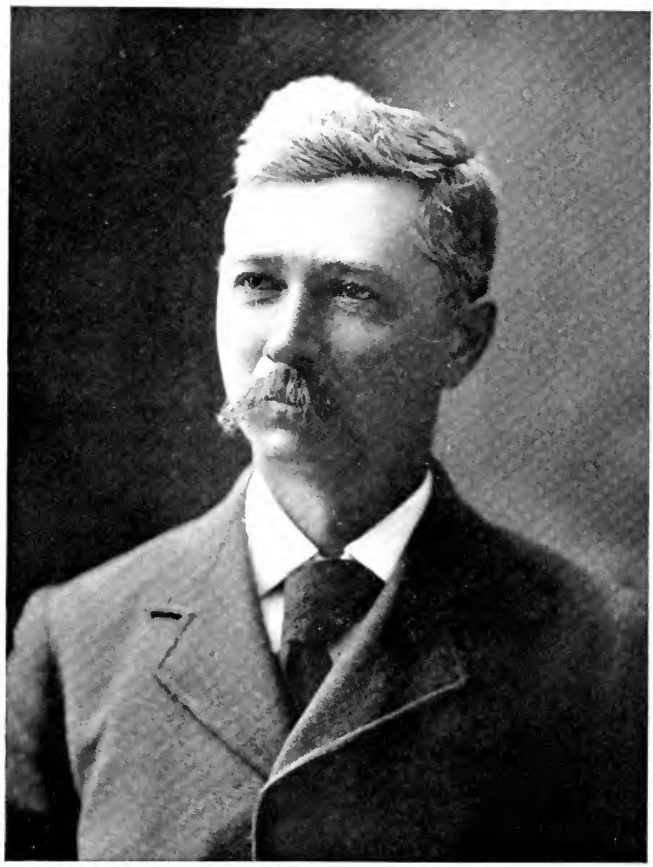
Monographie illustree des Mollusques Oligoceniques des environs de Rennes, par M. Cossmann, pp. 133–199, pls. 4–7. —C. W. J.

THIRTY-FIRST YEAR OF THE NAUTILUS.

The April number completed the thirtieth year of The Nautilus under the present editors. That it has had sufficient encouragement and support to live so long may fairly be taken to mean that the American conchologists have found it stimulating and useful. When the quarterly issue was begun the editors had anticipated increasing the number of pages and illustrations; but for the present The Nautilus is content to hold its own against the rising tide of expense in printing and paper, by the cordial help of the conchological fraternity.

It is your magazine. We trust that in this thirty-first year every one interested in mollusks will coöperate in making it more interesting and a greater stimulus to collecting and study. Contributions of articles, illustrations, notes and news items both personal and scientific will be needed; and by no means least, subscriptions.

H. A. Pilsbry,
C. W. Johnson.



ANSON A. HINKLEY

THE NAUTILUS.

Vol. XXXIV OCTOBER, 1920. No. 2

GUATEMALA MOLLUSCA.

BY A. A. HINKLEY.

This list is the result of three vacation trips. For the determinations I am indebted to Dr. H. A. Pilsbry, Dr. Bryant Walker, Dr. V. Sterki, Dr. Wm. H. Dall and others of the National Museum and Prof. F. C. Baker of the Illinois University.

For accommodations and personal comfort much is due to the kindness of Mr. Landry, Supt. of the United Fruit Companies' plantations at Quirigua. To Mrs. Lucie Potts, Proprietress of the Jocolo plantation. To Mr. and Mrs. Robert Hempstead of the Chejel and Chama coffee plantations and to others for their various acts of kindness. The list is arranged by localities.

LAKE AMATITLAN is some 20 miles south of Guatemala City; it is two lakes connected by a short strait across which the railroad embankment has been built. Laguna Station is on the south or southwest of the lake, just across the strait.

Pachycheilus lacustris (Morelet) is plentiful in the shallow water of the lake. The largest were found among rushes some 40 feet from a hot spring. Egg masses of this mollusk were numerous, much like those of *Physa* but larger. The fresh masses were clear, changing to yellowish as the young were about to emerge. Some were seen breaking through.

Amnicola guatemalensis Walker. Taken near the edge of the water or on driftwood and pumice. Another species of *Amnicola* was taken with the above.

Potamopyrgus coronatus (Pfeiffer). Taken from a muddy bottom in a sheltered place near a building. Many are smooth with a dark line in place of the row of spines.

ACROSS THE LAKE FROM LAGUNA were a number of dried-up pools on the railroad right-of-way, which contained dead specimens of the following species:

Succinea recisa (Morelet).

Aplexa fuliginea (Morelet).

Aplexa tappanensis guatemalensis (Crosse & Fischer).

Planorbis orbiculus (Morelet).

Planorbis cultratus (D'Orbigny).

Planorbis sp.?

Planorbula obstructa (Morelet) var. *anodonta* (Pilsbry).

Soon after passing out of the east gate of Guatemala City, the road descends into a deep ravine with a creek at the bottom; here the only species was *Aplexa fuliginea* (Morelet); it was also taken in the basins of fountains in the city.

OUT OF THE NORTH GATE the road is bordered by a row of large cedar trees on either side for a half-mile or more, to a cedar grove, then to the edge of a deep ravine where the road-bed is cut out of the high, irregular, precipitous slope until a much lower level is reached, and the road soon ends at the tapia baths. Farther down the canyon can be seen the reservoir. In the cedar grove were found:

Drymæus alternans (Beck).

Drymæus jonasi (Pfr.).

Helicina sp.? One specimen.

Pachycheilus largillierti (Philippi). Immature specimens were very numerous in the large pool, the individual rooms and the stream. The only mature specimen found was dead and bleached. From the reservoir were taken:

Pseudosuccinea championi (Von Martens). One specimen only.

Aplexa fuliginea (Morelet).

Physa sp. Varies from smooth to costate forms.

Planorbis caribæus Orb.

Segmentina obstructa (Morelet), var. *anodonta* (Pilsbry).

Gundlachia hinkleyi Walker.

Lævapex excentricus (Morelet).

Amnicola cisternina (Walker).

Amnicola hinkleyi (Walker).

Potamopyrgus coronatus (Pfr.).

Pisidium sp.? "They appear to be of the same group with a Pisidium from Chili, that is closely related to *Pisidium sterkianum* from Uruguay; same shape and appearance, but somewhat smaller."

Pseudohyalina maya Pils.

Thysanophora dioscoricola (C. B. Adams)? One poor specimen taken from the washings when collecting the Amnicola.

Maya Farm, Quirigua, a short distance from the Farm Overseer's quarters, are the interesting "Quirigua Ruins", a good description of which appeared in the *National Geographic Magazine* some years ago. On this farm were found:

Aperostoma dysoni (Pfeiffer).

Helicina amoena Pfeiffer. Under and about decaying vegetation.

Helicina flavida Mke. or *trossula* (Morel. The identity of the original *H. flavida* seems to be in doubt.

Thysanophora plagioptycha (Shutt.). One specimen.

Oxystyla princeps (Brod.). Two live ones taken from banana plants; dead ones scarce.

Gastrocopta pentodon (Say). Under chips, scarce.

Opeas beckianum (Pfr.).

Opeas micra (Orb.). One specimen.

Cæcilioides consobrina veracruzensis (Crosse and Fischer).

Leptinaria guatemalensis Crosse and Fischer.

Euglandina decussata (Desh.). About old logs, under loose bark and other vegetation. A fine species.

Guppya elegantula Pilsbry.

Guppya grundlachi (Pfr.).

Zonitoides minusculus (Binney).

Zonitoides elegantula (Pfr.). Under chips.

Ammoniceras stolli (Martens). Under chips. Only one specimen, rare.

Leptinaria livingstonensis Hinkley.

Streptostyla turgidula (Pfr.) var. *producta* Pilsbry. One specimen.

Succinea recisa Morelet.

Aplexa impluviata laeta Martens. Appeared to be feeding on banana leaves which had been thrown into the pool.

Planorbula obstructa anodonta (Pilsbry). Conchens river.

Laevapex excentricus (Morelet). Pools by the railroad.

Gundlachia hinkleyi Walker. With the above.

Potamopyrgus coronata (Pfr.). Rio Conchens.

Amnicola conchensensis Walker. Rio Conchens.

Ampullaria flagellata lattrei C. & F. On banana leaves and cull bunches of bananas which had been thrown away.

Mycetopoda sp. Rio Conchens. This mollusk burrows head down until the posterior part is just above the bed of the stream; the foot is extended nearly the width of the shell farther down in the soil. When removing the first one found a strong pull tore the foot from the shell.

Nephronaias ortmanni Frierson. Plentiful in Rio Conchens; in one place several hundred were massed together.

Glabaris depexa (Martens). With the above; only one found.

Pisidium guatemalensis (Sterki). Rio Conchens. Sterki says: "Has a hinge of unique formation; width 5, height 4, diam. 3 mm."; fragile.

Pisidium sp. With the above. Sterki says: "Although of the same size and the same appearance, they are evidently distinct from *Pisidium singleyi* (Sterki). Of the same group, same shape and appearance with a *Pisidium* from Barbados; unnamed, so far as I know."

Eupera yucatanensis minima (Pilsbry). Rio Conchens, scarce.

Livingston. Beach and beach drift.

Polygyra helictomphala (Pfr.). Only one specimen.

Streptostyla ligulata (Morelet). "A very rare species"; the only one found was at the edge of vegetation growth.

Helicina flavida (Mke.) or *H. trossula* (Morelet).

Helicina coccinostoma Morelet. First determination was *H. oweniana.*

Helicina sp. More depressed than any other Helicina found except *H. amœna.*

Lucidella lirata (Pfr.).

Truncatella sp. Two specimens.

Cochliopa minor Pilsbry.

Spirula spirula (Linn.). Plentiful in 1914, scarce in 1917.

Thais coronata var. On rocks beyond Cavech village and on piling and breakwater at Puerto Barrios.

Melongena melongena (Linn.). In shallow water. Donax seemed a favorite food for this mollusk.

Strombus pugilis (Linn.). A few dead ones near Cavech village.

Epitonium lineatum (Say). One small specimen.

Cœcum sp. One specimen.

Littorina nebulosa Lam. On rocks and drift logs; common.

Littorina carinata Orb. Young were very numerous on a perpendicular rock; many were beyond reach of the spray from the ordinary waves.

Litiopa melanostoma (Rang).

Nerita fulgurata (Gmel.). Beyond Cavech village, on rocks out of the water at low tide.

Neritina punctulata Lam. In Cavech river on rocks near the limit of high tide. Often these shells were nearly covered with small oval cases (of an insect?).

Neritina listeri Pfr. Close to *N. virginea,* only larger.

Neritina virginea (Linn.). Numerous on the muddy banks of Cavech river, covered with water at high tide, very plentiful on the pebbly beach of Rio Dulce.

Neritina lineata reticulata (C. & F.). In thick swampy woods near the beach.

Neritilia succinea guatemalensis (Pilsbry). Just above high tide in a clear pool of Cavech river; with them were a few young *N. virginea.*

Cylichnella bidentata (Say). Two specimens.

Haminea solitaria (Say). One specimen.

Tagelus poeyi Dall.

Mulinia guadelupensis (Recl.).

Strigilla pisiformis (Linn). Common on the beach, but both valves together were scarce.

Strigilla flexuosa (Say). Much like *S. pisiformis;* has not the red coloring of that species.

Macoma constricta (Brug.).

Donax striata (Linn.).

Donax striata mediamericana (Pilsbry). A small form of *striata.* Dead shells were more numerous than the live ones, or so appeared.

Tivela mactroides (Born). The most common species on the beach; no live ones seen and both valves together were very scarce.

Cyrena solida Phil. Plentiful in Rio Dulce, most mature ones badly eroded.

Cyrenoidea guatemalensis Pilsbry. In 1914 one specimen taken near the mouth of Cavech river.

Mytilus exustus (Linn.). In masses on rocks and drift logs and under the bluff of the projecting point of land, mostly immature.

Mytilopsis sallei (Recluz). Often with *M. exustus.*

Across the Rio Dulce from Livingston, on the first mountain or foothill, is Rio Blanco, a small stream in which were found:

Nephronaias calamitarum (Morelet).

Pachycheilus pyramidalis (Morelet). Mostly immature.

Pachycheilus indiorum (Morelet).

Pachycheilus corvinus (Morelet) and the color variety *lutescens* C. & F.

Helicina rostrata Morelet. On top of the hill one broken, nearly fresh specimen was found. The writer has three specimen received from Thomas Bland many years ago.

A short distance west of Livingston were found:

Aperostoma dysoni (Pfr.).

Amphicyclotus bisinuatus (Martens). Dead specimens.

Chondropoma rubicundum (Morelet). Scarce.

Subulina octona (Chem.). Very plentiful by the side of side streets and paths among decaying vegetation and filth; also found on the hillside in front of the hotel, with *Leptinaria livingstonensis.*

Oxystyla princeps (Brod.). Bones only.

Leptinaria livingstonensis (Hinkley). In front of the hotel, on the hillside.

Brachypodella subtilis pulchella (Martens). On stones nearly buried in the soil.

Averellia hinkleyi (Pilsbry). One bone.

Pachycheilus pyramidalis (Morelet). A creek where it is crossed by the telegraph line. A few fossils were taken at this place.

Neritina listeri (Pfr.). Same place as above.

Mountains of Rio Cavech and those back of Cavech village. These are listed together, although there is some distance between. The village is a little farther up the coast than the mouth of the river, the stream having a course oblique with the coast. The mountains or hills of this region are often steeply sloped and covered with thick timber, which keeps down the undergrowth in a great measure, so one can climb without much interference from that source. These limestone hills have many small crevices or openings, affording protection to different kinds of animal life besides mollusks.

Cœlocentrum gigas Martens. More plentiful back of the village than elsewhere. See Nautilus, Vol. 33, page 79.

Cœlocentrum fistula (Morelet). One specimen.

Euglandina decussata (Desh.). None living.

Euglandina monilifera (Pfr.). Bones.

Guppya gundlachi (Pfr.). Scarce.

Averellia hinkleyi (Pilsbry). Only bones.

Leptarionta trigonostoma (Pfr.). Dead specimens and fragments.

Drymæus sulphureus (Pfr.). Dead specimens and fragments.

Streptostyla delibuta (Morelet).

Streptostyla lattrei (Pfr.). Bones; a fine and well-marked species.

Streptostyla schneideri (Strebel).

Streptostyla turgidula producta (Pilsbry).

Opeas beckianum (Pfr.).

Opeas pumilum (Pfr.).

Subulina octona (Chem.). A mile or more back of the village, by a well-traveled path.

Pseudosubulina martensiana Pilsbry.

Leptinaria guatemalensis Crosse and Fischer.

Leptinaria livingstonensis Hinkley.

Spiraxis livingstonensis Pilsbry.

Spiraxis longior Pilsbry.

Brachypodella subtilis pulchella (Martens). Of the same color as the limestone on which they live, they are inconspicuous. The shell hangs parallel with the face of the rock or stands out at an angle.

Bothriopupa breviconus Pilsbry. One specimen.

Cæcilioides consobrina veracruzensis (C. & F.).

Helicina amoena Pfr.

Helicina flavida Mke. or *H. trossula* Morelet.

Helicina coccinostoma Morelet.

Cistula radiosum (Morelet). Found on limestone and dead wood, sometimes hanging by a thread. Some were in motion, but the larger part were attached to the rock or wood of similar color.

Chondropoma rubicundum (Morelet). Situated above fallen trees, base of rocks and under old banana leaves. Some variation in size.

Pachychilus indiorum (Morelet). Cavech river. This species prefers shallow water. The finest specimens were on a hillside in thick timber where the water spreads out thin over a flat rock surface marked with irregular seams and depressions; many of these mollusks were barely wet, hundreds of the shells with a mottled and polished surface showing through a thin film of water made an attractive sight to any one interested in the beautiful of Nature.

Pachychilus corvinus (Morelet). This mollusk prefers more water than the above. At this locality there is more color variation, from a dark purple to the almost white form known as variety *lutescens.*

Pachychilus largilierti (Philippi). In a small stream, almost dry, they had collected by the thousands, in small pools, many dead and the rest dying. Nearly all were immature. A few of the largest were taken.

PLANTERA, a banana plantation several miles up Rio Dulce from Livingston. For the first few miles the river is picturesque, passing between steep high hills covered with dense vegetation of varying shades of green. Sometimes the slope is broken by an abrupt face of rock. On one such face, larger than the rest, were many obscure figures and markings, in lines of lighter color, said to be drawings of an unknown race of people. The appearance was more like the marks from seepage water carrying lime.

Pachychilus largillierti (Philippi). Only a few specimens found in a small river which was followed for some four miles.

Ampullaria flagellata tristrami C. & F. In a small swamp near the Plantation buildings.

Neritina lineata reticulata (C. & F.). With the above.

Subulina octona (Chem.). A few in the yard under some loose stone.

ESMERALDA. This plantation is on the left bank of Rio Dulce some three miles below the old Fort San Felipe, now in ruins.

Guppya gundlachi (Pfr.). Fragments seen along the trail to Rio Saja.

Opeas micra (Orb.). Under trash in front of a hut.

Opeas pumilum (Pfr.). With the above.

Cœcilioides consobrina veracruzensis (C. & F.). Same as above.

Succinea recisa (Morelet) or *S. guatemalensis*. With above. These are too young to decide to which species they belong with certainty.

Helicina amoena Pfr.

Amphicyclotus bisinuatus (Martens). Two bones.

Ampullaria flagellata tristrami C. & F. On the border of the river among water plants and under drift lodgments.

Pachychilus glaphyrus (Morelet). These are between *immanis* and the *obeliscus* of the lake. Numerous on the border of the river.

Pachychilus pyramidalis (Morelet). Some fine large specimens were found in Rio Saja, under drift and other places protected from the force of the current.

Nephronaias dysoni (Lea). Found with the above. They were always more or less eroded, a good species. This stream is some five miles west of Esmeralda and the above two species were the only ones found there.

Potamopyrgus coronatus nicaraguanus (Ancey). Plentiful in small bays or recesses of the river.

Cochliopa dulcensis Marshall. Common with the other small species taken with a net.

Cochliopa izabal Pilsbry. Common.

Neritina lineata reticulata C. & F.

Neritina listeri Pfr. Both these Neritina were scarce.

Planorbis caloderma Pilsbry. A small species, little larger than *Segmentina obstructa*, with more tumid whorls.

Cyrenoides guatemalensis Pilsbry. One specimen.

Mytilopsis sallei (Recluz). Numerous, on sticks and stones, often in clusters of many individuals.

Jocolo. This plantation, on the north side of Lake Isabal, is owned and operated by Mrs. Potts, a hospitable lady. The commodious residence among palm and citrus trees is picturesque viewed from the small wharf projecting into the lake. The lake is bordered by rushes, with here and there small open beaches of sand. On a point some distance above the wharf was a windrow of fine drift, thrown up by a strong wind; this was the only place where drift was found. It evidently came down a river near by. This proved quite rich in number of species, but specimens were scattering. The entire windrow was worked over. The region has numerous small streams with beds of rock, gravel and sand, with soft mud where they enter the lake.

Nephronaias guatemalanus (von Martens). A few specimens referred to this were found in the lake with *N. ravistellus*. It is some higher and lighter colored than that species.

Nephronaias ravistellus (Morelet). Common. In 1914 they were found mostly in water two to four feet deep, but in 1917 they were plentiful among the rushes and on the sandy beach up to the water's edge.

Nephronaias tabascoensis (Küster). Mrs. Potts gave the writer a few found by a native.

Ampullaria flagellata tristrami C. & F. Marshy places and along the border of the lake, among the rushes on which the white egg-masses were quite numerous a little above the surface of the water.

Ampullaria flagellata lattrei C. & F. On rocks near San Felipe.

Pachychilus glaphyrus immanis (Morelet). Common on the soft mud at the mouth of the streams.

Pachychilus glaphyrus obeliscus (Morelet). The most plentiful *Pachychilus* in the lake. They are more attenuate and smaller than the closely related *immanis*.

Pachychilus lacustris (Morelet). These appear more like a smoother form of *P. obeliscus*, and do not agree with *P. lacustris* from Lake Amatitlan, from which they differ in fewer and flatter whorls, and the suture not as deep.

Pachychilus pyramidalis (Morelet). Plentiful in clear streams, often concealed in lodgments of brush and leaves. On account of its size and clean living it is preferred for food. They are cooked in stews or soups, croquettes, or roasted. The species often reaches three inches in length.

Pachychilus pottsianus n. s. Found only on two hillsides back of Jocolo.

Potamopyrgus coronatus nicaraguanus Ancey. Plentiful; varies from a smooth shell to one with strong striations and prominent spines.

Cochliopa dulcensis Marshall. With the following two species.

Cochliopa hinkleyi Pilsbry. This small flat species of a size that evidently washed through the net in numbers when taking the other small species.

Cochliopa izabal Pilsbry. Common, has some resemblance to *C. guatemalensis*.

Cochliopa izabal Pilsbry, mutation *peristriata* Pilsbry.

Hemisinus ruginosus (Morelet). Common in places on the lake shore. In 1914 one immature specimen was all that was found. In 1917 the first were taken in the net with *Cochliopa*, etc. Later while picking up *Nephronaias* they were noticed among numerous *Pachychilus* and could easily have been passed as the young of that genus. Their trail was made by burrowing instead of crawling on the surface as with other forms.

They burrowed somewhat like a mole, and often the little mole-like ridge could be followed quite a distance, and the mollusk found working under cover.

It is a viviparous genus. When cleaning these shells the embryos run from one to three to the individual. None were noticed with more than three.

Planorbis caloderma Pilsbry. Only three specimens taken in the net with the small forms.

Planorbis caribaeus (Orb). One small specimen with the above.

Ancylus sp. Taken in the net.

Euglandina decussata (Desh.). All dead but one.

Euglandina monilifera (Pfr.). One alive, found in the banana field under dead leaves.

Salasiella guatemalensis Pilsbry. Under leaves and trash.

Guppya elegantula Pilsbry. Lake drift.

Guppya gundlachi Pfr. Lake drift.

Zonitoides minusculus (Binney). Lake drift.

Averellia hinkleyi Pilsbry.

Thysanophora plagioptycha (Shutt.). Lake drift.

Strobilops strebeli guatemalensis n. subsp.

Bulimulus corneus (Sowb.). Found in a banana field under dead leaves.

Drymaeus sulphureus (Pfr.). Bones.

Oxystyla princeps (Brod). Dead.

Opeas beckianum (Pfr.). Lake drift.

Opeas micra (Orb.). Lake drift.

Opeas pumilum (Pfr.). Lake drift.

Subulina octona (Chem.).

Leptinaria guatemalensis C. & F. Lake drift.

Leptinaria livingstonensis Hinkley. In the fields back of Jocolo.

Caecilioides consobrina veracruzensis (C. & F.). Lake drift.

Gastrocopta pentodon (Say). Lake drift.

Succinea recisa Morelet. Banana fields.

Aperostoma dysoni (Pfr.). Under decaying leaves in the banana fields.

Amphicyclotus bisinuatus (Martens). Scarce.

Helicina amoena Pfr.
Helicina tenuis var. *lindoni* Pfr.
Helicina flavida Mke. or *H. trossula* Morelet.
Helicina coccinostoma Morelet.
Lucidella lirata (Pfr.). Lake drift.

PANZOS, State of Alta Verapaz. The head of navigation on the Polochic River. No land species found here, although a half day was spent on a stroll up the R. R. to a good-sized creek which was followed for some distance and the return made over the mountain, with no results whatever.

Ampullaria flagellata tristrami C. & F. Two good large specimens, dead, found in a marshy place near the R. R.

Pachychilus pyramidalis (Morelet). Young specimens plentiful in a creek near the town.

Pachychilus indiorum (Morelet). A few specimens taken with the above.

Amnicola panzosensis Walker. From a pool formed by a small stream from a spring or seepage on the mountain side.

Pisidium singleyi Sterki. With the above *Amnicola.*

CHEJEL, State of Alta Verapaz. At the end of the R. R. the writer was met by a guide and horses sent by Mr. Robert Hempstead, and was conducted to his residence on the Chejel coffee plantation. A nice home on the side of the mountain, some 2000 ft. elevation, with roses, violets and other flowers in the front yard. From the veranda on the other side of the house the mountain side is a steep slope to the base where it meets the base of the next mountain. An extensive mountain view in all directions is seen from this veranda.

Pachychilus indiorum (Morelet). Mr. Hempstead kindly showed me the spring from which we picked up a few specimens of this species. These are lighter-colored and do not show the mottled color of those from the Cavech. This was the only species found at Chejel.

Pachychilus corvinus (Morelet). Immature specimens I took for this species from a rill that crosses the road on the way to Purulha.

Trichodiscina sargi (Crosse & Fischer). One specimen found in a damp, shaded place at the base of a rock bank near the above rill. This appeared to be an ideal place for mollusks, but a half-hour's search produced nothing more.

Drymaeus castus (Pfr.). On the road to Puruhla one fair specimen a little broken and other fragments evidently dropped by birds were all noticed.

Streptostyla nigricans (Pfr.). One immature specimen.

Nothing was found from Puruhla to Tactic.

TACTIC. Half way between Pancojchl and Coban.

Pachychilus corvinus (Morelet). Plentiful in two creeks, one north of town and the other in the south edge of the town.

Physa sp. A few quite young noticed in a pool by the road to Coban.

On the road between Coban and Chama.

Euglandina decussata (Desh.). A larger form than those found nearer the coast; dead specimens only.

Pseudosubulina mitescens Martens.

Epirobia polygyrella (Martens). On rock faces exposed to the north.

Eucalodium decollatum (Nyst.). A subspecies. Dr. Pilsbry says "I have never seen this form before." One dead specimen. There were also specimens a little smaller and thinner than the above covered with fine oblique striae extending from suture to suture.

Amphicyclotus boucardi (Pfr.).

Pachychilus graphium (Morelet) var. *transcendens* C. & F. Picked up by the road; probably dropped or thrown aside by some one.

CHAMA, State of Alta Verapaz. This plantation of coffee, cacao and rubber is in the mountains near Rio Tsalbha and probably half a mile or more from Rio Negro. It is about 900 feet above the sea and the river is 50 ft. lower.

Ampullaria lattrei chamana n. subsp. Four live specimens were brought to the writer by an Indian.

Pachychilus pyramidalis (Morelet). Some distance up Tsalbha River from Chama.

Pachychilus corvinus (Morelet). A few specimens.

Pachychilus hinkleyi Marshall. Many dead ones, but few living. The water was too high to get the living in the swift current.

Pachychilus cinereus (Morelet). Only found in a creek. Probably a peck of these shells were in an old pot saved to burn for lime by Indians. These shells were all more or less mutilated in preparing them to cook.

Physa sp. Two fine specimens taken in a drainage ditch in the Cacao orchard. They have a colored band at different stages of growth as in *P. gyrina*, the transverse striae are irregular, the fine revolving striae are not as distinct as in *P. gyrina*.

Psoronaias kuxensis Frierson. A small stream at Chama, in sheltered places among the rocks on the bed of the stream, many eroded.

Euglandina decussata (Desh.).

Euglandina monilifera (Pfr.). Bluff on the mountain north of Chama.

Streptostyla delibuta (Morelet). Bluff.

Streptostyla lattrei (Pfr.). Bluff.

Streptostyla sargi Crosse & Fischer. Bluff.

Streptostyla sololensis C. & F. Bluff.

Streptostyla turgidula producta Pilsbry. Bluff.

Salasiella sp. Somewhat like *S. hinkleyi*, but the second whorl is much longer; one dead specimen from the bluff.

Salasiella sp. "Cannot refer to any known species" from the bluff.

Ammoniceras stolli (Martens). Three immature specimens in a clearing back of the plantation buildings.

Zonitoides minusculus (Binney). River drift.

Zonitoides elegantula (Pfr.). River drift.

Pseudohyalina puncticipitis Pilsbry. River drift.

Guppya elegantula Pilsbry. River drift.

Guppya gundlachti (Pfr.). River drift.

Lysinoe ghiesbreghti (Pfr.). From the bluff, one very young example.

Drymaeus sulphureus (Pfr.). Bones.

Coelocentrum fistulare (Pfr.). Variety from the bluff north of Chama.

Macroceramus concisus (Morelet). From the bluff.

Opeas beckianum (Pfr.). From the bluff.

Pseudosubulina salvini Martens? Bluff.

Pseudosubulina mitescens Martens. Bluff.

Leptinaria elisae (Tristram). Bluff.

Caecilioides consobrina veracruzensis (C. & F.). River drift.

Gastrocopta pentodon (Say). River drift.

Gastrocopta pellucida (Pfr.). A variety with thickened lip. River drift.

Adelopoma stolli (Martens). One specimen in river drift.

Carychium mexicanum costaricanum Martens. River drift.

Aperostoma dysoni (Pfr.). In cacao grove.

Aperostoma n. sp. On the bluff.

Amphicyclotus boucardi (Pfr.).

Helicina amoena Pfr. Cacao grove.

Helicina coccinostoma Morelet, variety *anozona* Martens. Bluff.

Helicina tenuis Pfr., var. *lindeni* (Pfr.), Bluff.

Helicina fragilis Morelet. Bluff.

Schasicheila hinkleyi Pilsbry. Bluff.

Schasicheila walkeri Hinkley. Bluff.

Eutrochatella nicrodina (Morelet) var. *chryseis* (Tristram). Bluff and drift.

Tomocylus simulacrum (Morelet). Bones scattered in recesses of rocks on the side of the mountain below the bluff.

Chondropoma rubicundum (Morelet). Bluff.

Lucidella lirata (Pfr.). Bluff and river drift.

At the places where the writer has collected different forms of slugs were often noticed. Quite a number were put in alcohol, but only two or three forms of *Vaginulus* came through in good condition.

Descriptions of new species and subspecies.

STROBILOPS STREBELI GUATEMALENSIS, n. subsp.

Shell depressed, light brown, with fine costae which extend over the base and into the small umbilicus; on the base the costae are smaller and crossed by longitudinal microscopical striae. Suture well marked, the first one and half whorls are

smooth. Aperture ovate, wide above, narrow below, peristome reflected and chocolate-colored. Height of shell $1\frac{1}{2}$, width $4\frac{1}{3}$ mm.

"This new subspecies differs from the East Mexico *S. strebeli* (Pfr.) by having the periphery more angular; the parietal lamella is more enlarged and prominent at the end, and it has $4\frac{3}{4}$ whorls, *S. strebeli* having a little over 5. *S. salvini* (Tristram) is a higher shell with wider umbilicus."

Found in beach drift of Lake Izabal near Jocolo.

Types in the Academy coll. and in the writer's coll.

SCHASICHEILA WALKERI n. sp.

Shell globose conic, thin, imperforate, umbilical region depressed; varies from brownish-yellow to a horn color, under the light brown cuticle. Whorls four, convex, crossed by fine irregular lines of growth and revolving microscopical striae which begin on the otherwise smooth nucleus. The costae and striae are visible under a glass on removal of the cuticle. Aperture subcircular, obtusely angular above with a slight, wide sinus at the base; a callus extends from the columella across the parietal wall to a slight notch at the suture. Operculum missing.

Shell measures: height 6, width 6.5 mm. Aperture, length 4, width 2.5 mm.

Found at a bluff on the mountain north of Chamá, Alta Verapaz, Guatemala.

Named in honor of Dr. Bryant Walker, who is doing good work for the advancement of malacology. Type in collection of the Academy of Natural Science, cotypes in coll. B. Walker and the writer.

AMPULLARIA LATTREI CHAMANA n. subsp.

A small, rather solid, short-spired race, with many bands of ecru-olive on a ground of deep colonial buff. The interior chocolate with some light bands above, lip with a broad chamois or pale yellow border without bands.

The aperture is narrower than in *A. lemniscata* Crosse & Fischer, which appears to be nearly related. The surface is not

irregularly pitted as in *A. lattrei*, and the microscopic spiral striæ are more plainly defined.

The embryonic whorls are dark-colored, almost black.

Height 42, breadth 40; aperture, length 33, width 18 mm.

Height 40, breadth 37.5; aperture, length 32, width 20 mm.

Specimens of exactly this form were collected about twenty years ago at "Rio Negro, Chama," by S. L. Schumo, a member of the Philadelphia Academy of Natural Sciences.

Four specimens were brought to the writer by an Indian; one (figured) is in the Academy coll., one in coll. of Mr. Bryant Walker, one in the Museum of the Illinois University, and the writer has the other.

PACHYCHEILUS POTTSIANUS n. sp.

Shell pyramidal, solid, smooth, of a dingy olive color; whorls eight, hardly convex, a light shade below the suture, the last slightly and broadly depressed on the upper part, in front of the aperture the periphery is obtusely angular, the angle diminishes with the growth of the whorl until the last of the body whorl is broadly rounded. Suture shallow, distinct. Aperture ovate, angular above, circular below, chocolate-colored within, parietal callus well defined and much thickened above, labium slightly thickened. Operculum ovate, nucleus depressed. When the mollusk is in its natural position the shell as viewed from above has the appearance of the penult whorl being humped and the under side of the shell is nearly always eroded as if it had been worn away in moving about. Four specimens measure:

Length 44, width 17. Aperture, length 14, width 8 mm.
Length 41, width 17. Aperture, length 14, width 8 mm.
Length 40, width 16. Aperture, length 15, width 7½ mm.
Length 42, width 17. Aperture, length 14, width 8½ mm.

This species was taken from two rills on hillsides, in dense woods. Often there was only enough moisture to keep the shells damp, or they were under fallen leaves; with them where there was a half inch or more of water were *P. pyramidalis*, from which they differ in being smaller and without any sculpturing. They are wider than *P. indiorum* of the same length, and have

not the color markings of that species. They differ from *P. corvinus* by a more solid texture and a smaller and different shaped aperture.

ANSON A. HINKLEY.

BY BRYANT WALKER.

Mr. A. A. Hinkley was born at Farmersville, Indiana, November 26, 1857, and died in Du Bois, Illinois, July 23, 1920. Living for a time at Rockford, Ill., he moved to Du Bois in 1881. The accompanying portrait though executed in earlier years is still an excellent likeness.

Mr. Hinkley was an enthusiastic, energetic, enterprising and most successful collector. I do not know when he first became interested in conchology. His first note on the subject appeared in "The Conchologists' Exchange," the predecessor of the NAUTILUS in 1887. My own correspondence with him began in 1893. He had then already began to specialize on the *Pleuroceridæ*, which continued to be his favorite study all of his life. Prior to that time he had taken two trips to Tennessee and had participated in the results of R. E. Call's expeditions to Alabama and Georgia. In 1894 and again in 1897 he collected in Tennessee and Alabama. He was also one of the contributors of "the sinews of war" to the remarkably successful work of B. H. Wright in developing the Unione fauna of the southern states in the decade prior to 1900.

In 1903 he began the series of collecting trips which have given him a permanent place in the history of American Conchology. In the winter of that year he explored the Coosa and Black Warrior rivers in Alabama. Two remarkable new genera, *Amphigyra* Pils. and *Neoplanorbis* Pils., and many new species of *Somatogyrus*, *Ancylus* and *Quadrula* were discovered. Mr. Hinkley was the first to develop the minute species of Alabama, which had been almost entirely overlooked by the early collectors in that State, whose attention had been wholly absorbed with the wonderful fauna of *Unionidæ* and *Pleuroceridæ* in that region.

A second trip in the winter of 1904 through Mississippi and to the Mussel Shoals of the Tennessee River resulted in the discovery of several additional species of *Somatogyrus;* the first living specimens of *Pyrgulopsis mississippiensis* C. and P. and a fine species of *Campeloma* that subsequently served to differentiate the *C. coarctata* of Binney from the original *coarctata* of Lea and establish the validity of *C. lewisi* Walker, which was typically based upon specimens collected by him in the Vallabusha River, Miss.

In the winter of 1906–7 he made his first expedition to Mexico and in 1908 a second trip. His collections on these journeys developed the remarkable Melanian and Unione fauna of the Panuco River system. Two new genera, *Pterides* Pils., *Lithasiopsis* Pils., a new subgenus *Emmericiella* Pils., and a great number of new species of both land and fresh-water shells were added to the Mexican fauna.

In 1912 he made his first expedition to Guatemala, a second trip in 1913 and a third in 1917. These resulted in large series of many of the rarer species of that region and the addition of many new species of both land and fresh-water forms to science. The material brought back by him from his last trip has not yet been completely worked up and it is probable that the number of new species will be largely increased when that work is completed.

The sickness and death of Mr. Hinkley's wife in 1915 and his own subsequent ill health kept him at home in that year and also in 1916 and 1918.

In the early part of January, 1919, he joined Messrs. Ferriss and Camp in a long trip "along the Mexican border" which continued until May and has been written up by Ferriss in the NAUTILUS (XXXIII, p. 37). On this expedition he paid special attention to the collection of the minute and fluviatile species. Only a very few of the many new species collected on this trip have, as yet, been published.

In the early summer of that year he made a short trip through western Tennessee and Kentucky and planned a thorough exploration of the Duck River, but unfortunately the project was cut short.

The net result of these many years of field work, if my count is correct, has added four new genera, one new sub-genus and one hundred and thirteen new species to the American fauna, a record that will perpetuate his memory for all time to come.

Mr. Hinkley was not a voluminous writer, preferring to leave to others the description of his material, but was an occasional contributor to the NAUTILUS from 1887 to 1920. His last note appeared in January, 1920, and an article on his third trip to Guatemala is published in this number.

Fifteen species have been named after him, viz.:

Holospira hinkleyi Pils.
Cælocentrum hinkleyi Pils.
Salasiella hinkleyi Pils.
Averellia hinkleyi Pils.
Lithasiopsis hinkleyi Pils.
Somatogyrus hinkleyi Walk.
Lymnaea hinkleyi Baker.
Ancylus hinkleyi Walk.
Gundlachia hinkleyi Walk.
Amnicola hinkleyi Walk.
Schasicheila hinkleyi Pils.
Pomatiopsis hinkleyi Pils.
Pisidium hinkleyi Sterki.
Sphorella hinkleyi P. and F.
Unio hinkleyi B. H. Wr.

TURRITIDAE VS. TURRIDAE.

BY S. STILLMAN BERRY.

By way of completing my own argument, I desire merely a word in reply to the points brought up by Mr. Dall in the last NAUTILUS. I hope he will forgive me for failing to perceive that his statements are in any way relevant to the real point at issue. This is solely and wholly the application of Article 4 of the International Code of Zoological Nomenclature. As I see it, and now on Dr. Dall's own showing in his final paragraph, *Turritidae* as a family name based on *Turris* is in flat violation of this Article, let alone all admitted principles of Latin orthography. Were the generic name actually spelled *Turritus*, the situation would of course be different, and it is merely this that Professor Foster was attempting to indicate; but such a circumlocution is in no way necessary.

It is a novel principle that a purely derivative name, such as

that of a family, must stand according to its first spelling, however erroneous. Should it ever come into general favor it would lead to some strange results.

The International Code alone must write the "finis" to a discussion of this sort.

ON THE OCCURRENCE OF PYRAMIDULA RUPESTRIS IN MAINE.

BY EDWARD S. MORSE.

Forty years ago while collecting land shells alongside the road in Riley, Maine, 17 miles north of Bethel, I found two specimens of a small Helix, which at the time I mistook for a variety of *Planogyra asericus*, being devoid of the elevated rings following the lines of growth; it was apparently the same size, form and color of *P. asericus*. Instead of being found in an alder swamp in wet ground, a common habitat of *P. asericus*, it was found in a hard-wood growth on the side of a hill associated with *S. labyrinthica*, *S. arborea*, *S. exigua* and other common species. Under the microscope I found the proportions of the shell different, as the accompanying drawings will show. Fig. 1 is the new form; fig. 2 is *P. asericus* drawn on the same scale. Realizing that the shell was new to this country, if not a new species, and not deeming it prudent to describe a new species from two specimens,

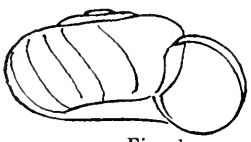


Fig. 1

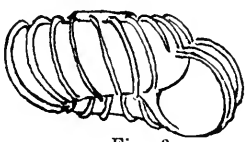


Fig. 2

Fig. 3

I visited the region again in 1891 in company with Major John M. Gould, who was with me the first time. We searched the woods in vain for a specimen of the shell. In August of this year Major Gould again visited the place but could not find the shell. A recent study of European species leads me to regard this *nova* as the old *Helix rupestris* of Draparnaud,

now *Pyramidula*. In Taylor's superb monograph of the land and fresh-water shells of the British Isles the author says of *P. rupestris:* "This species displays a great difference in form, ranging from an almost planorbular spire to a greatly elevated form with almost dislocated whorls, which has its metropolis in the isles of the Aegean Sea." Mr. Taylor figures a depressed form as var. *umbilicata* and says this form is more prevalent in the north of Europe. The spire becomes more elevated as the southern range increases. Fig. 3 represents a specimen of *Pyramidula rupestris* from England. While showing slight differences, the Maine specimens must be regarded the same. If it turns out to be an established variety I would like to dedicate it to Mr. Olaf O. Nylander, who has done such excellent work in studying and collecting the land and fresh-water shells of northern Maine. It will thus stand *Pyramidula rupestris* var. *nylanderi*.

NOTES ON MARINE MOLLUSCA ABOUT NEW YORK CITY.

BY ARTHUR JACOT.

Due to the unusually severe storms of the past winter the beaches about New York City were of special interest to the conchologist. On the one hand, bungalos, hotels, etc., were swept into the ocean bodily, while on the other, great quantities of shells were strewn along the shores.

At Rockaway Beach from the hospital (beyond the Park) to Edgmeer, a distance of four miles, there was an almost continuous rift of "skimmers" (*Spisula solidissima*) along the extreme high-tide line, which averaged two feet deep by ten feet wide. At some places these clams were piled up three to four feet deep, at other places they formed a double rift, while at still others (besides the rift at highest tide line) they were strewn as a thick carpet over that part of the beach laid bare at low tide. Counting 50 individuals per square foot, we estimated there were at least 5,000,000 per linear mile. It will be interesting to notice the abundance of this

species along this strip of beach after next winter's storms. It seems as though a large colony has been whipped out for a distance of several miles. At Long Beach (the next beach eastward) there were a dozen or two *S. solidissima* per linear rod.

We tramped over the top of this gigantic funeral pile for a distance of half a mile, starting near the hospital. As a result we picked up 16 specimens of *Pecten magellanicus* (with the animal) besides a few odd valves. Beyond the half mile the species was not found. The most astonishing find of the day, however, was a large specimen of *Buccinum undatum* fairly well covered with *Hydractinia echinata* and occupied by a putrid hermit. This species is of accidental occurrence west of the eastern end of the island. It is not an inhabitant of our sandy beaches.

On the channel side of Long Beach where dredges are widening the channel and building up land we found some hundred-odd specimens of *Ensis directus* freshly cast up. The largest had a width of $1\,^{5}/_{16}$ inches and a length of over 7 inches. A very few were found which were perfectly straight-looking from the outside like a true *Solen,* but when they were cleaned out and the hinge examined they were found to be *Ensis.* As I have never found the slightest indication of a Solen in this vicinity, nor as I do not know of a single authentic record of one for our coast, I am forced to the conclusion that the lots in the American Museum collection (as well as those in other museums) labeled New York and forming parts of the collections of shell fanciers have (as is the case with many other species) the wrong locality attached to them through carelessness or ignorance. This error seems to have been a common one for this species and it is time it be definitely rectified. This mistake of locality in collections of collectors of shells as a hobby (as the Jay, Haines, Newcomb, etc., collections) is common, so that their collections should not be considered for distributional records of species.

ANIMAL LIFE IN LOESS DEPOSITS NEAR ALTON, ILLINOIS, WITH DESCRIPTIONS OF TWO NEW VARIETIES OF LAND SHELLS FROM THE SAME DEPOSITS.*

BY FRANK COLLINS BAKER.

Many years ago Worthen (Geol. Ill., Vol. I, p. 315, 1866) reported the remains of a mastodon from near the City of Alton, from a deposit near the bottom of the loess, about thirty feet beneath the surface, where it was separated from the limestone by two to three feet of local drift. It was also stated by Worthen that the loess above the drift contained land and fresh-water shells. The only other reference to this deposit or its animal life, as far as known to the writer, is by Wm. McAdams (Proc. A. A. A. S., Vol. XXXII, p. 268, 1883). Recently Dr. M. M. Leighton, of the Department of Geology, University of Illinois, and also connected with the State Geological Survey, visited Alton and vicinity, and made a careful study of the Quaternary deposits, to determine the stratographic horizon of the concretions with which the mammalian remains are associated. During his study of the loess deposits he collected from them at different specified levels the remains of molluscan life, and has given me the following statement concerning the character and age of these deposits.

"The bluffs just northwest of Alton have a height of from 125 to 175 feet above the Mississippi River. Several quarries are located along the bluffs, which offer fine sections of the Mississippian limestone, some 50 to 100 feet thick, overlain by thin drift and thick loess deposits.

"The loess is separable into two deposits, a lower pink loess and an upper buff loess. The pink loess lies unconformably on the glacial till below, the till showing strong evidence of a long interval of weathering before the deposition of the pink loess. The till may well be as old as the Kansan, in which case the pink loess is probably Sangamon; if the till is Illinoian the pink loess cannot be older than late Sangamon, and may be

* Contribution from the Museum of Natural History, University of Illinois, No. 14.

Iowan or early Peorian. Although the pink color of the loess is believed to be largely original, there is some evidence suggesting that the pink loess was weathered somewhat before the deposition of the overlying buff loess. The interval of weathering, however, was doubtless brief. The buff loess is leached and oxidized at the top similar to the early Peorian loess (formerly called Iowan), and this strengthens the view that the pink loess is Sangamon. The mammalin remains at the top of the till and the base of the pink loess seem most likely to be early Sangamon. The calcareous concretions with which they are associated are secondary and, hence, later."

The mollusks collected embrace thirteen species of land shells, including two that appear to be undescribed. No lacustrine or fluviatile species were obtained (as would be expected), these mollusks being very rare or absent in true loess formations. Worthen's statement of the presence of fresh-water shells may have referred to the genus *Succinea*, some species of which occur in the vicinity of water bodies, though the loess *Succinea* are of the upland species and not the lowland species that are abundant near water (*Succinea retusa*, for example). The species of land shells in the deposit are the same, for the most part, as those found in typical loess deposits in Iowa and adjacent states. Except where mentioned the species are normal in form.

The division of the loess into two bodies, differing in color and probably attesting different periods of deposition, indicates that the deposition of the loess has been periodic rather than continuous. This is in line with the findings of Dr. Wm. C. Alden and Dr. Leighton in regard to the loess associated with the Iowan drift sheet in Iowa.† The cause of these epochs of loess deposition with breaks between is still a matter of conjecture. It is the writer's opinion that it might represent the presence of the Iowan ice to the north of the region.

Dr. Leighton reports that shells were more or less common at all levels of the loess. The age of these molluscan remains may be tentatively indicated in the following table. It will be noted

† Alden, Wm. C., and Leighton, M. M. The Iowan Drift, Iowa Geological Survey, Vol. XXVI, pp. 49 to 212, 1917.

that the pink loess, believed to be of Sangamon age, is the richest in number of syecies, and that the characteristic post-Iowan (*Peorian*) fossil, *Pyramidula shimekii* occurs only in the buff loess. Whether this distribution is to be considered as applying to the whole body of the loesses of this area, or is simply the result of local collecting, cannot be known until more extensive collections are made. The collections made by Dr. Leighton are from several localities in both Madison and St. Clair counties and also from different levels in the deposits, and these are believed to represent fairly well the general distribution of the loess faunas of this region. It is probable that a larger number of the minute species could be found as a result of prolonged search carried on especially for them. The material has been placed in the University of Illinois Museum through the courtesy of the Illinois Geological Survey. They are numbered P 738 to P 764 of the collection of Palaeontology.

TABLE OF DISTRIBUTION OF LIFE IN LOESSES NEAR ALTON.

Concretionary horizon.	*Polygyra profunda pleistocenica.*
(Above underlying till, believed to be Kansan.)	*Castoroides ohioensis* (incisor tooth).
	Mammut americanum (Kerr). (Reported by Worthen.)
Yarmouth interval.	
Pink loess believed to be of Sangamon age.	*Polygyra profunda pleistocenica.*
	Polygyra multilincata altonensis.
	Polygyra hirsuta.
	Polygyra appressa.
	Pyramidula alternata.
	Helicodiscus paralellus.
	Gastrocopta armifera.
	Zonitoides arborea.
Upper part of loess.	*Circinaria concava.*
	Succinea ovalis.
	Helicina occulta.
Buff loess.	
Early Peorian interval.	*Pyramidula shimekii.*
	Succinea ovalis.

The localities at which shells were obtained, together with the species found at each, are listed below.

From the concretionary horizon at the base of the pink loess and at the top of the underlying till; plant number 2 of the Mississippi Lime and Materials Co., Alton, Madison Co.

Polygyra profunda pleistocenica Baker.

Castoroides ohioensis Foster. Given to Dr. Leighton and said to have come from this horizon. Only a single incisor tooth (the left) was collected.

The *Polygyra* was apparently very abundant at this horizon, seven pieces of concretions containing ten specimens of shells. The concretions are of lime which is very hard. Some of the shells are internal casts.

From the lower ten feet of the pink loess, plant No. 2 Mississippi Lime and Materials Co., Alton. Many fragments of shells occurred, indicating an abundance of the different species at one time.

Polygyra profunda pleistocenica Baker. A few specimens.
Polygyra multilineata altonensis Baker. A few specimens.
Polygyra hirsuta (Say). Rare.
Gastrocopta armifera (Say). One specimen.

From the upper part of the pink loess, plant No. 2 Mississippi Lime and Materials Co., Alton.

Polygyra profunda pleistocenica Baker. A few specimens.
Pyramidula alternata (Say). A few specimens.
Circinaria concava (Say). One specimen.
Succinea ovalis (Say). Several specimens.
Helicina occulta Say. One specimen.

From cliff of loess near corner Market and East 6th Street, Alton. From pink loess.

Polygyra profunda pleistocenica Baker. Common.
Polygyra multilineata altonensis Baker. One specimen.
Polygyra appressa (Say). Common.
Polygyra hirsuta (Say). Rare.
Pyramidula alternata (Say). Not common.
Helicodiscus paralellus (Say). One specimen.
Circinaria concava (Say). One specimen.

From pink loess at Edgemont, St. Clair Co., north side of interurban railway.

Polygyra profunda pleistocenica Baker. Rare.

Zonitoides arborea (Say). One specimen.

From lower part of buff loess at Edgemont, St. Clair Co., north side interurban railway.

Pyramidula shimekii (Pilsbry). A few very large specimens, one individual measuring 7.10 mm. in greatest diameter.

Succinea ovalis Say. The Succineas are apparently this species, although they exhibit some variation, especially in the height of the spire. They are not *grosvenorii*, which occurs in the loess deposits of Iowa.

Description of New Varieties.

Polygyra multilineata altonensis n. var.

Shell differing from typical *multilineata* in being larger, the whorls more gibbous, the spire more depressed, and the sutures between the later whorls more deeply impressed; the last whorl begins to rapidly descend on the previous whorl until the upper part of the outer lip rests against the periphery, instead of above this point, as in *multilineata;* the deflection of the upper part of the whorl toward the aperture is also more abrupt, and forms a distinct shoulder at this point; the reflected lip is much heavier as is also the umbilical callus; the spiral color bands and lines are apparently much less numerous than in typical *multilineata.*

Greatest diameter, 32; height, 19.5; aperture height, 14; breadth, 14 mm. Holotype. U. I. No. P. 740 A.

Greatest diameter, 28; height, 15.5; aperture height, 11; breadth, 12 mm. Paratype. U. I. No. P. 740 B.

Horizon: Lower ten feet of pink loess, plant No. 2 Mississippi Lime and Materials Co., Alton, Madison Co., Illinois.

This form of *multilineata* is so uniformly different from the usual form and size of this species that it seems to require a special designation. It probably occurs in other loess deposits. The greater size and gibbous-shaped whorls are sufficiently characteristic to cause its immediate recognition. This variety is apparently not common in these loess deposits, only four

specimens being obtained by Dr. Leighton. The type material is from the lower part of the pink loess. The variety does not occur (apparently) in the higher or later loess deposits of this region.

Polygyra profunda pleistocenica n. var.

Shell uniformly smaller than typical *profunda*, more solid, with slightly higher spire and proportionally smaller aperture and umbilicus; the color bands are developed in but two specimens of the 19 specimens examined, the majority of the individuals being unicolored.

Greatest diameter, 22; height, 14.7 mm. Holotype. U. I. No. P. 751 A.

Greatest diameter, 24; height, 14 mm. Paratype. U. I. No. P. 751 B.

Greatest diameter, 26; height, 14.7 mm. Paratype. U. I. No. P. 751 C.

This race or variety of *profunda* is the most common land shell in the loess of the vicinity of Alton. The characteristics noted above will easily distinguish it from typical *profunda*. This variety recalls *Polygyra profunda strontiana* Clapp (Ann. Carnegie Mus. X, p. 537, pl. xxxii, figs. 13–15, 1916), the sizes being about the same in the two forms. In *strontiana*, however, the spire is higher and the shell of different shape. *Pleistocenica* is not common in the lower deposits of the loess near Alton nor in the higher deposits. It reaches its greatest development near the middle of the pink loess, from which the greater number of specimens came.

From pink loess on cliff of loess, corner Market and East 6th Street, Alton, Madison Co., Illinois.

NOTE ON A PREOCCUPIED GENERIC NAME IN CEPHALOPODS.

BY S. STILLMAN BERRY, REDLANDS, CALIFORNIA.

In 1913 (Zool. Anz., Bd. 42, p. 590) I proposed the name *Acroteuthis* as that of a genus of cephalopods having the *Sepia media* Linnæus 1767 as type, the said genus being

practically equivalent to the old *Teuthis* Schneider 1784, *not* of Linnæus 1766, which is a genus of fishes.

It has recently been called to my attention that *Acroteuthis* in this sense is itself invalid by reason of the existence of a prior usage of the same name in connection with a fossil genus of the same group of mollusks, a fact which had escaped my notice because of an almost complete lack from my library of the literature of cephalopod paleontology.

To remedy this unfortunate situation, I would suggest that the name *Acruroteuthis* be adopted as a substitute for *Acroteuthis* Berry 1913.

NOTES ON A SMALL COLLECTION OF SHELLS FROM ALASKA.*

BY FRANK C. BAKER.

A small collection of Alaska mollusks has recently been given to the Museum of Natural History which is of considerable interest. It was collected by Dr. Henry B. Ward, head of the Department of Zoology, University of Illinois, while engaged in survey work for the United States Bureau of Fisheries. The shells were collected incidentally during the months of July and August. The two bodies of water from which the material was collected are in the Copper River drainage and their location is thus described by Dr. Ward:

"The two lakes referred to as the locations from which the mollusks came are both in the drainage of the Copper River. Long Lake lies just off the Chitina River, which is the main tributary of the Copper River. The lake is right alongside the Copper River and the Northwestern Railway track, and is something like 150 miles from Cordova.

"Saint Anne Lake empties into Lake Klutina, which in turn empties through the Klutina River into the Copper River. This is on the west side of the drainage basin, about 250 miles from the Long Lake locality."

* Contribution from the Museum of Natural History, University of Illinois, No. 12.

Outlet of Long Lake.

Galba randolphi (Baker). Half-grown and typical.

Galba vahlii ("Beck" Möller).

Planorbis similaris Baker.

Two young individuals (three whorls) of a small Planorbis are indistinguishable from specimens of *similaris* of the same size from Colorado. They are not like *parvus* from near Philadelphia, having a less number of whorls in specimens of the same size, and the base lacks the reamed-out appearance so characteristic of typical *parvus*. The two localities are widely separated although the ecological and general climatic conditions are the same, the Colorado specimens occurring in a lake at an altitude of 8575 feet (see Bull. Amer. Mus. Nat. Hist., Vol. XLI, p. 532, 1919). This small Planorbis will doubtless be found in many places between these extreme localities, when it is discriminated from *parvus*.

Pisidium species.

Sterki says of this Pisidium, of which only four specimens were collected, "unknown to me; probably immature."

Saint Anne Lake.

Galba randolphi (Baker). Half-grown specimens.

Galba vahlii ("Beck" Möller).

The lymnaeids referred to *vahlii* were at first thought to be referable to *palustris*. The generally thinner, almost paper-like shell and the wide columella callus without well-marked plait seem to place them rather under *vahlii*. The spire in nearly all of the specimens is very long and the whorls are inclined to be flat-sided, differing in this respect from typical *vahlii*. This species, like the protean *palustris*, of which it is a near relative, probably exhibits a wide range of variation.

Valvata lewisii helicoidea Dall.

A single specimen of Dall's variety of *Valvata lewisii* occurred with the material from Saint Anne Lake. It corresponds in every way with the original description and figures (Alaska Mollusks, p. 123, pl. ii, figs. 1, 2) but is smaller than the specimen figured by Dall. The measurements of the Saint Anne Lake specimen are: height 2.2; greatest diameter 4 mm. The

variety has also been seen from Lake Winnipeg, Manitoba, collected by Professor C. H. O'Donoghue, of the University of Manitoba. It will probably be found to be widely distributed in Canada and Alaska.

Sphaerium tenue Prime.

Pisidium idahoense Roper.

A single specimen each of these two Sphaeriidae was contained in the Saint Anne Lake material. These specimens are typical.

I am indebted to Dr. V. Sterki for the determination of the Sphaeriidae from this locality as well as from the outlet of Long Lake.

NOTES.

NOTES ON CERTAIN BRACHIOPOD GENERA. — A recently published and valuable paper on the recent species of Brachiopoda in the National Museum (Dall, W. H., Proc. U. S. Nat. Mus., Vol. 57, pp. 261-377, 1920) places before students of the Brachiopoda a carefully prepared catalogue of the species contained in the National Museum collection and also brings together from many scattered sources valuable data on geographic and bathymetric range and bottom temperature. The author has also cleared the field of a number of mooted questions in synonymy and it is to be regretted that the paper is not accompanied with illustrations of the new species named. For the *Terebratula grayi* Davidson 1852, Dr. Dall proposes the subgeneric term *Pereudesia,* which fact is unfortunate, since J. W. Jackson (Geol. Mag., Decade 6, Vol. 3, pp. 21-22, 1916) used the term *Thomsonia* in a full generic sense for the peculiar type of structure that obtains in *Terebratula grayi* and *Terebratula grayi transversa,* and at a later date (Geol. Mag., Decade 6, Vol. 5, pp. 479-480, 1918), finding the term *Thomsonia* preoccupied, he alters to *Coptothyris,* which name will of necessity hold preference over Dr. Dall's *Pereudesia.*—DARLING K. GREGER.

Brasilica Clark 1913. This generic term was erected by Dr. John M. Clarke (Monog. do Serv. Geol. e Mineral. do Brazil, Vol. 1, pp. 214-216, 1913) with the *Centronella? margarida* Derby as the genotype. The use of the term *Brasilica* is not applicative, in view of the fact that it was employed by S. S. Buckman in 1898 for a genus of *Ammonites,* with the Jurassic species *A. bradfordensis* as the genotype. The generic term *Chapadella* is here proposed for the type of loop structure exemplified in *Centronella? margarida* Derby, the genotype. Chapada is a small village in Matto Grosso, Brazil, near which place H. H. Smith collected the material originally used by Dr. Derby in his paper published in the Revista do Museu. Rio de Janeiro, 1896.—Darling K. Greger.

Zonitoides nummus in Indiana.—In looking over a lot of shells collected on Feb. 28, 1904, by the late A. C. Billups from Great Miami River drift, Lawrenceburg, Ind., I found specimens which I take to be *Zonitoides nummus* Van., so am sending some. This is far out of the recorded range of this species so far as I know. The balance of the shells are what one would expect from that region. A good many of the *Z. minusculus* have the thickening of the lip, or rather back of the lip, "bourrelet" I believe the French call it. This is not a mark of maturity, as many of the half-grown shells have it. —Geo. H. Clapp.

PUBLICATIONS RECEIVED.

Journal de Conchyliologie, 1920, Vol. 66, No. 4. Révision des Cypricardiacea et des Isocardiacea Vivants du Muséum D'Histoire naturelle de Paris. Par Edouard Lamy. Pp. 259-307. A very exhaustive treatise on this group of bivalves.

Proceedings of the Malacological Society of London, Vol. 14, Pl. 1, Apr. 1920. A new subspecies of *Papuina tayloriana* from Dampier Island, by Hugh C. Fulton, p. 2. *P. tayloriana dampierensis.*

Molluscan Notes IV, by Hugh C. Fulton, p. 3. *Ennea pallaryi* Preston = *E. vriesiana* Ancy; *Xestina grunulosa* Mölldff. = *H. danae* Pfr.; *Goniostomus subhybridus* Da Costa = *Bulimulus (Drymœus) pulcherrimus* H. Adams; *Pseudachatina daillyana* Pilsbry = *P. perelongata* Rolle; *Neptunea antiqua japonica* Dautz. & Fisch. = *Chrysodomus intersculptus* Sowb.

Additions to the List of Recent Middlesex Mollusca. By J. E. Cooper, p. 5.

The Affinities of Pyramidula, Patulastra, Acanthinula and Vallonia. By Hugh Watson, pp. 6-30, pls. 1 and 2.

On *Mitra montereyi,* a new Californian species. By S. Stillman Berry, pp. 31-33.

On Six Variations of *Clausilia bidentata* and *Ena obscura,* with a locality. By A. E. Boycott, pp. 34-42.

On *Mitra montereyi,* a new Californian species. By S. Stillman Berry, pp. 31-31.

On the Size Variation of *Clausilia bidentata* and *Ena obscura,* with a locality. By A. E. Boycott, pp. 34-42.

Contributions to the History of the Cerionidæ. By C. J. Maynard (Pts. 1-5, App. to Vol. 10, Records of Walks and Talks with Nature).

On Certain Fossil Shells in the Boulder Clay of Boston Basin. By Edward S. Morse (Amer. Jour. Sci., 1920, Vol. 49, pp. 157-165). A very interesting paper. The author believes that the thick fragments found in the various deposits represent the southern *Venus campechiensis* and not *V. mercenaria.*

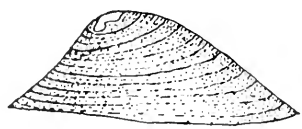
A Classification of the American Operculated Land Mollusks of the Family Annulariidæ. By John B. Henderson and Paul Bartsch (Proc. U. S. Nat. Mus., 1920, Vol. 58, pp. 49-82). In this paper American "Cyclostomidæ" are separated from the Old World groups and placed in the family Annulariidæ, the principal character used in separating them being the radula.

Annotated List of the Recent Brachiopoda in the Collection of the United States National Museum, with Descriptions of Thirty-three New Forms. By William H. Dall (Proc. U. S. Nat. Mus., 1920, Vol. 57, pp. 261-377). The collection of recent Brachiopods in the National Museum is unusually strong, containing 181 different forms, represented by over 6,000 specimens, including many original types.

On the Anatomy of Paludestrina jenkinsi. By C. G. Robson (Ann. Mag. N. H., 9 ser., V, May, 1920). This species has long been of interest on account of its rapid spread through the waterways of England, Wales and Ireland, and recently from the discovery that it is apparently parthenogenetic. It has a large crystalline style. There is a well-developed pedal gland as in *Valvata*. In the ovary were seen oöcytes but no spermatozoa. There is also an organ corresponding to the spermatheca. The capacious brood-pouch is excavated in the pallial integument of the right side, and capable of holding over 40 young. The writer has already suggested that *P. jenkinsi* is a *Potamopyrgus;* it should be compared with some of the tropical species, none of which have been dissected.—H. A. P.

The Radula of the Mitridæ. By Rev. A. H. Cooke (Proc. Zool. Soc. London, 1919 [1920], pp. 405-422, 18 figs. in text). A valuable contribution to our knowledge of the radula of this family. The work is based largely on the collection of the late Prof. H. M. Gwatkin.

Costa Rican Land and Freshwater Shells. By H. A. Pilsbry (Proc. Acad. Nat. Sci., 1920, pp. 2-10, 6 figs. in text). The paper is based on a collection made by Dr. P. P. Calvert and Mrs. Calvert in 1909 and 1910. Five new species are described.—C. W. J.



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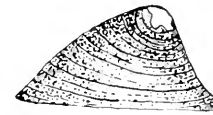

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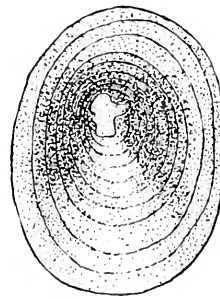

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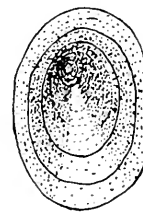

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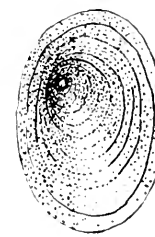

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WALKER: FERRISSIA OBSCURA ETC.

THE NAUTILUS.

Vol. XXXIV JANUARY, 1921. No. 3

ANCYLUS OBSCURUS HALDEMAN AND SPECIES REFERRED TO IT.

BY BRYANT WALKER.

(*Continued.*)

Through the courtesy of M. Menard of the Museum of Geneva, Switzerland, I have received photographs and other valuable data in regard to the types of the unfigured West-Indian species of *Ancylus* described by Bourguignat and have consequently been enabled to differentiate the following species with more certainty that I otherwise should have been.

IV.

Ferrissia jamaicensis n. sp. Pl. III, figs. 1–3.

Shell depressed, oval, slightly wider at the anterior end; lateral margins equally curved; anterior slope nearly straight, being very slightly convex towards the apex; posterior slope concave; the left lateral slope a little convex; the right lateral slope concave; apex obtuse, excentric, turned toward the right side, obscurely radiately striate, situated about halfway between the median line and the right margin and at about two-fifths of the length from the posterior end; lines of growth fine, but distinct and regular, with traces of subobsolete wrinkles on the anterior slope; light horn color.

Length (type) 5.25: width 3.5, alt. 1.5 mm.

Length (paratype, Adams' Coll.) 5.1; width 3.25, alt. 1.3 mm.

Type locality Jamaica. Also Kingston, Jamaica.

Type No. 34825 Walker Coll. Paratype in Adams' Collection.

There are one nearly mature specimen and three immature ones in the Adams' Collection received from Chitty and labeled "*obscurus?*" from Kingston, Jamaica. My own set of four specimens was received from Sowerby and Fulton as "*obscurus*". As these are apparently fully developed and are quite congruous in character, I have selected one of them as the type. The largest specimen in the Adams Collection is narrower than the type, the apex less eccentric and the posterior slope is longer and nearly straight below the base of the apex. The radial sculpture of the apex is very distinct in this specimen. When additional material can be obtained, it may prove to be, at least, varietally distinct.

After carefully reviewing my material I am now inclined to think that the Guadeloupe specimens considered as conspecific in the first part of this paper (NAUT., XXXIII, p. 99), though rather similar, are different. They will be considered elsewhere.

This species is also evidently related to *A. beaui* Bgt. from Guadeloupe, but as compared with the figures of Bourguignat's type, it is somewhat larger, proportionately not so wide, the anterior slope is less convex, the posterior slope longer and it lacks the distinct radial striation on the anterior slope, which, though not mentioned by Bourguignat, shows very distinctly in the photograph of his type.

V.

Ferrissia adamsi n. sp. Pl. III, figs. 7–9.

Shell depressed, oval, very slightly wider anteriorly; lateral margins equally curved; anterior slope nearly straight; posterior slope straight below the base of the apex at which point it is slightly incurved; left lateral slope very slightly convex; right lateral slope a little concave; apex prominent, very obtuse, slightly turned toward the right margin, situated nearly on the median line and about one-third of the length from the posterior end, radiately striate; surface smooth except for the distinct, rather coarse, regular lines of growth; light horn color.

Length 4, width 2.75, alt. 1.25 mm.

Type locality Kingston, Jamaica.

Type No. 50983 Walker Coll. Paratype in the Adams Collection at Amherst College.

I can not approximate this species to any that have been described from the West Indies; several specimens were in the lot received by Adams from Chitty mixed with the preceding species. Compared with that, *adamsi* is smaller, more heavily concentrically striate with growth lines, the apex is much more obtuse, more elevated and scarcely at all eccentric.

VI.

The third form mentioned (l. c. p. 99) as occurring in the Adams' "*obscurus*" from Jamaica consists of a number of small specimens in both lots, which, at first, I thought represented a distinct species, but after carefully reviewing them again I think it probable that they are young shells of the two preceding species; at least, I do not feel like describing them as distinct from the comparatively small series now available.

VII.

Ferrissia blandi n. sp. Pl. III, figs. 10–12.

?Ancylus obscurus Hald., Shuttleworth, Ann. Lyc., N. H. N. Y., VI, 1854, p. 72; Diag. Neuer Moll., No. 6, 1354, p. 99.

Shell small, slightly elevated, broad oval, a little wider anteriorly, both ends broadly rounded; right lateral margin nearly straight; left lateral margin somewhat more curved, especially anteriorly; anterior slope nearly straight; posterior slope short and slightly incurved; right lateral slope slightly concave; left lateral slope a little convex; apex prominent, obtuse, slightly turned toward the right side, situated at the posterior third of the length and to the right of the median line, distinctly radially striate; surface smooth except for the fine, regular lines of growth and traces of irregular rippling on the anterior slope; light horn color.

Length 2.75; width 1.8, alt. .8 mm.

Type locality St. Vincent Island, West Indies.

Type No. 50984 Coll. Walker. Paratypes in the Adams Collection at Amherst College.

The history of these specimens has already been given. This

little species seems to be quite distinct from any of those described from the West Indies. It is quite different in shape and proportions from *A. bermudensis* Van., which is the only one that approximates it in size.

Named after the original collector, the late Thomas Bland.

Explanation of Plate III.

Figs. 1, 3. *Ferrissia obscura* (Hald.). See NAUT., XXXIII, p. 101.

Figs. 4, 6. *Ferrissia jamaicensis* Walker.

Figs. 7, 9. *Ferrissia adamsi* Walker.

Figs. 10–12. *Ferrissia blandi* Walker.

TWO NEW PLIOCENE PECTENS FROM NOME, ALASKA.*

BY WILLIAM H. DALL.

The U. S. Geological Survey has recently received from Otto Halla of Nome, some fossil shells from a subterranean Pliocene beach reached by a shaft at twenty feet below the surface near the Solomon River. Among these specimens were *Astarte carteriana* Dall, a *Venericardia* like *alaskana* Dall, but much larger and heavier; fragments of a *Chrysodomus*, and two magnificent new species of *Pecten*. *Pecten lioicus* Dall, and *P. kindlei* Dall, both markedly peculiar forms of the subgenus *Chlamys*, had already been obtained from these anciently uplifted and now buried beaches, and doubtless when fully explored they will afford many other things of interest. The characteristics of the fauna indicate a warmer sea than at present exists at Nome, and the species as a rule are larger and heavier than their recent or Pleistocene analogues.

PECTEN (PLAGIOCTENIUM) HALLAE n. sp.

Right valve convex, heavy, subcircular, with subequal ears, hinge-line wide and straight, the ears sculptured with rather rude incremental lines; radial sculpture of the valve consisting

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of 17 or 18 low, rounded ribs with rather shallow narrower interspaces channeled only near the beak; the minor sculpture, if any existed, has been removed by abrasion but there are faint traces of fine radial striae in the interspaces; the hinge has a very large resiliary pit with a narrow ridge on each side of it; the adductor scar was large and the the margins of the valves was undulated by the external sculpture. Height of right valve, 120; width, 125; length of hinge-line, 70; (semi) diameter, 28 mm. U. S. Nat. Mus. Cat. No. 333042.

A fragment has a width of 147 mm. The nearest relative is perhaps the Pliocene *P. cerrosensis* Gabb, which has twenty-five much stronger ribs with much narrower interspaces, and a less inflated and smaller shell.

PECTEN (PATINOPECTEN) RHYTIDUS n. sp.

Right valve very thick and heavy, little inflated, subcircular, with 13 or 14 narrow ribs, here and there subnodulous or slightly imbricated, with much wider flattish shallow interspaces; the whole surface is finely radiately striated; there is no minor sculpture except the striation; the hinge-line long, straight, the ears subequal with coarse incremental sculpture; resiliary pit deep and wide, with a strong groove on each side; adductor scar large; valve-margins undulated by the external sculpture. Height of shell, 128; width of shell, 130; of hinge-line, 80; (semi) diameter, 12 mm. U. S. Nat. Mus. Cat. No. 333044.

No species of the late Tertiary or Recent fauna resembles this at all closely.

THE TYPE LOCALITIES OF LYMNAEA EMARGINATA SAY AND L. AMPLA MIGHELS.

BY OLOF O. NYLANDER, CARIBOU, ME.

In 1821 Thomas Say described *Lymnæus emarginatus* (Jour. Acad. Nat. Sci., Phila., II, 170) discovered by Aaron Stone in lakes of Maine. The type is apparently lost and the name of the lakes not given. Walter Wells in his book "The Water-

Power of Maine, Augusta, 1869," states: "The total count of those [lakes] represented upon the maps as connected with our rivers * * * not including the multitude of small ponds * * * is not less than one thousand six hundred and twenty." Of the above lakes 1568 are located within the State. In the "Fourth Annual Report of the State Water Storage Commission," 1913, page 322, the number of lakes and ponds in Maine is given as 2,222.

I have examined many of the Maine lakes, and from Moosehead Lake in the center of the State north to Temiscouata Lake, in Quebec, has been my collecting ground for over 30 years.

I have found specimens of *Lymnæus emarginatus* Say, that seem to compare with Say's description in only one lake; this is located on the east branch of First River between Long Lake and Cross Lake, Aroostook County, in Township XVII, Range 4, about lat. 47° 10′ N., and long. 68° 16′ W. It is called *Mud Lake or Second Lake.* Prof. F. C. Baker has examined in his studies of the "Lymnæidæ of North and Middle America," a large series of specimens from Mud Lake, and his opinion is that we have the true type in this lake. If students of shells will agree with me, let us call this the type locality of Say's *Lymnæus emarginatus.* For a description of this locality see THE NAUTILUS, Vol. XV, page 127.

Prof. Edward L. Morse visited this locality (Mud Lake) in June, 1859, hoping to rediscover *Limnæa ampla* of Mighels, and gave me a full account of his trip at the meeting of the Boston Malacological Club, Feb. 10, 1913. Prof. Morse in going to this lake, followed the account given by Dr. Mighels, and I followed the published accounts given by both Mighels and Morse. The fact is *Lymnæa ampla* Mighels is not found in Mud Lake (or Second Lake).

There is no name on any of the old maps of Mud Lake (or Second Lake). Say's original paper gave the locality: "Inhabits Lakes of Maine," and others say "Lakes in northern Maine (Say)." If northern is correct, Mud Lake is the type locality.

The type specimen of *Lymnæa ampla* was lost in the fire that

destroyed the custom house of Portland, Maine, 1854, together with all of Dr. Mighels' specimens.

In the summer of 1842 Alexander Longfellow, assisting in the Boundary Survey, collected in Second Eagle Lake, North lat. 47°, four specimens of *Lymnæa ampla* together with *Physa ancillaria*. This lake is also located on the east branch of Fish River and is at this time known under the name of Square Lake. The specimens collected by Mr. Longfellow and illustrated and published by Dr. Mighels in Boston Journal Natural History, Vol. 4, page 347, pl. 16, came from Square Lake inlet. The great trouble to all workers in natural history is the many changes in the names of places. This might have been avoided if the map makers had not made it their business to change names on every new edition. Specialists and makers of new species in every new edition of their works are changing the names of the species described, each calling them *Scientifically Correct*. What to-day (1920) is called Fish River lakes was called in 1860 Eagle Lakes; what is now Eagle Lake was called Lake Winthrop in 1860. Square Lake of to-day had the name of Lake Sedgwick in 1860, and was known as Second Eagle Lake in 1842. Cross Lake of to-day bore the name of Lake Preble in 1860, and Long Lake was Cleveland Lake in 1860. The French settlers that live in the vicinity of the Fish River Lakes are still using the old names.

Lymnæa emarginata Say and *L. ampla* Mighels have also undergone several changes during this period of 100 years, as the following list shows:

Lymnæus emarginatus Say, 1821.
Limnea emarginata Haldeman, 1842.
Galba emarginata Baker, 1911.
Limnæa ampla Mighels, 1843.
Radix ampla Morse, 1864.
Lymnæa mighelsi Binney, 1865.
Lymnæa (*Radix*) *mighelsi* Dall, 1905.
Limnæa emarginata var. *mighelsi* Nylander, 1901.
Galba emarginata mighelsi Baker, 1911.

What will it be one hundred years from now? I have some

fine specimens from the original localities that I will exchange with museums and collectors for specimens or publications new to my collections.

NOTES ON THE NAIAD FAUNA OF THE UPPER MISSISSIPPI RIVER.*

BY N. M. GRIER.

I. On the Anatomy of *Lampsilis higginsii* Lea.

Ortmann (1) is inclined to suspect that this species is merely a local form of *L. orbiculata* Hildreth, the form of very large rivers with muddy bottom, rather than the northern representative of that species, which some consider to be distinctly southern. Examination of the soft parts of *higginsii*, obtained while in the service of the United States Bureau of Fisheries, convinces me of the conformity of *higginsii* with descriptive material given for the genus *Lampsilis* by Simpson (3), and by Ortmann for *L. orbiculata* (2).

The most important point of resemblance between these two species is the common possession of a mantle flap greatly resembling that in *L. ventricosa*, and which obtains its greatest development in the female. As such a structure in *higginsii* seems to have been overlooked, detailed description of it follows. The papillae on the posterior border of the mantle obtain the greater development, those situated anteriorly being quite stunted when present. At the beginning of the posterior half of the mantle edge, the latter thickens to form a grooved flap which shortly attains a width three times that of the adjacent portions of the mantle edge, but which narrows down above the anal opening to a width equal to that of the anterior edge of the mantle. The greatest thickness is obtained at a

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1. Ortmann, A. R., "Notes upon the Families and Genera of Najades". Annals of Carnegie Museum, Vol. VIII, 1912, p. 353.

2. *Ibid.*, "Monograph of the Najades of Pennsylvania, Part III". Memoirs Carnegie Museum, Vol. VIII, No. 1, 1919, p. 324.

3. Simpson, C. T., "Descriptive Catalogue of the Naiades". B. Walker, Detroit, pp. 77–78.

point approximately $\frac{3}{4}$ of the distance along the mantle edge from the anterior end, where the edge is produced into a triangular process, directed somewhat anteriorly, and which is in the line with the anterior edge of the post-adductor muscle. Above, this process is spotted wtth a medium brown color, and its edge is produced into papillae which become finer towards the coarser ones of the branchial and anal regions. Below, the coloration appears confined to a strip widest near the vertex of the process described, and is succeeded posteriorly by the papillae previously mentioned.

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THE ANATOMY OF CERTAIN MUSSELS FROM THE UPPER TENNESSEE.

BY A. E. ORTMANN, PH. D.

In the Proc. Americ. Philos. Soc. 57, 1918, pp. 521–526, the present writer has published a Synopsis of the Naiades, or fresh-water mussels of the upper Tennessee drainage, assigning each species its proper place in the system. But in some of them the observations on the anatomy forming the basis for the taxonomic arrangement have not been given. It is the purpose of the present paper to furnish these data, together with additional remarks on species treated previously.

I am sorry that I am compelled to introduce again nomenclatorial changes without fully supporting them; but this will be done in another paper.

Fusconaia pilaris (Lea), F. pilaris lesueuriana (Lea), F. pilaris bursa-pastoris (Wright). (See Ortmann, l. c., pp. 527–529.)

Anatomy: *F. bursa-pastoris* (*Wr.*) in Nautil. 27, 1918, p. 90 (incomplete, no gravid females at hand).

Gravid females have been found subsequently on the following dates: May 11, 13, 14, '13; May 20, 22, 23, '14; July 7, 8, 13, '13. They belong in part to the var. *bursa-pastoris*, in part to the var. *lesueuriana*, but none have been found belonging to

typical *pilaris*. *Glochidia* have been observed from the earliest to the latest date, so that the breeding season begins probably very early in May, and lasts to about the middle of July (tachytictic).

In all three forms the anatomy is the same, that is to say, that of the genus *Fusconaia*, and agrees essentially with that of *F. subrotunda* (*Lea*). Also the placentae are of the same characteristic subcylindrical (not compressed or lanceolate) shape. *Glochidia* of the shape and size of those of *F. subrotunda:* subelliptical, higher than long, L. 0.13, H. 0.15 mm.

In the upper Clinch form of *bursa-pastoris*, the orange *color of the soft parts* and red color of the placentae prevail, whitish specimens being rare. The same is the case in Powell River, at least in its upper parts. Farther down in the Powell (Claiborne Co., Tenn.), specimens with whitish soft parts outnumber those with orange parts. In the lower Clinch, the specimens (*lesueuriana*-type) are nearly all whitish, and only a few with orange color have been found. In French Broad and Holston Rivers, in all three varieties, white soft parts and white placentae are the rule all the way up to the forks of the Holston and the Watauga River. Orange soft parts and red placentae are extremely rare. I have only one specimen from Grainger Co., Tenn. (*lesueuriana*-type), and one from Sullivan Co. (*bursa-pastoris*-type).

FUSCONAIA CUNEOLUS (LEA), F. CUNEOLUS APPRESSA (LEA). (See: l. c., pp. 530, 531.)

Gravid females: May 16, '15; May 22, '14; May 25, '15; July 5, 7, 8, 13, '13. *Glochidia* in specimens collected July 7 and 8. Thus tachytictic, breeding from May to July.

These two forms have the same anatomy, and belong to *Fusconaia*. They agree very well with the account given of *F. rubiginosa* (*Lea*) (=*flava Raf.*). (See: Ann. Carnegie Mus. 8, '12, p. 241.) Of nine specimens preserved, seven have a short mantle connection between anal and supraanal, while in two this is missing, but probably torn.

All four gills are marsupial, but in young specimens, the marsupial part of the inner gill is often restricted to the middle

of the gill. The ova form distinct, subcylindrical placentae. The *glochidia* are subelliptical, nearly semielliptical, about as high as long, L. and H. 0.16 mm. They are much like those of *F. flava*, but slightly larger.

Color of soft parts of the orange type, chiefly evident on the foot, mantle-margin, and adductor muscles. However, this color is not very intense, often very pale orange, and in young specimens the soft parts are sometimes whitish. The gonads are red, and so are the eggs and placentae, from pink to bright crimson; in some cases they are pinkish-orange.

This group undoubtedly represents, in the upper Tennessee, the *flava*-group of the interior basin.

FUSCONAIA EDGARIANA (LEA), F. EDGARIANA ANALOGA (ORTM.). (See: *F. cor* and *cor analoga*, Ortmann, l. c., pp. 532–533).

Most of the specimens preserved in alcohol represent the flat headwaters-form (*analoga*), but I have a sterile female (Anderson Co., Tenn.), which is the swollen typical form.

Gravid females: May 13, 14, '13; July 5, 7, 8, '13. Of those preserved none happened to have glochidia.

Soft parts identical with those of *F. cuneolus*, and with those of the *flava*-group in general. Color in most cases deep orange, chiefly so foot and adductors. I never found specimens with whitish soft parts, and only a few are marked: pale orange. Gonads, eggs and placentae rarely pink, mostly intensely crimson.

FUSCONAIA BARNESIANA (LEA) and varieties. (See: l c., p. 534 ff.).

The anatomy of this group has been described previously. (See: NAUTIL. 31, '17, pp. 61, 62.)

LEXINGTONIA DOLABELLOIDES (LEA), L. DOLABELLOIDES CONRADI (VANATTA). (See: l. c., pp. 545, 546.)

Gravid females: May 11, 13, '13; July 5, 7, 9, 10, 13, '13. *Glochidia:* May 13 and July 5 (tachytictic).

All gravid specimens belong to the compressed headwaters-form (*conradi*), but I have examined the soft part of males and

sterile females of the swollen form (*dolabelloides*) of the lower Clinch and the French Broad Rivers.

The structure of the soft parts is identical with that of *Lexingtonia subplana* (*Conr.*). (See: Ortmann, NAUTIL. 28, '14, p. 28.) It differs from that of the genus *Pleurobema* chiefly in the cylindrical placentae of deep red color.

Anal and supraanal openings separated by a short mantle connection, which is sometimes absent (torn?). Branchial opening with papillae, anal with crenulations. Posterior margins of palpi connected at base. Gills broad, the inner somewhat broader than the outer. Inner lamina of inner gills free from abdominal sac except at anterior end. Outer gills marsupial; when charged very little swollen. Placentae well developed, of subcylindrical shape.

Glochidia, in the specimens preserved, all unripe, but in one of them, collected on July 5, they were sufficiently formed so as to permit examination of shape and measurements. They are subelliptical in outline, higher than long, L. 0.16, H. 0.13 mm.

Color of soft parts orange, in most cases very intensely so, chiefly the foot, adductor muscles, and mantle-margin. Rarely the soft parts are paler, and occasionally they are whitish in young specimens. Among the larger gravid females in one only the shell is marked; "pale, marsupium cream;" but the specimen clearly belongs here, as is shown by the subcylindrical placentae. Gonads, eggs and placentae generally deep red, but in a few cases, the gonads have been marked as "orange," and in a few other cases the marsupium has been marked as "pink" or "cream color." However, in two males of the swollen form from French Broad River, the soft parts were pale. This is a remarkable exception, and quite interesting in so far as also other Naiades which the normally tinted tend to assume paler color of the soft parts in French Broad River.

According to the soft parts this species is a *Lexingtonia*. I have (l. c.) mentioned the beak-sculpture of *L. subplana* as a possible additional character of this genus. In the present species this consists of a number (six to eight) of fine, rather crowded, irregular, and wavy bars, distinct only anteriorly,

becoming indistinct and effaced in the middle part. Posteriorly, upon the posterior ridge, there are a few (two to three) low, indistinct tubercles, which show no connection with the anterior bars. Thus, anteriorly, the beak-sculpture resembles that of *L. subplana*, but posteriorly it is different in the development of low tubercles.

The description of the shell, as given l. c. for the genus, should be slightly modified so as to include this species. This refers chiefly to general shape and color pattern of the shell (rays breaking up into blotches).

PLEUROBEMA OVIFORME (CONRAD), P. OVIFORME ARGENTEUM (LEA), P. OVIFORME HOLSTONENSE (LEA). (See: Ortmann, l. c., '18, pp. 550 ff.)

I have described the anatomy of the flat headwater-form (*argenteum*) under the incorrect name of *P. fassinans*. (See: NAUTIL. 28, '14, p. 31.) *Gravid females* belonging to this have been collected on the following dates: May 11, '13; May 12, '15; May 13, 14, 15, 16, 20, '13; May 20, '15; July 5, 7, 8, 9, 10, 13, 14, '13. *Glochidia* have been secured on May 11, 15, 20, and July 8 and 9. This is a tachytictic form, breeding from May to July.

Soft parts of the typical *Pleurobema*-structure, much like that of *P. clava* (Ortmann, Ann. Carn. Mus. 8, '18, p. 234). Mantle-connection between anal and supraanal openings short, sometimes absent. Anal with very fine papillae, branchial with larger papillae. Posterior margins of palpi connected for $\frac{1}{8}$ to $\frac{1}{2}$ of their length. Inner lamina of inner gills free from abdominal sac, except at anterior end. In the female, the outer gills alone are marsupial. When charged, the placentae are rather distinct, but less so when glochidia are present. They always are lanceolate and compressed, never subcylindrical. *Glochidia* subelliptical, almost subcircular, about as high as long, L. and H. 0.16 mm. (much like those of *P. clava*). Sometimes they are slightly higher than long, L. 0.15, H. 0.17 mm. (So in specimens from Chickamauga Creek, Ringgold, Ga.)

Color of soft parts whitish, often with the foot yellowish, pale brown, or pale orange, rarely also mantle-margin and adductors

pale orange or orange-brown. The eggs and placentae are whitish, cream color, pale yellow, but in most cases of a peculiar and characteristic pale orange, and also the gonads of the female often have the same color. These colors agree with those of *P. clava*, but incline more frequently to the pale orange type. It should be remarked, however, that all specimens from Little River, Blount Co., Tenn. (about a dozen) represent a peculiar color variety. The structure of the soft parts is entirely normal, but the color is of the orange type, and the placentae are bright red (in over half a dozen gravid females). The shells of these specimens do not at all differ from those of the form *argenteum* as found in Virginia, except that the color markings of the epidermis are absent, and that the latter is comparatively dark (brown to black-brown). However, all of my specimens of this form are rather large. One of my females from Chickamauga Creek had pink placentae, the others had them cream color, as is normal.

Of the *typical P. oviforme* (form of the rivers of medium size), *gravid females* have been found on May 11, 13, '13; May 20, 25, '14; July 5, 7, 9, 10, 13, '13. Glochidia are at hand from July 5.

The anatomy is exactly like that of *P. oviforme argenteum*, as described above, and the glochidia have the same shape and size (0.16 mm.).

Color of the soft parts whitish, inclining on foot and mantle often to yellowish-brown or pale orange. Ova and placentae white, more rarely cream color or pale orange. Thus, in color, this form more closely resembles *P. clava*.

Of the *swollen* type, *P. oviforme holstonense*, I have found only few specimens. No gravid females have been secured, but sterile females and males. The anatomy is exactly as in typical *oviforme*.

Note. Lexingtonia dolabelloides conradi, chiefly in young specimens, often resembles the typical *P. oviforme* in the shell. But in the color of the soft parts they are quite distinct, and the intensely orange tints seen in the former have never been observed in the latter. Gravid females of *P. oviforme* are recognized also by the light-colored placentae, which are not quite so solid a

in *Lexingtonia*, and have a lanceolate, compressed shape, so that the charged marsupial gills, even in young specimens, are considerably more swollen. The two species also differ in the beak-sculpture, which, in *P. oviforme*, consists of about four subconcentric, rather indistinct bars, which are slightly angular and nodulous upon the region of the posterior ridge; but there is no trace of the fine, wavy, and crowded bars seen on the anterior side of the beaks in *Lexingtonia*.

LASTENA LATA (RAFINESQUE). (Ortmann, l. c., p. 556.)

The description of the anatomy will be found in NAUTIL. 28, '15, p. 106.

LASMIGONA (ALASMINOTA) HOLSTONIA (LEA). (See: *Lasm. (Sulcularia) badia (Raf.)* (Ortmann, l. c., p. 557.)

The anatomy has been described in NAUTIL. 28, '14, p. 431.

Additional specimens have been obtained subsequently, confirming the previous account, and furnishing more complete records for the breeding season. *Gravid females* have been collected on Sept. 6, 7, '13; Sept. 8, 12, '15; Sept. 20, '12; and in spring on May 12, '14; May 18, '15. *Glochidia* have been found as early as Sept. 20; and on the two dates in May, discharge of glochidia was observed. Thus this species is bradytictic, breeding from September to May.

ALASMIDONTA (PRESSODONTA) MINOR (LEA). (See: l. c., p. 580.)

Anatomy, see Ann. Carn. Mus. 8, '12, p. 295, and NAUTIL. 28, '14, p. 46.

Also here additional material has been secured throwing more light on the beginning of the breeding season. Dates for *gravid females* are as follows: Sept. 2, 4, 5, '14; Sept. 6, '18; Sept. 9, 11, '15; Sept. 17, 20, '12. *Glochidia* have been observed on the last two dates. This places the beginning of the season in September.

ALASMIDONTA (DECURAMBIS) RAVENELIANA (LEA). (Ortmann, l. c., p. 561.)

I have collected a number of specimens of this species in Pigeon River, at Canton, Haywood Co., N. Car., on May 14,

'14. Of three males and four gravid females, all with glochidia, two of them discharging, the soft parts have been preserved. The breeding season thus ends in May.

The anatomy is the same as that of the genus *Alasmidonta*, as described previously (Ann. Carn. Mus. 8, '12, p. 297), also with regard to color (inclining to yellowish and orange tints). It should be mentioned that the inner lamina of the inner gills is, in two males and two females, entirely connected with the abdominal sac (as is the case in *A. marginata*); but in one male and two females, it is free in the posterior half or one-third of the abdominal sac. The specimens with the inner lamina partly free are the smaller ones.

Glochidia as usual, triangular, with hooks, about as high as long, L. and H. from 0.29 to 0.32 mm. Thus they are smaller than those of *A. marginata*, where the L. is 0.33, the H. 0.36 mm.

PAGIAS FABULA (LEA). (Ortmann, l. c., p. 562.)

Anatomy described in NAUTIL. 28, '14, p. 65. *Gravid females*, with *glochidia*, were at hand, collected on Sept. 17, '12. An additional gravid female, with eggs, has been found on Sept. 7, '13. This indicates the beginning of the breeding season in September.

PTYCHOBRANCHUS SUBTENTUM (SAY). (See: *Ellipsaria subt.*, Ortmann, l. c., p. 564.)

The soft parts have been described in Ann. Carn. Mus. 8, '12, p. 308, fig. 5. Many specimens have been secured subsequently, confirming this account. It should be added that large females show that the folds of the marsupium are more numerous, and occupy nearly the whole outer gill.

Gravid females have been found frequently from Sept. 5 to Sept. 21, but with eggs only, indicating the beginning of the season; on May 20, '13, females discharging placentae with glochidia have been observed, indicating the end of the season.

DROMUS DROMAS (LEA), D. DROMAS CAPERATUS (LEA). (l. c., p. 566.)

Anatomy: Ann. Carn. Mus. 8, '12, p. 315, figs. 18, 18a, 18b. The soft parts of the var. *caperatus* are absolutely identical

with those of the main species. The color of the marsupium is mostly red, more rarely white.

Gravid females of the variety have been found on Sept. 7, 8, '14; Sept. 16, 17, 21, '15, mostly with eggs, but already on the earliest date a specimen with *glochidia* was seen. The latter have the same shape as those of the main species, L. 0.18, H. 0.09 mm.

ACTINONAIAS PECTOROSA (CONRAD). (l. c., p. 569.)

Anatomy: Ann. Carn. Mus. 8, '12, p. 325 (as *Nephronaias perdix*).

Gravid females have been found on Sept. 11, 15, '13; Sept. 15, '15; Sept. 17, '12; Sept. 17, '13, all with eggs. *Glochidia* have been found on May 12, '13, and May 20, '14, being discharged on the last date. Thus the breeding season is from September to May.

CARUNCULINA MOESTA (LEA). (See: *Toxolasma lividum* (*Raf.*) Ortmann, l. c., p. 578.)

This form is the upper Tennessee representative of *C. glans*, but I have a set of an absolutely identical form from the Ozark region (James River, Galena, Stone Co., Mo., collected by A. A. Hinkley), recorded by Hinkley (Proc. U. S. Mus. 49, '15, p. 588) as *Lampsilis glans*, and I shall include these specimens in the following report.

I have described (NAUTIL. 28, '15, p. 142) the anatomy of a sterile female of *C. glans*. Among the specimens of *C. moesta* from the Ozarks, there are males, sterile females, and one gravid female with glochidia, collected July 30, '14. From the upper Tennessee region, I also have males and sterile females, and a gravid female with glochidia, the latter collected on May 16, 15.

Thus the breeding season of this form is rather obscure. We should expect it to be bradytictic, and the specimen collected in May would agree with this. However, the presence of glochidia at the end of July appears strange; this specimen was discharging, and it might be a case of belated discharge. On the other hand, the beginning of the preceding season can not fall very early in autumn, for among a considerable number of

females found by myself on Aug. 31, '14, not a single gravid one turned up. Wilson and Clark (Bur. Fisher. Doc. 758, '12, p. 48) report glochidia in July for *C. glans*.

All specimens examined have the same anatomical structure agreeing with that of *C. glans*. The caruncle of the mantle-margin generally is brown, lighter or darker, varying to white or blackish. Its shape is short subcylindrical or hemispherical. The edge of the marsupium has black-brown pigment. The *glochidia* are subovate, higher than long, L. 0.17 to 0.18, H. 0.19 to 0.20 mm., thus agreeing with those of *C. parva*, as described previously (NAUTIL. 28, '15, p. 181).

CONRADILLA CAELATA (CONRAD). (See: *Lemiox rimosus* (*Raf.*). Ortmann, l. c., p. 574.)

Anatomy: see NAUTIL. 30, '16, p. 39. The nomenclature will be discussed elsewhere. The new generic name *Conradilla* takes the place of *Lemiox Raf.*, used in the publications referred to.

MEDIONIDUS CONRADICUS (LEA). (See: *Medionid. plateolus* (*Raf.*) Ortmann, l. c., p. 575.)

Anatomy: see Ann. Carn. Mus. 8, '12, p. 335, fig. 22, and NAUTIL. 28, '15, p. 142. A misprint in the latter paper should be corrected; the L. of the glochidium is 0.22 mm., not 0.28.

The breeding season is now rather well known; gravid females are found from the beginning of September (earliest date Sept. 6), and glochidia as early as Sept. 13; discharge of glochidia has been observed in numerous cases from May 11 to May 20.

EURYNIA (MICROMYA) PERPURPUREA (LEA). (Ortmann, l. c., p. 576.)

Anatomy: see NAUTIL. 29, '15, p. 68.

Immature glochidia have been found on Sept. 5, '18, mature ones on Sept. 21, '12.

EURYNIA (MICROMYA) NEBULOSA (CONRAD). (Ortmann, l. c., p. 577.)

Anatomy: see NAUTIL. 29, '15, p. 64.

Investigation of additional specimens has confirmed the char-

acters given previously. I have collected *gravid females* as early as Aug. 31. *Glochidia* were observed first on Sept. 2, so that the breeding probably begins toward the end of August. Discharge of glochidia has been seen from May 11 to May 24, and a single discharging female was found on July 5, probably exceptionally belated. My extreme measurements of the *glochidia* are: L. 0.21 to 0.23, H. 0.27 to 0.30 mm.

EURYNIA (MICROMYA) VANUXEMENSIS (LEA). Ortmann, l. c., p. 530.)

Anatomy: see Ann. Carn. Mus. 8, '12, p. 342, and NAUTIL. 29, '15, p. 65.

Earliest date for gravid females Sept. 2; for glochidia Sept. 17. Discharge from May 15 to May 25.

(The species of the genus *Truncilla* will be treated in a separate paper.)

MODIOLUS DEMISSUS DILLWIN, IN SAN FRANCISCO BAY.

BY G. DALLAS HANNA.

One of the supposedly accidental introductions of animal life from the east to the west coast of North America with the extensive attempts to transplant the oyster was the plicated mussel, *Modiolus demissus*. It was first recorded from the new location by Stearns in 1899 (NAUTILUS, XIII, p. 86) from specimens collected by R. N. Drake in 1894 at a point "3 miles north of Stanford University," that is, the southern part of San Francisco Bay. The record was repeated by the same author in April, 1900 (*Science*, n. s., XI, p. 658).

"Fine specimens" were again collected, apparently from the same colony, by Doe and Gifford, and recorded by Keep in April, 1901 (NAUTILUS, XIV, p. 115). In his "West Coast Shells," Revised edition, p. 37, 1911, the same author states, "It doubtless came to California with seed oysters which were planted in San Francisco Bay, where it may now be found in considerable numbers."

In his checklist Dall merely states that it is found on the oyster beds of the Bay (*Checklist of Recent Bivalve Mollusks of the N. W. Coast*, p. 18, 1916).

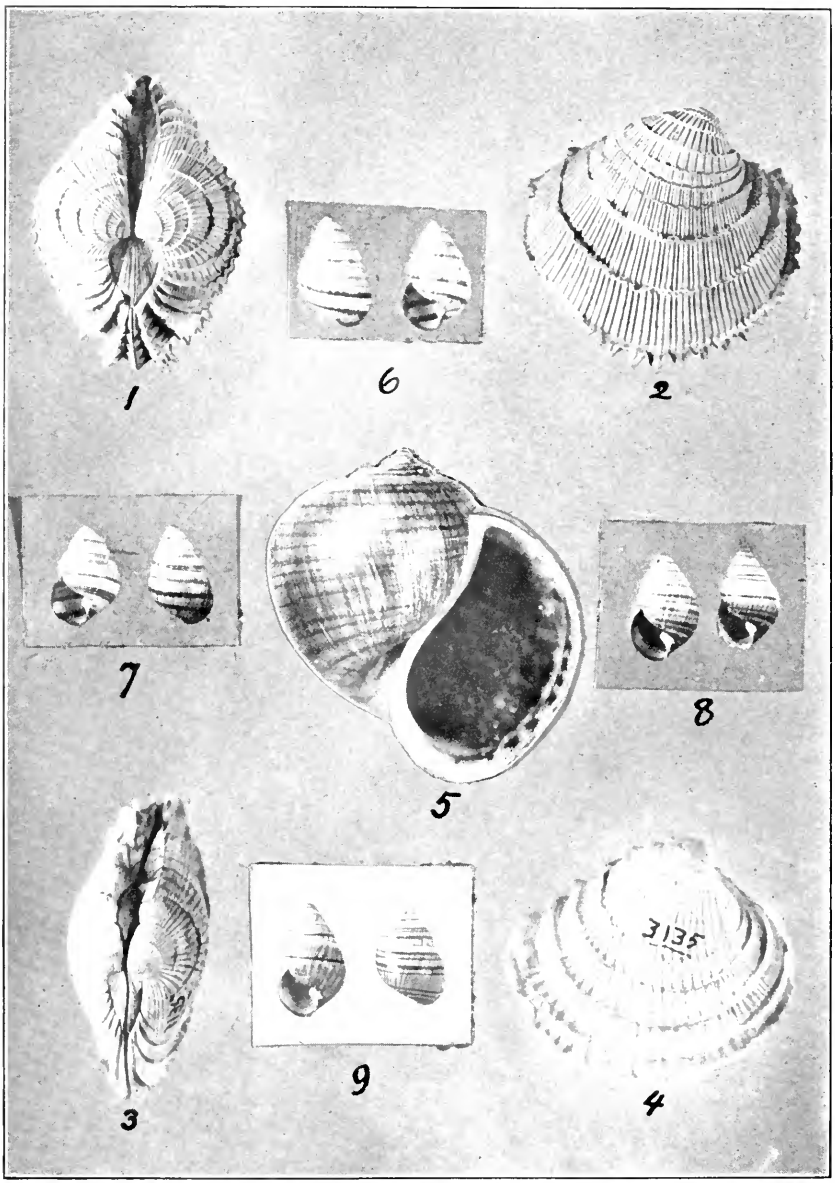
Packard (*Univ. of Calif. Publ. Zool.*, Vol. 14, No. 2, p. 257, 1918) states in his report on the mollusca obtained by the U. S. Bureau of Fisheries Survey of San Francisco Bay that, "Although it was not taken by the Survey it is reported to occur within the lower division of the Bay in sufficient numbers to be marketed occasionally."

The above is a review of all of the published records of the species on the west coast which are known to the writer. Mrs. Ida S. Oldroyd tells me she received specimens some years ago collected by Fred L. Button at Alameda. Henry Hemphill made wonderful discoveries during his extensive collecting on the eastern side of the Bay, among other things, the sand clam, *Mya arenaria*, but his collection does not contain a specimen of the plicated mussel from any west-coast locality. So it may be inferred that he did not find it.

Its extensive spread in the bay region however cannot be doubted. Through Mr. R. A. Coleman the California Academy of Sciences recently received 18 beautiful specimens of this mussel. They were taken at Bay Farm Island about one mile south of Alameda on the eastern side of the Bay. They were found living on the mud flats in very considerable numbers attached to the roots of *Spartina stricta maritima*, determined by Miss Alice Eastwood, locally known as wild rice. It is said to be occasionally brought into the markets from this locality.

Mr. Coleman states that the mussels were delicious eating. Many of the shells are over a hundred millimeters long and as much as fifty millimeters wide. The epidermis has a very high polish and the umbones have been only slightly eroded, in many cases none at all.

Those persons anxious to learn how long it takes to develop a variety, subspecies or species may well keep watch of *Modiolus demissus*.



1, 2. CHIONE GNIDIA B. & S.
3, 4. CHIONE MERIDIONALIS OLDROYD.
5. AMPULLARIA LATTREI CHAMANA HINKLEY (p. 53).
6–9. ACHATINELLA LEHUIENSIS MEINECKEI PILS. & COOKE.

A NEW PERUVIAN CHIONE.

BY IDA S. OLDROYD.

CHIONE MERIDIONALIS n. sp. Plate IV, figs. 3, 4.

Shell of medium size, somewhat triangular elongate, quite flat; concentrically laminated, the laminæ crenated, erect, ten in number, evenly spaced; interstices radiately ridged with fine ribs bundled in threes, evenly spaced. Ligamentary area very broadly excavated, with brown markings. Lunule narrow, elongate, faintly marked with brown and circumscribed by an incised line. Nymphs smooth, like young *C. gnidia*. Teeth smooth. Valve margins crenulate. Ligament inset, but showing externally. Color cream-white, with brown marking, interior white.

It is something like a young *C. gnidia* in sculpture, but the laminæ are not scalloped as in that species, and it is a small shell compared with that. It is elongate, while *C. gnidia* is ovate. The accompanying plate will show the difference in the two species. Figures 1 and 2 are *C. gnidia*.

Type locality, Peru. The type is in the University of California Museum, locality number 3135. One specimen is in the Stanford University collection.

LAND SHELLS OF SOUTHERN FLORIDA.

BY E. G. VANATTA.

The following species of land shells were picked from leaf-mould collected by Mr. Clarence B. Moore in Southern Florida during the winter of 1919 and 1920, at stations not recorded in THE NAUTILUS volumes XIX (1905), page 40; XXI (1908), page 99; XXVI (1912), pages 16, 31; XXXIII (1919), page 18.

All the records of *Bifidaria contracta* Say in those lists should be changed to *Gastrocopta contracta peninsularis* Pils., which differs from the typical *contracta* as indicated on page 17 of THE NAUTILUS, Vol. XXVI (1912).

Opeas pumilum Pfr. has not been recorded from Florida before.

Pumpkin Key, Lee County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Thysanophora plagioptycha (Shutt.).
Microceramus floridanus Pils.
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Polita indentata (Say).
Guppya gundlachi (Pfr.).
Euconulus chersinus (Say).

Shell Key (Gomez Old Place), Lee County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Liguus f. roseatus Pils.
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Guppya gundlachi (Pfr.).

Dismal Key, Lee County, Florida [THE NAUTILUS, XXI (1908), 100].

Opeas pumilum Pfr.

Buttonwood Key, Lee County, Florida [THE NAUTILUS, XXI (1908), 100].

Truncatella bilabiata Pfr.
Zonitoides minuscula (Binn.).

Watson's Place (a Key), Chatham River, Monroe County, Florida.

Polygyra c. carpenteriana (Bld.).
Gastrocopta rupicola (Say).
Zonitoides arborea (Say).
Zonitoides m. alachuana (Dall).
Zonitoides singleyana (Pils.).

Lopez Place (a Key), Monroe County, Florida.

Polygyra c. carpenteriana (Bld.).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Zonitoides m. alachuana (Dall).
Zonitoides singleyana (Pils.).

Hamilton Place, Lossman River, Monroe County, Florida.

Truncatella bilabiata Pfr.
Polygyra c. carpenteriana (Bld.).
Thysanophora plagioptycha (Shutt.).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Euglandina rosea (Fér.).
Guppya gundlachi Pfr.
Zonitoides arborea (Say).
Zonitoides m. alachuana (Dall).
Zonitoides singleyana (Pils.).

Lossman's Key, Monroe County, Florida [see NAUTILUS, XXVI (1920), 20].

Truncatella bilabiata Pfr.

Chevalier Place (a Key), Chatham River, Monroe County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Polygyra uvulifera (Shutt.).
Thysanophora selenina (Gld.).
Thysanophora plagioptycha (Shutt.).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Polita indentata (Say).
Euconulus chersinus (Say).
Zonitoides arborea (Say).
Zonitoides minuscula (Binn.).

Gopher Key, Monroe County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Polygyra uvulifera (Shutt.).
Thysanophora selenina (Gld.).
Thysanophora plagioptycha (Shutt.).
Microceramus pontificus (Gld.).
Liguus c. lossmanicus Pils.
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Polita indentata (Say).
Guppya gundlachi (Pfr.).
Zonitoides arborea (Say).
Zonitoides minuscula (Binn.).
Zonitoides singleyana (Pils.)

THE LEAPING RAZOR SHELL.

BY JAMES SHEPARD.

In making a tour throughout the length of Cape Cod in company with my daughter, C. Antoinette Shepard, we arrived at Wellfleet, Mass., on the afternoon of August 30, 1882. We had been on the beach but a short time when we beheld a sight such as we had never before witnessed. The tide was well out, and on the bare sand some rods from the water we noticed numerous small objects leaping up into the air from place to place and in various directions. We knew of nothing which would be likely to be moving about in that manner. Making our way hastily towards them, we found that those nearest to

us disappeared from sight. Consequently we proceeded more cautiously. Much to our surprise and delight these strange objects proved to be a colony of Razors (*Solen ensis*) roaming over the beach apparently having a frolic. By a strong and quick stroke of their foot they threw themselves up into the air and from place to place. They ascended something like two feet or more above the sand and leaped not less than three feet at one jump. Almost immediately after having landed on the beach at the end of one leap they leaped again, sometimes in one direction and sometimes in another. When their successive leaps were in the same general direction, as they most frequently were, they traveled over the beach about as fast as a person would ordinarily walk. We attempted to catch those which were the nearest to us, running for them as they were about to fall flat on the sand. They curved their foot downwardly, planting the end firmly in the sand and then by a straightening out of the foot rose from a prostrate to an upright position preparatory to boring a new burrow and sinking down into the sand with wonderful rapidity. They were so quick in their movements, that although we were with them for about two hours we were not able to catch hold of one before it had commenced boring into the sand. We succeeded in capturing a few, only a very few, without injuring the shell. These few we grasped when the end of the shell had penetrated the sand something less than one inch. In case the shell had penetrated the sand a full inch or more at the time we grasped them, it was impossible to pull one out without crushing the shell. In our several attempts to do so we not only crushed the shell but also tore the animal asunder, securing only a part of it while the rest remained in the sand.

I cannot state how many live Razors we saw that day, but there seemed to be no end of them. We could conceive of no reason as to why so many Razors were then out of their holes, other than that they came out of their own free will as I am confident that they did. But I find at least two scientific publications in which it is stated that "They never voluntarily leave their burrows." One English work is more conservative and probably correct in its statement that "the Solens rarely leave their burrows voluntarily."

I have never had the pleasure of seeing a live Razor excepting on my visit to Wellfleet.

SPECIES NAMED IN THE PORTLAND CATALOGUE: I, AMERICAN.

BY WILLIAM HEALEY DALL.

Daniel Solander, a pupil of Linnaeus, came to London in search of fortune, where he died in 1783, at the age of forty-seven years.

During his residence he was employed by Sir Joseph Banks to classify the Banksian Collection, afterward included in the British Museum. He also was engaged in arranging and classifying the conchological part of the remarkable collection gathered by Margaret Cavendish, Dowager Duchess of Portland. This collection is chiefly remembered by its connection with the funeral urn of Alexander Severus, then known as the Barbarini vase, purchased at the sale by the British Museum, renamed the Portland vase, later smashed by a precursor of the militant suffragettes, and wonderfully put together again from its fragments by patient work.

Solander named many nondescript shells in the Banksian Collection, and his manuscript furnished Dillwyn with many names or synonyms for his Catalogue of 1817.

After the death of the Duchess in 1785, her conchological collection, with other zoological, artistic, and historical items, was sold in the following year, and where Solander had named an undescribed species with reference to a figure in one of the earlier iconographies, this name is published in the catalogue prepared by an anonymous compiler and printed in April, 1786. Many of these names were afterward adopted, mostly without acknowledgment, by Bolten, Lamarck, and other later writers. The best known among the American species is our common *Unio complanatus*. The death of Solander before the publication of any of his new names leaves them dependent upon the Catalogue above mentioned and the citations of Dillwyn.

A few of the names are accompanied by a descriptive phrase,

but most of them depend for their status on the citation of figures.

The anonymous editor of the Catalogue added a few names on his own account and was apparently a conchologist of some note, but from his classification evidently not E. M. Da Costa. According to Dillwyn (1817) it was George Humphrey.

The following list comprises all the American species receiving names in the Catalogue. Those followed by an S are Solander's, the others are by the anonymous compiler. I have included the references to the figures which appear in the Catalogue.

It is curious that in the British Cyclopedia of Biography, in which so many nonentities find a place, no reference is made to the Duchess who was such a munificent patron of art, archaeology and science in her day.

The only typographical error to be noted in the work is the confusion by the printer of the names of Martini and Martyn, but the references make it clear in every case which is meant. None of these names are included in Sherborn's Index Animalium, 1758–1800.

Arca fusca S., p. 42, No. 1001, Jamaica, W. I. Gualtieri 87–G.

+*Arca fusca* Bruguière, 1789.

Buccinum monodon S., p. 17, No. 372, Tierra del Fuego. Also p. 139, No. 3093. Martyn, Un. Conch., f. 10.

=*Buccinum calcar* Martyn, 1784.

Buccinum neptuni S., p. 29, No. 668; p. 35, No. 859; p. 174, No. 3746. The West India Trumpet shell.

Murex tritonis Lin. *ex parte*, +*Tritonium neptuni* Bolten, 1798.

Buccinum testudo S., p. 98, No. 2148. Seba III, t. 70, f. 2–4.

+*Cassis inflata* Shaw, 1790.

Bulla vesicaria S., p. 136, No. 3030; p. 142, No. 3158. West Indies. Seba III, pl. 38, f. 46, 48.

=*Hydatina physis* L., 1758.

Cardium robustum S., p. 58, No. 1358; p. 162, No. 3517. Great American Cockle from Florida. Lister, Conch. 328, 165.

+*C. magnum* Born (not Linné), 1780, and *C. ventricosum* Bruguière, 1789.

Helix ovipara, p. 155, No. 3388; Surinam; p. 174, No. 3745, St. Vincent's.

a. Lister, 1055, I. =*Bulimus ovatus* Müller, 1774.

b. Lister, tab. 23. White margin to mouth.

=*Bulimus oblongus* Müller, 1764?

Helix picta, p. 182, No. 3900. Terrestrial shell from the West Indies. Rumphius, Thesaurus, 22, 1, 1739.

+*Helix picta* Born, 1780.

Helix undata, p. 177, No. 3802; p. 183, No. 3924. Lister, 76; Favanne, tab. 63, f. G 3.

+*Helix pellis-serpentis* Shaw, 1790, and *Solaropsis brasiliensis* Beck.

Mactra procera S., p. 24, No. 559. Great American Mactra from New York.

+*Heminactra solidissima* Dillwyn, 1817.

Murex plicatus S., p. 104, No. 2284. Falkland Islands (Not of Gmelin, 1792). Favanne, tab. 79, f. I.

+*Trophon patagonicus* Orbigny, 1841, as *Murex*.

Mya complanata S., p. 100, No. 2190. Maryland. Lister, 150, 5.

=*Unio complanatus* S.

Ostrea grandis S., p. 50, No. 1186; p. 99, No. 2168. Great American compass Pecten from Halifax, North America.

+*Pecten magellanicus* Gmelin, 1791–2.

Ostrea elongata S., p. 55, No. 1303; p. 151, No. 3312. Purple spot oyster from Virginia.

+*Ostrea virginica* Gmelin, 1791–2.

Solen plebeius S., p. 42, No. 1005 (bis). Barbados. Lister, Conch. 421, f. 265.

+*Tagelus gibbus* Spengler, 1794.

Tellina cruenta S., p. 58, No. 1360. Knorr, VI. t. 12, f. 1.

+*Sanguinolaria sanguinolenta* Gmelin, 1791–2.

Tellina marginalis S., p. 137, No. 3049. Lister, Conch. 387.

=*Tellina laevigata* Linné, 1758.

Trochus alveolatus S., p. 52, No. 1240. Beehive snail. Lister, Conch. 62, 60. Jamaica.
=*Helix epistylium* Müller, 1774.

Venus nimbosa S., p. 175, No. 3761. Florida. Favanne, t. 49, f. I1.
+*Macrocallista gigantea* Gmelin, 1791–2.

Voluta ancilla S., p. 84, No. 1873; p. 137, No. 3061. Straits of Magellan. D'Avila, I, pl. 8, f. s.

Voluta angulata S., p. 76, No. 1711. Martini, Conch. Cab. IV, f. 1325.
+*Turbinella scolymus* Gmelin, 1791–2.

Voluta brasiliana, p. 186, No. 3958. Brazil. Large undescribed species with only two plaits on the column.
+*V. brasiliana* Lamarck, 1811.

Voluta muricata S., p. 142, No. 3142. West Indies. Lister, Conch. 810, 19.
+*Turbinella muricata* Born, 1780.

Voluta virescens S., p. 26, No. 610; Guinea; p. 136, No. 3020; p. 174, No. 3751. Martini, Conch. Cab. III, f. 942, 933.
+*Voluta polygonalis* Lamarck, 1811, *fide* Pfeiffer.

COLLECTING AT NAHANT BEACH, MASS.

BY LILLIAN DYER THOMPSON.

Nahant Beach, very often incorrectly called Lynn Beach, lies just the other side of the boundary line between Lynn and Nahant. This beach is in the shape of an extremely large crescent, and is of the finest quality of sand. On this beach, which fronts the ocean, I collected eleven species one afternoon, while in the rock pools of Little Nahant which tip one end of the beach, we found eleven other species. The rock pools we visited are exactly opposite Egg Rock, and are on the Atlantic side of Little Nahant. In these rock pools I have found many

varieties of crabs and sea anemones, besides many species of mollusks.

The following is a list of species collected on the beach and in the tide pools. Those with the asterisk were found dead.

On the Beach.

Neptunea decemcostata Say.*
Polinices heros Say.
Polinices duplicata Say.*
Alectrion trivittata Say,*
Colus stimpsoni Morch.*
Buccinum undatum Linn.*
Ensis directus Conr.
Modiolus modiolus Linn.*
Solemya borealis Totten* (perfect).
Cyprina islandica Linn.*
Spisula solidissima Dillw.*
Siliqua costata Say.*
Tellina tenera Say.*
Petricola dactylus Sowerby.*
Lyonsia hyalina Conrad.*

In the Rock Pools.

Litorina littorea Linn.
Litorina palliata Say.
Litorina rudis Donovan.
Lacuna vincta Montg.
Thais lapillus Linn (banded and plain).
Acmaea alveus Conrad.
Acmaea testudinalis Müll.
Crepidula fornicata Linn.
Saxicava arctica Linn.
Mytilus edulis Linn.

WILLIAM WILDER.

We regret to record the death of Mr. Wilder in Honolulu, July last. For some years he had been collecting Hawaiian land shells, especially the tree shells, Achatinellidae and Auriculella, and had brought together a valuable collection. Mr. Wilder is shown collecting Achatinellas in a photograph by Irwin Spalding, published in NAUTILUS for July last, Plate II. We understand that his collection will be secured for the Bishop Museum, Honolulu.—H. A. P.

THE LAND MOLLUSKS OF THE BELGIAN CONGO.*

BY T. D. A. COCKERELL.

The American Museum of Natural History has issued a series of reports on its Congo Expedition, all characterized by fullness of treatment and abundant and beautiful illustrations. Other similar reports are in course of preparation. The completed series will constitute a guide to the zoology of equatorial Africa, full of interest for the general naturalist and evolutionist, as well as for specialists in the several departments. Among these reports one of the most interesting is that on the Land Mollusks, by Dr. Pilsbry. The presentation of the subject is so clear and complete, and the illustrations are so good, that the reader has no difficulty in understanding the characters of the fauna, though he may have known very little about it before. To one accustomed to the mollusks of America or Europe, the tropical African series seems to belong to another world. Even when there is a certain similarity of form, as among the Helicidæ, the anatomy shows that we are dealing with strange generic types. The closest affinity is of course with the fauna of the Oriental region, yet even that is remote, although some doubtless very ancient genera range through tropical Asia and Africa. There is here a rather close parallel between the distribution of the land mollusks and the fresh-water fishes. Certain genera of fishes, but with distinct species, occur in the fresh waters of India and of tropical Africa, but the latter region has many remarkable types of its own, in some cases much more allied to neotropical genera than to anything in India. It is evident that Africa, the land of the okapi and the tsetse fly, is a storehouse of ancient groups of animals, some of which at least, were formerly much more widely spread. While we thus emphasize the probable antiquity of various African groups or genera, we find remarkable specific diversity, apparently indicating that

*Henry A. Pilsbry. A Review of the Land Mollusks of the Belgian Congo, chiefly based on the collections of the American Museum Congo Expedition, 1909–1915. Bulletin American Mnseum of Natural History, Vol. XL, p. 370, 23 plates (8 colored), 1919.

the evolutionary process has been active during the latest geological periods. While the Belgian Congo has of course been only very imperfectly explored for land mollusks, about 500 localities are represented, and about 390 species and races have been found. Of these 390 forms, I find 214 reported from one locality only. The case is even stronger than these figures suggest, as when two or more localities are given, they are often only short distances apart, or perhaps in some cases different names for essentially the same place. Again, of 214 species and subspecies in the collection reported on, 160 required new specific, racial or varietal names. When we consider the amount of specific and racial diversity thus indicated, making full allowances for our imperfect knowledge of the distribution of the recorded species, it becomes evident that the total existing fauna must amount to some thousands at least.

It is well known that the high mountains of tropical Africa are inhabited by certain organisms, especially plants, very closely related to Palæarctic species. In the case of the plants, at least, it is possible that the seeds were brought by birds. Among the mollusks, it is interesting to find a *Vitrina* high up on Mt. Ruwenzori, near the line of perpetual snow. But after all this is not a typical *Vitrina;* it differs in the less extensive mantle, the sculpture of the shell, and in the teeth. Dr. Pilsbry accordingly establishes for it a subgenus *Calidivitrina*,—the name rather unfortunately chosen, since it is not an inhabitant of the hot lowlands. On comparing the Congo mollusks with those of tropical Asia, some puzzling questions arise. Thus among the slugs there are such similarities that Godwin-Austen formerly placed both African and Indian species in his genus *Africarion*. He now agrees that the Indian slugs constitute a quite distinct genus (*Pseudaustonia*), and it seems at least probable that the Indian series has undergone an evolution similar to, but quite independent of, the African. These conclusions could never have been reached without a study of the soft anatomy, and thus we are led to treat with some caution those cases of similarity among the smaller shells, the anatomy being unknown. There is, for example, a striking resemblance between some of the African and Oriental species of the *Gulella*

species, but they may well represent independent developments, especially since they also superficially resemble Pupillidæ, to which they are not at all related. Thus the tendency of modern research will probably be to emphasize rather than diminish the separateness of the Ethiopian fauna.

It is rather a shock, at first, to see the African slugs heretofore called *Veronicella* or *Vaginula* referred to *Lævicaulis* and *Pleuroprocta*, names proposed several years ago by Simroth. It can hardly be doubted, however, that the Veronicellidæ must be held to include a number of genera, in spite of the great external similarity. Dr. Pilsbry is in error, I think, in calling the family Vaginulidæ, on the stated ground that the type of *Veronicella* has not been rediscovered. As a matter of fact the actual specimen described by Blainville is still to be seen in the British Museum, as was explained in Conchologist, 1893, pp. 43–44. It was collected by Sloane in Jamaica, and is properly called *Veronicella sloanii* (Cuvier).

PUBLICATIONS RECEIVED.

THE JOURNAL OF CONCHOLOGY, Aug., 1920, Vol. 16, No. 4.

Census Authentications. By the late W. D. Roebuck, p. 101.

"Ground" Clausilias. By Rev. A. H. Cooke, p. 102.

Note on Conus chytreus Melvill. By A. T. Hopwood, p. 103.

Notes on Kentish Mollusca. By H. C. Huggins, p. 104.

The Land and Freshwater Mollusca of Audruicq, Pas-de-Calais. By Jno. W. Taylor, pp. 106–117.

Editorial Notes, p. 125.

The Non-marine Mollusca of Llandudno and District. By H. Beeston, pp. 128–132.

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON, Sept., 1920, Vol. 14.

Notes on Marginella guttula Sowerby. By John Shirley, p. 51.

Presidential Address—The Armature of Land Mollusca. By G. K. Gude, pp. 52–73.

Note on Xylophaga praestans Smith. By J. R. LeB. Tomlin, p. 73.

Concerning Edenttellina. By Charles Hedley, pp. 74–76. *E. corallensis* n. sp., p. 76, figs. 6–8.

Nomenclatorial Notes Relating to British Non-marine Mollusca. By A. S. Kennard and B. B. Woodward, pp. 77–90.

The Anatomy of two species of Helicarion from Tropical Africa. By Hugh Watson, pp. 91–118, pls. 3 & 4. *H. cryptophallus* n. sp., p. 97, pl. 4.

Mitra burnupiana n. sp., from South Africa. By Rev. A. H. Cooke, p. 114.

Note on the dates of publication of the earlier parts of Captain Thomas Brown's Illustrations of the Conchology of Great Britain and Ireland. 2nd edition. By Alexander Reynell, p. 116.

Correlation of Shape and Station in Freshwater Mussels (Naiades). By A. E. Ortmann. (Proc. Amer. Phil. Soc., 1920, Vol. 19, pp. 269–312.) The author has ascertained "that the more obese (swollen) form is found farther down in the larger rivers, and passes gradually, in the upstream direction, into a less obese (compressed) form in the headwaters; with the decrease in obesity often an increase in size (length) is correlated; a few shells which have in the large rivers a peculiar sculpture of large tubercles, lose these tubercles in the headwaters." The observations were made in the headwaters of the Ohio and Tennessee Rivers.

Variation in Nacreous Color of Certain Species of Naiades Inhabiting the Upper Ohio Drainage and their Corresponding Ones in Lake Erie. By N. M. Grier (Amer. Midland Nat., 1920, pp, 211–243, Vols. 2–3). In a summary the author says "In practically all the species dealt with a change in nacreous color is observed going down stream from the headwaters to the mouth. . . The shells of L. Erie have a greater

proportion of blues among them than the corresponding shells in the Upper Ohio Drainage.

Light Production in Cephalopods. By S. Stillman Berry (Biol. Bull., 1920, Vol. 28, pp. 141–195). An Introductory Survey.

Notes on Some Undescribed Californian Helices. By S. Stillman Berry (Proc. Cal. Acad. Sci., 4 ser., Vol. 10, pp. 53–70, pls. 4–6, 1920). Five new subspecies of Epiphragmophora are described and figured.

Fossil Mollusks from the John Day Basin in Oregon. By G. Dallas Hanna (Univ. Oregon Publication, Vol. 1, No. 6, 1920). Two new species are described and figured.

Report of Cephalopods Collected During 1906 by the U. S. Bureau of Fisheries Steamer "Albatross" in the Northwestern Pacific. By Madoka Sasahi (Prac. U. S. Nat. Mus., Vol. 57, pp. 163–203, pls. 23–26, 1920). The paper contains descriptions of 18 new species, three new genera *Watasella*, *Chunella* and *Gonatopsis*, and two new families *Watasellidae* and *Eledonellidae*.—C. W. J.

A Monograph of the East American Scaphopod Mollusks. By John B. Henderson (U. S. Nat. Mus., Bull. III, 1920, pp. 1–177, pls. 1–20). This excellent monograph is based upon the material contained in the National Museum, including much dredged by the author, together with the American Scaphopods of the Philadelphia Academy and the Mus. Comparative Zoology. Practically all of the East American material extant has therefore been studied. The classification is that of Pilsbry and Sharp, with the addition of a new subgenus of *Cadulus*: Platyschides, type *C. grandis* Verrill.

The specific distinctions of these simple shells are worked out with admirable clarity, in the descriptions and keys for determination. All of the species and subspecies are illustrated. 98 species, about one-third of them new, with numerous sub-

species, are recognized. In the Introduction a historical sketch is given, and an interesting account of the geographic distribution.—H. A. P.

NOTES ON A COLLECTION OF SHELLS FROM TRINIDAD, CALIFORNIA. By Eric Knight Jordan (Proc. U. S. Nat. Mus., Vol. 58, pp. 1–5). Two new species of *Odostomia*, *O. euglypta* and *O. edmondi*, are described.

A NEW FRESHWATER MOLLUSK FROM INDIANA. By Bryant Walker (Proc. U. S. Nat. Mus., Vol. 57, p. 525). *Ferrissia bartschi*, from Lake Maxinkuckee.

NOTES.

TAPES PHILIPPINARUM IN THE HAWAIIAN ISLANDS. My information concerning *Tapes philippinarum* differs much from Bryan's in NAUTILUS, XXXII, p. 124. A Japanese now living in Honolulu has twice planted this bivalve on the mud flats at Moanalua on Oahu. The first planting did not survive long; the second maintained itself in fine shape up to the present day, when they are abundant enough to be gathered and put on sale in the markets. They are frequently imported from Japan to Honolulu by the barrel for sale among the Japanese. I send you some of these imported shells.—D. THAANUM.

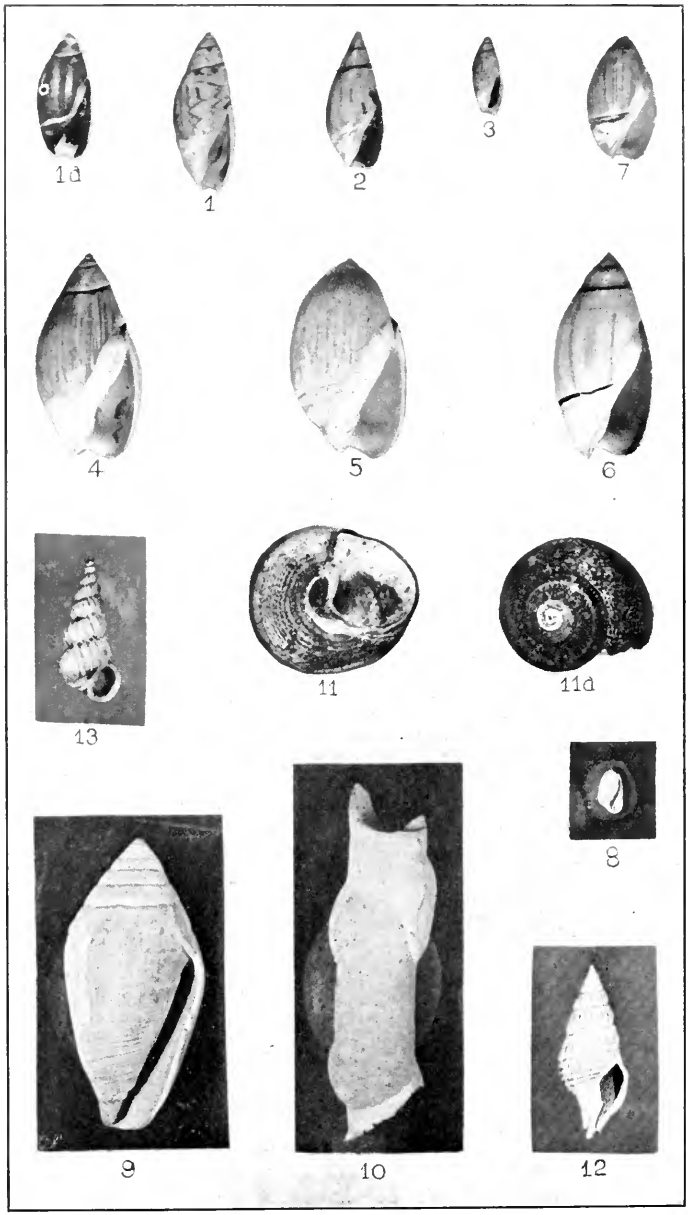
M. EUGENE AUBOURG DE BOURY died on April 17, in France, at the age of sixty-three years. A correspondent writes that M. de Boury, though a long-time invalid, had devoted himself with ardor to the study and collection of mollusks of the genus *Scalaria*. He gathered in the last ten years an extraordinary collection of these beautiful and rare shells for the Paris Museum of Natural History, increasing their series from 300 sets to 3000, exclusive of photographs and illustrations of inaccessible species to the number of 1800 more. This series far surpasses any other extant. He published numerous papers on the genus and indicated many new subdivisions of it, but the great monograph which was his ideal must remain for other hands to prepare.—(*Science.*)

LAND SHELLS OF CHOKOLOSKEE KEY AND CAPE SABLE, FLORIDA.—Have just run across a big lot of *Liguus* and *Oxystyla* that Simpson sent me 3 or 4 years ago and in cleaning them up I shook a small amount of dirt out of a bunch from Chokoloskee Key which yielded the following species. You will note that only two of them are in Vanatta's list, NAUTILUS, XXI, p. 100.

Chondropoma dentatum (Say).
Truncatella caribaeensis "Sby." Rve.
Truncatella bilabiata Pfr.
Lucidella tantilla (Pils.).
Thysanophora inaguensis (Weinl.).
Thysanophora plagioptycha (Shutt.).
Gastrocopta contracta (Say).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Varicella gracillima floridana Pils.
Euglandina rosea, near *parallela* (Binn.).
Polita dalliana ("Simp." Pils.)? juv.
Guppya gundlachi (Pfr.)? juv.
Zonitoides arboreus (Say).
Zonitoides minusculus (Binn.).
Oxystyla floridensis Pils.

The most interesting of the lot is *Lucidella tantilla;* there is one perfect adult, three fresh shells that have been bitten in half by some rodent (?), several other fragments and three young. As I only had enough dirt to about fill a 2×3 tray you can see it was quite rich. I have noticed that *Lucidella tantilla* appears to be a favorite food with some beast that bites them fairly in half. *Gastrocopta rupicola* is frequently treated in the same way, but it is so common that it does not make so much difference.

Three miles east of Cape Sable, Simpson collected *Oxystyla floridensis* and some *Liguus* that I take to be *solidus*, although they are all very thin. They are all dead, but the yellow banding of *solidus* shows on some of them very plainly.—GEORGE H. CLAPP.



OLDROYD: PLEISTOCENE MOLLUSKS AND WESTERN OLIVELLAS.

THE NAUTILUS.

Vol. XXXIV APRIL, 1921. No. 4

A NEW ACHATINELLA FROM OAHU.

BY HENRY A. PILSBRY AND C. MONTAGUE COOKE.

Achatinellæ of the typical section are very abundant in some spots on the Waianae Range. It is in fact the only place in Oahu where the collector finally has to stop picking, gorged with shells, while the bushes still hang full of them. One feels like Sindbad in the Valley of Diamonds. Snails of the section *Achatinellastrum*, however, are the greatest rarities. All that have been found up to 1920 could almost be counted on the fingers. *A. lehuiensis* Gul., and *A. lehuiensis gulickiana* P. & C., one specimen of each. *A. thaanumi* P. & C., two specimens; of *A. spaldingi* a few hundreds, but all from a very small area. The localities of these are widely scattered along the northern side of the range, just within the forest limit so far as known; each species in a single place.

Mr. W. H. Meinecke had the good fortune to find another form which we rank as a sub-species of *A. lehuiensis*, though its locality is remote from Lihue, the localities of *A. thaanumi* and *A. spaldingi* lying between them. The new subspecies, however, was taken in some abundance.

ACHATINELLA LEHUIENSIS MEINICKEI. Pl. 4, figs. 6–9.

The shell differs from *A. lehuiensis* by the wider, more capacious form. In color it is polymorphic. The pattern selected

as typical, pl. 4, fig. 9, fig. 8, left, has the last whorl closely streaked with rood's brown, cinnamon and pale pinkish buff, the former predominating, crossed by several darker, burnt umber, spiral bands and lines. A band below the suture white. This pattern fades on the penult whorl, leaving the upper part of the spire and the apex white. In some specimens the streaks are more or less diluted, pl. 4, fig. 7, to the point of disappearing, forming transitions to the following. The second main pattern, pl. 4, fig. 6, has a cartridge-buff ground, a sutural band and the spire white; streaks faint or wanting, but there are two dark bands, weakly interrupted, at periphery and on the base; sometimes a third below the subsutural white band. This is much the coloring of *A. spaldingi.*

The columellar fold is rather thin and situated high. The aperture shows the banding vividly within. Outer lip quite thin.

Fig. 9, right. Length 15, diam. 9.6, aperture 7.8 mm.; $5\frac{3}{4}$ whorls.

Fig. 9, left. Length 15.2, diam. 8.3, aperture 7.7 mm.

Fig. 8, left. Length 14.5, diam. 9.5, aperture 7.9 mm.

Waianae mountains in Haleauau valley, where the trail ascending Kaala leaves the stream. Cotypes in collections A. N. S. Phila., Bishop Museum and W. H. Meinecke.

A. spaldingi is quite distinct from the light form of *meineckei* by its texture, dull surface, etc. *A. thaanumi* stands nearer to *lehuiensis* and *meineckei*, the unstreaked pattern of the latter approaching it; yet at present *thaanumi* appears distinct by its coloration and rather solid, smooth shell.

Mr. Meinecke's account of the finding of these shells follows.

HUNTING ACHATINELLA MEINECKEI AND PARTULINA DUBIA IN THE WAIANAE MOUNTAINS, OAHU.

BY WILLIAM H. MEINECKE.[1]

On Dec. 27, 1918, I took a tramp to Mt. Kaala, Oahu, from Schofield Barracks (Leilehua). . . . On the way up, at the first

[1] Letter to H. A. P.

timber, I collected a number of specimens of *Achatinella mustelina* and accidentally found one plain *Partulina dubia*, the first I had ever collected on the north side of the Waianae Range. On Dec. 29, 1918, I returned for more, and found a few plain ones a few yards away from the trail and less than fifty yards from Haleauau stream bed. A scant hundred yards farther up the trail, under the bark and in knot holes of the smooth-leaved lehua trees growing *within arm's reach of the very trail*, I found several fine specimens of dark, banded *P. dubia*, very similar to those which I had found in Waimano Valley, above Pearl City, Koolau Range, in 1913. In spite of careful and persistent hunting, they could be found only within a very small area, less than a hundred feet in extent. They were all within fifteen feet of the ground, most of them not more than five feet off the ground.

I showed them to Mr. Irwin Spalding, who said that they were the most distinctly banded *dubia* he had ever seen; but I think that those which I collected in Waimano Valley, above Pearl City, Koolau Range, in 1913, are more distinctly banded, and in some specimens even darker. At the first opportunity, Jan. 5, 1919, I took Mr. Spalding up to the locality and we managed to find a few more specimens in a knot-hole which I had not searched quite thoroughly. Most likely you have seen those specimens in Mr. Spalding's collection while you were here last summer.

No further visits were made by me till June 13, 1920, when I went alone again and managed to find four more excellent specimens of banded *dubia*, in the same locality. A scant hundred yards above this *dubia* locality and a little farther off the trail—not more than two hundred feet away from the trail on the Haleauau side—I found under the bark on the trunks of the smooth-leaved lehua trees four young specimens of an entirely new variety or species of *Achatinella*. They were all near the ground. I hunted the tree trunks, but the higher I climbed, it seemed, the less luck I had, so I finally settled down to hunting down low. I could not hunt very long then as it was getting late.

Having collected a few *Achatinella spaldingi* (with Mr. Spald-

ing on Jan. 12, 1919) from Pukaloa, the next valley, I noticed their similarity, and thought that I had found a few *A. spaldingi*. I told Mr. Spalding later that I had found a few *A. spaldingi* in Haleauau, but he only laughed and seemed to discredit the find.

Upon my return from Kau, Hawaii, last September, I had the good fortune of meeting my old-time hiking partner and friend, Mr. Daniel B. Langford, whom I am sure you know quite well. I showed him the shells two days before he left here for Japan. On Oct. 9, 1920, I again went out, this time to look particularly for more of the new shells. I could not find any more banded *P. dubia*, but managed to get a few young specimens of the new shell [*Achatinella lehuiensis meinickei*]. As before, these were all found under the bark of the smooth-leaved lehua trees, from within a foot of the ground to about six feet. Some were on the outside, crawling. The higher up the tree I went the less I found and the smaller the specimens. At ten or twelve feet above ground I found none, so I concluded to hunt "off the ground." Here again the shells seemed to be confined to a very small area, not more than a hundred feet across, or possibly 200 ft. Late in the afternoon, there being no other place to hunt (I had hunted every plant in sight, even the Hilo grass), I concluded to try the top of a large lehua tree on which I had found several young specimens. Here I found on the leaves, *at the tip-top of the tree*, some thirty to forty feet above the ground, several large shells which I believe to be adults.

Again on Oct. 31, 1920, I went up the same trail to help the Trail and Mountain Club of Honolulu mark the trail to Kaala with signboards. I put in a good half-hour's hunt of the very same lehua tree gone over two weeks before, and was rewarded by finding over a dozen good specimens of *A. l. meineckei* and several *A. mustelina* on the very same branches, side by side. Being on a tramping trip I had to move on, so I presume that there are at least a few more specimens still to be found.

I kept the specimens alive for one week, then let them drown in water for about twenty hours, after which they were readily removed from their shells. I kept each animal and its shell

separate from the rest and put six of them (those which I could see seemed to have embryonic shells within) in separate vials and numbered the animals and their shells to correspond. The rest I preserved en masse.

Unfortunately I did not keep the animals of the banded *P. dubia*, so I cannot send you any of them. It might be well to note here that the *A. l. meineckei* seemed to be much darker, even to a purplish appearance in some cases, when alive and after drowning, but appeared very much lighter immediately after the animal was pulled, due no doubt to the color of the animal, as the shells are very thin.

NOTES ON CRASPEDOPOMA LUCIDUM, LOWE AND OTHER MADEIRA SNAILS.

BY T. D. A. COCKERELL.

In the Madeira Islands there is only one genus of Cyclostomoid shells, *Craspedopoma*. It is represented by four species, all described by Lowe, living to-day only on the main island of Madeira. One of them, *C. lucidum* Lowe, is common to the fossil beds east of Canical, Madeira, and is said to occur fossil on the Southern Desert Island and on Porto Santo. Wollaston is very explicit about the Porto Santo records, citing three localities, and remarking that the specimens are rather small. I could not find any trace of it there, and Mr. A. C. de Noronha and the Rev. Drummond Paterson, who have collected much more extensively, have also failed to find it. Near Canical, in Madeira, it occurs in the well-known beds along with *Plebecula bowditchiana* (Fér.), *Geomitra delphinula* (Lowe) and many other shells. These shells are cited by Wollaston as "subfossil", but they are properly regarded as fossils, and by all available criteria should be Pleistocene, perhaps Lower Pleistocene. Several of the forms are extinct, and the representatives of some of the living species are appreciably different from their descendants. Thus the common *Leptaxis undata* (Lowe), found in quantity fossil, mixed with *P. bowditchiana*, is larger than ordinary living specimens. It may be regarded as a distinct

race (*grandior*, n. var.), max. diam. 29–30.5 mm. In this peculiarity the fossil *L. undata* falls in line with other species, thus *P. bowditchiana* is a sort of large edition of the common living *P. punctulata* (Sby.) of Porto Santo.

At the Mount Church, above Funchal, I found *C. lucidum* alive, and made notes on the animal. The tentacles are dark grey, with black basal collar; eyes prominent, black; head and foot pale reddish ochreous, suffused with dusky; front of head, below tentacles, with about six transverse dusky lines; an elongate dark patch on each side above mouth; a large suffused rosy area behind each eye, visible when the light shines through the animal; sole pale ochreous, not divided, but foot emarginate posteriorly. The Mount is about 1900 ft. above sea level. At higher altitudes in Madeira snails seem to be very scarce. Thus around the Pico do Serrado, at about 3000 ft., the only snail I could find was *Geomitra calva* (Lowe), though I obtained three species of slugs. These slugs were *Milax gagates*, the typical jet black form, *Arion hortensis* (new to Madeira) and *Limax maximus*. At lower altitudes the *M. gagates* are plumbeous. (var. *plumbea* Moquin-Tandon). Many years ago I described *M. gagates* var. *maderensis*, a dark brown variety from Madeira. It is now clear that it is only a color-variation, not in any sense a local race. Everything indicates that all the Madeira slugs have been introduced, though some of them have been in the island a long while. I found *Arion hortensis* also at Madeira, and on the Portella Pass another addition to the fauna, *Agriolimax laevis*.

NEW PLEISTOCENE MOLLUSKS FROM CALIFORNIA.

BY T. S. OLDROYD.

ANACHIS MINUTA, n. sp.

Shell small, thick, nuclear whorls smooth; preceding whorls four in number are cancellated by strong straight longitudinal ribs and nearly equally strong revolving ridges, three on each whorl. Whorls slightly convex, sutures broad and sunken; cancellations equally strong, on the whole length of the shell.

Aperture small and curved, outer lip thick, with two dentations within. Length, 4; breadth, 6 mm.

Type is in the Oldroyd collection Stanford University. Type locality, upper Pleistocene at Santa Monica. Collected by Dr. Frank Clark, Santa Monica.

EPITONIUM CLARKI, n. sp. Plate V, fig. 13.

Shell white, thin, nuclear whorls missing, with 7 well-rounded post-nuclear whorls; varices 14 in number, not all continuous; making a half turn around the spire, and with a short spine near the sutures. Shell encircled by fine thread-like spiral striations not very close together; on the top of each whorl near the suture it is entirely smooth but on the base of the whorl the lines are closer together, or in pairs; the lines extend over the whole base close to the umbilicus. Aperture ovate, outer lip thickened. Length, 19; breadth, 8 mm.

Type is in the Oldroyd collection Stanford University. Type locality, upper Pleistocene at Santa Monica. Collected by Dr. Frank Clark, of Santa Monica in whose honor it is named.

TEGULA HEMPHILLI, n. sp. Plate V, figs. 11 & 11a.

Shell a fossil, thick, depressed, spire slightly conical; color, a reddish brown and mottled in appearance. Whorls four in number, with slightly angulated shoulders, encircled with a row of faint nodules. The whole shell, covered with a coarse wavy striation. Base flattened, slightly concave. Aperture oblique; umbilicus wide and deep. Height, 16; breadth, 20 mm.

Type, University of California. Type locality upper Pleistocene at Pacific Beach, San Diego, Cal. The type and four other specimens were collected by Mr. Henry Hemphill, in whose honor the species is named.

CLATHRODRILLA DIEGENSIS, n. sp. Plate V, fig. 12.

Shell elongate, spire elevated, apex acute, nucleal whorl smooth; seven postnucleal whorls. The whorls of the spire are crossed by slanting ribs, sutures deep. On the top of each whorl there is a wide revolving groove; on the base of the upper whorls there is one groove, on the next to the last whorl there are two, the body whorl shows the lines of growth and is

grooved to the end of the canal. Outer lip thin and broken, the notch shows small on the last line of growth. Aperture elliptical; columella curved, slightly encrusted. There is a slight umbilical fissure. Length, 23; breadth, 9 mm.; length of aperture including canal 9 mm.

Type, University of California, coll. Type locality, upper pleistocene, at Pacific Beach, San Diego, Co. The type and three other specimens were collected by Mr. Henry Hemphill.

CONUS CALIFORNICUS FOSSILIS, var. nov. Plate V, fig. 9.

This answers the description of *Conus californicus* with the exception that it is much larger, stronger, and with spire much more elevated. Length, 40; width, 19; height of spire 14 mm. angle of spire 70.

Type is in the Oldroyd collection, Stanford University. Type locality, lower San Pedro series, Nob Hill cut, San Pedro. This variety is found in both the upper and lower San Pedro beds.

VERMETUS NODOSUS, n. sp. Plate V, fig. 10.

Shell a fragment; length, 46; breadth, 11 mm.; smooth and perfectly round and curved, septate within. The specimen has three large pear-shaped nodes, two of which are opposite each other, over the septum, one lengthwise of the shell, and the other crosswise.

Type is in the Oldroyd collection Stanford University. Type locality, lower San Pedro series of the Nob Hill cut, San Pedro.

TORNATINA TUMIDA, n. sp. Plate V. fig. 8.

Shell cylindrical, smooth, white, whorls five including the nuclear, which is small and sunken; spire rather flat, sutures deeply channeled; aperture nearly the length of the body whorl; posterior end narrowed, anterior much dilated and rounded toward the columella, which is strongly plicated, and covered with a light incrustation extending nearly to the top of the whorl. Length, 6; breadth, 3½ mm.

Type is in the Oldroyd collection Stanford University. Type locality Lower San Pedro series of the Nob Hill cut, San Pedro, Cal.

SOME VARIETIES OF WESTERN OLIVELLAS.

BY T. S. OLDROYD.

Conrad described *Olivella pedroana* from a fossil found at San Pedro, in 1854, but the figure is more like what Carpenter described as *O. intorta;* this is plentiful in the Upper San Pedro, and not at all like *O. boetica* Cpr., described by him in the report of the British Association for Advancement of Science, published in London in 1864. The following is Carpenter's description, not a very full one, *O. boetica*, narrow, dull, thin. This has erroneously been called *anazora*, *tergina*, *petiolata* and *rufifasciata*. Habitat between San Diego and San Pedro, Santa Barbara, Monterey, Oregon, the region on each side of the Columbia River, Puget Sound and Vancouver Island. Type locality not given. Sowerby in Thesaurus Conchyliorum, Vol. 4, gives the type locality as British Columbia. They are quite plentiful at Departure Bay, Vancouver Island, but most of them are a reddish brown in color; they are also found in Puget Sound and all along the coast of British Columbia, and Alaska up in the Bering Sea. All of the northern *O. boetica* are much the same in shape but in the farther north they grow larger and more beautifully striped, a creamy white with zigzag markings of brown, these have also been found in Puget Sound, and it would be more practicable to call the northern specimens all the same. The *O. boetica* in the region between San Pedro and San Diego vary from those in the north, both in color and shape; in fact, though it is not generally known, there are two distinct varieties in this region, different in size and shape, the smaller of the two which I will describe is also found in lower California, living, and is very plentiful in the upper Pleistocene at San Pedro.

Olivella biplicata Sowerby was described in the Tankerville Catalogue in 1825. The type locality is Monterey; it is also found further south in San Luis Obispo County. Although they vary somewhat in shape of spire yet they are easily distinguished, being thicker, broader, and with a much larger callus spot than the San Pedro variety. Those found in the

Strait of Juan de Fuca and British Columbia are different, as are those found in Lower California. The West Coast Olivellas are very variable, they differ on some of the Channel Islands, and on some of the islands of the north. I have picked a type from the most prevalent forms along the cost. As far as the recent shells are concerned, we could get along without this division, but they all occur as fossils at San Pedro in various horizons and therefore I suggest these varietal names as a help and convenience in working over the fossils. There has been a color variety described by Mr. Vanatta, but I have used only the form and general outline of the shells, as the fossils have all lost their color.

OLIVELLA BOETICA DIEGENSIS, n. var. Plate V, fig. 2.

This differs from the typical shells of British Columbia, in the color being a light drab, sometimes mottled; not as oval in outline, spire longer and running more sharply to a point. Length, 19; breadth, 8 mm.

Type in the Oldroyd collection, Stanford University. Range San Diego to San Pedro; living. Pleistocene in upper San Pedro.

OLIVELLA BOETICA MEXICANA, n. var. Plate I, figs. 3.

This differs from var. *pedroana* in being smaller, more slender, spire not running quite as sharply to a point. Length, 10; breadth, 4 mm.

Type is in the Oldroyd collection, Stanford University. Type locality, Scammon's Lagoon, Lower California. Pleistocene, the upper San Pedro. Living at San Pedro. Collected by Mr. Henry Hemphill.

OLIVELLA BIPLICATA FUCANA, n. var. Plate V, fig. 4.

Shell broader across the middle and lower part of the aperture than var. *angelena;* spire running more sharply to a point from the middle of the shell. Color more uniform, being a light drab. Length, 28; breadth, 14 mm.

Type in Oldroyd collection, Stanford University. Living. Type locality, Straits of Fuca, near Cape Flattery. Pliocene at San Pedro.

OLIVELLA BIPLICATA PARVA, n. var. Plate V, fig. 7.

This var. is nearest *angelena*, but much smaller, a little broader in proportion; outer lip more curved, shell more highly colored and variable in color; found in the upper Pleistocene at San Pedro. Length, 14; breadth, 8 mm.

Type in the Oldroyd collection, Stanford University. Type locality, Point Abreojos, Lower California. Collected by Mr. Henry Hemphill.

EXPLANATION OF PLATE V.

(All figures natural size.)

Fig. 1. Olivella boetica Carpenter, Alaska.
Fig. 1a. Olivella boetica Carpenter, Vancover Island, typical.
Fig. 2. Olivella boetica diegensis, n. var.
Fig. 3. Olivella boetica mexicana, n. var.
Fig. 4. Olivella biplicata fucana, n. var.
Fig. 5. Olivella biplicata typical. Monterey.
Fig. 6. Olivella biplicata angelina T. S. Oldroyd.
Fig. 7. Olivella biplicata parva, n. var.
Fig. 8. Tornatina tumida, n. sp.
Fig. 9. Conus californicus fossilis, n. var.
Fig. 10. Vermetus nodosus, n. sp.
Fig. 11. Tegula hemphilli, n. sp.
Fig. 12. Clathrodrilla diegensis, n. sp.
Fig. 13. Epitonium clarki, n. sp.

COLLECTING SHELLS ON THE EAST COAST OF FLORIDA IN THE WINTERS 1891 AND 1892.

BY OLOF O. NYLANDER.

Collections made at Jacksonville, Pablo Beach, Indian River and Lake Worth Inlet, were partly named and compared with specimens in the museums at New York City, New Haven, Conn., Boston and Cambridge, Mass., in the summers of 1892–93. A number of the species however were not named until this winter by Mr. T. Van Hyning of the Florida State Museum

and Dr. Paul Bartsch of the U. S. National Museum, and I am under many obligations for their kind assistance.

The specimens were picked up in a general way and no special effort was made to secure large series or the minute species.

As my residence is in the extreme northern part of Maine and I have only a small library on shells, I will follow Bulletin No. 37, U. S. National Museum, by William H. Dall. Although the classification is not up to date, it has a great advantage as nearly all are familiar with the names used in that work.

In December, 1891, around Jacksonville I obtained many dead specimens of *Polygyra vannostrande* Bld. and *P. jejuna* Say, and in the St. John's River *Vivipava georgiana* Lea and *Cyrena carolinensis* Lam.

In January, 1892, I made two trips to Pablo Beach on my first visit going towards Mayport. For a distance of four miles the beach was covered with the large valves of *Cardium magnum* Born; such a mass of shells I had never seen. On my second visit, a week later, there was not a *Cardium* to be found or hardly anything in the line of shells. The two trips to Pablo Beach yielded the following species:

Purpura floridana Conr. Two specimens.
Labiosa (*Raeta*) *canaliculata* Say. Three single valves.
Tellina alternata Say. Five perfect specimens.
Dosinia discus Rev. Four fine specimens.
Petricola pholadiformis Lam. One single valve.
Pholas costata Linne. Single valves common.
Pinna seminuda Lam. Common.
Pinna muricata Linne. Common.
Donox variabilis Say. The sand at low water mark was filled with these shells.
Arca incongrua Say. Few fine specimens.
Arca ponderosa Say. Two living specimens.
Cardium robustum Sol. Common.

In the month of February I started on a four weeks trip from Jacksonville to Titusville by rail, and then by steamer the whole length of Indian River to Jupiter and Lake Worth. While examining the limestone outcrops at Rock Ledge on Indian

River, I picked up two specimens of *Mytilopsis leucopheata* Conr. and one *Planorbis duryi* Wetherby. In many places oyster beds are common, and in the Indian River narrows the mangrove roots between high and low water mark were completely covered with young oysters.

Three weeks in March, 1892, was spent at Lake Worth, the most beautiful place on the Florida coast, with the Gulf stream close to the shore. Much of my time was spent in looking at the living forms of everything found below low water in the inlet, and a collection of many objects was made. I had no special collecting outfit, so the small and minute forms were practically left out. The inlet of Lake Worth was at that time a lonely place, only occasionally a sail boat passed in and out, and at low tide I could wade across. At the time of my visit to Lake Worth two residents at Palm Beach had small collections, Mrs. Nelsson and her children collected after storms and had some shells that I did not see and claimed they were the only specimens found by any collector at Palm Beach proper.

Mr. J. J. White at the time a resident of Palm Beach had a small collection of named shells collected mostly at Lake Worth. Mr. White published two articles in THE NAUTILUS, Vol. XI, page 31 and Vol. XII, page 142, about the specimens collected by him and his description of the locality is good.

Shells collected at Lake Worth inlet:

Ostrea virginica Gmel. Young specimens common.
Ostrea frons Linne. Single valves.
Ostrea cristata Born. Single valves.
Anomia simplex Orb. Common on old logs.
Spondylus spathuliferus Sowb. A few single valves.
Pecten irradians var. *dislocatus* Say. Single valves common.
Pecten ornatus Lam. Single valves common.
Pecten nodosus Linn. Several single valves.
Pecten fuscopurpureus Conr. Single valves common.
Avicula atlantica Lam. One fine specimen.
Margaritiphora radiata Lam. One fine specimen.
Pinna muricata Linn. Common.
Pinna seminuda Lam. Common.
Modiolus demissus Dillw. Several.

Modiolus tulipus Linn.
Arca occidentalis Phil. Several fine living specimens.
Arca transversa Say. One fine specimen.
Arca secticostata Rve. One single valve.
Arca campechensis Dillw. Six fine specimens.
Pectunculus pennaceus Gmel. Four single valves.
Divaricella dentata Wood. One fine pair.
Lucina tigrina Linn. Several fine specimens.
Chama macrophylla Lam. One specimen and single valves.
Cardium isocardia Linn. Several fine specimens.
Cardium muricatum Linn. Single valves.
Liocardium serratum Linn. One fine valve.
Liocardium mortoni Conr. Common.
Venus mortoni Conr. One single valve.
Chione cancellata Linn. Common.
Chione intapurpurea Conr. One fine single valve.
Anomalocardia cuneimeris Conr. Several.
Pitaria simpsoni Dall. One single valve.
Pitaria fluminata Menke. One fine specimen.
Tagelus gibbus Spengler. One good specimen.
Tellina magna Spengler. One large single valve.
Tellina brasiliana Lam. Several fine specimens.
Macoma cerina C. B. Adams. Common.
Teredo navalis Linn. Common in timbers.
Bulla occidentalis A. Adams. In Lake Worth common.
Haminea guildingi Swainson. In Lake Worth common.
Melampus lineatus Say. In Lake Worth common.
Siphonaria naufragum Stearns. Lake Worth inlet few.
Terebra dislocata Say. Common.
Conus proteus Hwass. One partly broken specimen.
Cancellaria reticulata Linn. Few.
Oliva literata Lam. Several large specimens.
Marginella apicina Menke. Common in Lake Worth.
Fasciolaria gigantea Kiener. Two young shells.
Fasciolaria distans Lam. Beach-worn shells.
Fulgur pyrum Dillw. Three specimens.
Fulgur canaliculata Say. Beach-worn shells.
Fulgur perversa Linn. One large living shell 11 inches long.

Fulgur carica Linn. Large dead shells, common north of inlet.

Melongena corona Gmel. Old shells in Indian camp sites in Lake Worth.

Tritonidea tincta Conr. Few shells.

Nassa vibex Say. Common.

Columbella mercatoria Linn. Six specimens.

Murex pomum Gmel. One large dead shell.

Murex rufus Lam. One shell found at Palm Beach.

Murex ? A large much worn shell.

Eupleura caudata Say. One specimen, Lake Worth.

Muricidea floridana Conr. Common on old logs in inlet.

Purpura deltoidea Lam. Three specimens.

Janthina fragilis Lam. Several living specimens on beach.

Tritonium chlorostoma Lam. Five dead specimens.

Tritonium pileare Lam. Seven good specimens.

Tritonium olearium Linne. One good specimen.

Tritonium femorale Linne. One good specimen.

Cassis cameo Stimpson. Two badly worn shells on beach.

Cassis tuberosa Linn. One good specimen at old inlet.

Cassis testiculus Linn. Two good specimens.

Cassis inflata Shaw. Fine specimen, common.

Dolium galea Lin. One large fine specimen and several small ones.

Pyrula papyratia Say. Three specimens.

Cypræa exanthema Linn. Ten specimens, two very large.

Cypræa cervus Linn. One good specimen.

Cypræa spurca Linn. Several good specimens.

Trivia pediculus Linn. Common.

Strombus gigas Linn. Common.

Strombus pugilis Linn. Two specimens on beach.

Strombus bituberculatus Lam. In Lake Worth, common.

Strombus costatus Gmel. One good specimen.

Cerithium caudatum Sow. Two specimens.

Cerithium semiferruginum Lam. Two specimens.

Cerithium floridanum Morch. Common in Lake Worth.

Cerithium algicola C. B. Adams. Few.

Cerithium literatum Born. Few.

Cerithium muscarum Say. Few.
Modulus floridanus Conr. Common.
Litorina lineata Phil. Common.
Ampullaria depressa Say. Shells inhabited by crabs.
Crepidula fornicata Say. Worn specimens.
Crepidula plana Say. Small specimen in dead shells.
Natica canrena Lam. Two dead shells.
Nerita duplicata Say. Several good specimens.
Sigaretus perspectivus Say. One good specimen.
Turbo crenulatus Gmel. Living on dead logs in inlet.
Astraea tuber Linn. Many fine large specimens were collected.
Livona pica Linn. One large dead shell.
Calliostoma jujubinum Gmel. One good specimen.
Nerita peloronta Linn. One large shell.
Nerita versicolor Lam. One good specimen.
Neritina virginea Linn. Common in Lake Worth.
Ceratozona rugosa Sow. On lime rock in inlet.
Argonauta argo var. *americana* Dall. One specimen.
Spirula peroni Lam. Common on beach.

Of the land shells at Lake Worth, *Euglandina rosea* Fer. and *Polygyra septemvolva* Say seemed common.

MOLLUSCAN SPECIES NAMED IN THE PORTLAND CATALOGUE, 1786, PART II, FOREIGN SPECIES.

BY WILLIAM HEALEY DALL.

(Concluded from p. 100.)

ANOMIA SANGUINEA S., p. 184, No. 3928. Scarlet Anomia from New Zealand. +*Terebratula sanguinea* Leach, 1815.

ARCA LABIATA S., p. 185, No. 3947. Davila, 1, pl. 18. +*Arca concamera* Bruguière, 1789; and +*Cucullaea auriculifera* Lamarck, 1819.

ARCA NODULOSA S., p. 98, No. 2158; p. 100, No. 2194. China. Gualtieri, pl. 87, E. Not of O. F. Müller, 1776.

ARGONAUTA HIANS S., p. 44, No. 1055 *b*; p. 174, No. 3798. China. Brown paper Nautilus. Rumphius Thes. 18, B. +*A. hians* Dillwyn, 1817.

ARGONAUTA NAVICULUS H., p. 44, No. 1055 *a*. Rumphius, Thes. 18, 4. +*A. nitida* Lamarck, 1822.

ARGONAUTA NODOSA S., p. 96, No. 2120; p. 173, No. 3734. Tuberculated paper Nautilus. Cape of Good Hope. Rumphius, Thes. 18, 1. +*Argonauta tuberculata* Shaw, 1811.

BUCCINUM GALEA S., not Lin., p. 61, No. 1399 *a*. The great Oriental tun shell. ?+*Dolium melanostoma* Jay, 1839.

BUCCINUM IRIS S., p. 14, No. 301; p. 64, No. 1455; p. 153, No. 3356. Martyn, l, f. 2 *b*. =*Buccinum prismaticum* Martyn, 1784.

BUCCINUM CALCARATUM S., p. 133, No. 2961. Gualtieri, 31, F. =*Murex hippocastaneum* Born, 1780.

BUCCINUM CEPA S., p. 61, No. 1399 *b*. The great Mediterranean tun shell. =*Dolium galea* (Linné), 1758.

BUCCINUM CORONARIUM S., p. 160, No. 3495. New Zealand. The great waved lip Buccinum. Martyn II, f. (45). =*Buccinum succinctum* Martyn, 1784.

BUCCINUM DUBIUM H., p. 188, No. 2998. Smooth terrestrial shell of a pale brown color, with several rows of brown spots on each volution. ?=*Ampulla priamus* Bolten, 1798.

BUCCINUM MURICATUM H., p. 104, No. 2296. Favanne III, x 3. +*Colubraria obscura* (Reeve), 1844.

BUCCINUM NEREIDEUM S., p. 33, No. 776. Mediterranean Trumpet Shell. +*Triton nodiferus* Lamarck, 1819.

BUCCINUM PANDURA S., p. 17, No. 371; p. 103, No. 2262. The pink Harp from Guinea. +*Harpa rosea* Lamarck, 1822.

BUCCINUM PUSTULOSUM S., p. 88, No. 1960. Rumphius, Thes. 49, B. +*Ranella argus* Gmelin, 1791–2.

BUCCINUM TAURINUM S., p. 142, No. 3158. China. Lister, 841, 69. =*Terebra subulata* Linné, var. (1767).

BUCCINUM TRITONIS H., p. 29, No. 68; p. 32, No. 765. Oriental Trumpet Shell. =*Murex tritonis* Lin. (ex parte), 1758.

BUCCINUM TRITONIS S., p. 29, No. 68; p. 33, No. 776; p. 35, No. 839. Mediterranean Trumpet Shell. +*Triton nodiferus* Lam. (=*Buccinum nereideum* Solander, No. 776).

BULLA IMPERIALIS H., p. 155, No. 3391. Pink-mouthed poached egg, from the Friendly Islands. =*Ovula tortilis* Martyn, 1784.

BULLA ZONATA S., p. 164, No. 3561; p. 172, No. 3758. Born, f. 1, tab. 9, 1780. China. =*Bulla amplustre* Born, not Lin. +*B. velum* Gmelin, 1791–2.

CARDIUM HYSTRIX S., p. 116, No. 2550. Gualtieri, 72, B. ?+*Cardium indicum* Lamarck, 1819.

CARDIUM IMPRESSUM S., p. 155, No. 3389; China, p. 188, No. 3996; Tranquebar. Born, t. 2, f. 15, 16. Pink spotted variety of the Venus heart cockle. =*Cardium cardissa* Born, not Lin. +*C. roseum* Gmelin, 1791–2. +*C. junoniae* Lam., 1819.

CARDIUM PROTRUSUM S., p. 178, No. 3825. China. Lister, 319, 156. +*C. humanum* Wood, Ind. Test. 1818, not of Linné, 1758.

CARDIUM SPINOSUM S., p. 105, No. 2297. Mediterranean. Favenne 52, A 2. =*C. echinatum* Linné, 1758.

CONUS ARANEOSUS S., p. 76, No. 1714; p. 106, No. 2328. Spiderweb cone from China and Coromandel. Martini. Conch. Cab., Vol. II, fig. 676. +*C. araneosus* Hwass, 1792.

CONUS ARCHITALASSUS S., p. 189, No. 4017. Amboyna. Argenville, Suppl. tab. 1, figs. M, N; Martini, Conch. Cab. II, vign. No. 26, figs. 1, 2, p. 214. +*C. ammiralis* var. *granulatus* Lam., 1822; not *C. granulatus* Gmelin, 1791–2.

CONUS AUGUR S., p. 44, No. 1046. Knorr, VI, tab. 13, fig. 6. +*C. magus* Born, 1780, not of Linné. +*C. augur* Bruguière.

CONUS FUSCATUS S., p. 160, No. 3491. China. Martini, Conch. Cab. II, f. 693. =*C. fuscatus* Born, 1780.

CONUS MAPPA S., p. 116, No. 2554. "China." Knorr, 1, tab. 8, f. 4. =*Conas cedonulli* L. var. *mappa* Hwass, 1792.

CONUS NOCTURNUS S., p. 156, No. 3411. China. Martini, Conch. Cab. II, f. 687, 688. +*C. nocturnus* Hwass, 1792.

CONUS PULCHER H., p. 179, No. 3844. Coast of Guinea. Lister, 772. Not *C. pulcher* A. Adams, 1853. ? *C. proteus* Hwass.

CONUS QUERCINUS S., p. 67, No. 1501. Martini, Conch. Cab. II, f. 657. =*C. cingulum* Martyn, 1784. +*C. quercinus* Hwass, 1792.

CONUS UNDULATUS S., p. 180, No. 3866. Gualtieri, 25, l (f. A A). =*Conus textile* Linné, 1758.

CHAMA LAZARUS var. PANNOSUS S., p. 96, No. 2123. Rumphius, Thes. 48, 3. =*C. lazarus* Linné, 1767, +*damaecornis* Lamarck, 1819.

CLIO S., p. 115, No. 2520; not of Linné. Davila l, pl. 20, figs. D, E, e. Represents three forms of *Cavolina*.

CYPRAEA AURORA S., p. 10, No. 197; Otaheiti; p. 178, No. 3831. Orange Cowry, from the Friendly Islands. =*C. aurantia* Martyn, No. 59, 1784.

CYPRAEA PANTHERINA S., p. 50, No. 1206. Lister, 681, 28. +*Cypraea guttata* Lamarck, 1810. +*C. tigrina* Lam., not Gmelin.

CYPRAEA PUSTULATA S., p. 106, No. 2330. Orange warted cowry from China. Lister, 710, 62. +*C. pustulata* Lamarck, 1810.

HELIX ALBA H., p. 186, No. 3970, not of Gmelin. A terrestrial sinistral shell from the E. Indies. Lister, t. 33, 32 and 46. Favanne, 63 E. =*Amphidromus* sp. indet. (?*citrinus* auct.)

HELIX ERUBESCENS H., p. 187, No. 3973. Lister, 24, 22. =*H. pudica* Müller, 1774.

HELIX OTIS S., p. 38, No. 925. Favanne, t. 63, f. 11. +*Labyrinthus otis* Beck, 1838.

HELIX PLICATA S., p. 18, No. 400. Favanne, pl. 61, f. D. 10; not *plicata* Born, 1780. ?=*Ampullaria* sp., or *Natica*.

HELIX VITELLUS H., p. 26, No. 601. Rumphius, Thes. 22, 1. =*Natica vitellus* Linné, 1758.

ISOGNOMA LIGNEA S., p. 9, No. 176. =*Ostrea isognomum* Linné, 1758.

ISOGNOMA RIGIDA S., p. 115, No. 2516. Pulu Condore. Lister, 227, 62. =*Pedalion* Solander, 1770.

ISOGNOMA PERNA S., p. 137, Mo. 3041. China. =*Ostrea perna* L., 1767.

LEPAS CORNUCOPIAE S., p. 101, No. 2216. Argenville, 26, D. +*Anatifer pollicipes* Bruguière, 1789.

HELIX INSIGNITA H., p. 176, No. 3794. Lister, 67, 68. *Helix marginella* Gmel.

MACTRA NIVEA H., p. 29, No. 678. Great white Mactra from the coast of Guinea. ?Le Fatan of Adanson.

MUREX ELONGATUS S., p. 65, No. 1479. Favanne, pl. 79, f. H. +*M. clavus* Kiener, 1841.

MUREX FIMBRIATUS S., p. 106, No. 2327; p. 136, No. 3038. Martyn, 1, f. 6 c, Favanne, 37, H. 1; Davila, 1, pl. 10. =*Trophon geversianus* Pallas, 1769.

MUREX RETICULARIS H., p. 12, No. 240, Sicily. Born, 11, 5, 1780. =*Murex reticularis* Linné, 1758.

MYA GIGAS S., p. 101, No. No. 2213. Mediterranean. Lister, 414, 258. =*Panope glycymeris* Born, 1778 (as *Mya*).

MYA OVALIS S., p. 134, No. 2983. Lister, 146, 1; not of Pulteney, 1799, or Donovan, 1801. +*Unio batavus* Maton and Rackett, 1807.

MYTILUS CASTANEUS S., p. 69, No. 1560. Lister, Conch., 154, 9, Vir[ginia]. =*Unio complanatus* Sol.

MYTILUS LINGUA S., p. 77, No. 1718. Amboyna. Humphrey's Conch., pl. 2, f. 2, 1770; Petiver, Gazoph. 32, 9. =*Patella unguis* L., 1758. =*Lingula unguis* Lam., 1799.

MYTILUS PICTUS S., p. 158, No. 3458. Painted muscle, bright green, waved with brown, from the Mediterranean. Knorr, IV, t. 15, f. 5. =*M. ungulatus* Linné, 1758.

MYTILUS UNGUIS S., p. 172, No. 3717. Amboyna. Humphrey's Conch., pl. 2, f. 2, 1770; Petiver, Gazoph. 32, 9. =*Patella unguis* L., 1758.

NAUTILUS SCROBICULATUS S., p. 182, No. 3906. Great umbilicated Nautilus from New Guinea. Lister, 552, 4; Knorr, IV, t. 22, f. 1.

OSTREA PURPUREA S., p. 189, No. 3091, New Holland; p. 174, No. 3741. China; p. 177, No. 3878. =*O. cucullata* Born, 1780.

PATELLA AURICULARIA H., p. 154, No. 3384; p. 187, No. 3983. Amboyna. China. Rumphius, Thes. 40, N (as an operculum). +*Dolabella rumphii* Cuvier, 1817.

PATELLA FUNGOIDES H., p. 55, No. 1301. Mushroom limpet from Cape of Good Hope. Humphrey's Conch., pl. IV, f. 16, 1770. +*Patella fungoides* Bolten, 1798.

PATELLA GORGONICA H., p. 105, No. 2302. Humphrey's Conch., III, f. 8, 1770.

PATELLA MACROSCHISMA H., p. 71, No. 1601. Humphrey's Conch., pl. 7, f. 3, 3, 1770.

PATELLA MYTILIFORMIS S., p. 42, No. 990; p. 58, No. 1359. Falkland Islands. Humphrey's Conch., III, f. 9, 1770. =*Patella mytilina* Helbling, 1779. +*P. gondola* Bolten, 1798.

PATELLA OCULUS-HIRCI H., p. 105, No. 2302. Humphrey's Conch., pl. 2, f. 6, 1770. =*Patella oculus* Born, 1778.

PATELLA PULCHRA H., p. 105, No. 2302 *b;* p. 135, 2995. Cape of Good Hope. Humphrey's Conch., t. 2, f. 8, 1770.

PATELLA UMBRACULUM H., p. 178, No. 3830. Umbrella limpet from China. Humphrey's Conch., pl. 5, f. 5, 1770. +*Patella umbella* Gmelin, 1791–2.

PINNA RIGIDA S., p. 136, No. 3040; p. 138, No. 3078. Knorr, II, t. 26, f. 1. +*Pinna rigida* Dillwyn, 1817.

PLACUNA PLACENTA S., p. 8, No. 136; p. 16, No. 353 a. China; p. 140, No. 3119. Chinese window shell. =*Anomia placenta* Linné, 1758.

PLACUNA EPHIPPIUM S., p. 16, No. 353 b. Polish saddle shell. =*Anomia ephippium* Linné, 1758.

SERPULA ATTRAHENS S., p. 106, No. 2331, Madagascar. Humphrey's Conch., pl. VII, f. 15, 1770.

SERPULA GIGANTEA H., p. 6, No. 97; Oriental. Seba III, pl. 94, largest fig. p. 186, No. 3955, Luconia, 21 inches long. =*Serpula gigantea* Pallas, 1766.

SERPULA TORTUOSA H., p. 184, No. 3939. Humphrey's Conch., pl. 11, f. 4, 1770.

SOLEN PALLIDUS S., p. 42, No, 1005 *a*. Lister, t. 412, lower figure. Solen sp. indet.

SOLEN ROSTRATUS S., p. 160, No. 3487, China; p. 167, No. 3624. A large fine violet Solen from China. Valentyn, Biv. 13, No. 5. +*Sanguinolaria diphos* Gmelin, 1791–2.

STROMBUS AMPLUS H., p. 28, No. 658. Brander, Foss. Hant. pl. 6, f. 76, 1766. =*Hippochrenes amplus* (S.).

STROMBUS AURIS DIANAE H., p. 29, No. 679; p. 64, No. 1452. Pulu Condore, Martyn, 1, f. 1. =*Alata aratrum* Martyn, 1784.

STROMBUS LUCTATOR H., p. 87, No. 1926; Brander, Foss. Hant. pl. 5, f. 64.

STROMBUS SINUATUS H., p. 189, No. 4022. Seba III, 62, 3; Favanne, 22, A. 2. +*Strombus laciniatus* Dillwyn, 2817.

STROMBUS TRICORNIS H., p. 5, No. 50. Martini, Conch. Cab. III, f. 843, 845. Lister, No. 873, f. 29. +*Strombus tricornis* Lamarck, 1822.

STROMBUS TRUNCATUS H., p. 133, No. 2967; p. 150, No. 3507; p. 169, No. 3655. E. Indies. Davila 1, t. 12, f. 14. +*Pterocera bryonia* Gmelin, 1791–2.

TELLINA CRUENTA S., p. 10, No. 187. Knorr, VI, t. 12, f. 1. +*Sanguinolaria sanguinolenta* Gmelin, 1792.

TROCHUS GRANOSUS H., p. 87, No. 1942. New Zealand. Martyn, f. 37, 1784. =*Trochus granosus* Martyn, 1784.

TROCHUS ONUSTUS H., p. 4, No. 31. +*Xenophora conchyliophora* Born, 1780.

TROCHUS SOLARIS S., p. 86, No. 1914, New Zealand. Martyn, 1, f. 30, g. =*Trochus heliotropium* Martyn, 1784.

TROCHUS SULCATUS H., p. 113, No. 2481. New Zealand. Der Naturforscher IX, t. III, f. 5, 6. Martyn, f. 33 (=35) r. (*Trochus sulcatus*): +*T. cookii* Gmelin, 1792. (Schreibers, 1788.)

TROCHUS TECTUS H., p. 187, No. 3982. All Saints Id., West Indies. Lister, 628, 14 (bad). ?+*T. americanus* Gmelin, Jamaica.

TURBO CORNUTUS S., p. 147, No. 3235, China. Davila 1, pl. 5, f. I. +*T. cornutus* Gmelin, 1791–2.

TURBO SMARAGDUS H., p. 11, No. 229. New Zealand. =*Limax smaragdus* Martyn, f. 73, 1783.

TURBO UNDULATUS H., p. 18, No. 408; p. 178, No. 3828. New Holland. =*Limax undulatus* Martyn, f. 29, 1784.

VENUS ARCTICA S., p. 138, No. 3074. Lister, 426, 267. =*Saxicava arctica* Linné, 1767.

VENUS EROSA S., p. 71, No. 1603; p. 186, No. 3961. New South Wales. Chemn. VI, 336. +*Cyrena zeylanica* Lamarck, 1818. +*Venus coaxans* Gmelin, 1791–2.

VENUS PUNCTATA S., p. 98, No. 2150. Amboyna. Rumphius, Thes. 43 G. +*Cytherea meretrix* Lamarck, 1818.

VOLUTA AMPHORA S., p. 30, No. 708; p. 181, No. 3874. Martini, Conch. Cab. III, 780, Africa. +*V.* (*Cymbium*) *diadema* Lamarck, 1811.

VOLUTA ANGURIA S., p. 64, No. 1448. Great brown African melon. Martini, Conch. Cab. III, 767. +*V. neptuni* Gmelin, 1791–2.

VOLUTA ARAUSIACA S., p. 26, No. 611; p. 186, No. 3965. Amboyna. Rumphius, Thes. 37, 2. +*Voluta vexillum* Gmelin, 1791–2.

VOLUTA CITHARA S., p. 96, No. 2122; p. 182, No. 3902; p. 190, No. 4030. Seba III, pl. 65, f. 1, 2. +*V. armata* Lamarck, 1811.

VOLUTA ELONGATA S., p. 30, No. 707; p. 143, No. 3161. Martyn, t. 1, f. 25, New Caledonia. =*Limax fibratus* Martyn, 1784. (*Placostylus f.*)

VOLUTA FILOSA S., p. 76, No. 1705. Martyn, f. 22, 1. =*Mitra nexilis* Martyn, 1783.

VOLUTA GRAVIS S., p. 103, No. 2274. Malacca Str. Martini, Conch. Cab. III, 95, f. 916, 917. +*Turbinella rapa* Lamarck, 1822.

VOLUTA HAUSTRUM S., p. 137, No. 3054. China. Martini, Conch. Cab. III, 781. +*Voluta* (*Cymbium*) *tessellata* Lamarck, 1811.

VOLUTA IMPERIALIS S., p. 183, No. 3913. Luconia. Martini, Conch. Cab. III, f. 934–5. +*Voluta imperialis* Lamarck, 1811.

VOLUTA INCOMPTA S., p. 96, No. 2116. South Seas. Martyn, f. 19, 1. =*Mitra tessellata* Martyn, 1784.

VOLUTA INCRASSATA S., p. 13, No. 264; p. 131, No. 3696; p. 105, No. 2315. Martini, Conch. Cab. III, f. 499, 500. +*Oliva angulata* Lamarck, 1811.

VOLUTA MELO S., p. 41, No. 969. Martini, Conch. Cab. III, f. 772, 773. +*Voluta indica* Gmelin, 1791–2.

VOLUTA NOBILIS S., p. 6, No. 89; p. 172, No. 3711; p. 183, No. 3926. East Indies. China. Martini III, f. 774–6; Lister, 769, 6. +*Voluta scapha* Gmelin, 1791–2.

VOLUTA PEPO S., p. 87, No. 1940; p. 100, No. 2204. Martini, Conch. Cab. III, f. 768–70. Great brown melon from Guinea. +*Voluta navicula* Gmelin, 1791–2. +*V. neptuni* Gmelin, ex parte, fide Pfr.

VOLUTA PONDEROSA S., p. 25, No. 566; p. 189, No. 4023. East

Indies (reversed shell, a dextral one figured by Favanne, pl. 35, f. 1). Martini, Conch. Cab. III, f. 916. +*Turbinella rapa* Lamarck, 1822.

VOLUTA SCABRIUSCULA H., p. 85, No. 1913. Martyn, f. 21. =*Mitra sphaerulata* Martyn, 1784.

VOLUTA SCAFA S., p. 41, No. 969 *a*; p. 136, No. 3039. Guinea. Adanson, t. 3, f. 2. Martini, Conch. Cab. III, t. 70, f. 764. +*Voluta porcina* Lamarck, 1811.

VOLUTA VIRESCENS S., p. 26, No. 610; p. 136, No. 3020; p. 174, No. 3751. Guinea. Martini, Conch. Cab. III, f. 932, 933. +*Voluta polyzonalis* Lamarck, 1811.

TWO NEW SOUTH AMERICAN SHELLS.

BY W. H. DALL.

A bunch of Gorgonians was recently received from the Paulista Museum, San Paulo, Brazil, which were growing on bivalve shells. The latter were separated valves often in good condition. The locality is San Sebastian Island off the southern coast of Brazil.

Among them was a *Macoma*-like shell which appeared to be new.

The subgenus *Scissula* includes species like *T. decora* Say, which have the hinge of *Angulus* and an external oblique sculpture of incised lines. The present shell however has two deeply bifid teeth in the right and one in the left valve with no trace of a lateral lamina in either valve. It therefore bears the same relation to *Macoma*, subgenus *Psammacoma* as *Scissula* does to *Angulus* in the *Tellina* group. I propose therefore to institute a new section for it.

PSAMMACOMA (TEMNOCONCHA) BRASILIANA n. sp.

Shell white, equivalve, subequilateral, thin, compressed, dorsal slopes subequal; anterior end broadly rounded, posterior end obscurely obliquely truncate but hardly angulate at the junction with the broadly arcuate base; sculpture of incremental lines upon which are impressed sharp regular grooves about

three to a millimeter, at first concentric but about the anterior third of the valve becoming oblique, and becoming obsolete near the posterior third; beaks inconspicuous; interior chalky white, the muscular impressions subequal, the pallial sinus rounded, in front, mostly free from the pallial line and falling a little short of the anterior adductor scar; the ligament is short and the margins smooth. Length 35; height 23; diameter 8; the vertical from the beaks behind the anterior end 17 mm. U. S. Nat. Mus. Cat. No. 333023.

AMPULLARIA (FELIPPONEA) ELONGATA n. sp.

Shell solid, conic, of three and a half flattish whorls separated by a distinct, almost channelled suture (the apex deeply eroded); shell substance grayish to slate color, with irregular broad spiral purple lines, the whole covered with an olivaceous, thick, polished, dehiscent periostracum of a brittle character; base rounded, umbilicus only a narrow chink behind the thin raised inner lip; aperture pear-shaped, smooth inside, showing the color bands; margin sharp-edged, not continuous across the body. Height of decollate shell 29; of last whorl 25; of aperture 17; of maximum diameter 19 mm. U. S. Nat. Mus. No. 333024.

Habitat. Uruguay River, Dept. of Paysandú; Dr. F. Felippone.

It is interesting to get another and quite distinct species of this subgenus which seems characteristic of Uruguay River fauna. The present species differs most obviously from the type, *F. neritiniformis*, in the flat-sided spire and absence of an umbilicus.

THE GENUS PLEBECULA LOWE.

BY T. D. A. COCKERELL.

At the fossil-beds near Caniçal, Madeira, the large globular shells of *Plebecula bowditchiana* (Fér.) occur in hundreds of thousands weathered out of the fine sand. In Porto Santo we find similar deposits, but nearly all the species are different, in

spite of the fact that the mountains of the smaller island are plainly visible from the vicinity of Caniçal. Between Porto Santo and Madeira is deep sea, and it is evident that the islands could not have been united within the life-time of existing species of snails. Nevertheless, among the scant half-dozen forms common to the Caniçal and Porto Santo deposits is *P. bowditchiana*, one which would seem among the least likely to be accidentally transported across the sea. It is a heavy white shell, resembling in a general way the well-known *Leucochroa candidissima* of the Mediterranean basin. The vast quantities at Caniçal suggest at first a former climate very different from that of today, but the snail was doubtless adapted to arid or semiarid conditions, such as prevail now at the eastern end of Madeira. The sandy wastes of the locality swarm with living snails at the present time, but they are with inconspicuous exceptions *Helix pisana*, probably introduced long ago from Africa by the Moors. The *P. bowditchiana*, however, would need more cover than exists now, as they were nocturnal, hiding by day, if we may judge by the habits of their living relatives. I have carefully compared the Madeira and Porto Santo *P. bowditchiana*, thinking that some differences might be found, but they are unquestionably identical. There is, however, this difference; the Porto Santo specimens show a much wider range of variation. This may be taken to indicate that the species evolved on Porto Santo, and the one or more examples which somehow reached Madeira started a colony which remained essentially true to the type represented by the immigrants. Twenty *P. bowditchiana* from Porto Santo varied as follows in dimensions, the first figure of each pair being the length, the second the diameter at right angles to the axis, both in mm. 15.18 (1), 15.20 (1), 16.20 (2), 17.19 (1), 18.21 (2), 20.22 (1), 21.22 (2), 21.23 (1), 22.22 (1), 22.24 (2), 23.23 (3), 24.27 (1), 25.24 (1), 25.25 (1). The shell having a length less than 18 mm. (obtained in the vicinity of the Fonte d'Areia) constitute a distinct form or variety, which may be named *reducta*. They are not only small, but differing from the related small *P. punctulata*, they are broadened, with a strongly and evenly arched outer lip, so that the whole shape is very like that of

Helix hortensis. The one I take as typical of the variety measures 16 by 20 mm., and the apex, with curved rows of granules, is delicately tinted with orange, giving the shell a more recent appearance than usual. This may be the latest phase of *bowditchiana*, but its resemblance in form to more ordinary snails might be taken to indicate greater antiquity. I was not able to make out distinct zones in the Porto Santo fossil beds, although some species abound in one place, and are rare or absent elsewhere. The sandy deposits are broken down by the weather, and the shells loosened upon the surface. Many of these are again covered, as the wind blows the sand, and the lime again cements the deposit, so that it is quite possible to find shells of entirely different ages mixed together. In fact the very modern *H. pisana* is being thus incorporated, and no doubt in years to come it will be possible to dig *pisana* and *bowditchiana* out of the same fossil-beds, just as if they had been strictly contemporaneous.

In order to show the greater uniformity in the Caniçal P. *bowditchiana*, I give the measurements of 156 shells, citing the two dimensions as before. 18.19 (1), 18.21 (1), 19.20 (2), 19.21 (7), 20.20 (6), 20.21 (18), 20.22 (8), 21.21 (9), 21.22 (22), 21.23 (7), 21.24 (3), 22.21 (1), 22.22 (12), 22.23 (28), 22.24 (2), 23.22 (1), 23.23 (5), 23.24 (13), 23.25 (1), 24.22 (1), 24.24 (2), 24.25 (4), 26.25 (1).

The nearest living relative of *P. bowditchiana* is *P. punctulata* (Sowerby), exceedingly common on Porto Santo, and found also on the outlying islets, even the isolated Ilheo de Nordeste. It hides under rocks, more or less buried in the ground, and I never saw it crawling abroad. A remarkable feature is the opaque white mantle, which, when the animal is within the shell, looks at first sight like a dense white epiphragm. The genitalia show a very long slender flagellum. The living animal may be described as follows: Animal whitish translucent; tentacles and neck above dark grey, nearly black; foot very broad, caudal end very broad and flat; a large black mark on each side posterior to tentacles; mantle opaque white (specimen from Villa Baleira). The shells vary much in color, some being very dark. Two bands, never seen in *bowditchiana*, are

nearly always present, but on the Ilheo de Baixo, on Jan. 22, I found a creamy-white bandless variety, which may be called var. *lactescens*. This form was also known to Wollaston. The distribution of *H. punctulata* is peculiar. It has not been recorded from Madeira, but a rather small and peculiar race (*avellana Lowe*) occurs both living and fossil on Bugio, the southernmost of the Desertas. At the fossil-beds near Caniçal, Madeira, however, I found a specimen of undoubted *P. punctulata*, measuring 13 by 14 mm., thinner than *bowditchiana*, and still showing faint traces of the bands. It has a recent appearance, and may not be truly fossil. Whether *P. punctulata* really lived in Madeira, may still remain somewhat uncertain, as Baring and Ogilvie Grant (Zoologist, Nov. 1895) report finding seven whole *H. pisana* in the stomach of a kestrel, and it is conceivable that an owl pellet might contain an unbroken snail shell.

The *P. punctulata* in Porto Santo suffer severely from an enemy, the broken shells being found very commonly under rocks. From the position of these remains, it was impossible that the enemy should be a bird, and the small lizards (*Lacerta dugesii*) so common under the rocks probably could not break the shells. Baring and Ogilvie Grant (loc. cit.) speak of the great spider of Porto Santo (*Lycosa madeirana* Walck.) as feeding on snails, and I have no doubt that this is the mysterious enemy of *P. punctulata*. In the face of such an enemy, *P. bowditchiana*, with its large and thick shell, would have a great advantage over its smaller relative.

The common *P. vulgata* (Lowe) of Madeira has the same white mantle, and is evidently strictly congeneric. According to Pilsbry this is the real *nitidiuscula* of Sowerby, though not that of Wollaston. The soft parts of *vulgata* from Funchal were described as follows :

Animal with foot broad, white ; tentacles black ; dorsal side of head and neck very dark, abruptly contrasting with the white foot ; mantle opaque white. The habits of *vulgata* seem to be much like those of *punctulata*, though it is perhaps less retiring. There is a large *Lycosa* (*L. blackwallii* Johnson) in Madeira, which may prey upon it but it seems to be absent from the lowlands about Funchal, where *P. vulgata* abounds.

NEW NAMES FOR WEST INDIAN TERTIARY PECTENS.

BY C. WYTHE COOKE.

Doctor T. Wayland Vaughan has kindly called my attention to the fact that the names *vaughani* and *waylandi* applied by me in 1919 to extinct species of *Pecten* from the West Indies had already been used by Ralph Arnold for different species of the same genus. For these preoccupied names I propose to substitute the following:

PECTEN VAUN Cooke, n. n.

Synonym: *Pecten vaughani* Cooke (not Arnold), Carnegie Inst. Washington, Pub. 291, p. 133, pl. 8, figs. 2–4, 1919.

Occurrence: Anguilla formation (upper Oligocene), Crocus Bay, Anguilla.

PECTEN VAUN var. FLABELLUM COOKE, n. n.

Synonym: *Pecten vaughani* var. *flabellum* Cooke, Carnegie Inst. Washington, Pub. 291, p. 134, pl. 8, figs. 6–7, 1919.

Occurrence: La Cruz marl (middle Miocene), La Cruz and Santiago, Cuba.

PECTEN (*Chlamys*) LANDI Cooke, n. n.

Synonym: *Pecten* (*Chlamys*) *waylandi* Cooke (not Arnold), Carnegie Inst. Washington, Pub. 291, p. 131, pl. 7, figs. 4a, b, 1919.

Occurrence: La Cruz marl (middle Miocene), Santiago, Cuba.

GEORGE BRETTINGHAM SOWERBY.

George Brettingham Sowerby, F. L. S. (the third G. B. S.), died on Jan. 31st at his residence at Richmond, Surrey, England. Eldest son of G. B. Sowerby (II), he was born in London, Sept., 1843. He commenced business as a conchologist about 1860. Many important collections passed through his hands during the 56 years he was in business, his retirement taking place in Jan., 1916. He was a fellow of the Linnean

Society, an original member of the Malacological Society of London and a member of the Conchological Society of Great Britain and Ireland.

He described in various publications about 720 new species of recent shells. Amongst his most important works we might mention: "Marine Shells of South Africa," 1897, with Appendix, 1897. "Illustrated Index of British Shells," 2nd Edition, 1887. "Thesaurus Conchyliorum," part of monograph of *Turbo* and whole of part 44, supplement to *Conus* and *Voluta*.

He leaves a widow, one son and two daughters. A most genial and generous character endeared him to all his friends and acquaintances.—H. C. F.

NOTES.

THE HEAVENLY TWINS.—Your correspondent in the NAUTILUS for October 20 (p. 70), Mr. Darling K. Greger, has started a nomenclatorial smoke screen which is provoking an unwonted excitation of my risibles. One must not deal cacophonously with so serious a matter as the substitution of new scientific names for old ones, especially when a felony is contemplated. So this case must go to the jury. It is stated in the note referred to and which I beg your permission to comment upon as I am the discordant cause behind it, that in 1913 I introduced the name *Brasilica* for a genus of Devonian brachiopods peculiar, as far as now known, to Brazil, but that in so doing I committed trespass as the term *Brasilica* (according to your correspondent) had been employed in 1898 by Dr. S. S. Buckman for a genus of Ammonites, in view of which interference an opening was presented for the creation of a new name into which Mr. Greger forthwith intrudes a proposed substitute, *Chapadella*. I was not aware of the magnitude of my offending until I received from Dr. Buckman a note on the subject which was intended for you, Mr. Editor, but which I have ventured to withhold as it innocently perpetuates an error. I am confident Dr. Buckman will pardon me for using his authority to explain that he never made use of the name *Brasilica*. Being a

good latinist he naturally would not. His genus-name was *Brazilia.* And so in his judgment and on the face of Mr. Greger's impeachment, *Brasilica* had a right to live. Alas! neither did I use the term *Brasilica,* but *Brasilia;* and here I am, *mutatis mutandis,* just as bad a trespasser on Dr. Buckman's preserve as if Mr. Greger's commentary had been right. Who is to decide in this very delicate point on nomenclatorial ethics, whether upon an indictment false and disproved, I can be convicted and fined. Perhaps it may be seemly for me to intimate that it is polite, when practicable, to permit an author to himself correct his errors when they are shown to him. If he will not, then he is beyond grace.

Doctor Dall, in his great wisdom, disposes of the matter thus: (Letter of February 21, 1921.)

"There is no *Brasilica* Clarke. Ergo, *Brasilica* Greger = 0. *Chapadella* Greger = *Brasilica* Greger = 0."

In the presence of this formula I propose to rechristen this brachiopod genus with the name *Brasilina.*—JOHN M. CLARKE.

LIGUUS AT MARCO, FLORIDA.—Marco, as you know, is a settlement at the north end of Key Marco, or Marco Island.

When we were collecting Liguus in 1904–6–7, we found none at Marco, and the inhabitants knew of none there then, though the tree snails were remembered as having been at Marco some years before. Also, a man told us he had in the past found "blue snails" near Marco and had been in the habit of shipping them to a curio dealer in Key West. He gave me the dealer's name and address.

We carefully examined the trees where the man reported the discovery of the blue Liguus but we found no snails of any kind there. Now (January, 1921) Albert Addison tells us that his son Chester, some weeks ago, saw snails having blue stripes on them in a thicket in sight of the houses of Marco, the same place I think where the man years before spoke of having found blue snails.

We searched carefully this thicket, which now is small, and found some Liguus there, which I am sending you by insured parcels post [*Liguus fasciatus roseatus*] but none of the blue variety, as you will see.

I am inclined to believe that the snails of Marco were nearly all killed by some unusually cold spells, but that a very few not found by us in our early visits here have been increasing in numbers in the trees of the thicket in question since then.—CLARENCE B. MOORE.

Capt. W. D. Collier, the leading citizen of Marco for a great number of years, informs me that there were no Liguus snails at Key Marco in his early days, but that forty-eight years ago he brought tree snails from Middle Cape (Cape Sable) and "planted" them at Caximbas, Goodland Point and Marco, all on Key Marco. He had been that winter with Prof. Velie of Chicago collecting Liguus on the lower coast and on the Keys along Hawk Channel to Key West. They searched all those Keys but he never saw or heard of Liguus showing any blue coloring. He states that Liguus, after the planting at Marco, developed and spread until they became numerous, but he thinks they subsequently were almost killed out by severe cold. M. G. MILLER.

NOTE ON A VARIETY OF LIGUUS.—In my paper on the variations and distribution of *Liguus* in Florida I figured a form from Lignumvitæ Key (pl. 37, figs. 4*c*, 4*d*) which I took to be a form of var. *lignumvitae*, having only three specimens. Mr. Simpson has recently named this form *Liguus solidus lineatus* (In Florida Wilds, Frontispiece, fig. 3). He states that among more than a thousand specimens examined he always found it distinct. It appears that the name *lineatus* is preoccupied by *Achatina lineata* Valenc., 1833, which was based upon another variety of the old *Liguus fasciatus*. To avoid having two varieties with the same name in the same species or closely related species, I would propose for the shell figured on my pl. 37, fig. 4*c* the varietal name LIGUUS FASCIATUS SIMPSONI, the type being no. 128063 A. N. S. P.—H. A. PILSBRY.

SHELLS OF ZION NATIONAL PARK, UTAH.—Fossil specimens of *Polita indentata* Say, *Gonyodiscus cronkhitei* Nc., and *Succinea avara* Say, imbedded in several pieces of limestone from Zion

Canyon, were presented to the Academy of Natural Sciences of Philadelphia by Louis H. Bregy. He also donated specimens of *Oreohelix haydeni* var. *oquirrhensis* Hemp. and *O. strigosa* var. *depressa* Ckll., which he collected at The Narrows, Zion Canyon, Zion National Park, S. W. Utah. This would indicate that *O. h. oquirrhensis* Hemp. probably inhabits the entire length of the state.—E. G. VANATTA.

SIPHONARIA JAPONICA Donovan AN EARLIER NAME FOR S. COCHLEARIFORMIS Reeve.—This common Japanese species was first described and very well figured in Donovan's Naturalist's Repository, III, 1825, pl. 79, as *Patella japonica*. It was collected by a Mr. Stutzer.

On pl. 78 of the same work *Venus stutzeri* Don. is figured, also from Japan. This is *Circe scripta* L. var. *personata* Desh., and earlier than Deshayes.—H. A. PILSBRY.

A NEW LOCALITY FOR ARKANSIA WHEELERI ORTMANN & WALKER. This new genus and species was described in NAUTILUS, 25, 1912, pp. 97–100, from Old River, at Arkadelphia, Clark Co., Arkansas. This is, as Wheeler has informed us (NAUTILUS, 31, 1918, p. 112) an "ox-bow" lake of the Ouachita River, a few miles above Arkadelphia, and this place, and the Ouachita River below Arkadelphia (Wheeler, l. c. p. 121), have remained, so far, the only localities from which this rare shell has been reported.

Recently a large number of Naiades from various parts of Oklahoma has been donated to the Carnegie Museum by D. K. Greger, of Fulton, Mo., collected by him in 1919. Among them was a single dead shell of *Arkansia wheeleri*, in fair condition, from Kiamichi River at Antlers, Pushmataha Co., Oklahoma, a tributary of Red River, in the southern portion of the state.

This considerably extends the range of this species, and we might expect to find it more widely distributed in the streams running southward from the Ozarks into the Ouachita and Red Rivers in southern Arkansas, northern Louisiana, and southern Oklahoma, and it might also exist in the Red River drainage in northeastern Texas.—A. E. ORTMANN.

PUBLICATIONS RECEIVED.

Lake Makinkuckee, A Physical and Biological Survey. By Barton Warren Evermann and Howard Walton Clark. 2 Vols. Publication No. 7, Department of Conservation, State of Indiana, Indianapolis, 1920. The mollusks are treated on pages 41 to 75 of Vol. 11 of this, the most exhaustive work on the ecology of any body of water in the United States. Very full and valuable notes are given on the food habits and general biology of the 14 species of Unionidæ which are recorded. The remainder of the list, furnished in part by Dr. Paul Bartsch, contains 79 species and subspecies of freshwater bivalves and univalves and 57 land snails. This brings the total number of species and subspecies of mollusks from this small Indiana lake and its environs to 130. Such a large number has probably not been previously recorded from a similar equal area in the same latitude.—G. Dallas Hanna.

The Journal of Conchology. Jan., 1921, Vol. 16, No. 4. On Obeliscus (Protobeliscus) riparius (Pfr.). By Geo. C. Spence, p. 135.

Obituary Notice: Edward Collier. By R. Standen, p. 136.

The Non-marine Mollusca of Llandudus and district. By H. Beeston, pp. 136–144.

Evolution in the Molluscan Radula. By The Rev. A. H. Cooke, pp. 145–150.

Note on Conus lineatus Solander and Conus lineatus Brug. By A. T. Hopwood, p. 151.

Scheme for the division of British marine area into census areas. By R. Winckworth, pp. 152–155.

Description of a new Galeomma from Bombay. By J. R. le B. Tomlin, p. 156.

Description of Antimitra (?) hewitti n. sp. from South Africa. By J. R. le B. Tomlin, p. 156.

Pisidium parvulum Clessin in the Great Ouse and the Severn. By C. Oldham, p. 158.

MORPHOLOGICAL FEATURES OF CERTAIN MUSSEL SHELLS FOUND IN LAKE ERIE COMPARED WITH THOSE OF THE CORRESPONDING SPECIES FOUND IN THE DRAINAGE OF THE UPPER OHIO. By Norman McDowell Grier. (Ann. Carnegie Museum, Vol. 13, pp. 145-182, 1920.)

MARINE MOLLUSKS OF HAWAII. By Henry A. Pilsbry. (Proc. Acad. Nat. Sci., Phila., 1920, pp. 296–328, pl. 12, with 11 figs. in text.) Forty-five new species and subspecies are described, with keys to the described species of Hawaiian Terebra and Mitra.—C. W. J.

THE WEST AMERICAN MOLLUSKS OF THE FAMILIES RISSOELLIDAE AND SYNCERATIDAE AND THE RISSOID GENUS BARLEEIA. By Paul Bartsch. (Proc. U. S. Nat. Mus., 1920, Vol. 38, pp. 159–176, pls. 12, 13.)

NEW FRESH-WATER SHELLS FROM GUATEMALA. By William B. Marshall. (Proc. U. S. Nat. Mus., 1920, Vol. 58, pp. 301–302, pl. 17.)

THREE NEW SPECIES OF PLEUROCERIDAE. By Calvin Goodrich. (Occas. papers Mus. Zool., Univ. Mich., No. 91, pp. 1–5, pl. 1, 1921.)

NEW FLORIDIAN SUBSPECIES OF THE GENUS LIGUUS. By Charles T. Simpson. (Proc. Biol. Soc., Washington, 1920, Vol. 33, pp. 121–126.) Eighteen new subspecies are described.

SUMMARY OF THE MARINE, SHELL-BEARING MOLLUSKS OF THE NORTHWEST COAST OF AMERICA, from San Diego, California, to the Polar Sea, mostly contained in the collection of the United States National Museum, with illustrations of hitherto unfigured species. By William Healey Dall, U. S. Nat. Mus. Bull. 112, 1921, 217 pages, 22 plates. "To the preparation of this summary the author has brought the results of more than 50 years' study of the molluscan fauna of the northwest coast." Its appearance has long been looked forward to by West Coast con-

chologists, and indeed by all who are interested in American marine shells. There are no descriptions, but a reference is given to description and figure, if published. A large proportion of the descriptions have appeared in the widely-distributed Proceedings of the National Museum, and so are generally accessible to those concerned.

A great number of moderately large and striking shells are recorded from Bering Sea. The array of *Chrysodominæ* and *Buccinidae* is astonishing, and so far as I know unparalleled anywhere else in the world.

The Californian fauna comprises 996 of the 2122 species enumerated. 151 species are exclusively abyssal, and 136 species are common to the Atlantic, nearly all belonging to the Arctic seas.

In the list Dr. Dall has frequently used subgeneric names in place of generic. It appears to the writer that since a binomial name is defined as consisting of the generic combined with the specific name, it would be better to conform to the ordinary usage. The distinction between genus and subgenus is of course largely a matter of individual opinion or of current use, but one cannot logically consider a given group to belong to both taxonomic grades. In more important matters there appears little to criticize and much to commend and admire.

When Dr. Dall took up the study of West Coast mollusks some 468 species had been recorded. The enormous advance he has made in all branches of the science, with the help of many zealous workers on the coast, is shown by this volume. It is a splendid record of the achievements of a generation of conchologists, and an inspiration for those to come.—H. A. P.

The Cretaceous Formations of Northeastern Colorado, and the Foothills Formations of Central Colorado. Colo. Geol. Surv. Bull. 19. By Junius Henderson. While concerned mainly with Mesozoic geology and paleontology, there are some references to recent mollusks, as on p. 45 where the shells of Greasewood Lake, near Osgood, and of some similar ephemeral lakes are discussed.—H. A. P.