THE

NAUTILUS

A QUARTERLY JOURNAL
DEVOTED TO THE INTERESTS
OF CONCHOLOGISTS

VOL. XLI
JULY, 1927, to APRIL, 1928

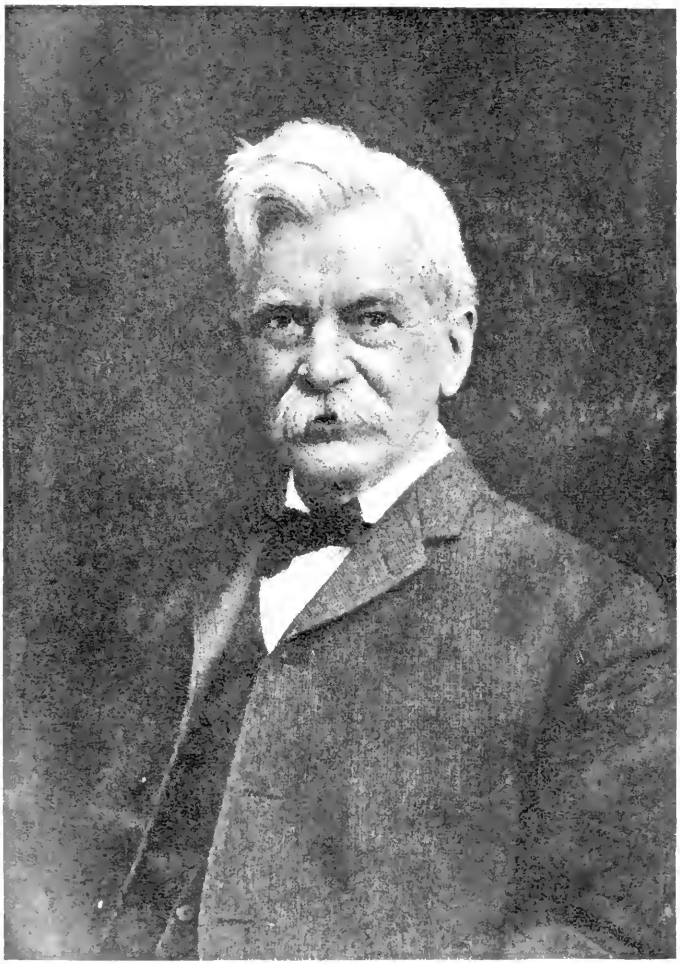
EDITORS AND PUBLISHERS
HENRY A. PILSBRY
Curator of the Department or Mollusca and Marine Invertebrates,
Academy of Natural Sciences
PHILADELPHIA
CHARLES W. JOHNSON
Curator of Insecta and Mollusca, Boston Society of Natural History
BOSTON

CONTENTS

OF

THE NAUTILUS, XLI.

INDEX TO AUTHORS



A. G. Vessell

THE NAUTILUS.

Vol. XLI JULY, 1927. No. 1

WILLIAM HEALEY DALL

By the death of Dr. Dall on March 27, 1927, American conchology has lost its most eminent representative.

W. H. Dall was born in Boston, Mass., August 21, 1845. His father was a missionary of the Unitarian Church to India. Educated in the public schools of Boston, Dall afterward studied under Louis Agassiz at Harvard.

"Dall, in common with most naturalists, developed an interest in natural history when so young that he was unable to recall the date. The accident that led him to become interested in shells was, he said, the possession when a boy of twelve of a copy of Dr. Gould's 'Invertebrata of Massachusetts'. Inspired by this work, and living near Boston, he undertook to make a complete collection of the shells of Massachusetts. Finding species that he was unable to name, he made bold to consult the author, Dr. Gould, who gave him much sound advice, and whom Dall characterized as 'one of the best and most lovable of men'.

"A little later, when employed in an office on the India wharf in Boston, where he did boy's work for wages, he kept a book in his desk and at odd times when unoccupied with his regular task, copied scientific books which he then thought he would never be able to buy.

"The next factor in shaping his zoological career was work in the museum at Cambridge, where he fell under the

magnetic influence of Louis Agassiz. His third opportunity occurred in Chicago at the time of the Civil War, when, having failed to obtain a livelihood in Boston, he found employment in the Windy City. Although hard at work during the day, he spent his evenings studying at the Chicago Academy of Sciences.

"It was there that he met William Stimpson and Robert Kennicott, both of whom became dear personal friends. It was there also that he determined, in the event of a choice of occupations, to accept irrespective of pay the one that promised most in the way of opportunity for continuing scientific studies. Acting on this resolve he more than once declined offers of higher salary and undertook harder work with less pay where there were better advantages for study.

"In 1865 he visited Alaska as one of the scientific staff of the Western Union International Telegraph Expedition, and when his friend, Robert Kennicott, leader of the expedition, died on the ice of the Yukon, Dall, though only twenty-one years old, was unanimously chosen to succeed him. In 1867 he explored and mapped the mighty Yukon River from the coast up to Fort Yukon, then believed to be on or near the international boundary. On his return he published an illustrated volume on 'Alaska and its Resources', (1870) comprising upwards of six hundred pages and a map, which for many years remained the standard authority on the territory. Professor Baird, appreciating his industry and talent, promptly took him into the fold of the Smithsonian Institution, which except during absences on field expeditions, continued to be his headquarters until his recent fatal illness.

"From 1871 to 1874 Dall was captain of a Coast Survey vessel and head of a scientific survey of the Aleutian Islands and adjacent coasts, the results of which, with much other material, were embodied in a quarto volume entitled the 'Pacific Coast Pilot, Coasts and Islands of Alaska' (1879), prepared jointly by himself and his associate, Marcus Baker.

"From 1880 till his death he was an honorary curator in the National Museum; from 1884 to 1925 he was paleontologist of the United States Geological Survey; from 1893 till 1927 he held the chair of invertebrate paleontology in the Wagner Institute of Science; and from 1899 to 1915 was honorary curator of the Bishop Museum, Hawaii.

"He was the recipient of several medals and honorary degrees, including that of LL.D." [1] He held honorary membership in many societies, American and foreign. He was President of the American Association for the Advancement of Science in 1882 and 1885.

Dall's early work on mollusks was mainly published in the American Journal of Conchology (Vols. 5 to 7), and was based upon West Coast material. The papers on limpets and Brachiopoda, among others, were generally recognized as important, and gained for the young naturalist, who was still well under thirty, favorable standing in the group of distinguished conchologists of that time,—such men as Newcomb, Binney, Tryon, Cooper, Bland, Lea, Prime, and others.

When the series of Proceedings of the U. S. National Museum was begun in 1878, Dall became one of its chief contributors. His first publication on Tertiary paleontology was at this time. In 1881 his paper on chitons, making Carpenter's genera valid, was published, and in 1883 an important paper on Hemphill's collections of Florida shells.

In 1886 and 1889 the Reports on the "Blake" Mollusca came out (Bull. M. C. Z., Vols. 12 and 18). These classical volumes show Dall's powers at their mature stage. They are not only indispensible in the study of deep sea mollusks and the conditions of their existence everywhere, but they are still in constant use in dealing with shore forms of tropical America.

From 1890 to 1903 Dall was engaged upon his *magnum opus*, "Contributions to the Tertiary Fauna of Florida",

[1] From C. Hart Merriam, Science, 1927, p. 346.

small quarto, 1654 pages and 60 plates, published in six parts by the Wagner Free Institute of Science, Philadelphia. Malacologists and paleontologists will probably agree that this is the most important single work ever issued in America on marine Mollusca, and at the same time on American Tertiary paleontology. Its great influence upon the progress of paleontology will be obvious to anyone familiar with literature of our Tertiary published before and after Dall's work. The discussions on molluscan taxonomy and nomeclature give these volumes a high value to conchologists as well as to paleontologists everywhere—far beyond the limits expressed in the modest title.

Dall's work on Tertiary Mollusca was continued in his "Miocene of Astoria and Coos Bay, Oregon", 1909, the "Monograph of the Molluscan Fauna of the Orthaulax pugnax Zone", 1915, and numerous shorter papers.

In the years devoted to Tertiary paleontology Dall elaborated his new classification of the Pelecypoda, based chiefly upon the morphology of the hinge. It was outlined in his article in Eastman's edition of Zittel's "Textbook", 1896, subsequently elaborated in various paleontological papers and in a series of synopses of the classification of families and of the American species of each, published in "Proceedings of the U. S. National Museum", "Nautilus", "Journal of Conchology" and some other serials. Those who have gathered this series of about 20 papers into one volume find it indispensible in dealing with our marine bivalves.

In land mollusks Dall's work was chiefly descriptive and faunistic. His three papers on the Galápagos fauna form practically a monograph. He published the first account of the land shells of the United States-Mexican boundary region, and many short papers descriptive of Mexican and United States species.

"In 1899 Dall was one of the most eminent of the scientific guests of the late E. H. Harriman on the famous and unique Harriman Alaska Expedition. It is well within the truth to say that in view of the vast amount of work done

by Dall during his thirteen previous visits to Alaska and in the preparation of his publications on the geography, geology, meteorology, anthropology and natural history of the territory, his knowledge was of the greatest service; while his genial disposition and readiness to answer multitudes of questions, both to individual members and at the evening gatherings in the cabin, made him the most beloved member of the expedition. To the series of thirteen volumes on the results of the research work of the voyage, he contributed a valued article on the 'Discovery and Exploration of Alaska' and a beautiful and touching poem on the Innuit People." [2] To the technical series he contributed the account of "Land and Fresh Water Mollusks" (Harriman Alaska Expedition, XIII, 1905; 171 pages, 2 plates), a summary of existing knowledge of American mollusks north of parallel 49°. This work covers territory quite inadequately treated of in previous manuals, and is further useful for its copious references and the revision of nomenclature of fresh water families.

From his early days in California, over fifty years ago, Dall kept up his interest in West Coast and Alaskan marine mollusks; throughout the half century he remained the chief authority on those faunas. He described a very large number of species in many papers, finally (1921) publishing a "Summary of the Marine Shellbearing Mollusks of the Northwest Coast of America, from San Diego, California, to the Polar Sea". It had been hoped that he would publish a monograph with figures and synonymy, a task for which he was equipped by life-long familiarity with the fauna.

In the space available it is possible to mention only Dall's more extensive works. No small part of his time was given up to correspondence. He was always ready to give the benefit of his wide knowledge to earnest students, even to beginners in science. Practically every conchologist in America can testify to his generosity in the identification

[2] C. Hart Merriam, Science, p. 347.

of material and in help with intricate questions of taxonomy and nomenclature.

An excellent portrait was published in this journal for May, 1915.

"It was the possession of such sterling qualities as intellectual capacity, patience, industry and thirst for knowledge, coupled with high ideals of integrity and obligation, that enabled Dall to attain the position he so long held among the eminent scientists of the world. The closing words of his appreciation of his friend William Stimpson may well be applied to himself: 'Those who had the privilege of his companionship will carry an abiding memory of his abilities as a naturalist and his noble and lovable characteristics as a man'." [3]

—H. A. P.

A NEW SUBSPECIES OF THAIS FROM LOUISIANA

WILLIAM J. CLENCH
Museum of Comparative Zoölogy

THAIS FLORIDANA HAYSAE, subsp. nov. Plate 1, fig. 1.

Shell large, acutely ovate, exterior color, a dull gray to brownish gray, occasionally spotted with small, irregular patches of bluish. Whorls convex, 6 to 7, regularly increasing in size. Two rows of large, usually two- or three-ridged blunt tubercles are produced on each whorl a little above the middle. Proceeding toward the spire these tubercles become two-ridged, finally becoming a series of single knobs. (Holotype.) Spire acute, produced. Aperture ovate to ovate-rounded, about half the total length of the shell. Inner margin of the palatal lip strongly crenulate, inner periphery of aperture pale orange to yellowish orange, shading into light pink below. Canal slightly pro-

[3] C. H. Merriam, Science, 1927, p. 347.

duced, curving upwards and backwards. Columella thick, massive, slightly twisted, generally straight, sometimes slightly convex. A well defined ridge extends from umbilical area to tip of canal. This is absorbed at the columellar region and not continued as an axial lamella. Sculpture of very fine flattened spiral ridges crossed by numerous minute growth lines, the spiral sculpture, however, predominating. Suture exceedingly deep caused by an evagination of the superior border of the palatal lip adjacent to each whorl. Rarely this is closed by being cemented along the upper portion of the ridge.

Type locality: Grand Bayou, Mississippi delta, Louisiana, received from Miss Markley L. Hays.

Holotype: Museum of Comparative Zoology, No. 52203.

Paratypes: Museum of Comparative Zoology; Academy of Natural Sciences, Philadelphia; Museum of Zoology, University of Michigan.

L. 88; W. 55.51 Ap. L. 46; Ap. W.[1] 20 mm. Holotype 52203.

L. 112.5; W. 56; Ap. L. 49; Ap. W.[1] 19 mm. Paratypes 52204.

L. 83; W. 51.5; Ap. L. 51; Ap. W.[1] 19.5 mm. Paratypes 52204.

L. 83; W. 51; Ap. L. 49.5; Ap. W.[1] 19.5 mm. Paratypes 52204.

Remarks: Miss Hays very kindly sent to me sixty-six specimens of this subspecies from which the above description was made. The very large size, the production of the large double row of tubercles, and the produced spire differentiate this subspecies from *T. floridana* Conr.

Typical *T. floridana* is rarely as large as this subspecies, has a single row small tubercles, and a smaller aperture in proportion to its size. Fig. 2, obtained from Beaufort, North Carolina, represents a form of *T. floridana* in which the tubercles are well developed. Material obtained south of Beaufort shows a decrease in the size of the tubercles,

[1] Measurements from inner border of columella to inner side of outer lip.

and St. Augustine forms are almost devoid of this character. The material from which Conrad described his species probably came from the west coast of Florida in the vicinity of Tampa. Forms of *T. floridana* from this region differ from East Florida and Texas forms in being slightly narrower.

The main characters of *T. floridana haysae* are very constant, with the exception of the proportionate length of the spire as exhibited by the type series. One specimen is very much longer than any of the others (112.5 mm.), though its other measurements are more or less consistent. The two- and three-ridged tubercles are produced by an increased size of the spiral ridges as they pass over these formations.

Miss Hays reports that this form does considerable damage to the oysters in the delta region and is known locally as the "drill", a name applied as well to *Urosalpinx cinereus* Say.

A QUANTITATIVE STUDY OF THE MARINE MOLLUSKS OF CAPE MAY COUNTY, NEW JERSEY

BY ALBERT ELMER WOOD AND HORACE ELMER WOOD 2ND

The plan of this paper was developed by the junior author following a conversation with the late Professor Gilbert Van Ingen of Princeton University on the need for an ecological study of the South Jersey sounds facies before the region was too thoroughly "improved" with summer resorts. This region has not been studied ecologically. However, it does not differ fundamentally from the Wood's Hole Region, which has been studied intensively; and scattered work has been done as far south as Beesley's Point, the extreme northern tip of Cape May County. Davenport's

classical study of the Cold Spring sand spit gives much the closest analogy, in miniature, to Seven Mile Beach, a fairly typical South Jersey barrier island. The inner harbor, cut off by the sand spit from the outer harbor, makes a situation very similar to the sounds, separated from the ocean by the island.

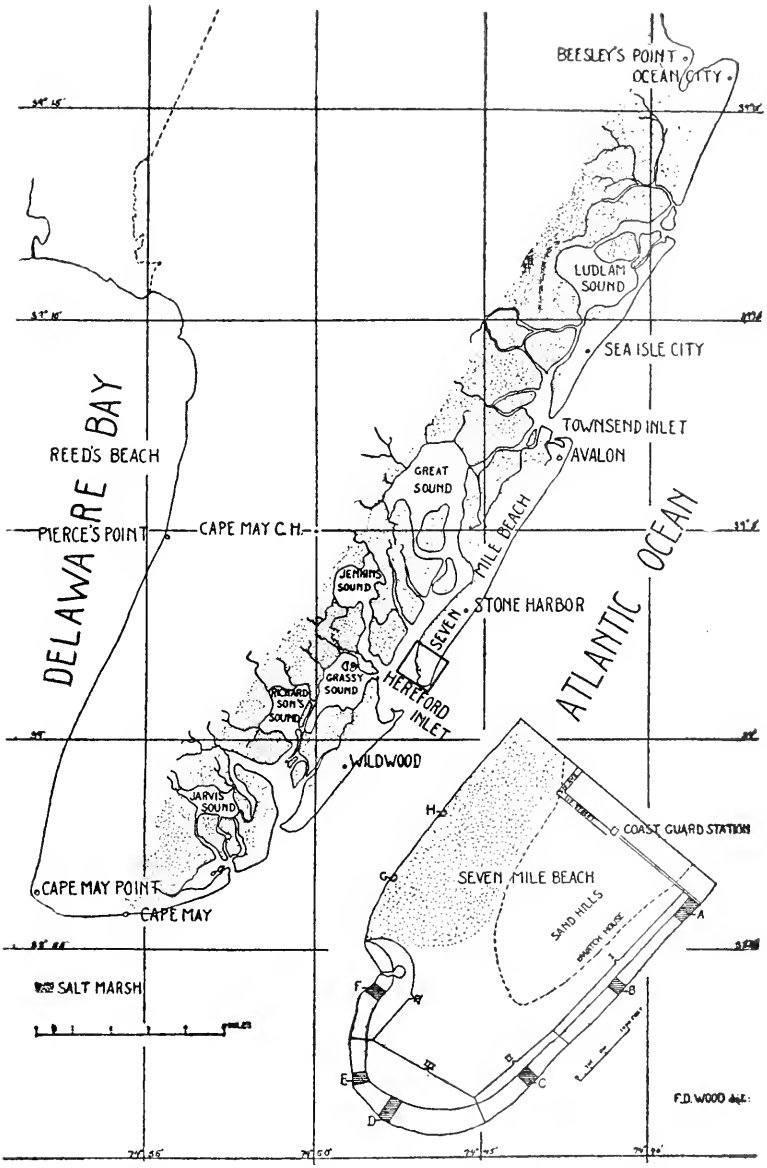
There are no pretensions to new systematic data in this paper, nor are the ecological results particularly striking. The use of large enough numbers to give statistical validity and the stratigraphic implications are perhaps more significant. It seems possible that some such quantitative differences in the proportions of various forms or groups as are recorded in table 1, may be found to hold good, in a general way, throughout the Cenozoic, since most existing molluscan genera go back about that far. Not only the list of species present in a given formation, but also the relative abundance of individuals of the various species should be taken into account in determining what facies is represented. Stratigraphers could make use of the data of ecology, particularly quantitative ecology, to great advantage. This paper is only a suggestion as to the possibility of deriving advantage from this line of attack, in dealing with stratigraphic and paleogeographic problems.

Studies somewhat similar in subject matter are those of: Allee (1923 *a* & *b*), Davenport (1903), Packard (1918), Sumner, Osborn and Cole (1911) and Verrill (1873). The bearing of ecology on stratigraphy is implied by H. B. Baker (1914) and emphasized by F. C. Baker (1922), both, however, in relation to epicontinental forms. The importance of quantitative ecology is emphasized by Forbes (1907), Packard (1918) and Michael (1920). The closest parallel to this paper is by Abrard (1924), in which he undertook, with the tertiary stratigrapher in mind, a qualitative study of variations in molluscan shells cast up at intervals along the west coast of France, finding intergradations between typical marine and estuarine faunules. His point of view is very similar to this study, and there are certain slight similarities in results.

The field work was done by the senior author with the assistance of the junior author, Messrs. George Clark, John Clark, and Blair Wood. The counts were made during the summers of 1924 and 1926. All the localities selected were those least "favored" by summer visitors, and the southern end of Seven Mile Beach is almost unaffected by human activities. The specific identifications should be accepted with some slight reserve as the authors are not specialists in this field, and the nomenclature is subject to the same reservation. The scope of the study was limited to the area between high and low water marks, although, obviously, most of its mollusk shells are cast up from the submerged zone. Where a very abundant animal was counted in a small area, this area was selected where the animal in question was especially numerous, as giving an approach to its maximum frequency. Shells were not counted unless more than half intact. Allowance must be made for the prevalence of pelecypod valves over gastropods, as 2:1, given the same number of individuals, for the greater fragility of some forms, producing a fictitious rarity, and for the tendency to overlook small specimens. All these factors, of course, affect fossil faunas equally. One special factor, in this case, is the strong tidal current which sweeps in and out of Hereford Inlet, and brings many empty shells into facies in which they are never found alive.

There is the usual sand hill sequence; bunch grass, then bay-berry (here growing to be real trees over ten feet high), wild cherry later, and finally scrub cedar, which formerly ran the whole length of the island in a narrow belt. The newest sand hills are toward the ocean—one full row has developed during the last twelve years, under the observation of the authors.

Donax variabilis is found alive all along the beach, but especially north of Section III. *Busycon canaliculatum, B. caricum, Natica duplicata, N. heros* and *Mactra solidissima* live in the sand on the ocean side, often being exposed at low tide. *Mytilus edulis* inhabits mud banks in the outer channels, exposed at low water, and also piles in the open



Map of Cape May County, modified from those of the U. S. Geological Survey. The inset sketch map of the southern end of Seven Mile Beach was made for this paper, the distances being paced off.

ocean. *Nassa obsoleta* occurs in life in vast numbers throughout the lower regions of the outer channels, especially where there is about 50-50 admixture of mud and sand. *Mya arenaria* has nearly the same habitat as *Nassa*, except for the fact that when marsh grass over-runs the ground, *Mya* remains, but *Nassa* does not. *Mya* also extends further north in the channel than *Nassa* does. *Ensis directus* lives in mud or sandy mud in the outer channels, in the inter-tidal zone. *Venus mercenaria* and *Ostrea virginica* have habitats similar to *Ensis*, except that they inhabit slightly deeper water, and all the channels. *Modiola plicatula* occupies the banks of the channels. *Littorina litorea* clings to grass in salt marshes. The fauna of the minor sounds was not studied; in general its mollusks consist of a few species, i. e., *Venus mercenaria, Modiola plicatula, Littorina litorea, Ostrea virginica* and *Nassa obsoleta.*

Packard (1918) and Allee (1923 a) count living animals only, as the shells of dead animals may be distributed by currents, tides, shore birds and hermit crabs. In spite of the errors they introduce, empty shells are included in this count, for the following reasons: 1, the stratigrapher can not make such a distinction, even if the ecologist can; 2, the use of only living specimens reduces the total numbers to such a point that they are not statistically significant. Allee's figures suffer from this; Packard, however, counts empty shells separately.

Allee (1923 b) refers to "old associations" and "ecological age", following Cowles, Shelford and Adams, when, by all analogy and common sense, just the opposite is meant. By their terminology, the open ocean is ecologically the youngest and the recently formed sandy beach, the oldest. This is directly opposed to other uses of "old" and "young", both ordinary and scientific, and should be discontinued.

Pairs of attached pelecypod valves were counted separately, except in the case of *Donax* in A and B. Additional errors of proportion are introduced by including, without correction, the numbers of *Donax* in A and B, *Nassa* in F

and G and *Mytilus* in H, in smaller areas than for their competitors. The proportions that follow, taken without correction from table 1, therefore, tend to give minimal values. On the ocean side, pelecypod shells outnumber gastropods more than 46:1, or, allowing fully for the double pelecypod valves, they outnumber the gastropods more than 23:1. On the channel side, the gastropods are outnumbered by the pelecypods as 7:8, or, from the view-point of the number of animals, the gastropods are nearly twice as numerous in the sections counted, and the actual predominance of gastropods in the fauna is greater than the figures show. Making rough corrections for the various sources of error, it is safe to say that pelecypods are at least thirty times as numerous as gastropods on the open beach, and that gastrapods are definitely more numerous than pelecypods in the outer sounds. On the other hand, Packard (1918) found that, in San Francisco Bay, the pelecypods were nearly five times as numerous as the gastropods, but that the preponderance was much less marked just outside the Golden Gate. Much more work must be done before any definite generalizations can be made.

The localities on Seven Mile Beach, A to H inclusive (see map), represent a progressive transition from a typical ocean (beach) facies to a typical interior channel (sounds) facies. Localities A, B, and C are along the ocean, approaching the southern end of Seven Mile Beach. D is on the point itself, E and F are to the north, on a somewhat muddy beach on the channel side. G is a sandy tidal mud flat. H is a mussel bed on a sandy mud bar. Pierce's Point and Reed's Beach have narrow, steeply sloping sandy beaches with mud flats at the foot exposed only at low tide.

	1924		1926	
	Along Beach	Intertidal	Along Beach	Intertidal
Section A	300 feet	150 feet	300 feet	175 feet
Section B	150 feet	100 feet	150 feet	175 feet
Section C	150 feet	.....	150 feet	200 feet
Section D	150 feet	.....	150 feet	450 feet
Section E	150 feet	.....	150 feet	180 feet
Section F	150 feet	225 feet	150 feet	215 feet

Section G was one square yard, both years
Section H was six inches square, both years

A few specimens of the following shells were also present in I and II, but were not found in the sections which were counted:—*Buccinum undatum*, *Busycon perversum*, *Pholas costata*, *Sigaretus perspectivus*, and *Zirphaea crispata* (?).

The Pierce's Point area extends a hundred feet south from the second rail run-way south of the road across the marshes. The distance from high to low water mark is fifty feet (not counting the mud flats beyond, exposed only at dead low tide). Neither *Ostrea virginica* nor *Nassa obsoleta* nor *Melampus bidentatus* were counted from the whole section, but from small areas.

At Reed's Beach, the count started from fifteen hundred feet north of the road across the marshes, at a king-crab drying pen, and continued twenty five feet further on, and extended the ninety feet from high water mark to the edge of the mud flats which were covered at the time the area was visited. Most of the shells were concentrated in a strip about a foot wide at high water mark, to which strip the figures in table 1 apply. On the rest of the beach there were 83 shells of *Ostrea virginica* and the fragment of a *Venus mercenaria*.

Table 1 gives the complete figures for the various areas in which the shells were counted. Table 2 is a qualitative summary of table 1.

TABLE ONE

GASTROPODS	Sect. A		Sect. B		Sect. C		Sect. D		Sect. E		Sect. F		Sect. G		Sect. H		Pierce's Reed's	
	1924	1926	1924	1926	1924	1926	1924	1926	1924	1926	1924	1926	1924	1926	1924	1926	1924	1926
Busycon canaliculatum										2		2						
Busycon caricum	2	1	1			1		5	6	20		8					2	
Crepidula convexa						1	1	10	2	11	2	1					1	2
Crepidula fornicata	16	14	12	3	1	25	11	20	1	13	3	23					22	9
Crepidula plana	27	10	5	8	2	24	1	10	5	14		4					20	3
Littorina litorea					2				1	4		3					1	1
Melampus bidentatus								1		6		3					h	2
Nassa obsoleta		1		1		3			818	1179	f	g	1305	1493			i	171
Nassa trivittata								2	7	9	8	125		2			19	12
Natica duplicata	2		8	3		1	2	3	5	17	4	16					1	
Natica heros	2		1			1		1	1	4		4					4	
Scalaria lineata																		1
Urosalpinx cinereus				1				1		2	1	3					4	4
PELECYPODS																		
Anomia glabra	612	915	503	462	158	750	291	491	12	244	54	72		1				
Arca pexata	29	2	6	8	1	17		10	5	2		2					1	
Arca ponderosa		1	4		1	2	2		1	3		2						
Arca transversa		4	3	2		11	2	5	1	4	2	4						
Donax variabilis	b	c	b	d	b	e	b	339	398	369	193	279					18	
Ensis directus a	18	33	3	8	2	19	24	18	21	7	2	12					72	
Lucina dentata	15	4	9	10	4	15	5	5		6								
Macoma baltica																	371	336
Mactra lateralis																	350	315
Mactra solidissima a	521	465	806	229	44	971	223	784	209	938	94	248		4				
Modiola plicatula	2	4	1		1		3	5	1	12	3	6				5	42	1
Mya arenaria		1				1				1	1						13	
Mytilus edulis	84	381	142	59	42	128	93	115	36	51	123	75		10	503	182	7	4
Ostrea virginica	215	104	80	42	26	82	87	118	40	241	35	124			6	2	j	582
Pandora trilineata	5	4	2	1	1	3		1										
Pecten irradians	22	35	42	7	22	48	14	20	6	14	5	7		1				
Petricola pholadiformis	3	9	4	3	5	5	6	19	3	1	6	2				17	2	
Tagelus gibbus	2	4	2	1	2	6	3	4	2	4								
Tellina tenta								2									6	
Venus mercenaria	7	8	3	1	2	7	6	2		17	1	3		6			4	

a. Fauna of a tide water pool in section B, i. e., 6 **Mactra solidissima** and 4 **Ensis directus**, omitted in the list. **b.** Count omitted in 1924. **c.** Count omitted in 1926. **d.** 1510 live **Donax variabilis** counted in one square foot. **e.** 47 live **Donax variabilis** counted in one square foot. **f.** 2842 live **Nassa obsoleta** were counted in an area 82.5 feet by 225 feet. **g.** 1586 live **Nassa obsoleta** were counted in an area 87 feet by 60 feet. **h.** 58 **Melampus bidentatus** were found in four square feet. **i.** 89 live **Nassa obsoleta** were found in four square feet. **j.** 76 **Ostrea virginica** were counted in four square feet. Only the adults were listed. There were several times as many young ones attached.

TABLE TWO

Dominant Molluscs (in the order of their relative abundance).

Section A.		Section B.		Section C.	
1924	1926	1924	1926	1924	1926
Donax	Donax	Donax	Donax	Donax	Donax
Anomia	Anomia	Mactra	Anomia	Anomia	Mactra
Mactra	Mactra	Anomia	Mactra	Mactra	Anomia
Ostrea	Mytilus	Mytilus	Mytilus	Mytilus	Mytilus
Mytilus	Ostrea	Ostrea	Ostrea	Ostrea	Ostrea
		Pecten		Pecten	Pecten

Section D.		Section E.		Section F.	
1924	1926	1924	1926	1924	1926
Anomia	Mactra	N. obsoleta	N. obsoleta	N. obsoleta	N. obsoleta
Mactra	Anomia	Donax	Mactra	Donax	Donax
Donax	Donax	Mactra	Donax	Mytilus	Mactra
Mytilus	Ostrea	Ostrea	Anomia	Mactra	Ostrea
Ostrea	Mytilus	Mytilus	Ostrea	Anomia	N. trivittata
			Mytilus	Ostrea	Mytilus
					Anomia

Section G.		Section H.	
1924	1926	1924	1926
N. obsoleta	N. obsoleta	Mytilus	Mytilus

Pierce's Point

1924
Ostrea
Nassa obsoleta
Melampus
Macoma
Mactra lateralis
Ensis

Reed's Beach

1926
Ostrea
Macoma
Melampus
Nassa obsoleta

It is noteworthy that the counts for the two summers, 1924 and 1926, run closely parallel as to relative frequency at least of the more abundant shells, and run roughly parallel as to the numbers themselves.

SUMMARY

1. Ecology, and particularly statistical ecology, may be of great assistance in solving stratigraphic problems.

2. For statistical treatment, sufficiently large numbers must be obtained to make the results significant. In deal-

ing with mollusks, this usually involves including the shells of dead individuals in spite of the errors introduced. The stratigrapher must deal with such material.

3. The counts for the summers of 1924 and 1926 run roughly parallel as to the more abundant species.

4. On the open ocean beaches of Cape May County, New Jersey, pelecypods enormously outnumber gastropods. In the main sounds, gastropods are the dominant element.

5. Collections along the ocean beach are marked by *Donax, Anomia, Mactra, Mytilus,* and *Ostrea;* in the outer sounds by *Nassa obsoleta* and *Modiola* as well; from Delaware bay by *Ostrea, Nassa obsoleta, Melampus* and *Macoma.*

REFERENCES

Abrard, R. 1924. Note sur les dépôts littoraux entre l'embouchure de la Seudre et celle de la Gironde. Bull. Mus. Nation. d'Hist. Natur., Paris, XXX, p. 536-542.

Allee, W. C. 1919. Note on animal distribution following a hard winter. Biol. Bul., XXXVI, p. 96-104.

1922. The effect of temperature in limiting the geographical range of invertebrates in the Wood's Hole littoral. Anat. Rec., XXIII, p. 111.

1923a. Studies in marine ecology: I. The distribution of common littoral invertebrates of the Wood's Hole Region. Biol. Bul., XLIV, p. 167-191.

1923b. Studies in marine ecology: III. Some physical factors related to the distribution of littoral invertebrates. Biol. Bul., XLIV, p. 205-253.

Baker, F. C. 1922. The importance of ecology in the interpretation of fossil faunas. Ecology, II, p. 277-280 (for "Oct. 1921"). Jan. 20, 1922.

Baker, H. B. 1914. Physiographic and molluscan succession in lake pools. Rep. Mich. Acad. Sci. XVI, p. 18-45.

Davenport, C. B. 1903. The animal ecology of the Cold

Spring sand spit. Decennial Publ. Univ. Chicago, X, p. 157-176.

Flattely, F. W. and Walton, C. L. 1922. The biology of the sea-shore. MacMillan, N. Y., p. 1-84.

Forbes, S. A. 1907. On the local distribution of certain Illinois fishes: an essay in statistical ecology. Bul. Ill. State Lab. Nat. Hist., VII, (p. 273-303, Maps 1-15, Pl. XXIV-XXXII).

Huntsman, A. G. 1919. The vertical distribution of certain intertidal animals. Proc. and Trans. Roy. Soc. Canada, XII, 4, p. 53-60.

King, L. A. L., and Russell, E. S. 1909. A method for the study of the animal ecology of the shore. Proc. Roy. Phys. Soc. Edinburgh, XVII, p. 225-253.

Michael, E. L. 1920. Marine ecology and the coefficient of association; a plea in behalf of quantitative biology. Journ. Ecology, VIII, p. 54-59.

Packard, E. L. 1918. A quantitative analysis of the molluscan fauna of San Francisco Bay. Univ. Cal. Publ. Zool. XVIII, p. 299-308, 317-336, pls. XII and XIII.

Pearse, A. S. 1926. Animal ecology. McGraw-Hill, N. Y., p. 138-157.

Pratt, H. S. 1916. A manual of the common invertebrate animals. McClurg, p. 492-602.

Rogers, J. 1908. The Shell Book. Doubleday, Page & Co., p. 1-485.

Simroth, H. 1898-1907. Mollusca, Bronn's Klassen und Ordnungen des Tier-Reichs. III, 2, p. 769-771.

Sumner, F. B., Osburn, R., and Cole, L. J. 1913. A biological survey of the waters of Wood's Hole and vicinity. Bul. Bur. Fisheries, XXXI, I, Physical and Zoological, p. 143-155, 170-192, 327-330, 340-406, 429-441.

Verrill, A. E. 1873. Report upon the invertebrate animals of Vineyard Sound and adjacent waters. Rep. U. S. Fish. Comm., 1871-72, p. 295-513. Plates.

SOME SOUTH DAKOTA MOLLUSCA

BY JUNIUS HENDERSON

I have received from Mr. Henry E. Lee, of Rapid City, South Dakota, two fine examples of [*Lampsilis*] *Proptera laevissima* (Lea) and two of *Anodonta grandis* Say, from Chamberlain, South Dakota. The only published record known to me of that species of *Lampsilis* in that state is Over's, in his list in THE NAUTILUS, but he gives no locality. The molluscan literature for the state is scant and scattered, in comparison with that of most states. There is doubtless much unrecorded material in public and private collections, which, if brought together, would give an excellent idea of the molluscan fauna of the state. Two lists by Over were published in 1914 and 1915.[1] Since then the University of Colorado Museum has received a number of parcels of shells from various localities from Mr. Lee, as well as from Dr. Arthur T. Evans, of Brookings. The localities are as follows:

Evans—Caputa, Cottonwood and Claremont; old lake bed northwest of Hayti; Lake Campbell, 13 miles southwest of Brookings; Lake Oakwood, Brookings County; pool near Stony Butte, 25 miles south of Fort Pierre; Jennings farms, 15 miles south of Fort Pierre.

Lee—Caputa and Chamberlain; Tourist Park, Rapid City; Rapid Creek and Dark Canyon, near Rapid City; Seavey's Lake, 11 miles north, and water hole 6 miles north of Rapid City; Spring Creek on Hill City road; brook near Black Hawk.

The following are the species, with their localities:

Anodonta grandis Say. Brookings, Hayti, Chamberlain, Lake Campbell.

[1] W. H. Over, "List of Mollusca of Harding and Perkins Counties", Bull. No. 6, S. Dak. Geol. Surv., pp. 95-96, 1914; "Mollusca of South Dakota", THE NAUTILUS, Vol. XXIX, pp. 79-81, 90-95, 1915.

Lampsilis siliquoidea (Barnes). Brookings.
Proptera laevissima (Lea). Chamberlain.
Amnicola cincinnatiensis (Anthony). Lake Campbell.
Amnicola emarginata Küster. Lake Campbell.
Amnicola limosa (Say). Lake Campbell.
Cochlicopa lubrica (Müller). Chamberlain, Tourist Park.
Euconulus fulvus (Müller). Hayti, Lake Campbell.
Gonyodiscus cronkhitei anthonyi (Pilsbry). Tourist Park.
Gastrocopta armifera (Say). Chamberlain.
Helicodiscus parallelus (Say). Chamberlain, Lake Campbell.
Lymnaea caperata Say. Caputa, Lake Campbell, Spring Creek, Stony Butte, Water Hole.
Lymnaea palustris Müller. Lake Oakwood, Stony Butte, Hayti, Lake Campbell, Claremont.
Oreohelix cooperi (W. G. Binney). Spearfish (Bryant Walker).
Physa integra Haldeman. Rapid Creek. Identified by Walker.
Physa sayi warreniana Lea. Dark Canyon, Seavey's Lake, Rapid Creek, Caputa, Black Hawk. Identified by Walker.
Planorbis parvus Say. Hayti, Lake Campbell.
Planorbis trivolvis Say. Lake Oakwood, Lake Campbell, Stony Butte, Hayti, Caputa.
Polita binneyana (Morse). Chamberlain.
Polita hammonis (Müller). Tourist Park.
Planorbula armigera (Say). Lake Campbell.
Succinea avara Say. Chamberlain, Tourist Park, Dark Canyon, Jennings Farm.
Succinea grosvenori Lea. Cottonwood.
Succinea haydeni W. G. Binney. Lake Oakwood.
Vitrina alaskana Dall. Tourist Park.
Vallonia gracilicosta Reinh. Chamberlain, Tourist Park.
Valvata tricarinata Say. Hayti, Lake Campbell.
Valvata tricarinata perconfusa Walker. Lake Campbell.
Zonitoides arborea (Say). Chamberlain, Tourist Park.

THE TYPE OF STREPTOSTPLA SHUTTLEWORTH

BY H. BURRINGTON BAKER

The International Code of Zoölogical Nomenclature recognizes four methods by which genotypes may be designated or fixed; these take precedence in the following order:

1. Type by original designation (autotype).
2. Type by original fixation (monotype, tautotype).
3. Type fixation through substitution (apotype).
4. Type by subsequent designation (lectotype).

An example of the fixation of a type by absolute tautonymy is the case of *Streptostyla* Shuttleworth (1852, Bern. Mitt., p. 203). This was originally proposed as a subgenus of *Spiraxis* and included, among other species, *Sp. streptostyla* + *Achatina streptostyla* Pfr. (1846, Zeit. Mal. 3, p. 59), from Mexico, which became automatically the genotype of the group. Later Albers-Martens (1860, Die Hel., p. 33) recognized two subgenera, but unfortunately chose *Sp. nicoleti* Sh. as the type of *Streptostyla* s. s., and proposed *Chersomitra* (l. c.), type *Sp. nigricans,* as a new subgenus to include *S. streptostyla.* Of course, *Chersomitra* is a synonym, with a different type, of *Streptostyla* s. s. I now propose *Eustreptostyla* as a new subgenus, with the genotype *Sp. nicoleti* Sh. (1852, B. M., p. 204), from Córdoba, Mexico, to include the species with costulate embryonic whorls and strong columellar spiral. *S. toyuca* Dall is probably another member of this group.

GUPPY'S GROUPS OF HELICINIDAE

BY H. BURRINGTON BAKER

When, several years ago (1922, Proc. Acad. Nat. Sci. Philadelphia 74, pp. 29-67), I attempted to review the groups of American Helicinidae, I overlooked a paper by R. J. L. Guppy (March, 1895, Proc. Victoria Inst. Trinidad, pt. 2, pp. 72-77), that also seems to have escaped the notice of other students of the family. In his paper, Guppy presented a revised arrangement of the Helicinidae, and proposed a number of sectional groups. The following names appear to have been new:

Diaphana Guppy (1895, p. 75), monotype *Helicina subfusca* Menke (1828, Syn., p. 79), from Porto Rico (and St. Thomas); not *Diaphana* Brown (1827). This, being preoccupied, goes into the synonymy of *Analcadia* Wagner (1907).

Fitzia Guppy (1895, p. 74), monotype *Helicina regina* Morelet (1849, Test. Nov. I, p. 19), from Cuba. This is an absolute synonymy of *Viana* H. & A. Adams (1856), for which Pilsbry and Brown (1910, Proc. Acad. Nat. Sci. Philadelphia 62, p. 525) have chosen the same type.

Isoltia Guppy (1895, p. 76), monotype *Helicina nuda* "Arango" Pfr. (1866, Mal. Bl. 13, p. 63), from Barigua, Cuba. This replaces *Incrustata* Wagner (1907) as a possible sectional name in the subgenus *Idesa* of *Alcadia*.

Krebsia Guppy (1895, p. 75), type, now chosen, *Helicina costata* Gray (1824), Zool. Jour. I, p. 67), from Jamaica; not *Krebsia* Moerch (1877, Mal. Bl. 24, p. 97). This, being preoccupied, goes into the synonymy of *Excavata* Wagner (1907), which is a section of *Eutrochatella* s. s.

Schrammia Guppy (1895, p. 75), monotype *Helicina conuloides* Guppy (1868, Ann. Mag. Nat. Hist. ser. 4, v. 1, p. 435), from Dominica. The type species probably belongs in the subgenus *Idesa* of *Alcadia*.

Urichia Guppy (1895, p. 74), type, now chosen, *Helicina adamsiana* Pfr. (1848, P. Z. S. London, p. 119), from Jamaica. The type is a species of *Lucidella.*

DESCRIPTION OF A NEW SPECIES OF LYMNAEA FROM BRITISH COLUMBIA

BY FRANK COLLINS BAKER[1]

LYMNAEA (GALBA) HEDLEYI Baker. Fig. 3.

Lymnaea hedleyi F. C. Baker, Nautilus XL, p. 122, fig. 3.

Shell ovate to elongate-fusiform, rather thin; periostracum light chestnut or brown; surface somewhat shiny in fresh specimens, lines of growth crowded, fine; spiral sculpture of deeply incised lines and more or less malleation; nuclear whorls 1¼, rather large, smooth, rounded, horn-colored; whorls 5, well rounded to quite convex, the body whorl varying from somewhat compressed to quite convex; spire varying from long and pointed to short and

FIG. 3. *Lymnaea hedleyi* F. C. Baker.

depressed; sutures well impressed; aperture ovate or long ovate, about as long as the spire; peristome slightly thickened within; inner lip rather wide, reflected over the columellar region, leaving a wide umbilical chink; there is no plait on the columella (excepting in young specimens), which, however, may be a little thickened in the middle; parietal wall with a wash of white callus.

L. 16.5; W. 9.7; Ap. L. 9.7; W. 6.5 mm. Type.
L. 15.0; W. 9.0; Ap. L. 9.0; W. 4.5 mm.
L. 15.0; W. 7.0; Ap. L. 7.2; W. 3.8 mm.
L. 11.2; W. 8.0; Ap. L. 7.5; W. 4.1 mm.

[1] Contribution from Museum of Natural History, University of Illinois.

Type: Academy of Natural Sciences of Philadelphia No. 142489. *Paratypes:* Museum of Natural History, University of Illinois, No. z13550.

Type locality: Red Pass Junction, source of Fraser River, British Columbia, altitude 3394 ft.

This little lymnaeid is unlike any other west-coast form of this genus. It is differently shaped and very much smaller than *sumassi* Baird, which occurs in this general region.[2] It most resembles *L. binneyi* Tryon, but differs in its longer, more pointed spire, deeper sutures, and more convex whorls. The texture is also different, *binneyi* having a waxy luster and coarse growth lines while *hedleyi* is of duller luster and the growth lines are finer. *Traski* Tryon, has more flat-sided whorls, a more pointed spire and less convex whorls, and a differently shaped columella. The texture is also different in the two forms, *traski* being more waxy. The variation in the height of spire and the convexity of the whorls is paralleled only by forms of *emarginata*, which certain forms of *hedleyi* somewhat resemble.

The species is dedicated to Mr. Charles Hedley, who collected the specimens. The writer is indebted to Dr. H. A. Pilsbry for the opportunity of studying and describing this interesting form.

DESCRIPTION OF A NEW SPECIES OF SOMATOGYRUS FROM WISCONSIN

BY HENRY A. PILSBRY AND FRANK C. BAKER

SOMATOGYRUS TRYONI new species.

Somatogyrus currierianus (Milwaukee specimen) Tryon, Mon. Fresh-water Univ. Moll., Contin. Haldeman, p. 62, pl. 17, fig. 13, 1870 (not the description).

[2] Baker, Lymnaeidae of North America, p. 403, pl. XLI, figs. 11-17.

Type locality: Pipersville Rapids, Rock River, Jefferson Co., Wis.

Shell globosely conic, very solid; color brownish or greenish horn, or light yellowish olive, rarely hyaline excepting in the young; sculpture of distinct growth lines, coarse in places, in others the shell is smooth, the young shell having very fine spiral lines; whorls 4½, convex, rapidly increasing in diameter, the body whorl globose; sutures well impressed; spire broadly conic, slightly shorter than aperture; apex blunt, the nuclear whorl not much raised above the second whorl, rounded, punctate or malleated; aperture roundly ovate or ovate, slightly narrowed and angular posteriorly, whitish or bluish white within, sometimes with a dirty yellowish border within the thin, sharp outer lip; peristome continuous, appressed to the parietal wall; inner lip and whole columellar region with a heavy, flattened callus, which either completely closes the umbilicus or leaves a small, narrow chink; in very old specimens there is a delicate keel bordering the flattened columellar area; the whole apertural border is thickened and frequently a second apertural border is formed within the first.

L. 8.6; D. 7.3; Ap. L. 6.0; D. 4.0 mm. Milwaukee specimen (A. N. S. P. No. 57023).

L. 5.6; D. 5.3; Ap. L. 4.1 mm. Type A. N. S. P.

L. 6.2; D. 5.3; Ap. L. 4.0; D.; 2.5 mm. Paratype (U. of I., Z22511).

L. 5.8; D. 4.1; Ap. L. 3.1; D. 2.1 mm. Paratype (U. of I., Z22511).

Genitalia with a simple verge apparently without flagellum, very wide and much compressed. Radula with the formula 28: 28: 6-1-6: 6-1-6/6-6: 6-1-6: 28: 28, the side cusps of center and lateral subequal on either side of a large central cusp. Operculum with distinct, though fine, spiral lines.

Distribution: Rock drainage, Ashippun River east of Mapleton; Bark River at Highway 67, Waukesha Co.; Crawfish River at Aztalan, Bark River at Rome, Pipersville Rapids, Jefferson Co. Fox drainage (Illinois),

Mukwonago River and Creek, Waukesha Co.; Lake Michigan drainage, Milwaukee, Milwaukee Co.

The Milwaukee specimen (No. 57023 A. N. S. P.) figured by Tryon as *currierianus* Lea was long ago recognized as an erroneous identification and queried on the label by the senior author. It could not be identified with any known species of the genus. There seemed to be no reason to doubt the locality, which is vouched for on the label by the name of I. A. Lapham, a reliable naturalist of Wisconsin in the sixtys; yet in the absence of confirmation by collectors in the last fifty years, the record had come to be regarded as dubious or mythical.

During the summer of 1926 Dr. Alvin R. Cahn, of the Department of Zoology, University of Illinois, collected extensively in Waukesha and Jefferson counties, Wisconsin, and among the material submitted to the junior author for his work on the fresh water Mollusca of Wisconsin were a number of Somatogyrus that appeared to be the same as the Milwaukee specimen of Tryon, excepting that they were somewhat smaller and had a small umbilical chink. The Milwaukee specimen is apparently a very old shell, perhaps having added a third seasons growth, a fact shown by a dark line marking the place of a former outer lip. A specimen in the Pipersville lot has begun to do the same thing. The Milwaukee specimen is scarcely typical of the normal adult stage of the species, and for this reason the type material is taken from the Pipersville locality, from which the genitalia and radula were described. These will be figured by the junior author in the Monograph of Wisconsin Fresh Water Mollusca, now awaiting publication by the Wisconsin Natural History Survey.

S. tryoni differs from *S. integer* in its longer spire, rounder whorls of the same, deeper sutures, more globose body-whorl, which is not dilated, and the very narrow umbilical opening, which is rarely completely closed by the heavy columellar callus, as is the case in *integer,* in which the inner lip is bordered by a wide sulcus indicating added shell growth to the inner lip. From *S. depressus,* which it great-

ly resembles in form, it is at once distinguished by the very heavy columellar callus and the small umbilical chink, depressus having only a thin wash of callus and being distinctly umbilicated.

BOSTON MALACOLOGICAL CLUB

The Boston Malacological Club has held its regular meetings during the past season, on the first Tuesday evening of each month, from October to May, inclusive. These have been held in the Library of the Boston Society of Natural History, with the exception of the Annual Meeting, on May 3rd, when the members of the Club were the guests of the retiring president, Mr. Arthur F. Gray and Mrs. Gray, at their home in Watertown, Mass.

The meetings have been well attended; the membership list, now numbering forty-two, has been increased by the addition of four new names; and at the April meeting it was voted to create a class of Honorary Membership, the number to be limited to five.

Dr. Henry A. Pilsbry of Philadelphia, Pa., Dr. Bryant Walker of Detroit, Michigan, and Mr. J. W. Taylor of Leeds, England, were elected to Honorary membership.

The Club this year decided to take up a family of shells, at each meeting, for discussion and examination, the evenings assuming the character of a Symposium, with short talks by several of the members, covering the nomenclature, classification, geographical distribution, habits and characteristics of the family, with a comparison of fossil and living forms.

Much interest was added by the large number of species from the Natural History Society's study collections, shown at the meetings through the kindness of Mr. Charles W. Johnson, and by specimens from the private collections of the members.

The families discussed were the Strombidae, Cypraeidae,

Conidae, Muricidae, Cardiidae and on one evening "Sinistral Shells". At the January meeting, the Club listened to a talk by Mr. William J. Clench, of the University Museum at Harvard, on "Collecting in the Southeastern States", in which he told of collecting-trips undertaken in the interest of the University of Michigan, in the summers of 1923, 1924 and 1925.

The first of the trips covered 3700 miles by motor, and lasted twelve weeks, the other two being shorter. The ground visited included parts of Michigan, Ohio, Indiana, Arkansas, Tennessee, Missouri, Alabama, Mississippi, and Florida, the sea-coast being touched at one point in the last-named state. The collecting proved excellent, an enormous number of both species and specimens being gathered, including varieties of *Io,* and one specimen of the rare *Polygyra chilhoweensis* (Lewis), which was found by Mr. Remington, who was Mr. Clench's companion on the trips.

A set of lantern slides showed many of the southern lakes and rivers, including the famous Suwanee River. Pictures of the expedition buried to the hubs in sand or mud, or showing the joys of piloting a motor heavily laden with camping and collecting equipment, where often the only "road" is the bed of a creek, and the only "bridge" a ford where the motor must plunge into the stream, to splash across as best it may, made Mr. Clench's audience realize that such trips call for much patience and resourcefulness, in addition to an enthusiasm for mollusks.

A paper of especial interest was read before the Club at its March meeting, by Mr. Francis N. Balch, on "Symbiosis in an Undescribed Bermuda Nudibranch."

Mr. Balch began by saying that he had various unrelated questions to bring up, concerning nudibranchs in general, and this one in particular, and that we might imagine ourselves gathered together in a laboratory, where, having run across this interesting creature, we could discuss the questions which it suggested.

He defined the term symbiosis, in its restricted sense, as the living together, in one organism, of vegetable cells

(usually algae) and cells which are either animal or else fungus cells, which in their physiology resemble animal cells, saying that the nudibranch is one of the highest forms of animal life in which true symbiosis occurs, as far as is now known.

On the blackboard was a series of beautiful outline drawings—the work of Mrs. Balch—showing the varying types of breathing-apparatus of different species of molluscs, including nudibranchs, and on colored lantern-slides were enlarged figures of the special form in question, which, only seven millimeters in length, was found by Mr. Balch under the roots of a gorgonian.

The alga, or vegetable denizen of this tiny creature, appeared as a sort of intricate border along each side, somewhat resembling the borings of a worm: in places, near the surface, and at others going deeper in, one part crossing another at a different level, while above waved a row of frond-like cerata, through which the animal is commonly supposed to breathe, although upon this, the speaker cast some doubt.

The algal growth was found, under the microscope, to be formed of masses of minute spherical cells, containing oil-globules, and the question was discussed as to its use in the animal, it being thought that it might possibly act as a reserve supply of food in case of need. The commonly received explanation, however, is that since the vegetable cell gives off oxygen, and utilizes carbon dioxide, while the animal or fungus cell does exactly the reverse, the two benefit mutually by an exchange of these gases. If this is the true explanation, the vegetable cell may be said to perform for the animal organization, in some sort, the function of an auxiliary breathing apparatus.

The speaker mentioned, as of special interest, that, at the time this Bermuda symbiotic nudibranch was found, symbiosis had nowhere been discovered in the mollusca, but that at about the same time, Sir Charles Eliot found a very similar symbiosis in another nudibranch.

Mr. Balch emphasized the fact that both these symbiotic

nudibranchs belonged to a very ancient group, in which the typical molluscan breathing apparatus, the ctenidium, had been lost, and not as yet replaced by any stable or apparently efficient new breathing apparatus; and he suggested that it might be more than a coincidence that algal cells, producing oxygen, were found symbiotic among the mollusca only in these two forms belonging to a group which perhaps lacks effective oxygenating apparatus of its own.

The genus to which the Bermuda form belongs (Tritoniella) was believed to be undescribed at the time it was discovered by Mr. Balch, but it afterward appeared that Sir Charles Eliot had found the same genus at Gough's Island, a lonely islet lying south and slightly east of the Cape of Good Hope; hence the other side of the Equator, and the other side of the Atlantic from Bermuda.

This genus also belongs to the ancient and primitive group before referred to, which has many representatives in the Old World and in the Pacific; but which hitherto has been unknown in the Western Atlantic, excepting for one representative in the Falkland Islands and one somewhat doubtful form from Brazil. In closing, the speaker touched upon the problems of zoö-geographical distribution suggested by these facts.

The Club brought its present season of activities to a close on May 28th, when its Annual Field Day was held; Scituate, Mass., being the spot selected, the members convening early in the afternoon, when the tide served for collecting on the beach, the rocks and the flats. Living specimens of *Zirfaea crispata* L. were found in large numbers.

The present officers are: President Mr. Wm. J. Clench, Vice-president Rev. Oliver P. Emerson, Secretary-Treasurer Miss Theodora Willard, Executive committee Mrs. Franklin D. Williams and Dr. Austin W. Cheever.

THEODORA WILLARD, *Secretary.*

W. H. DALL—MEMORIAL RESOLUTION OF THE CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA

Whereas, it has pleased Almighty God in His infinite wisdom, to remove from this plane of labor our friend and fellow worker William Healey Dall,

Be it resolved: That we, the Conchological Club of Southern California, do publicly express our feeling of loss in his passing, respect for his great services to conchology, and grateful appreciation of the many courtesies, which we, individually and as a Club, have received at his hands.

And be it further resolved: that one copy of these resolutions be spread upon the minutes of this Club, and another be sent to THE NAUTILUS for publication.

C. E. WHITE, *President.*,
CLEMENTINE M. GAY, *Secretary.*

GEORG OSSIAN SARS

In the death of this veteran zoologist on April 9 at eighty-nine years of age, Norway has lost one of her most distinguished men of science. Sars was best known to malacologists as the author of a standard work on the mollusks of his country, "Mollusca Regionis Arcticae Norvegiae", 1878; 446 pages, 52 plates. It was copiously illustrated by his own hand, not only with figures of the shells, but often the living animal and dentition as well. The Crustacea occupied much of his time, but he accomplished an amazing amount of good work on other groups, such as Coelenterates, Echinoderms and Annelids. Sars was ever ready to help scientists of other lands with information and specimens, as the present writer found when working on cirripedes. He was able to carry on his researches until within a few days of his death. "His career

throughout was an honor to science, to his country, and to his race".[1]

NOTES

HELIX PISANA IN CALIFORNIA.—A fully illustrated account of this introduced species and the methods of controlling it is given in the "Monthly Bulletin of the Department of Agriculture of the State of California", vol. 16, No. 2. It is very destructive to fruit trees and flower gardens in the San Diego region.

RECORDS OF POLYNESIAN SNAILS.—*Prosopeas javanicum* (Reeve) was collected by Wilmatte P. Cockerell at Apia, Samoan Is., 1924. It is a widely spread species but not before reported from that group. *Subulina octona* was also taken; both species perhaps recent importations.

At Rarotonga, Cooks Islands, Mrs. Cockerell found the following: *Microcystis vinosa* Pse., *M. conula* Pse., *Opeas oparanum* Pfr., *Subulina octona* Brug., *Omphalotropis variabilis* Pse. and *Georissa striata* Pse.—H. A. PILSBRY.

ARION HORTENSIS IN PHILADELPHIA, PA.—Mr. James B. Clark collected some debris from Wister's Woods, Germantown, Philadelphia, in which were found *Arion hortensis* Fér. and *Polita lucida* Drap., both of them new to the list of Philadelphia Mollusks published in THE NAUTILUS, Vol. 8, 1895, p. 133.—E. G. VANATTA.

HELMINTHOGLYPTA TRASKII (Newcomb) AT "FORT TEJON", KERN COUNTY, CALIFORNIA.—The only locality mentioned in the original description (Proc. Calif. Acad. Nat. Sci., Vol. 2, 1861, pp. 91-92) of this shell in 1861 is "Los Angeles." A few years later, Newcomb, (Amer. Journ. Conch., Vol. 1, 1865, p. 344) added "Fort Tejon" to its habitat and this record has been often repeated in the

[1] Sketches in *Nature*, June 4, 1927, and with portrait, in *Nyt Magazin for Naturvidenskaberne*, April 20, 1927.

literature since. On account of the occurrence at this place of so many animals and plants of limited range, one has a natural inclination to question the existence so far from home of a species of land shell in a group so prone to colonize as this is known to be. It was, therefore, with much interest that an opportunity was recently offered to study a set of specimens from there. This feeling of doubt persisted in spite of the fact that material from "Fort Tejon" passed under the scrutiny of Dr. Paul Bartsch (Proc. U. S. Nat Mus., Vol. 51, 1916, p. 613), and he assigned it to *traskii* without comment.

The collection, to which reference is here made, was obtained in April, 1927, by Dr. E. C. Van Dyke, the entomologist to whom the California Academy of Sciences is under lasting obligations for many land shells. The following notes on the occurrence seems worthy of record: "The shells were collected on the margin of a wet meadow about a quarter of a mile south of old Fort Tejon, long since abandoned. The fort was a famous military post during civil war days and is situated in Grape Vine Canyon on the Ridge Route Highway between San Francisco and Los Angeles. The place is famous as the type locality of many insects; Mr. John Xantus de Vessey and Dr. George Horn both collected here extensively. It is also the type locality of some plants, so I am informed by Miss Alice Eastwood. The region is exceedingly interesting biologically because many species have been found nowhere else. It has many of the southern California forms as well as some from the north which have been able to follow the coast ranges. There are some characteristic Sonoran species."

I have carefully examined the shells collected by Dr. Van Dyke with the expectation that differences would be found from those of the Los Angeles region. However, except for the slightly smaller size, they can be matched exactly in shape, color and microscopic sculpture in lots from the south. The difference in size amounts to only about one millimeter and this is believed to be insufficient for separation

Therefore, unless there be anatomical differences of note it appears that the Fort Tejon shells should continue to be referred to *Helminthoglypta traskii*. The soft parts of two of Dr. Van Dyke's specimens have been preserved. As has been our custom for some years with alcoholic material not likely to be consulted often, these have been hermetically sealed with proper label. By this method of preservation the danger of destruction of valuable specimens through evaporation of the preservative is forever obviated. The method is not applicable to large preparations but the danger with them is not so great. Shell vials, homeopathic vials or ordinary test tubes make good containers and the operation of sealing them up is quickly and easily accomplished providing a gas blow torch which produces a small but hot flame is available.—G. DALLAS HANNA, California Academy of Sciences.

MOLLUSKS IN SPHAGNUM MOSS.—Mr. W. E. Burnett sent a quantity of Sphagnum from Bradford, Pennsylvania, taken from a spring-fed water hole. In it were found the following shells:

Columella edentula Drap.
Polita hammonis Strom.
Euconulus chersinus Say
Striatura ferrea Morse
Striatura milium Morse
Zonitoides arborea Say
Helicodiscus parallelus Say
Succinea ovalis Say
Pisidium abditum Hald.

E. G. VANATTA.

PUBLICATIONS RECEIVED

NEW SPECIFIC NAMES FOR AUSTRAL MOLLUSCA. By H. J. Finlay. Trans. New Zealand Institute, Vol. 57, 1926, pp. 488-533. (Jan. 19, 1927.) This is one of a series on molluscan taxonomy published during recent years by a small group of indomitable Australasian conchologists. The revision they have made on the nomenclature of their fauna is very extensive, new genus-names by the score and species-names by the hundred having been proposed. The present paper alone contains about 200 changes. Not many of these changes concern western North American conchology and paleontology, but there are a few, and attention is directed below to some of those which appear to be of most importance.

First place in the paper is given to *Haliotis oracherodii imperforata* Dall; this is renamed because of prior use of *imperforata* with *Haliotis*. Unfortunately, these shells are merely freaks or pathologic specimens of *cracherodii* in which the animal failed to develop the usual series of perforations and, as such, many will contend, are not deserving of a separate name. But more unfortunate still is the fact that there is an earlier name than Dall's, as the following synonymy will show. Therefore, whether the freak is deserving of a name or not, the notes show some, at least, of the literature that has accumulated about it.

1904. *Haliotis cracherodii*, Kelsey, Nautilus Vol. 18, 1904, p. 67. The imperforate shell is noted and called a "freak."

1907. *Haliotis cracherodii holzneri* Hemphill, Trans. San Diego Soc. Nat. Hist. Vol. 1, No. 2, Sec. 3, 1907, pp. 59-60. The shell is formally described from Lower California and stated to be without a trace of perforations. The type specimen, now No. 1374 (Calif. Acad. Sci.) shows this to be true.

1910. *Haliotis cracherodii*, Dall, Naut. Vol. 23, 1910, p. 96. The imperforate shell is again noted but without name.

1911. *Haliotis cracherodii holzneri*, Dall, Naut. Vol. 24, 1911, p. 125. This time Hemphill's name is used in referring to the form.

1919. *Haliotis cracherodii imperforata* Dall, Proc. U. S. Nat. Mus. Vol. 56, 1919, p. 370. The shell is here named and described as a "tetaralogical specimen, hardly even a variety."

1921. *Haliotis cracherodii holzneri*, Dall, Bull. 112, U. S. Nat. Mus. 1921, p. 183, pl. 20. In the explanation of the plate it is stated that the specimen figured has some holes; Hemphill originally described it as imperforate.

1921. *Haliotis cracherodii imperforata* Dall, Op. cit. p. 184, pl. 21.

1927. *Haliotis cracherodii lusus* Finlay, n. n., Trans. New Zeal. Inst. Vol. 57, 1926, (Jan. 19, 1927), p. 492.

All of this demonstrates the impossibility of one of us being able to grasp the whole of the literature pertaining to Mollusca. I have had some little experience and amusement myself in running down names and appreciate the fun Mr. Finlay and his associates are having. He makes one wonder

whether, if we do not develop a host of Sherborns in the next 100 years, the present system of nomenclature will become so involved that order will be hopeless. Unless bibliography and indexing of the literature of the world keep pace with taxonomy, the system will become so confused that chaos must result.

Mr. Finlay's references to west American paleontology are equally unfortunate, due to the impossibility of consulting the whole of the literature. The following synonymy will serve to illustrate.

Turritella socordia Hanna[1].

Turritella tricarinata Burwash, Proc. and Trans. Roy. Soc. Canada, Vol. 7, Sect. 4, 1914, p. 81.

Turritella socordia Hanna, Proc. Calif. Acad. Sci. 4th Ser. Vol. 13, Mar. 18, 1924, p. 185. New name for *T. tricarinata* Burwash, not King.

Turritella burwashi Finlay, Trans. New Zealand Inst. Vol. 57, 1926, (Jan. 19, 1927), p. 497. New name for *T. tricarinata* Burwash, not Brocchi.

Turritella sargeanti Anderson and Hanna.

Turritella uvasana tricarinata Dickerson, Proc. Calif. Acad. Sci. 4th Ser. Vol. 5, 1915, pp. 44, 58, pl. 5, fig. 2.

Turritella sargeanti Anderson and Hanna, Oc. Pprs. Calif. Acad. Sci. Vol. 11, 1925, p. 125. New name for *T. u. tricarinata* Dickerson, not King.

Turritella uvasana royi Finlay, Trans. New Zealand Inst. Vol. 57, 1926, (Jan. 19, 1927), p. 497. New name for *T. u. tricarinata* Dickerson, not Brocchi, not Burwash.

Turritella uvasana insula Finlay, Op. cit. p. 497. New name for *T. u. bicarinata* Dickerson (Op. cit.) not Eichwald, Pusch, or G. B. Sowerby. Anderson and Hanna (Op. cit.) have already stated that this form is invalid because sometimes the same specimen may be tricarinate in one part and bicarinate in another.

In spite of the above mentioned points, which are certainly not offered in a critical mood, Mr. Finlay is to be envied for the pleasure he must have had in chasing reference and is to be complimented for the indefatigable industry shown in the preparation of the paper.

G. DALLAS HANNA.
California Academy of Sciences, San Francisco, Cal.

1 We may add that the type of this species is a distorted internal cast which ought never to have been named in the first place. We have thus three names for this phantom *Turritella*. It is a good illustration of the folly of renaming species the author knows nothing about.—ED.

JESSE WEDGWOOD MIGHELS, M. D.

From a small photograph in the library of the Portland Society of Natural History.

THE NAUTILUS.

Vol. XLI OCTOBER, 1927. No. 2

HUNTING EULOTA (KARAFTOHELIX) FISCINA FULTON, IN SAGHALIEN

BY DANIEL B. LANGFORD

The southern part of Saghalien, under Japanese administration, consists of two parallel ridges, extending almost due north and south and separated by a wide marshy valley cut up by an intricate network of small creeks and streams. The western and highest ridge comprises a series of sharp peaks quite uniform in height, the average altitude being around 3000 feet. The eastern side of this ridge being cut up by numerous deep narrow gulches which support a very heavy vegetation. The eastern ridge comprises a chain of rounded hills, heavily forested on the top and sides, culminating in the peak of Tiara, 1950 feet in height.

Until a comparatively recent date this part of Saghalien was heavily forested with pine, larch, spruce, white birch, willow and a dense undergrowth of various large leaved plants, bushes and ferns. Lumbering, forest fires and the ravages of the caterpillar of a species of *Dendrolimus* have combined to destroy vast areas of the larger trees and this destruction is at present continuing at an alarming rate.

Conspicuous among the plants of the forest undergrowth is a giant composite *(Petasites japonicus* var. *giganteus)*,

called "Akitabuki" by the Japanese. The leaves of this plant often attain a diameter of six feet and are borne on stems as high as a man's head and three inches in diameter. Another large leaved plant is "O-itadori" *(Polygonum sachalinense* Fr. Schm.), having leaves often a foot in length and the soft, woody stems growing to a height of fifteen feet. A nettle "Yezo Irakusa" *(Urtica dioica,* var. *platyphylla* Wedd.) grows everywhere in great luxuriance.

The central plain is practically denuded of large forest trees and is covered with tall grass with razor-like serrated edges, second growth conifers and white birch. Thickets of willow and the usual undergrowth are found along the numerous small streams.

The first specimens of *E. fiscina,* to come to my notice were collected by a student of the Imperial University during the summer of 1923. These specimens came from Maoka, on the west coast, on the leaves of "Akitabuki". The following year an opportunity came to visit the island and the last week of July was spent collecting over the southern end of the island. Specimens taken at this time were figured by Pilsbry, Proc. A. N. S. Phila., 1927, plate I.

The snail was collected at three localities: Ichinosawa, about three miles to the west of Odomari at the end of the central valley and but a short distance from the coast at a very low elevation; Kiminai, some 18 miles to the north east of Odomari in the valley of the Kiminai River at an elevation of about 500 feet, situated on the Pacific coast slope of the eastern ridge; and at Kawakami, 18 miles north west of Toyohara on the eastern slope of the west ridge at an elevation of about 1000 feet.

Experience indicates that this species inhabits damp situations along the creeks, preferring deep shade under the large leaved plants, and apparently feeding on decaying leaves and other soft decaying vegetation. No specimens were taken on the tops of the ridges nor at any great distance up the sides of the gulches. It almost invariably was found associated with the plants "Akitabuki", "O-itadori" and "Yezo Irakusa".

But five specimens were taken at Ichinosawa, two adult and three immature. These were on or near the ground in thickets along the Ichinosawa River. At Kiminai 30 specimens were taken. This region is quite heavily forested. The snails were under thickets of their favorite plants and mostly on the ground or low down on the stems of "Akitabuki", a few being on the under side of the leaves. It was raining heavily at the time. At Kawakami the snails were located in numbers. More than 300 magnificent specimens were taken in a few hours of collecting. About half a mile below the inn at Kawakami is a steep narrow gulch branching off from the south side of the river. A small stream winds along the bottom. A short distance up this gulch the favorite plants of *fiscina* grow in great profusion and completely clothe the sides and bottom of the valley. The nettle is particularly rank here.

On this day the sun was beating down with tropical fierceness and the ground fairly steaming from the heat. The majority of specimens were on the under sides of leaves or on the stems of plants, only a small number being found on the ground. Frequently they would be found on the tops of leaves in the glaring sun. All thus exposed were much faded in color and the "skin" peeling off indicating that this exposure had continued for some length of time.

Three species of Tabanidae, of exceptionally bloodthirsty natures, swarms of mosquitoes, innumerable gnats, called "buyo", which cause intense pain followed by almost unbearable itching and finally swelling and large blisters, and the nettle, a slight touch producing a sensation very similar to touching an exposed electric light wire, tax the power of endurance almost to the limit and are a decided handicap to close observation of the habits of the snail. It was possible, however, to notice that they were in most cases very active, crawling up the stems of plants, particularly the "Akitabuki". When the leaf was reached they would move but a short distance, suddenly withdraw into the shell and drop to the ground. The leaves were quite

hot to the touch and it is possible that the heat causes them to drop. Numbers of broken shells among the rocks on the ground attested to the dangers attending this form of "sport". If the fall did not prove disastrous the snail began crawling almost immediately after dropping, presumably to repeat the experience.

Other species of shells collected on Saghalien were:—

Succinea lauta karaftoensis Pilsbry. On partly decaying leaves in damp places at Ichinosawa, Kiminai and Kawakami.

Kaliella gudei Pilsbry. Ichinosawa.

Gonyodiscus pauper Gould. On decaying logs and stumps and under bark, at Ichinosawa, Kiminai and Kawakami.

Pristiloma japonica Pilsbry. Ichinosawa.

Columella edentula Drap. On stems of "Akita buki" and other large leaved plants, at Ichinosawa, Kiminai and Kawakami.

Zoogenetes harpa Say. Ichinosawa.

Lymnaea sp. Kiminai River.

Margaritana margaritifera, L. One specimen. Kiminai River.

THE MOLLUSCA OF LAKE BAIKAL

BY T. D. A. COCKERELL

I have just returned from a trip to Lake Baikal, where, as the guest of the Biological Station of the University of Irkutsk, I had the great pleasure of seeing the Baikal snails alive, dredged up from the stony bottom in a few fathoms of water. When I reached the lake, I hastened to the shore, expecting to find the snails at the water's edge, but none could be seen. They do not exist along the shore line, but only some distance out, in the deeper water. At the station they have devised an ingenious apparatus for

bringing up large stones, and on these will be found many mollusca, planarian worms and amphipod crustacea. Mr. Ivan Rubtzoff, who went collecting with me, knows the species so well that he can name them at sight. Those we brought up, close to the station, were *Benedictia baicalensis* Gerstf., *Baicalia flori* Dyb., *Ancylus troschelii* Dyb., *Valvata grubii* Dyb., species of *Achoanomphalus*, &c. It was interesting to see the living *Benedictia;* a *Paludina*-like snail with the head, tentacles and upper parts of body black, the sole grey. In deeper water are other species of *Benedictia* with larger and thinner shells, the largest being *B. fragilis* Dyb., 40 to 52 mm. long. The lake contains about 90 species of mollusca, of which 81 are endemic, while many of the most characteristic species belong to endemic genera. The lake is very clear, the water is saturated with oxygen, and there is very little mineral matter in solution. The shells are consequently thin; those of *Ancylus sibiricus* Gerst. are so fragile that it is difficult to get them intact, and they are often lost from specimens brought up. Baikal is the deepest lake in the world, with a maximum depth of about 1560 meters. The water is extremely cold. Thus the conditions are quite unique and apparently unsuited to the more ordinary forms of mollusca. *Lymnaea auricularia* is represented by two endemic varieties at the warmer southern end of the lake. A peculiar variety of *L. ovata* has been described by Lindholm, and *Physa fontinalis* has been taken. Some of the Baikal types are found in the great river Angara, flowing swiftly out of the lake, but in the surrounding country the fresh water shells are of ordinary European type. Thus Middendorff long ago found *Planorbis contortus*, *P. nitidus*, *Lymnaea stagnalis*, *L. truncatula*, &c., in the vicinity of Irkutsk.

Professor Lvoff, head of the department of geology at the University of Irkutsk, has found a very interesting series of fossils, I suppose probably of Tertiary age, in dense rock at Vitim in the Transbaikal. The principal specimens are shells of paludinoid form, about

17 mm. long, with deep sutures, which seem to me to differ in no visible character from *Benedictia*. Caddis-cases show that the deposit is of fresh water origin. There are also fragmentary fishes, probably salmonoid. If the reference of these shells to *Benedictia* can be confirmed, an extension of the lake to the eastward is apparently indicated. Professor Nassonov tells me that he thinks the Sea of Japan holds the key to the origin of the Baikal fauna, the ancient connection with the sea having been eastward rather than northward or southwestward. However the evidences of marine origin are much weaker than is generally supposed, and probably inconclusive. The nudibranch, *Ancylodoris baicalensis* Dyb., probably never came from the lake. It cannot now be found by any one. It was described from a specimen left after the death of Grube in a bottle simply labelled Lake Baikal. The supposed pteropod is certainly a mistake.

I hunted in the surrounding region for land snails, with extremely poor success. Probably there is no region which is fertile and with an abundant flora, which possesses so few land snails. I imagine that this may be due to the fact that the Gobi Desert, immediately to the south, has made impossible any migration northward since the ice age. The plants and insects, being more mobile, have come in from the east, and perhaps partly from the west. The only snail of fair size I could find was what I take to be *Eulota fruticum asiatica* Dyb., probably better called a distinct species, *E. asiatica*. I collected them at Baikal Railway Station and at Archan. The other snails are such small and widespread species as *Cochlicopa lubrica*, *Euconulus fulvus*, *Gonyodiscus ruderata* and *Vitrea radiatula*. *Succinea* also occurs. Westerlund described two species of *Hygromia* from Irkutsk, and a third from a locality in the same region. The type locality of *H. sibirica* Wst. is Kultuk, at the southern end of Lake Baikal, and *Vertigo alpestris* Ald. has been taken at this place. I passed through Kultuk on the way to Archan, but had no opportunity to hunt for snails. Of slugs I found only one

species, common everywhere. This is *Agriolimax agrestis*, invariably of the very pale reddish variety without spots.

At Archan, Olga and Nina Lvoff, the daughters of Professor Lvoff, guided me to a travertine deposit they had discovered at the foot of the mountains, close to the shrine of a Buriat priestess. In this I found leaves of *Populus tremula*, and fossil snails of the species *Eulota asiatica*, *Euconulus fulvus*, and *Cochlicopa lubrica*. As the aspen and all these snails are still living in the immediate vicinity, I conclude that the deposit must be of Holocene age.

As I write we are making arrangements to go to Tashkent, in Russian Turkestan.

P. S.—On further consideration, I believe the snail of the Baikal region, referred to as Dybowski's *asiatica*, must be the *Helix schrenckii* Middendorff, of which Dr. L. V. Schrenck said that the depressed form was like *H. fruticum*. This species has been recorded from Baikal. Gude refers it to *Theba*, but this is not very convincing. I have not as yet made any dissections. *H. sibirica* Friv. is said to be the same, and I fancy *asiatica* Dyb. must also be identical.—T. D. A. C.

CONUS AURORA LAMARCK

BY J. R. LeB. TOMLIN AND MINA L. WINSLOW

What is the correct name to employ for the commonest South African cone? There is no lack of choice. The species is variable in coloration and this fact has led as usual to a bewildering array of synonyms.

The earlier writers on South African Mollusca generally called it *rosaceus* Chemnitz, referring to the Systematisches Conchylien-Cabinet XI, plate 181 figs. 1756 and 1757, and this is probably the earliest identifiable record,

though it is erroneously said to inhabit the East Indies.

The name *rosaceus* was not, however, used as a valid binomial until Dillwyn so employed it in 1817.

In recent years it has been the fashion to call it *tinianus* of Hwass or Bruguiere, to whichever author we ascribe the species of Conus described in Encyclopédie Méthodique, Vers, vol. I, pt. ii. This view was introduced by Sowerby in Journal of Conchology, vol. V, p. 10, 1886, and repeated in his "Marine Shells of South Africa", p. 28, 1892.

Conus tinianus is said to have come from Tinian Island (one of the Ladrones), and is described as exhibiting "un rouge vif analogue à celui de cinnabar, et trois rangs de taches irrégulières, d'un bleu cendré, pâle. . . Ces taches offrent, dans leur intérieur, des suites circulaires de points fauves et blancs, qui disparaissent sur le fond rouge de la coquille." The shell is figured in the Encyclopédie Méthodique Tableau 338, fig. 2, and shows a cone much more of the *rattus* type, broadening rapidly from the base, and quite unlike the build of the Cape species. However, we are not now concerned with the identity of *tinianus*.

Dillwyn's appropriate name *rosaceus* was antedated by Lamarck in 1810 with the equally fitting *aurora*, both citing the same figures of Chemnitz in reference. This last, then, seems to be the earliest valid name.

The following synonymy is probably far from being complete: *caffer* and *secutor* apply to brown varieties with a median band; *lavendulus* and *loveni* to lavender or bluish shells which are variously marbled with shades of brown; *fulvus* is a tawny shell with the median band almost obsolete; *beckeri* is a large form with the spire flatter than usual, and the last whorl consequently subangulate; the type of *succinctus* is a specimen which ought to have been thrown away, with but little trace of pattern or color left. To summarize:

Oct., 1810. *Conus aurora* Lamarck: Ann. Mus. Paris XV, p. 423.

1817. *Conus rosaceus* Dillwyn: Descr. Cat. Rec. Shells I, p. 433.

1848. *Conus caffer* Krauss: Südafr. Moll. p. 131, pl. 6, fig. 24.

1848. *Conus loveni* Krauss: l. c. fig. 25.

1865. *Conus secutor* Crosse: Journ. de Conch. XIII, p. 303, pl. 9, fig. 3.

Nov. 14, 1854. *Conus succinctus* A. Adams: P. Z. S. 1853, p. 118.

Jan., 1886. *Conus tinianus* Sowerby *(non* Brug.): Journ. of Conch. V, p. 10.

1892. *Conus tinianus* Sowerby *(non* Brug.): Marine Shells of So. Africa, p. 28.

Jan., 1889. *Conus fulvus* Sowerby: Journ. of Conch. VI, p. 10, pl. I, fig. 1.

Sept. 9, 1911. *Conus beckeri* Sowerby: Pr. Mal. Soc. London IX, p. 352, text-figs.

July 28, 1915. *Conus lavendulus* Bartsch: U. S. Nat. Mus. Bull. 91, p. 12, pl. I, fig. 10.

NOTES ON OSTREA CALIFORNICA MARCOU

BY G. DALLAS HANNA AND LEO GEORGE HERTLEIN
California Academy of Sciences

When the account[1] was recently prepared on the paleontology of Coyote Mountain, Imperial County, California, an attempt was made to include all references to previously recorded fossils. As often happens, the work was incomplete, our collaborator, Mr. Frank M. Anderson, having discovered an omission which is here supplied.

In 1858 Jules Marcou published in Zurich, Switzerland,

[1] Hanna, G. D. Paleontology of Coyote Mountain, Imperial County, California. Proc. Calif. Acad. Sci. 4th Ser., Vol. 14, No. 18, Mar. 23, 1926, pp. 427–503, pls. 20–29.

an account of the geology of North America.[2] He was attached to one of the early U. S. Surveys but withdrew through some misunderstanding. His observations were published privately in Zurich.

A considerable number of new species of fossils were described and seven plates of illustrations of them appear. The first is "*Ostrea virginica* var. *californica*" (p. 32, pl. 5, figs. 2, 2a). The specimen was collected by Capt. A. W. Whipple "in the Colorado desert, California; near Carrizo Creek, between San Diego and Fort Yuma". Marcou considered the formation as probably belonging to the Miocene or perhaps the Pliocene.

The species appears from the illustration to be exactly the same as was collected in the region and reported in the Coyote Mountain report under the name *Ostrea iridescens* Gray.[3] That identification was obtained from Dall's review of west American oysters[4] and Carpenter's description.[5] *O. iridescens* was based on living shells of the Gulf of California. Figures of the species are not available. In the Conchological Museum of the Leland Stanford University there are specimens from the west coast of Mexico, which, according to Mrs. I. S. Oldroyd, were identified at the U. S. National Museum as *O. iridescens*. These specimens have a prolonged rectangular outline, laminated structure, brownish-purple metallic luster on the interior, and the hinge is somewhat long and square. These forms agree with Carpenter's description except that they do not resemble closely *O. virginica*. We are therefore inclined to regard *Ostrea californica* as a valid species for the present, and consider the form referred to *O. iridescens* by Hanna to be referable to Marcou's species. When a large collection from the west coast

[2] Marcou, Jules. Geology of North America with two reports on the prairies of Arkansas and Texas, the Rocky Mountains of New Mexico, and the Sierra Nevada of California, originally made for the United States Government. Zurich, 1858, pp. VI, 1–144, pls. 1–7, 3 geol. maps.

[3] Hanna, Op. cit. p. 468, pl. 26, figs. 4–7.

[4] Nautilus, Vol. 28, No. 1, May, 1914, pp. 1–3.

[5] Cat. Mazatlan Shells, 1856, pp. 157–158.

of Mexico is studied it is possible that distinctions may appear which will permit definite classification of the Ostreas of this region.

This opportunity is taken to bring the name *Ostrea californica* to notice so that it may not again escape study when the proper time comes. Heretofore it seems to have completely missed the attention of all American bibliographers.

FURTHER NOTES ON THE COLONY OF HELIX NEMORALIS IN MASSACHUSETTS

BY CHARLES W. JOHNSON

Since publishing my note on the occurrence of *Helix nemoralis* at Marion, Massachusetts, (THE NAUTILUS, vol. 40, p. 93) I have had, through the kindness of Mr. Albert P. Morse, the privilege of studying 122 additional specimens. Forty-eight of these were collected by Mr. Lewis April 18 and 19, 1927, and the others by Mr. Morse. The following numbers arranged according to their banding, shows quite a remarkable variation for so small and apparently recently established colony.

Variety *libellula* (yellow)

Bands		Specimens
00000		29
00300		22
00345		4
003(45)		1
12345		4
(123)(45)	Fused only on the outer half of the body whorl	2

123x(45)	Band 1 and 2 are fused near the lip, 3 and the extra band x and 4 and 5 are all fused toward the lip	1
		63

Variety *rubella* (red)

Bands		Specimens
00000		9
00300		29
00305		1
00345		7
003(45)		1
00345	Bands 4 and 5 fused near the lip	1
12345		4
12345	Bands 2 and 3 partly fused	1
12345	Bands 1, 2 and 3 partly fused	1
123(45)		1
1(23)(45)		1
123(45)	Bands 1, 2 and 3 partly fused	1
1(2345)	Band 1 fused with the others near the lip	1
		58

The range of the species seems very limited, confined, according to Mr. Morse, to two estates. The only possible clue as to their introduction is, that several years ago a large number of rose bushes were imported from Ireland. That young shells or even the eggs may have been among the roots of the bushes seems quite probable. A favorable situation on the coast has presented a suitable environment and thus accounts for their rapid increase.

Dr. H. E. Crampton of Columbia University has supplied the following data from a lot of 790 specimens from Marion, collected in June, 1927.

Band Formula	Ground color Yellow	Red	Total
00000	157	78	235
00300	159	175	334
00345	36	54	90
003(45)	2	16	18
00340	1	1	2
00305	2	4	6
00045	1	0	1
00(34)5	1	0	1
12345	39	38	77
123(45)	3	15	18
(12)3(45)	1	3	4
(123)(45)	0	4	4
	402	388	790

A NEW VARIETY OF HELISOMA CAMPANULATA FROM MICHIGAN*

BY FRANK C. BAKER

HELISOMA CAMPANULATA MICHIGANENSIS var. nov.

Planorbis campanulatus var. *rudentis* Dall, Alaska Moll., p. 90, 1905 (not the true *rudentis* of Dall).

Planorbis campanulatus rudentis Winslow, Oc. Papers, Mus. Zool. Univ. Mich., 180, p. 3, pl. i, figs. 8–10, 1926. (Not of Dall.)

Shell differing from typical *campanulata* in being axially shorter, exhibiting 3½ full whorls on the base, the inner whorl diminishing slowly in diameter, while in the typical form there are 2½ whorls visible, the second of which diminishes rapidly in diameter and disappears

* Contribution from the Museum of Natural History, University of Illinois, No. 44.

abruptly in the umbilicus; basal whorls rounded, not subangulated.

H. 5.5; Gr. D. 15.5; Ap. H. 5.8; D. 5.0 mm. *Type.* (Baker coll., 1809.)

H. 5.4; Gr. D. 15.0; Ap. H. 5.8; D. 4.6 mm. *Paratype.* (Baker coll., 1809.)

Type locality: Marl Lake, Roscommon Co., Mich. *Types:* Baker coll. *Cotypes:* Univ. Mich.; Bryant Walker.

This shell has been confused with *rudentis* Dall, but an examination of a paratype kindly sent by Dr. Paul Bartsch, of the U. S. Nat. Mus., shows that this approximation is not correct, *rudentis* being higher axially, and differing in the form of the umbilicus which is, as Dall has said, "reamed out", forming a regular, broad, cone-shaped or funnel-shaped umbilicus, quite different from the small, rounded perforation in *michiganensis.* The sculpture, also, is heavier than in the new variety. The paratype of *rudentis* from the National Museum measures as follows:

H. 6.5; Dr. D. 16.0; Ap. H. 7.0; D. 4.5 mm. (U. S. N. M. 365574.) Knee Lake.

Dr. Bartsch says of this specimen "it is a trifle smaller than the type but larger than most of the other seven specimens.

Rudentis appears to be a northern form which is probably confined to the Canadian region and the Hudson Bay drainage. *Michiganensis* should be found in other localities in both Michigan and Wisconsin. None has been seen from Wisconsin. The new variety is likely to be confused with another recently-described variety, *campanulata davisi* Winslow (op. cit., p. 8, pl. ii, figs. 17–19), which is smaller than *michiganensis*, the whorls are more tightly coiled and four are usually visible on the base, and the axial diameter is typically somewhat less. The most obvious character of differentiation is the small size and more tightly coiled whorls, which leaves a very narrow and deep umbilicus. This variety is very abundant in a small, now dry lake, east of White Lake, Oakland Co., Mich., and is

also found in Mud Lake, Waukesha Co., Wis. In Miss Winslow's interesting and valuable revision of the *campanulata* group if the name *michiganensis* is used for *rudentis* all of the Michigan varieties will be included, although a new summary will include the true *rudentis* in addition. As the writer has stated elsewhere, the fauna of the small and large lakes of Wisconsin and Michigan appear to have each a facies peculiar to itself. From the limited data at hand on the ecology of *michiganensis* and *davisi* it would appear that the former live in the larger, perhaps clearer small lakes, while the latter live in small, more or less muddy lakes, of shallow depth.

NON-MARINE MOLLUSKS OF VOLUSIA COUNTY, FLORIDA

BY MAXWELL SMITH

The material which forms the subject of this paper was collected by Sydney B. Holt and the writer in March, 1927. Excursions were made in various directions from DeLand.

No collecting was done in the vicinity of Daytona Beach due to the fact that most of the hammocks have been cleared for real estate development with the result that both fauna and flora are practically destroyed, thru the agency of ax and flame.

TURTLE MOUND

This is said to be the highest Indian Mound in the state and is composed mostly of oyster shells. It is situated about seven miles south of Coronado Beach on the "island" between the Halifax River and the Atlantic. The approach is first thru a well wooded section and later over a dune region as yet unspoiled by man. The mound is visible some distance away but is most imposing when viewed

from the river. From the placid shore of the river it is only a few minutes' walk to the ocean beach. The top of the mound affords a unique view embracing broad expanses of water, dunes and a fringe of palms. The slopes support a considerable number of plants and bushes with cacti in large groups. Under these live Polygyra and other mollusks. At the base of the mound an accumulation of river drift was found to be exceedingly rich in small shells. A quantity of this was brought home and so far has yielded the following species:

Zonitoides minuscula alachuana Dall. Named for the county.
Vitrea dalliana Pils. Previously reported from Lee, Monroe and Brevard Counties.
Euconulus fulvus Drap.
Helicodiscus parallelus Say.
Polygyra septemvolva Say. Under cacti.
Gastrocopta pellucida hodeacella Pils.
G. contracta Say.
Microceramus pontificus Gld.
Helicina orbiculata Say.
Truncatella bilabiata Pfr.

SHELL PITS NEAR DELAND

Here tons of semi-fossil shells are dug out and used as a top dressing on the minor roads. Viviparus and Ampullaria are plentiful together with a half dozen or more other genera. Two species are conspicuous by their apparent absence in nearby water:
Goniobasis catenaria Say. *(G. papillosa* Anth.) See Pilsbry's notes Naut. 4, 124.
Physa scalaris Jay. First noted from the Everglades.

STARK GROVE NEAR FATIO

Euglandina rosea Fer.
Polygyra avara Say. This was described in 1819 from ex-

amples taken in "Fatio's orange grove" on the St. John's River". The name Fatio appears on a tiny freight station on the railroad close to the grove. This habitat, where the type apparently was obtained, is best reached today by motoring to Lake Beresford boat house and then walking down the railroad track to the freight station.

Polygyra uvulifera Shutt. Taken alive under half rotted wood close to the St. John's River.

Drymaeus dormani albidus Wright. A scarce shell not found elsewhere by us; taken in orange tree cavities close to the ground, also under dead leaves and rubbish in dense shade. It is said to be abundant here in the wet season when it climbs to the tops of the trees.

Helicodiscus parallelus Say.

Zonitoides minuscula Binney.

NEAR OLD STETSON ESTATE, DELAND

Succinea floridana Pils.

Polygyra uvulifera Shutt.

LAKE BERESFORD

Lampsilis vesicularis Lea.

Viviparus waltoni Tryon.

LAKE MONROE AT BENSON SPRINGS (ENTERPRISE)

Viviparus waltoni Tryon.

Ampullaria paludosa Say.

Elliptio hinkleyi Wright.

ST. JOHN'S RIVER NEAR DELAND LANDING

Planorbis duryi Weth. Reported from Orange County by C. H. Baker; Rockledge, Brevard County by Nylander.

P. scalaris Jay. Young specimens. Known to inhabit Miami River region and Orange County.

ISLAND IN ST. JOHN'S RIVER NEAR BLUE SPRINGS

Ampullaria paludosa Say. Found alive on mud under water hyacinths, mostly young specimens. This was the only colony of living ones that we observed.

Ferrissia peninsulae P. & J. Fresh dead examples abundant in the dry portion of this tiny island.

Physa cubensis Pfr. Young.

Planorbis caribaeus Orb. Young.

Amnicola sp. According to Dr. Walker "probably new". This and the *Musculium* will be described later.

Musculium mearnsi Sterki. Rather plentiful with the Ferrissia, all dead. Description prepared in 1916 from specimens examined by Dr. Sterki at the U. S. National Museum labelled "Head of the St. John's River". The manuscripts will be published shortly. There are two specimens in the Sterki collection from "Gee Creek, Fla." County unknown.

M. sp. Apparently a new species detected among the others by Dr. Sterki.

Eupera singleyi Pils.

BLUE SPRINGS

Succinea effusa Shutt. Found living on a log, overhanging the crystal stream amidst a scene of indescribable tropic beauty. Here abound mullet, turtles and water moccasins. Alligators are occasionally seen.

Unio buckleyi Lea. May have been brought here by fishermen for bait. No doubt lives nearby.

PONCE DE LEON SPRINGS

Planorbis glabratus Say.

Viviparus waltoni Tryon.

Ampullaria paludosa Say.

A NEW SPECIES OF SPHAERIUM (S. NOTATUM)

BY V. STERKI

SPHAERIUM NOTATUM, new species.

Somewhat elongate, subequipartite, medium inflated; beaks slightly or barely anterior, moderately projecting, rounded and slightly mamillar; dorsal margin rather short, moderately curved, bounded by slightly marked angles, ventral moderately and regularly curved; anterior and posterior slopes slightly marked, anterior end well rounded, posterior somewhat angular; surface dull to dullish, microscopically rugulose, with the striae rather fine, crowded, sharp, irregular to subregular; color of the adult corneous to drab or grayish, mostly with a narrow marginal lighter zone, of the young straw to light yellowish; shell rather thin, opaque or subtranslucent; hinge moderately curved, of the same formation as in *striatinum*, etc., plate quite narrow, cardinals small; long. 15, alt. 11.5, diam. 8.3 mm.

Habitat: rivers and creeks, occasionally ponds.

Distribution: rather wide, mostly west of the Mississippi River but not seen from the Rocky Mts.; so far as now known, most frequent in Kansas, in Dickinson, Saline, Ottawa, Marion, Morris, Butler Counties, and some others, to Missouri, Illinois, Wisconsin, Iowa, Nebraska and North Dakota (in the last three or four, from one or a few places), also to Arkansas, Oklahoma and southwestern Texas, in the last, recent and fossil. The distribution shows some marked gaps; but, being over areas mostly unexplored, they will probably be bridged.

This Sphaerium had been known for many years and regarded as probably a distinct species; then the fine materials collected at many places in Kansas, by Dr. H. P. Mera, and numerous accessions from other places, brought confirmation and a better understanding of the relations,

and variation. There are now over a hundred entries in the collection of the Carnegie Museum, representing thousands of specimens looked over.—*Types:* No. 9469 t (Sphaeriidae collection) from the Camp Creek, Dickinson Co., Kansas.

It is of the same group with *S. striatinum* Lamarck, and apparently takes its place westward, but their areas are somewhat overlapping, e. g. in Illinois and Wisconsin. The mussels are larger, more equipartite with the dorsal margin somewhat shorter somewhat less and more evenly inflate. The surface is more markedly rugulose, more dull, and decidedly less variable as to striation; (about the color, see below).

Variation: The species is rather variable in several respects. Typical and near-typical forms are found over most of the area; even they show differences, of size: from 14 to 17 mm. long; shape: some old specimens have the posterior end rounded—a feature shown by most species of the group. The striae are from very fine and crowded to somewhat coarser and regular, especially over the beaks; color: the grayish—or drab—corneous shade is prevalent in the adult and, by the way, practically unknown with *S. striatinum.* The straw color to light yellow of the young is more persistent in some forms, and in one lot, apparently not distinct, even the mature ones have not changed. A large number of specimens from a drainage ditch at Urbana, Ill., collected by Dr. H. J. Van Cleave, are somewhat different, slightly smaller, with the beaks more prominent, and the color just dark corneous, are probably a local form, due to environment.

S. n. neoshense: somewhat smaller, less inflate, slighter, with outlines more rounded, surface less rugulose, with striae fine and slight, color lighter, corneous to yellowish; Neosho River, Kansas, several places, also collected by Dr. Mera; e. g. Nos. 9490, 9554, appears to be a regional subspecies.

S. notatum? gibbosum: dorsal margin, and hinge, somewhat more curved, posterior slope more marked and the

end more angular, ventral margin less curved; mussel more inflate, above, but the discs towards the ventral are somewhat flattened; surface less rugulose and somewhat glossy color light to dark corneous.—Greenwood Park pond at Des Moines, Ia., collected by Mr. T. Van Hyning, in 1906, associated with *notatum,* and a few other Sphaeria. There were many hundred specimens of the two, and these are markedly different from each other, but with intermediate forms. It appears possible, or even probable, that they are distinct species, may be carried into the pond by streams, and there hybridized. I could not obtain any facts proving or disproving this. But: some specimens of *gibbosum,* typical, have been seen from other places, partly distant, not accompanied by *notatum;* and: with all other *notatum* from scores of places, there were no *gibbosum.*

Beside these, there are some other Sphaeria more or less resembling *notatum,* under doubt. Additional materials may prove whether they be forms of this, or of distinct species.

SOME MISPLACED PLEUROCERIDS

BY CALVIN GOODRICH

Several species of the Pleuroceridae have been permitted to remain for many years in genera to which they do not belong. In the notes that follow I have called attention to more or less casual corrections of such mistakes, and have undertaken on my own part the correction of others. So far as I have been able to do so I have examined types.

Io rota Reeve, 1860. Thought by Tryon to belong to *Angitrema.* Pilsbry has recognized this as *Pachymelania aurita* (O. F. Müller). See "Aquatic Mollusks of the Belgian Congo", p. 267.

Melania brevis Lea, 1843; *Lithasia showalterii* Lea, 1850; *L. fusiformis* Lea, 1861, and *L. vittata* Lea, 1862, all from the Coosa River, are not Lithasias as Lea and Tryon considered them, but Goniobases. This was pointed out to me several years ago by Herbert H. Smith. The correction requires a change in the name *Melania showalterii* Lea, 1861, and I propose that this species be made *Goniobasis pilsbryi.*

Melania bitaeniata Conrad, 1834. A *Strephobasis* in the judgment of Tryon. I take this to be a *Goniobasis*, possibly a deformed and smooth specimen of *Goniobasis hydei* (Conrad).

Melania compacta Anthony, 1854. Placed by Tryon in *Lithasia.* This and its synonym, *Lithasia nuclea* Lea, 1860, are Anculosas.

Melania planospira Anthony, 1854. Called an *Anculosa* by Tryon. The author gives Tennessee as the type locality, but the specimen in the Museum of Comparative Zoology that is labeled "type" is marked as from Kentucky. It is the stout Anculosa-like *Lithasia obovata* (Say) that occurs in the Green River at Mammoth Cave. Anthony does not mention the cave as one of the places he visited on his walking trip into the south, but he describes *Melania latitans* as from it.

Melania torta Lea, 1845. Placed by Tryon in *Pleurocera.* This is a plicate *Goniobasis* that is close to *laqueata* (Say). It appears to be confined to a few streams of southern Tennessee. It is, as Tryon remarks, peculiar for the "great accumination of the upper part of the spire."

Melania strigosa Lea, 1841. The types, 121,603, National Museum, have the sculpture of *Goniobasis arachnoidea* (Anth.), and are close to that species. It is a creek form, probably from near Knoxville, Tenn., and not a mollusk of the rivers, as the locality given by Lea, Holston River, indicates.

Trypanostoma lyonii Lea, 1863, *Pleurocera* Raf. displacing *Trypanostoma* Lea. This is the common *Goniobasis ebenum* (Lea) that occurs in the Cumberland River and its streams above the Falls and in its tributaries below. Oc-

casional specimens in some of the colonies are plicate on the spire. A pure strain of the plicate shells inhabits the New River of the Cumberland and is, I think, the same as *Goniobasis emeryensis* Lea. The locality for *emeryensis* is given as "Rocky Creek, Head Branch of Emery River, E. Tenn." Dr. Ortmann and I, at different times, tried to find the shell in the Emory drainage, and failed. The maps of the 1860's were probably not very good in the matter of detail, especially as regards the rough country of Eastern Tennessee, and it is likely that even the natives were not quite sure whether their Rocky Creek belonged to the Cumberland or the Emory.

Melania opaca Anthony, 1860. A *Pleurocera* according to Tryon. The type in the Museum of Comparative Zoology is a *Goniobasis* of one of the groups that occur in the vicinity of Helena, Ala. If it is a good species it is close to *Goniobasis germana* (Anth.), described at the same time.

Trypanostoma tennesseense Lea, 1862. Placed by Tryon in the synonomy of *Pleurocera opaca*. Lea says he received the shells from Drs. Troost and Currey and J. M. Safford. Those in the National Museum that came from Dr. Troost, which I assume to be the types, are freakish specimens of *Goniobasis sordida incurta* (Anth.)

Melania procissa Anthony, 1854. Made by Tryon, with some hesitation, the sole member of his first group of *Goniobasis*. He thought it probable that the shell, though assigned to Alabama, might be from North Carolina where *Anculosae* somewhat like it occur. In examining some material from the Alabama Museum of Natural History I came upon a shell accompanied by a note in Herbert H. Smith's handwriting venturing the opinion that this was Anthony's *procissa*. It was taken on Muscle Shoals, and is a young *Lithasia verrucosa* (Raf.) with a freakish sculpture.

Goniobasis stewardsoniana Lea, 1862. The types, 119,270, Natural Museum, are *Lithasia verrucosa* (Raf.) in which the tubercules have coalesced into raised lines continuous quite around the whorls.

Melania abbreviata Anthony, 1850. Tryon makes this a *Goniobasis* and throws *M. elegantula* Anth., *coronilla* Anth., *curvilabris* Anth., and *chalybaea* Anth. (Brot) into its synonomy. The type of *abbreviata* is a deformed *Lithasia,* probably *L. fuliginosa* Lea. Of *coronilla,* Mr. W. J. Clench of the Museum of Comparative Zoology writes me that "one specimen, marked 'original', presumably from the original lot, is labeled 'Kentucky.' This is probably the correct locality. * * * It looks very much like the Green-Barren River material," meaning *Lithasia obovata* (Say) that in the Green River and its drainage takes many forms. One of the forms, in numbers always comparatively rare, is *curvilabris.* It may be pathological. A corresponding form in the Ohio river has been named *Goniobasis informis. Chalybaea* seems to be a nude name.

Melania aequalis Haldeman, 1841. Considered a *Goniobasis* by Tryon. Specimens in the National Museum are young shells either of *Io* or *Lithasia.* In the Walker collection are young *Lithasia verrucosa* Raf. that are from Nolachucky River, as is the case with *aequalis.* They are remarkable for rather strong plicae, which appear to be the most striking character of Haldeman's species. Fig. 164 in Tryon's monograph shows a specimen with an aperture quite unlike *Goniobasis,* but resembling that of some Lithasias.

Melania tabulata Anthony, 1854. A *Goniobasis* in Tryon's opinion. I did not see this species in examining the Anthony types. Three lots in the Lea collection named *tabulata* are *Lithasia obovata* Say. The author's description and the figures in Tryon suggest *obovata.* The type locality is given as Tennessee though, more likely, it is Kentucky. Anthony's geography was often imaginative.

Melania nickliniana Lea, 1841. Placed by Tryon in *Goniobasis.* This is a form of *Anculosa carinata* Brug.

Goniobasis auricoma Lea, 1862. It is a young *Lithasia,* probably *verrucosa* Raf.

Melania gibbosa Lea, 1841. Thought by Tryon to be *Goniobasis.* The types, two specimens, are *Lithasia obovata*

Say, possibly deformed, the columella being peculiarly impressed. As in the case of *M. hildrethiana* Lea, which is *obovata* also, *gibbosa* is only a dwarfed form of the species that is the most abundant of the *Pleuroceridae* on the Falls at Louisville.

Melania densa Anthony, 1850. Placed by Tryon in the synonomy *Goniobasis simplex* (Say). The type is an elongated *Lithasia fuliginosa* Lea.

Melania depygis Say. Considered by most collectors to be the leading term of a group of *Goniobasis*. Mr. A. A. Hinckley expressed his suspicion to me several years ago that this is the slender form of *Lithasia obovata*, usually only partly grown, that occurs in great numbers at the Falls of the Ohio. My belief in the correctness of this view has gained support through the examination of several collections from the Falls, including two that I made myself. I have recently gone over several thousand specimens that were taken by Call in this place and are now the property of the Museum of Comparative Zoology. Not one individual was a *Goniobasis* and all from the Falls that were named *depygis* were in fact *L. obovata*. Other species erected on the variations of *obovata* at this place are *Goniobasis infantula, louisvillensis* and *informis* Lea, all named in 1863, and probably from the same sending.

Melania livida Reeve, 1860. Though thrown by Tryon into the synonomy of *Goniobasis semicarinata* Say this shell belongs to that of *Pleurocera acuta* Raf.

Melania alexandrensis Lea, 1845. Included by Tryon, together with the next species, in his grouping of *Goniobasis*. The types are young *Pleurocera acuta* Raf. Specimens in the Museum of Comparative Zoology that were received from Josiah Hale, the original collector, are also *acuta*.

Melania haleiana Lea, 1845. The type lot consists of juvenile *P. acuta* together with young *Goniobasis* that, apparently, are *plebeius* Anth.

Melania grisea Anthony, 1860. A *Goniobasis* according to Tryon. I cannot be sure that I saw the types during my

examination of the Anthony material, but one lot named *grisea* and labeled "for exchange" is young *Lithasia,* probably *florentiana* Lea.

Goniobasis lawrenci Lea, 1869. The types are *Pleurocera acuta* Raf.

NOTE ON THE GENUS CERATODISCUS

BY H. A. PILSBRY

Ceratodiscus was proposed for a Haitian operculate landshell, *C. solutus* Simpson and Henderson, of which the animal and operculum were unknown. A Cuban species from Guantanamo was subsequently (1914) described, *C. ramsdeni,* and in the same paper *Cyclotus minimus* Gundl., Pfr. was referred to the same group and its operculum was described by myself.

Recently Dr. Joh. Thiele has described and figured the operculum and dentition of *C. minimus* (Archiv f. Molluskenkunde LIX, 1927, p. 155–157, pl. 9, figs. 5–7). He concludes that it is a Helicinid snail, approximating to *Stoastoma.* The operculum is figured as though the nucleus was at the columellar border, but he does not mention the point in his description. In my description the nucleus is stated to be at the external border. The radula is not figured in full detail by Thiele, and appears to resemble that of *Lucidella;* compare H. B. Baker's figures of *L. (Poenia) lirata,* Proc. A. N. S. Phila., vol. 74, 1922, pl. 3, fig. 5, pl. 5, fig. 21. I am inclined to view *Ceratodiscus* as forming a subfamily, Ceratodiscinae, of the Helicinidae, characterized by the peculiar operculum with external nucleus, and the tubular whorls of the openly umbilicate shell.

On opening specimens of *C. ramsdeni* I find that the in-

ternal partitions are absorbed for a narrow space in the middle of each, leaving a very low, flat chamber parallel to the upper face, the partitions projecting into it above and below.

The following species of *Ceratodiscus* are now known:

C. solutus Simpson and Henderson, Nautilus XV, 1901, p. 73, pl. 5, figs. 1, 2. La Ferriere, Haiti.

C. ramsdeni Pilsbry, Nautilus XXVII, 1914, p. 134; XXVIII, pl. 1, figs. 6, 7, 8. Guantánamo, Cuba.

C. minimus ('Gundlach' Pfr.), Monogr. Pneum. III, Suppl. 2, p. 16; Suppl. 3, p. 31. Monte Toro, etc., Cuba.

C. portoricanus Pilsbry and Vanatta, Proc. A. N. S. Phila. LXXIX, 1927, p. 21, text figure. Montoso, Porto Rico, 2624 ft.

ON POMACEA PERRY (AMPULLARIIDAE)

BY H. A. PILSBRY

In "The Aquatic Mollusks of the Belgian Congo", Bull. Amer. Mus. N. H., 1927, p. 170,[1] Dr. Bequaert and I named *Pomacea maculata* Perry as type of *Pomacea*, and through some unaccountable confusion or lapse of memory "(=*Nerita urceus* O. F. Müller)" was added. The genus *Pomacea* Perry ("Conchology", 1811, text of pl. 38) is a composite group. Perry's figs. 1 and 2 are Helices; fig. 3, *Pomacea maculata* is *Ampullaria gigas* Spix; fig. 5, *Pomacea orbata*, is *Ampullaria globosa* Swains.; and fig. 4 is a helicid, probably not determinable.

The figure of *P. maculata* is not very good for *P. gigas*,

[1] It may be mentioned here that this work was written over three years ago, publication being unavoidably delayed. While a few small insertions were made on the proofs, it was impracticable to bring it fully up to date.

but judging by the size, the channelled suture and the rounded posterior extremity of the aperture, it cannot well be anything but that Brazilian species.

P. orbata is well figured and is undoubtedly *A. globosa* Swainson; being prior to that well known name, it will have to be accepted as *Ampullaria orbata* (Perry), or in Boltenian nomenclature, *Pila orbata* (Perry). Another synonym of this species, as already noted by Bryant Walker, is *Ampullaria rotundata* Say. (New Harmony Dissem. II, Aug. 12, 1927, p. 245). Say was misled by the false locality of his specimen.

P. S. Since the above was in type I have thought to look at Perry's earlier work, "Arcana," where *Pomacea* was monotypic for *P. maculata.* This is on the 12th plate; we owe to Iredale's acumen the date, approximately March 1810. The "Arcana" is a rare work; Iredale know of four copies, two in London libraries, one in Sweden, one in his own collection. There is an excellent example in Philadelphia, library of the Academy of Natural Sciences No. GNH–169a. It is a diverting and occasionally quite thrilling book.

A NEW JAPANESE EUHADRA

BY H. A. PILSBRY AND T. D. A. COCKERELL

EUHADRA SANDAI OKANOI, new subspecies.

The shell is strongly depressed with a rapidly contracting umbilicus. Color ecru-olive (varying to chamois) with a large umbilical spot and a supraperipheral band of brownish black; on the upper surface irregular streaks of naples yellow. The last whorl descends deeply to the very oblique aperture. Height 22.5, diam. 40.5 mm., 5¾ whorls.

This is one of several land snails found along the "lime shed road" near Tsuruga, Echizen, Japan, by Mr. T.

Okano, who very kindly undertook to collect specimens for one of us. It will be figured in a revision of the *Euhadra herklotsi* group soon to be published.

JESSE WEDGWOOD MIGHELS

To those interested in the study of Mollusca, especially of the species found in New England, the name of Mighels is very familiar, but this is the first time that we have been able to present to our readers some of the interesting facts pertaining to his life.[1]

J. W. Mighels was born in Parsonsfield, Maine, July 6, 1795. "On reaching the age of eighteen he had acquired sufficient learning to teach a common school. Aspiring to become a physician, he sought the aid of Dr. James Bradbury of his native town, who found so much of promise in young Jesse that he gave him encouragement and instruction for some time, notwithstanding the fact that the young man had no academic training. Mighels later attended 'medical lectures' at Dartmouth College, from which he received the degree of M. D., August 20, 1823."

"He settled immediately in Minot, Maine, where he built a house and began the practice of medicine, winning an enviable reputation. On December 12, 1826, he married Miss Evelina Augusta Rust, daughter of Capt. Henry Rust, Jr. Two sons were born to them. Dr. Mighels remained nine years at Minot, and in 1832 moved to Portland, Maine, where he continued the practice of his profession for about fifteen years, and it is said won a reputation for his skill in surgery. It has been said that he

[1] His name is pronounced *Miles*. We are indebted to Mr. Arthur H. Norton for a most interesting account of his life published in "The Maine Naturalist", Vol. VII., pp. 63–74, June, 1927. From this I have selected those parts pertaining to his conchological work. I am also indebted to Mr. Norton for the accompanying portrait.

moved to Portland in order to better gratify his tastes for scientific pursuits."

"Four years after he moved to Portland there was organized in the place the 'Maine Academy of Science' (1836), which had a brief career, and now is all but forgotten."

"This Academy, though entirely distinct from, was the forerunner of the Portland Society of Natural History, and the name of Dr. Mighels appears among those who signed the call for a meeting for the organization of the latter to be held December 19, 1843. Two preliminary meetings had been held, one on November 24, and the other December 1 of the same year. At the latter Dr. Mighels was added to the committee which had been chosen to 'draft a constitution'. The first election of officers was held December 20, 1843, and Dr. Mighels was elected corresponding secretary, which office he held continuously by re-election until his removal to Cincinnati in 1847. He was one of the most active members of this young society, serving on various committees and occasionally lecturing at its public meetings."

"It is due to his work as a conchologist that Dr. Mighels won for his name a lasting place among the pioneer naturalists of America. A memorandum in one of his books states, that he commenced to study shells in 1837 and sold his collection of shells to the Portland Society of Natural History, March 13, 1846."

"What is now known of the extent and disposition of that collection is here taken from Dr. Mighels' own handwriting, or in other words from the subscription paper through which the collection became the property of the Portland Society of Natural History; the preamble is as follows: 'Dr. J. W. Mighels proposes to dispose of his entire collection of shells to the Portland Society of Natural History for the sum of $1000. The collection consists of more than 3000 species and 6000 to 10000 specimens, embracing many rare and interesting varieties, with all the species that are known to inhabit the State of

Maine. He proposes also to include in the sale all the duplicate specimens for which he is now negotiating in Europe, Africa, Sandwich Islands, etc., with no extra charge, excepting the expense of postage and freight, which will not probably exceed 8 or 10 dollars.'

" 'In case the sale is effected, Dr. Mighels agrees to arrange and label the whole collection, so far as the species are known to him, without any compensation, whenever the Society shall furnish suitable cases and place them in the hall of the Society at their own expense. In order to purchase the collection of shells above named, that they may be placed in the hall of the Portland Society of Natural History, as a donation from ourselves, we the subscribers agree to pay the sums annexed to our names whenever the sum subscribed shall amount to one thousand dollars.' "

"At that time (1843-1854) the Society was quartered in an upper room of the Exchange Building; this building was otherwise occupied as a business block, by the U. S. Court and by the Post Office. It was located on the corner of Middle and Exchange streets, where the Post Office building of the present day stands. On January 8, 1854, the Exchange Building was totally destroyed by fire, with all of its contents, including the entire collection of the Natural History Society."

After hearing of the fire Dr. Mighels wrote: "Is it possible that my beautiful collection of shells is destroyed? The work of nine years of delightful enthusiastic industry —is it all gone? How is it possible to replace the deep water species of Maine and the Gulf of St. Lawrence? The species from Europe, East and West Indies, Sandwich Islands, from the Nile, India, South America and Oregon! What a loss! Money and books and goods and buildings can be replaced, but that collection, I fear never!"

"That Dr. Mighels was not only a collector but a patient student of his chosen subject, is shown no less by his books than by his few published papers. A number of books from his library became the property of William Willis,

the historian, as appears by his signature; they descended to his son Henry Willis, vice-president of the Portland Society of Natural History, and were finally presented to the Society by his widow, in accordance with his wishes."

"The first of these books to claim attention is one 9½ by 8 inches, made of heavy unruled paper suitable for drawing, and with tissue fly leaves. It was evidently made and bound to order. On the first or title page is written, 'Lamarck's System of Conchology, Illustrated. From Crouch and Brooke and from Nature.' Not only is the text more or less fully copied but also two hundred and forty-three figures. This portion of the book is followed by seven figures of 'miscellaneous shells' with names, and 'Shells of Portland', with eighty-six figures; these are followed by seven species of Maine shells critically described and illustrated with nineteen figures; habitats and remarks are also given. There are also figures of shells from Porto Cabello, Alabama, and eighteen figures of *Achatinella*. The last thirty figures are drawn on cards which are glued to the pages of the book. Among the beautiful figures of *Achatinella* Dr. Mighels reached the climax of his skill as a portrayer of shells."

"Another book, evidently John C. Jay's Catalogue (though lacking the title page) consisting of ten printed plates, with fifteen pages of printed text, is augmented by fourteen additional plates, containing one hundred and two figures drawn by Dr. Mighels. Thomas Wyatt's Manual of Conchology after Lamarck and Blainville, in two volumes, 1838, is rebound, and interleaved and increased to the extent of one hundred and ninety-two figures with considerable written text, including a number of his new species."

"He continued to live in Cincinnati until 1856 or 1857. On leaving a dimly lighted courtroom where he had been needed as a witness, he fell down an open shaft or stairway, sustaining severe injuries from which he never fully recovered."

"As a broken down sufferer, in 1858 he returned to

Maine, living at Norway until death claimed him, September 1, 1861. His remains were laid in the Rust family tomb, in the Rustville Cemetery, Norway, Maine."

CONCHOLOGICAL PUBLICATIONS OF J. W. MIGHELS

1841. Catalogue of the Marine, Terrestrial and Fluviatile Shells of Maine. Published by the author.
1842. With C. B. Adams. Descriptions of twenty-four Species of the Shells of New England. Journ. Boston Soc. Nat. Hist., IV; 37–54, p. 4.
1843. With C. B. Adams. Descriptions of twenty-five new Species of Shells. Proc. Boston Soc. Nat. Hist., 1, 48–50. This is an abbreviation of the preceding paper.
1843. Catalogue of the Marine, Fluviatile and Terrestrial Shells of the State of Maine and Adjacent Ocean. Journ. Boston Soc. Nat. Hist., IV, 308–345.
1843. Description of six Species of Shells Regarded as New. Journ. Boston Soc. Nat. Hist., IV, 345–350, pl. 16, figs. 1–6.
1843. Descriptions of seven Species of Shells Regarded as New. Proc. Boston Soc. Nat. Hist., I, 129, without plate. This is an abbreviation of the preceding paper, six species are described.
1844. Dr. Gould communicated on behalf of Dr. J. W. Mighels some specimens of Shells with descriptions. Proc. Boston Soc. Nat. Hist., I, 187–189. Eleven species are described as new.
1845. Descriptions of Shells from the Sandwich Islands and Other Localities. Proc. Boston Soc. Nat. Hist., II, 18–25. Fifty-one species are described as new.

C. W. J.

CORRESPONDENCE

In Camp, New Harmony, Indiana,
Sept. 7, 1927.

Dear Dr. Pilsbry:—What conchological memories this old town has! Our tent is pitched on the Wabash River embankment, just fifteen feet from the river. We arrived here about 4 P. M.—and before supper made a good collection at the north end of an island just above the ferry.

We have had the best of luck on the trip—no rain and all the rivers low. To date, over 1000 pounds of shells have been shipped back to Ann Arbor, of course *Unionidae* taking the lion's share for weight. For the most part the collecting has been done in the large rivers and streams. The small creeks have all run dry.

Western Kentucky rivers proved a disappointment for beauty. Most of them are muddy, filled with stumps and logs, and run turbid water even several days after a rain. However, they proved rich in material. Many times we were knee deep in mud—feeling over the bottom with our hands and tossing out on the bank all kinds of Unios!

Tomorrow we start working north, picking up what material we can on the way. There are several good rivers to cross such as the Patoka and White which should produce something. WILLIAM J. CLENCH.

NOTES AND NEWS

A SYNONYM OF POLYGYRA AURICULATA SAY.—In his interesting book "Amerikafahrt" (1926) Professor O. Abel has unconsciously added a synonym to our catalogues, "*Polygyra auricularis*", mentioned on p. 133, figured in fig. 78 (p. 112), central figure. The specimen was picked up on the shore of Vero Island, St. Lucie Co., Florida.—H. A. P.

THE NOISY OYSTERS.—The incessant clicking of oysters as they open and shut their valves has set up such a disturbing noise at one point in the Atlantic Ocean as to cause the United States Coast Survey to abandon its plans of employing under-water radio in surveying the North Carolina coast. 'We have been listening to the clicks of oysters instead of the sound of the bomb signal in the radio-acoustic equipment' states Commander W. E. Parker, chief of the Division of Hydrography and Topography. (See *The Literary Digest* for Sept. 3, 1927.)

PUBLICATIONS RECEIVED

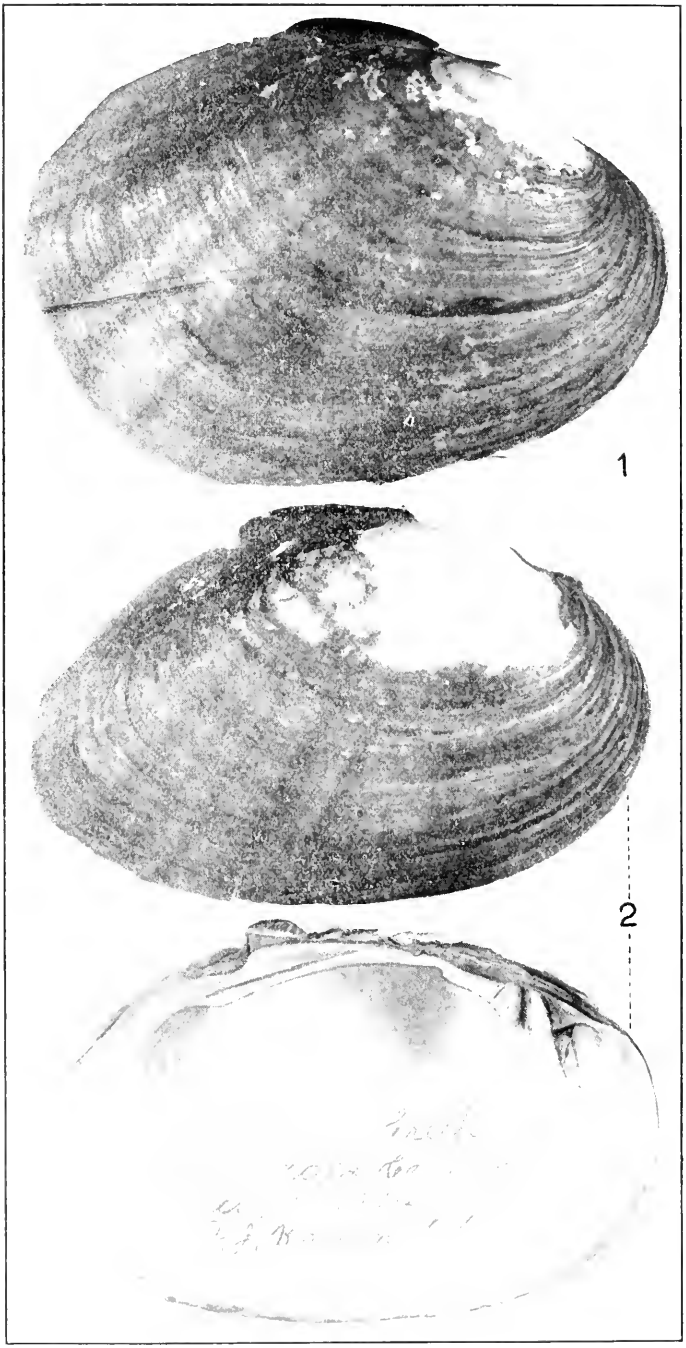
SMALL SHELLS FROM DREDGINGS OFF THE SOUTHEAST COAST OF THE UNITED STATES BY THE UNITED STATES FISHERIES STEAMER "Albatross" in 1885 and 1886. By W. H. Dall. (Proc. U. S. Nat. Mus., vol. 70, art. 18, pp. 1–134, 1927.) Including those recorded in a supplement (p. 115) the total number of species obtained from these dredgings, omitting pelagic forms, is 400, comprising 5 Brachiopoda, 41 Pelecypoda, 14 Scaphopoda and 340 Gasteropoda. Of the whole number 240 are described as new. The dredgings were made off the coast of Georgia in 440 fathoms and off Fernandina, Fla., in 294 fathoms. This paper is most interesting in showing the richness of the fauna of the sea bottom in certain localities. It is to be regretted that the new species are not illustrated as it will be very difficult to determine them from the short descriptions. We note however that many of the species are represented by numerous specimens, in the absence of illustrations would it not be possible to place some of these in other museums thus making them more available for students.—C. W. J.

THE SHIPWORMS OF THE PHILIPPINE ISLANDS. By Paul Bartsch (Bull. U. S. Nat. Mus., 100, vol 2, pt. 5, pp. 533–

562, pls. 53–60, 1927). This represents the first paper bearing on the shipworms of this region, the economic importance of which have but recently been emphasized. One new subgenus Ungoteredo and 16 new species are described and figured. The illustrations are excellent.—C. W. J.

A REVIEW OF AUSTRALIAN HELMIT SHELLS. By Tom Iredale. (Records Australian Museum, vol. 15, no. 5, pp. 321–354, pls. 31 and 32, 1927.) The various species of Cassididae often referred to several subgenera of the genus Cassis, have long been difficult to define when studying the species of the world, especially those of Australia. The author has clearly defined the described species, together with seven new ones, which are beautifully figured. The following new genera are proposed, NANNOCASSIS, genotype *Cassis nana* T. Wood HYPOCASSIS, genotype *C. bicarinata* Jonas. *C. fimbriata* is also in this genus. XENOPHALIUM, genotype *X. hedleyi* Iredale. XENOGALEA, genotype *C. pyrum* Lam. 12 species are recognized in this genus, peculiar to the Neozelanic and Southern Australian waters. ANTEPHALIUM, genotype *C. semigranosum* Lam. The genotype of CYPRAECASSIS Stutchbury is *C. rufa* L., of PHALIUM Link, *B. glaucum* L., of SEMICASSIS Mörch, *C. japonica* Reeve, and of CASMARIA H. and A. Adams, *B. vibex* L. Little has been done by the author on the radula, "but years ago Troschel recorded that the radula showed differences in the two main groups that were worthy of generic rank".—C. W. J.

SACCULUS OKAI, A NEW PARASITIC GASTROPOD. By Shintaro Hirase. Annot. Zool. Japonenses XI, July, 1927. This is a form living in colonies in gall-like swellings of the test of tunicates. The body is globular, about 3x2 mm., with a pair of tentacles, eyes, and flattened foot. The ample mantle has a dorsal slit, and there is a monopectinate gill. There is a bipectinated osphradium. It is taenioglossate, and is believed to "belong to some family near the Lamellariidae".—H. A. P.



LAMPSILIS RAFINESQUEANA
Frierson

THE NAUTILUS.

Vol. XLI JANUARY, 1928. No. 3

A COLLECTING TRIP TO THE NORTHWEST

BY JUNIUS HENDERSON

Accompanied by Eugene Herman Nanney, a University of Colorado student, I spent the summer of 1927 on a collecting trip to the Northwest. We travelled 4,500 miles by flivver, with a camp outfit, and unnumbered other miles on foot, from Boulder, Colorado, through southern Wyoming, northeastern Utah, Idaho, Oregon, Washington, southern Montana and eastern Wyoming, back to Boulder. We collected mollusks at 140 localities, chiefly in western Oregon and western Washington. A monograph on the non-marine mollusks of these states is now in preparation, in which all of our unpublished land and fresh-water shells will be included. Probably another report will discuss the marine shells.

Two things were very impressive on the trip: 1. The difficulty of finding parking places along the main graded and paved roads of the Northwest where it is desirable to search for mollusks. Parking on the roadway is prohibited and there is seldom space for parking off the roadway. Most of the roads are laterally shouldered or ditched in such a way as to prevent driving off even where there is an open, level space. 2. Along the route travelled, except in western Washington and Oregon, there are not many good

localities for land snails close to the main highways, and time did not permit much digression. Consequently, as stream crossings afforded opportunity to obtain aquatic mollusks, they greatly preponderate in the season's collections.

From McCammon, Idaho, nearly to Portland, Oregon, one passes almost continually over arid, sage-covered stretches of land, with very little shrubbery suitable for snail cover, no rock slides, and with green fields only in scattered valleys here and there. Even in the moist belt along the coast, with its luxuriant vegetation, shell-bearing snails are not so plentiful, generally distributed and easy to find as one would expect. This has always seemed surprising to me. I found the same difficulty in locating colonies of land snails in Alaska, northwestern British Columbia and Yukon Territory, where aspen groves that looked promising only yielded a few small species. Pilsbry and Cooke mention the relative scarcity of land snails on Vancouver Island. One reason may be the general prevalence of non-calcareous rocks and coniferous forests, neither of which are favorable to most snails.

We found the big, beautiful *Monadenia fidelis* (Gray) abundant in only one colony, at Empire, Oregon. *Haplotrema* was more generally distributed, but nowhere abundant. Only one lot of *Polygyra townsendiana* (Lea) was found, between Astoria and Portland, but a fine lot of 53 specimens from Blaine, Oregon, sent in by Alex Walker, included two examples of *P. t. brunnea,* recently described from south of Kelso, Washington, by Vanatta. Doubtless we would have found more terrestrial material had we searched more industrially, but it was discouraging work, we were pressed for time and our real object was to get the fresh-water material, which stands more in need of study.

In passing through Wyoming, Idaho, Montana and eastern Oregon and Washington, there was constant temptation to leave the highway and get into the foothills and mountains after *Oreohelix,* but had we done so we would never have reached our real objective, the coast, so we

could only say, "Get thee behind us, Satan!" and step on the gas.

We hoped to pick up the trail of *Goniobasis* in northern Idaho and eastern Oregon and Washington, as it has been found there, though absent from southern Idaho, Wyoming and Colorado; but we found none until after we passed Portland, though we have specimens from The Dalles received from other collectors. We obtained *G. silicula* (Gould) from 28 stations, from 15 miles south of Bandon, Oregon, to Aberdeen, on the Washington Coast, and inland nearly to Seattle, but none north of Seattle and none by the north side of the Olympic Mountains. *G. plicifera* (Lea) we obtained at 7 stations, all in the Willamette Valley, except Astoria, Oregon, and Centralia, Washington. Many authors have made *silicula* either a synonym or variety of *plicifera*. Upon examination of large numbers of both from many localities scarcely any indications of intergradation have been found and I nowhere found them mingled or found any lot that could not be easily identified definitely as one or the other. Hence I consider them distinct species. Perhaps others have had a very different experience with them. Possibly the absence of *Goniobasis* northward and eastward in the Puget Sound Basin may be due to the fact that the whole region was heavily glaciated, and sufficient time has not elapsed since the retreat of the glaciers for the genus to re-establish itself. A more thorough search may locate some colonies beyond where we found them. *Margaritifera* (*Margaritana*) also we failed to find very far north of Seattle, and only one colony on the north side of the Olympics, Crescent Lake.

A great surprise was the comparative scarcity of *Pisidium, Physa, Lymnaea* and the larger species of *Planorbis*. Many stations that yielded only a few examples of any of these genera presented conditions similar to stations where they fairly swarm in some other regions. At only two or three stations in the coastal region were any of them abundant. A quiet bay, now almost cut off by a turnpike,

at the northwest end of Lake Whatcom, in the edge of Bellingham, seems to be the type locality of the interesting *Lymnaea stagnalis occidentalis* "Hemphill" Baker, where it was associated with fine, large *Planorbis binneyi* Tryon. Other parts of the lake visited by us seemed less favorable, but in 1925 we found a few of each of these species at the south end.

Anodonta nuttalliana, oregonensis and *wahlamatensis* were all described by Lea, from the Willamette River, near its junction with the Columbia. These three, with *A. californiensis* Lea, are closely related and appear to intergrade. We had hoped to be able to obtain for careful study a large quantity of the three first-named, from various stations in the region of the type locality, but when we were there the water was altogether too high for successful collecting.

Marine collecting is excellent at some localities on the Oregon and Washington coasts, such as Sunset Bay, south of Coos Bay, but nowhere did we find as many species in a short time as at Fidalgo Island on Puget Sound, or at some California localities. Although much of the coast of both states is rugged, with steep bluffs and rocky islets, suggestive of numerous rocky points exposed to the surf and many tide pools, yet at most localities visited by us immense quantities of sand eroded from the bluffs by storm and wave have accumulated about the bases of the rocks and thus prevented the development of tide pools and other ideal conditions favorable to large faunas of littoral marine invertebrates.

One accustomed to the Southern California beaches misses such familiar shells as *Donax, Tivela, Crucibulum, Polinices*, etc. Compensation for this lack lies in the great abundance and variety of *Thais*, so variable in color and sculpture that one is almost tempted to take all within reach. The Oregon-Washington faunas, as would be expected, are much more nearly allied to those of northern California, with a strong representation of Alaska species. The brackish-water mud-flat genera *Cerithidea* and

Melampus, so abundant in some bays of southern California, as at San Pedro, are absent from Oregon and Washington bays.

Echinodermata are well represented on these coasts. The sand-dollars of California we found as far north as Pacific Beach, Washington. Purple urchins were abundant at many localities, forming a beautiful sight when mingled with immense, expanded, green sea-anemones in clear, quiet tide pools. The little six-rayed starfish (*Leptasterias*) is very common under rocks. We obtained two of the twenty-rayed starfishes (*Pycnopodia*) and several other species. The starfish everywhere in evidence in great abundance and exceedingly variable in color, is *Pisaster ochraceus.* In places we saw scores of them in close contact with one another. On parts of the jetty at Newport, Oregon, one could scarcely walk over the big rocks without stepping on starfishes.

HUNTING HELICES IN CALIFORNIA

(Extracts from a letter to the Editor)

Long Beach, California,
September 11, 1927.

The first week in August I set out with my Buick and camp outfit for a three weeks' shell collecting vacation.

I went up the Coast road as far as Gaviota Pass the first afternoon; next morning went on to Morro Bay. Found half a dozen good *Helminthoglypta traski phlyctaena* Bartsch (one alive), near Las Crucis. Stayed one day for early tide at Morro, and went on to Cayucos for three more early tides. I collected land shells at three stations near Cayucos. They seem to be related to the specimens I sent you in June from Salmon Creek. I extracted some of the animals after drowning and now have them in alcohol for you, also one *H. t. phlyctaena.* This shell from around Cayucos seems to puzzle me. I have had nothing like it

before.[1] I have a good set saved for you. I found the same form at two stations on the "Old Creek" road on the ocean side of Santa Lucia mountains about four and seven miles east of Cayucos, but did not find it over the ridge on the valley side.

Leaving Cayucos I crossed the range to Paso Robles and again across the great San Joaquin valley to Visalia, thence up in the high sierras. I explored the southern edge of Sequoia Park on the south fork of the Kaweah River. Went up the old Mineral King Road to an elevation of 8,000 ft., finding very poor snail country; the only specimen in fact in my two days' stay was a single live *H. traski proles* Bartsch; rather slim picking; no trace of any other species. The country is too straight up and down to furnish very good homes for snails.

From there I went back down the mountain to 900 ft. elevation and climbed the new road to the "Giant Forest" on the north fork of the Kaweah. The reward of three days' diligent search was a very nice set of live specimens of *Helminthoglypta sequoia*. Part of them show quite a reddish cast to the shell, almost the color of the redwood bark. When this shell is taken alive and properly cleaned it is indeed a pretty species. It is very fragile and when aestivating under the bark of logs, part of the bark must be removed with a sharp knife, else the shell will be crushed in the fingers. Three days careful search through the Park turned up no trace of *Helminthoglypta traski proles* or *H. tudiculata tularensis*,—nothing but *H. sequoia*.

After these delightful days in the Park I again dropped down to the valley and tried to gain access to the King's River country, but without success. The San Joaquin Light and Power Co. has the road closed to all but their own trucks, as they have two dams and power plants under construction. Disappointed, I had to cross the ridge from Trimmer's Springs to the old Toll House Road to Hunting-

[1] It is *Helminthoglypta umbilicata cayucosensis* Pils., NAUTILUS, vol. 38, p. 104, described from specimens taken by Mr. and Mrs. Chace. It has also been collected in several localities by Mr. Morris E. Carruthers.—ED.

ton Lake, along which I had found my first *Monadenia mormonum loweana.* I turned off above Ockenden to the right and went about 15 miles over the divide to the "Dinky Creek" and meadow country, which drains into the north fork of King's River. I collected around here and one day hiked 5 miles over to the "McKinley Grove" of Sequoias, and found the same form of *mormonum* there.—This must be the extreme southern limit. I hope some time to get up in the King's River country and find just where the two species have their dividing line, or perhaps some other form in between.

Another year I hope to get started in early June before they all hide away for the dry season; there is so much country yet to be carefully explored. This form of *mormonum* is surely a corker to find alive at this season, as they all seem to bury themselves under the loose pine needles near decaying logs. One could collect 500 to 1,000 shells in Cuba to one of those Sierra forms. It is hard to make the average collector who has never collected them realize the value of these forms.

HERBERT N. LOWE.

CUBAN LAND SNAILS COLLECTED BY H. N. LOWE

BY H. A. PILSBRY

EUTROCHATELLA CHRYSOCHASMA MENDOZANA n. subsp.

The shell is about the size of *E. c. hernandezi* "Wright" Wagner, but more broadly conic; white with typically sulpher tinted summit (sometimes white), a wax yellow basal callus and dull orange lip, which is slightly expanded and in fully adult shells is thickened and built a little forward at the inner margin. Length 6.3, diam. 4.8 mm.; 7 whorls.

Type No. 141897 ANSP. Specimens also in collections of H. N. Lowe and E. E. Hand.

At the caves near Mendoza, Pinar del Rio, Cuba, collected by H. N. Lowe and E. E. Hand, 1926.

This small race was taken in abundance. It appears to be rather constant in size and other characters.

UROCOPTIS MENDOZANA n. sp.

The shell resembles *U. vignalensis* in general shape, and has the same type of sculpture. General color light neutral gray (in some specimens having a brownish tint), nearly uniform, but with some scattered darker streaks; on close inspection the riblets are seen to be whitish. The rounded aperture is carob brown within, the expanded lip white in the upper part, brownish elsewhere. There is a distinct white columellar fold. The internal axis has a thin, moderately wide, crenulated lower lamella, a very much weaker low one above it, and an extremely weak upper spiral.

Length 22, diam. 6 mm.; 9⅔ whorls remaining. Type.

Length 18.5, diam. 5.8 mm.; 8½ whorls remaining.

Around the caves near Mendoza, Province of Pinar del Rio, Cuba; collected by H. N. Lowe, 1926. Type No. 142856 ANSP.; specimens also in Lowe's collection.

The axial armature is much weaker than in *U. vignalensis*. Other species of the "group of *U. trilamellata*" are much more slender.

It will be figured in the next issue of NAUTILUS.

UROCOPTIS MONELASMUS n. sp.

Urocoptis vignalensis, var., Pilsbry, NAUTILUS XL, Jan., 1927, pp. 74, 75, pl. 1, fig. 8.

The shell resembles *U. vignalensis* (Wright, Pfr.) in shape; ground color pecan brown to vandyke brown; sculpture of thread-like, arcuate whitish riblets much narrower than the intervals, and finer, more numerous than in *U. vignalensis*. Last whorl without basal keel. The circular aperture is deep brown within and has a well expanded peristome, which is very briefly in contact with the preceding whorl above. The internal axis has a single strong, smooth, spiral lamella revolving near the base in each whorl.

Length 18.6, diam. 5.6 mm.; 9 whorls remaining.

Around the caves near Mendoza, Pinar del Rio, Cuba. Type 141495 ANSP., collected by H. N. Lowe, 1926.

At the time I figured this shell as a fine-ribbed variety of *U. vignalensis* I had not opened it. I find now that it has a single axial lamella, not three. *U. violacea* is a much more slender species. By the dark interior and other characters the new species belongs to the group of *U. trilamellata* (Man. Conch. XV, p. 255.)

HELICES FROM CALIFORNIA AND TEXAS AND A ZONITID FROM VIRGINIA

BY H. A. PILSBRY

HELMINTHOGLYPTA SEQUOIA n. sp.

The shell is thin, rather depressed, with low conic spire, not quite imperforate, the dilated lip covering most but not all of the umbilicus. Color between buffy olive and isabella, lighter, almost chamois color towards the lip; a narrow chestnut band revolves above the periphery. Upper surface is scarcely glossy, having wrinkles of growth, and on the post-embryonic whorls there are inconspicuous rather well spaced papillae, in some places arranged subregularly in forwardly descending trends, in other places rather irregular; on the last whorl these papillae disappear, leaving a wrinkle sculpture and slight malleation, both less developed than in *H. tudiculata tularensis;* base smoother, glossy. The suture descends moderately to the aperture. Peristome is slightly expanded, triangularly dilated nearly over the umbilicus.

Height 15, diam. 22 mm.; 5½ whorls.

Sequoia National Park, California, the type, no. 142857 ANSP., and other specimens collected by H. N. Lowe.

This species is evidently related to *H. callistoderma* Pils., a larger shell with much more crowded papillae which extend over the last whorl. In *H. sequoicola* (Cooper) the whorls increase more gradually and the texture and color differ. These three species form a group characterized by the possession of papillae.

The largest specimen seen measures 22.6 mm. in diameter, the smallest 18.3 mm. In the small specimens the umbilicus is all but closed, reduced to a mere crevice behind the reflected lip.

This species will be figured in the next number of NAUTILUS.

HUMBOLDTIANA FERRISSIANA n. sp.

The subglobose shell is narrowly, obliquely umbilicate, rather thin, white under a thin yellow periostracum (between maize yellow and chamois) with three carob-brown bands, the lower one rather weak and interrupted. The surface is glossy, first half whorl smooth, the following whorl finely radially costulate-granose, next whorl with traces of fine granulation in places; later whorls have irregular growth wrinkles and some narrow whitish streaks on the larger wrinkles. The whorls increase rapidly, and the last one descends rather deeply to the aperture. The aperture is oblique; peristome thin, the outer and basal margins very narrowly expanded, the columellar margin broadly, triangularly reflected over the umbilicus.

Height 26.3, diam. 32.3 mm.; 4⅓ whorls. Type.

Height 30, diam. 34.2 mm.; 4¼ whorls.

Miter Peak, Davis Mountains, Texas. Type 144338 ANSP.; other topotypes 144338.

When monographing this genus (Proc. A. N. S. Phila. 1927) I overlooked the specimens from the Davis mountains, which prove to differ from the three species then described from north of the Mexican boundary.

H. texana Pils., the nearest species geographically, is smaller, higher, more coarsely granulose. In *H. chisosensis* Pils., which appears to be the most nearly related species, the weak granulation extends upon the last whorl

and the spire is lower. The exact relations of *H. ferrissiana* to the other forms remains to be determined when living specimens are collected.

All of the specimens taken—over thirty— are "dead" shells, most of them having lost the periostracum more or less completely.

GLYPHYALINIA BURRINGTONI n. sp.

The shell is depressed, umbilicate, glossy, somewhat translucent, of a warm buff tint. It resembles *G. rhoadsi* but differs by having the retractively radial grooves less widely spaced, minor grooves and wrinkles between them more strongly developed; on the latter part of the last whorl the grooves become closely though somewhat irregularly spaced. Under the compound microscope the surface is seen to be covered with fine, distinct, weakly beaded spiral striae, not seen in *G. rhoadsi.* The umbilicus is contained about 4.4 times in the diameter. The spire is slightly convex; four rapidly widening whorls. The aperture is lunate, shaped much as in *G. rhoadsi.*

Height 2, diam. 4 mm.

Near and at the Natural Bridge, Virginia, type 144764, paratypes 13744 and 137571 ANSP., collected by Dr. H. Burrington Baker, April 12, 1926.

This is a smaller more depressed shell than *"Polita" hammonis electrina* (Gld.), which resembles it in microscopic sculpture, but has more crowded radial grooves and wrinkles.

Glyphyalinia was elevated to generic rank in my monograph on New York mollusks (not yet published), on account of the peculiar dentition of *indentata.* Dr. H. Burrington Baker has examined several species, including his namesake *G. burringtoni,* and finds more important characters in the reproductive organs. His results are soon to be published.

I have had a bleached specimen of *G. burringtoni* from Cumberland, Maryland, in the collection for many years, but deferred description until better material should turn up.

NADEAU LAKE, FORT FAIRFIELD, AROOSTOOK COUNTY, MAINE

BY OLOF O. NYLANDER

Nadeau Lake is situated in the northeastern part of Fort Fairfield, very near the boundary line between Maine and New Brunswick. This lake is about three-quarters of a mile long and less than a quarter of a mile wide, lying in a valley between hills and draining northward into McDonald's Brook.

In this small lake is probably the largest deposit of marl or bog lime in New England, being from three to twelve feet in thickness. The lime is mostly extracted from the water by a small plant *Chara cf. gracilior* which grows profusely over the bottom of that lake and when dead forms a deposit of lime on the bottom. There is a small bunch of trees at the southern end of the lake, otherwise the land is cleared and under cultivation almost to the water's edge. Most of the lake is drained so there is only a small basin of water in the middle and a small stream of water along the sides.

Mollusca are plentiful in the water and they have contributed in part to the making of the bog lime. I find in this part of Maine, that nearly every bog lake or pond has some shells that are peculiar to it, and my previous published lists in THE NAUTILUS, vol. XIV, 1901 and vol. XXII, 1909 confirms this statement.

Since September 8th, 1925, I have visited Nadeau Lake many times and the following species of shells were collected.

Anodonta marginata Say. Rather small.
Sphaerium sulcatum Lam. Common.
Sphaerium rhomboideum Say. Rare.
Pisidium variabile Prime. Common.

Valvata lewisii Currier. Found on *Chara fragilis* on the bottom of the lake.
Lymnaea obrussa decampi Streng. Common.
Planorbis hirsutus Gld. Large specimens, common.
Planorbis trivolvis Say. Common.
Planorbis campanulatus Say. Common.
Planorbis exacuous Say. Obtained only five specimens.
Planorbis parvus Say. Common.
Physa heterostropha Say. Small specimens.

I also revisited the Lovely Brook bog in Fort Fairfield in August 1925, and discovered a colony of *Planorbis crista* Linn., collecting about fifty specimens. The colony of *P. crista* in the Barren Brook bog, Caribou, still exists and ten specimens were obtained in August 1925. On the scanty vegetation growing on the marl bed along the water edge I found for the first time the small orchid *Liparis loeselli.* Thus I find that certain geological conditions are great factors bearing on the distribution of both the fauna and the flora.

MOLLUSCAN PROVINCES IN THE WESTERN UNITED STATES

BY JUNIUS HENDERSON

One working on the non-marine Mollusca of the Western United States is inevitably strongly impressed with the existence of a number of molluscan provinces, distinct in certain of their biological characteristics, though their boundaries, of course, are not sharply defined, and the region would perhaps be divided in different ways by different students, depending upon what particular groups of mollusks they happen to be studying. Looking at the subject in a larger way, there are some provinces upon which we may all agree.

If a line be drawn through eastern Montana, Wyoming, Colorado and northern New Mexico, thence southwestward, it will divide the United States into two major molluscan divisions. The eastern division is characterized by the abundance of numerous species of *Polygyra,* large heavy-shelled, operculate species of fresh-water univalves such as *Campeloma, Viviparus, Goniobasis, Lithasia, Anculosa, Pleurocera,* etc., and a large and varied fauna of heavy-shelled Unionidae. None of the fresh-water univalved genera mentioned extends at all into the western division, except *Goniobasis,* which is represented by only a very few species inhabiting southwestern Montana, northern Idaho, Oregon, Washington and northern Califoria. *Polygyra* is absent from most of the western division, but is represented by a few forms with much the same distribution as *Goniobasis.* Heavy-shelled Unionidae of a few species are sparcely distributed in eastern Montana, Wyoming and Colorado, but do not cross the Rocky Mountains. Their total absence from North America west of the Rockies is remarkable, "this being the largest area destitute of Unio life in the temperate or tropical regions of the globe."[1] The family Unionidae, is, however, represented in all the states west of the Rockies by the thin-shelled genera *Anodonta, Gonidea* and *Margaritana.* The latter extends eastward from Oregon and Washington into western Idaho and western Montana, but is absent thence eastward to Pennsylvania and northward through central British America. As *Unio, Goniobasis, Viviparus, Campeloma* and *Lithasia* are found in Cretaceous and Tertiary formations of the Rocky Mountain states, it is evident that their range has for some reason become restricted since Tertiary time. The two major divisions are also set off one from the other by the presence in the western area of many species of *Ashmunella, Sonorella, Oreohelix* and the group of species usually assigned to *Epiphragmophora, Oreohelix* crossing the line only into the Black Hills region, and the others not at all.

[1] Simpson, THE NAUTILUS, VIII, 118, 1898.

The western division may be subdivided into several provinces, each marked by the presence of certain genera and the absence or relative scarcity of others. For example, in the Rocky Mountain province, embracing Colorado, Wyoming, Montana, Idaho, Utah and northern New Mexico, the characteristic, conspicuous and abundant land snails nearly all belong to the genus *Oreohelix*. The presence of *Anguispira kochi occidentalis* (Martens) and *Polygyra* in Montana and northern Idaho, and of one species of *Goniobasis* and *Margaritana* in western Montana and northern Idaho, suggests affinity with the Oregon-Washington Province, but on the whole Montana and Idaho belong with the Rocky Mountain Province, as a large proportion of all the species found in those states occur also in the states to the southward, and not westward. The abundance of *Oreohelix* throughout the province suggests affinity with the Southwestern Province, but the absence of other characteristic southwestern genera emphatically vetoes that idea.

The southwestern Province, comprising central and southern New Mexico and Arizona (possibly also Nevada and eastern California), is also inhabited by numerous species and subspecies of *Oreohelix*, but is definitely set off from the Rocky Mountain Province by the presence of many species of *Sonorella, Ashmunella* and *Holospira*, none of which has been found in the Rocky Mountain Province except one or two species of *Ashmunella* in northern New Mexico. Because of the scarcity of ponds, lakes and perennial streams, the aquatic molluscan faunas are not so abundant and varied as in the Rocky Mountain Province.

The Oregon-Washington Province is distinguished from the Rocky Mountain Province by the nearly, but not quite, total absence of *Oreohelix*, the greater prominence of *Polygyra, Haplotrema, Goniobasis* and *Margaritana*, and the presence of *Epiphragmophora* (or *Monadenia*).

The California Province is characterized by the great development of the group of snails usually referred to *Epiphragmophora*, represented by a few forms northward

but none eastward, and by the almost total absence of *Oreohelix,* represented by only one small species on Catalina Island. *Margaritana, Goniobasis* and *Polygyra* extend into the state from the northward.

In the absence of insuperable faunal barriers, any attempt to establish zoological provinces very rigidly must fail. They must necessarily be very much generalized, and will break down with too detailed discussion of species, as faunas overlap. It would be interesting to know why there should be such faunal differences as are indicated for those western provinces—what barriers there may be or what there may be in the history of the migrations of species that have brought about their present distribution. It may be possible, when sufficient information is accumulated, to answer some of the questions. That the distribution of various groups is not altogether a matter of climatic conditions is quite certain, and no other environmental factor yet observed seems sufficient.

For example, *Margaritana margaritifera* (Linn.), including a northwest American color form *falcata* (Gould), is circumpolar in its distribution, having "the most extensive range of any of the Unionidae". It occurs in moist portions of western Oregon and Washington, in semi-arid and arid Idaho, Utah and Nevada, in New England, eastern British America and Alaska, as well as in Europe and Asia. Occurring under such varied environmental conditions, why should it be absent from Pennsylvania to western Montana and northward through central British America? This interesting problem has been ably discussed by Walker, who concludes that it is not, as one might suppose, because it was destroyed by glaciation and has not yet been able to re-establish itself in that region.

Again, the genus *Oreohelix,* and even some of the species, notably *O. cooperi* (W. G. B.) and *O. strigosa depressa* (Ckll.), have a great range and thrive under very diverse climatic and other environmental conditions. Both species

[2] Walker, "The distribution of *Margaritana margaritifera* (Linn.) in North America", Proc. Malac. Soc. London, IX, 126-144, 1910.

mentioned are found from Montana to New Mexico, and from the cool, moist regions near timber line in the mountains to the dry, often hot plains at their base, thus being adapted to a wide range of temperature and humidity. Eastern Washington, Oregon and California seem just as suitable a habitat as southern Idaho, eastern Utah, New Mexico, Arizona or Wyoming. Many parts of Utah seem just as favorable for *Sonorella* and *Ashmunella* as do New Mexico and Arizona, but if so the snails have not yet discovered the fact. Mountain streams in other parts of Montana and elsewhere in the southern Rockies seem just as favorable for *Goniobasis* as where they occur in southwestern Montana. It is likely that they crossed the continental divide from the westward by way of Yellowstone Park, in company with *Margaritana.*

The reasons for faunal provinces and for peculiarities in the distribution of species are often complex. There are many possible environmental factors that may either limit or encourage migration, and these factors interact in a very complicated fashion. There are not only many kinds of faunal barriers, more or less effective, but also many methods by which species may pass or be transported over such barriers. Land is a natural barrier to the passage of fresh-water faunas, but in some places streams flowing in various directions have their common source in an area where their headwaters are more or less connected, at least part of the time. Sometimes the lower stretches of two streams are connected during floods, affording a highway for the interchange of species. Sometimes one stream captures part of the drainage of another by headward or lateral erosion, thus making possible such interchanges. There are many known instances of the transportation of live mollusks for long distances clinging to the feathers and feet of aquatic birds.

It is certain that glaciation destroyed all life in large areas and formed temporary barriers to migration during the last glacier epoch, the Pleistocene, yet upon the retreat of the ice the same or other species promptly repopulated

the glaciated areas. Nevertheless, some cases of erratic distribution are probably the direct result of glaciation. That, however, cannot be the cause of western molluscan provinces. Mountain ranges are rather effective, but not insuperable barriers to the migration of some types of animals. Tryon, Bartsch, Goodrich and others have shown that even a fresh-water stream may be a barrier to the migration of fresh-water species. This is notably true of a river heavily-laden with sediment, such as the Missouri, but a large, clear stream may be a barrier to a species adapted to small brooks, and a swift stream may be a barrier to a species adapted to sluggish water.

It is clear, then, that in studying the problems of distribution one must know not only all the environmental factors of the present time, but must also know the more important details of the geography and environment for some distance back in the past, with the geological transformations that have occurred. All this makes the subject more enticing.

Since the foregoing was written, Dr. Pilsbry has reminded me of the close approximation of these provinces with those proposed by Binney in 1885,[5] in discussing the land snails only, before some very important western genera now recognized had been segregated (*Oreohelix, Sonorella* and *Ashmunella*). His Eastern Province extends clear to the base of the Rocky Mountains, a little farther west than mine. His Central Province includes the whole intermountain region, my Southwestern Province plus most of my Rocky Mountain Province. His Pacific Province includes the whole Pacific Coast region west of the Sierra Nevada and Cascade Mountains, northward to Alaska. However, he divides it into two regions, namely, the Californian, from Humboldt Bay to San Diego, and the Ore-

[3] Henderson, NAUTILUS, XXXVII, 77-81, 1924; Univ. Colo. Studies, XVI, 1-3, 1927.

[4] Bartsch, NAUTILUS, XXX, 92, 1916. Goodrich, NAUTILUS, XXXV, 1-4, 1921. Tryon, Strepomatidae, XLI, 1873.

[5] Binney, Manual Amer. Land Shells, pp. 18-25, 1885; Terr. Moll. U. S., V, 39, 1878, with zoogeographic map.

gonian, from northern California to Alaska. Doubtless he would also have divided the Central Province, had conchological investigations in that region been anywhere near as far advanced as at present.

MARGARITIFERA VS. MARGARITANA

BY JUNIUS HENDERSON

Kennard, Salisbury and Woodward[1] show that the well-known generic name *Margaritana* Schumacher, 1817, must give way to *Margaritifera* [misspelled *Margartifera* by printer's error] Schumacher, 1816. This is very unfortunate and will lead to much confusion, as *Margaritana* has long been used for the fresh-water mussels of circumpolar distribution. They say: "It is true that the name *Margaritifera* had been applied by Patrick Brown (Civil and Natural History of Jamaica, 1756, p. 412) to a section of the pearl oysters, but his work being pre-Linnean does not count even though republished in 1789." Though Brown, in common with other polynomialists, used generic names in a real generic sense, he was in no sense a binomialist, as he used descriptive phrases instead of specific names, and this applies to the republication as well as to the original publication of his *Margaritifera*, consequently it must be ignored and not considered a preoccupation of the name to the exclusion of Schumacher's first name for the fresh-water mussel. This seems to be an instance justifying the committee on zoological nomenclature in exercising its discretionary power by validating the name *Margaritana*.

[1] Kennard, Salisbury and Woodward, Proc. Malac. Soc. London, XVI, 276, 1925.

ADDITIONAL RECORDS OF SOUTH DAKOTA MOLLUSCA

BY W. H. OVER

Since publishing a list of South Dakota Mollusca in THE NAUTILUS, Vol. XXIX, 1915, I have added the following species to the list. With the exception of a single species they are represented in collection of the University of South Dakota Museum. It may be fair to say that these records accumulated by the ending of the year 1924 when I was compelled to cease active interest in Mollusca. Most of the species listed here were identified by Mr. Bryant Walker.

Alasmidonta truncata B. H. W. Rivers of the eastern part of the state.

Alasmidonta calceola Lea. Big Sioux River in Minnehaha County.

Quadrula rubignosus Lea. Rivers of the eastern part of the state.

Quadrula tuberculata Raf. Big Sioux River, Lincoln County.

Quadrula coccinea Lea. Vermillion River, Clay County.

Quadrula costata Raf. Fire Steel Creek, Davidson County.

Cokeria southalli Marshall.[1] James River, Huron, Beadle County.

Lampsilis ventricosus canadensis Lea. Lake Byron, Beadle County.

Anodonda marginata Say. Lake Kampeska, Codington County.

Campeloma subsolidum Anth. Firesteel Creek, Davidson County.

Vitrea hammonis Stroem. Clear Lake, Marshall County.

Segmentina crassilabris Walker. Jim Creek, Roberts County.

Planorbis hirsutus Gld. Marshall County.

[1] No specimen. THE NAUTILUS, Vol. XXIX, 1916, p. 133.

Planorbis vermicularis Gld. Roberts County.
Amnicola walkeri Pils. Marshall County.
Ferrissia rivularis Say. Lake Byron, Beadle County.
Ferrissia parallela Hald. Marshall County.
Ferrissia tarda Say. Roberts County.
Succinea haydeni W. G. Binn. Marshall County.
Gastrocopta procera mcclungi H. & J. Moist draws of the western part of the state.

PECTEN (PATINOPECTEN) LOHRI, NEW NAME FOR PECTEN OWENI ARNOLD, A PLIOCENE SPECIES FROM CALIFORNIA [1]

BY LEO GEORGE HERTLEIN
California Academy of Sciences

PECTEN (PATINOPECTEN) LOHRI Hertlein, new name.

Pecten (*Patinopecten*) *oweni* Arnold, U. S. Geol. Surv. Prof. Paper No. 47, 1906, p. 63, pl. 8, figs. 1, 1a and 1b, "Foxin's Ranch, Santa Barbara County," California. Pliocene. Not *Pecten oweni* De Gregorio, Naturalista Siciliano, Anno Terzo, No. 5, 1883-1884 (1884), p. 133; new name for *Pecten pictus* Sowerby Thes. Conch. Vol. 1, 1847, p. 62, pl. 20, fig. 233. "Isle of Baicus." A recent species. Not *Pecten pictus* Goldfuss, Petrefactae Germaniae, Bd. 2, 1834-1840, p. 67, T. 97, figs. 4a, b, c. A European Oligocene species. (According to De Gregorio.)

Unfortunately Arnold's name for the well known Lower Pliocene species is preoccupied for a recent one of the Philippines. His remarks upon the relationship of the California species are apparently correct. He stated "This species is quite closely allied to *P. healeyi*, of which it is probably the precursor. It may be distinguished from the latter by its smaller size, greater convexity, fewer and stronger ribs, more prominent intercalary riblets on the right valve, and relatively much longer hinge line."

[1] Published by permission of the Director, California Academy of Sciences.

Pecten lohri is common at many places and has been reported from the Etchegoin, Purisima, Pico, lower Wildcat, and Merced (of Pillar Point), formations of California, all of which are lower Pliocene. It apparently does not occur in the Upper Miocene as originally suggested.

This species is named for Dr. Fred von Löhr, topographer who accompanied Mr. W. M. Gabb on an expedition into Lower California.

NOTE ON A "DOUBLE-MOUTHED" HOLOSPIRA COCKERELLI, DALL

BY GEO. C. SPENCE

Polystomatism, or the possession of more than one mouth, has been recorded in the case of various species of shells. At the moment I can instance Limnaea auricularia (L), Clausilia bidentata (Ström) and Brachypodella raveni Crosse and agnesiana C. B. Ad.

I can now record a similar occurrence in *Holospira cockerelli* Dall; one individual in a set of this rare species, kindly given me by Dr. Pilsbry, having this peculiarity. This shell which is almost full grown has been fractured by some means and partly repaired, but instead of completely filling up the gap and continuing to use the whole shell the animal has constructed another mouth with fully formed lip rather more than half a whorl above the original aperture.

This malformation is sometimes caused by an obstruction in the mouth but in this case fracture appears to have been at any rate the primary cause.

TWO NEW SPECIES OF SHELLS FROM URUGUAY

BY DOCTOR H. VON IHERING

BULIMULUS (SCUTALUS) FELIPPONEI, n. sp.

A conic-ovate shaped shell, rather solid, with narrow umbilicus, of a whitish color, covered with a thin and greenish, lustrous periostracum. There is a spiral border on the last whorl, whitish, and barely visible; the spire is conic and the point obtuse and smooth. The first whorls, called *nepionic* are adorned with fine lineal, vertical creases, the whorls, numbering 7-7½ are slightly convex and separated by a deep suture. The last whorl has irregular vertical grooves, the others are smooth; with fine spiral lines impressed, sometimes hardly visible, the aperture has an oblique position, almost vertical, oblong-shaped, angular on the front. The peristome is reflexed on the outer border. The columellar border is wide, dilated, and forms an angle with the columella and with the anterior border of the aperture. The height is 23.5 mm.; the major diameter is 13 mm.; the aperture is 11 mm. long; and an interior width of 6 mm.

This new and interesting species comes from Canelones (Republic of Uruguay) and I have the pleasure of dedicating it to Doctor Florentino Felippone, of Montevideo, whose activities and studies have been of great profit towards furthering the knowledge and connection of the molluscs of Uruguay, this being the reason why I dedicate to him this species.

This is the first species of *Scutalus* known from Uruguay. Another similar species, *Bulimulus peristomatus* exists in the Argentine. Doring 1879, upon which Pilsbry's description is compared, in his excellent "Manual of Conchology", series pulmonata, Vol. 11, page 29.

The above-mentioned species is, notwithstanding, bigger, and has the margins of the aperture convergent the

same as in our species, which, furthermore, has more whorls. If the shells are not found in good condition, the fine sculpture of the apex whorls will be lost, a detail which made me think that I had to deal with a species of *Bostryx* of the section *Lissoacme*, sub-generic division of Pilsbry's which was based on the sculpture of the apex; but it is probable that in this sense there may be transitions. In our species the apex starts smooth, and afterwards acquires fine vertical striae, sometimes difficult to see. In the *Bulimulus irregularis* Pfeiffer, the apex sculpture is similar to the *B. felipponei*, whilst in general, the *Scutalus* species have the sculpture irregular and deflected.

STROPHOCHEILUS FELIPPONEI, n. sp.

Shell thin, slightly globose, coated with a periostracum, of a dark yellow color. The spire is short, the embryo shell is composed of four whorls, the first being smooth, the others densely covered with numerous and fine longitudinal ribs. In the following whorls, these fine ribs persist, and they reunite in groups close to the suture, merging into a small whitish plate. The disposition of these plates at the side of the suture, causes an impression of a crinkling of the same, which, in general, happens with the species of the group *Strophocheilus*. The aperture is wide oval; the columela which is slightly convex, is thickened above in a doubling form, colored white, which forms an obtuse angle with the wall of the aperture, in which can be seen a terminal line of the callus. The position of the aperture is oblique. The external lip is sharp but not reflexed. There is no visible vestige of the umbilical fissure. Evidently it is a new shell, which has almost reached its definite dimensions, taking into account that the species of this group do not, as a rule, have many more than 1½ whorls in the post-embryonal shell. Length of shell 385 mm.; major diameter 275 mm.; length of aperture 254 mm.; width of same 17 mm. This species is bigger and more bellied than the *S. lutescens*, and is less bellied than the *S. globosus*, whose spire, moreover, is

shorter. Of the two species mentioned, this latter is distinguished by a complete absence of the umbilical fissure. This species I collected in the suburbs of Paysandú (Republic of Uruguay), where it is not common. My particular friend, H. von Ihering, notable macalogist, honored me by dedicating to me this species, as a mark of esteem and in attention to my activities in the study and investigations of the malacological fauna of Uruguary.

DR. FLORENTINO FELIPPONE.

ON THE DESIGNATION OF GENOTYPES

BY W. A. LINDHOLM

In NAUTILUS, XLI, p. 21. Dr. H. Burrington Baker proposes for designation of genotypes valid according to the International Code of Zoölogical Nomenclature the following terms: autotype, monotype, tautotype, apotype and lectotype. All these terms, with exception of tautotype, were proposed already in 1912 by N. Banks and A. N. Caudell [1] for designation of *type-specimens*, and are hitherto admitted in practical use for the supposed aim in systematic biology. It is therefore not convenient the *same* terms to use for definition of *genotypes*.

Some time ago the writer [2] proposed for designation of the various categories of genotypes, valid and invalid, mentioned in the International Rules of Zoölogical Nomenclature, a number of terms. An earlier attempt with the

[1] Nathan Banks and A. N. Caudell, The Entomological Code, a Code of Nomenclature for Use in Entomology, Washington, 1912.

[2] W. A. Lindholm, Vorschläge zur genaueren Bezeichnung der Genotypen (Zoologischer Anzeiger LXIII, 1925, p. 161-5); Eine weitere Kategorie von Genotypen (op. cit. LXIV, 1925, p. 245-7); Berichtigungen zu der Uebersetzung der § 30 der Internationalen Nomenclaturregeln (op. cit. LXXIII, Heft 578, 1927).

same purpose, made by Ch. Schuchert and S. S. Buckman,[3] was not based on and therefore not adaptable to the Rules.

For the four categories of genotypes, enumerated by Dr. H. B. Baker loc. cit. the corresponding terms of the writer are as follows:

1. Type by original designation—autogenotype.
2. Type by original fixation—monogenotype, tautogenotype.
3. Type fixation through substitution—apogenotype.
4. Type by first valid subsequent designation—idiogenotype.

The designations of the other (invalid) categories of genotypes mentioned in the Rules may be found in the cited papers of the writer.

It may here be pointed out, moreover, that the term "genotype", as largely used by the systematists in zoölogy and botany, was introduced in 1897 by Ch. Schuchert [4] and has therefore precedence and priority against the same term of quite other significance, which was proposed in genetics by W. Johannsen [5] in 1903.

[3] Ch. Schuchert and S. S. Buckman, The Nomenclature of Types in Natural History (Annals and Mag. of Nat. Hist., 7th series, vol. 16, No. 91, 1905, p. 102-104).

[4] Ch. Schuchert, What is a type in natural history? in "Science", April 23, 1897, pp. 636-40 and Ch. Schuchert in Bull. U. S. National Museum, No. 53, Part I, 1905, p. 15 (rectified definition). Here at first Schuchert on p. 12 proposed also the term Lectotype for designation of type specimens.

[5] W. Johannsen, Ueber Erblichkeit in Populationen und in reinen Linien. Jena 1903.

THE GROWTH OF THE MUSSEL MYTILUS CALIFORNIANUS

BY OSCAR W. RICHARDS

Hopkins Marine Station of Stanford University,
Pacific Grove, California

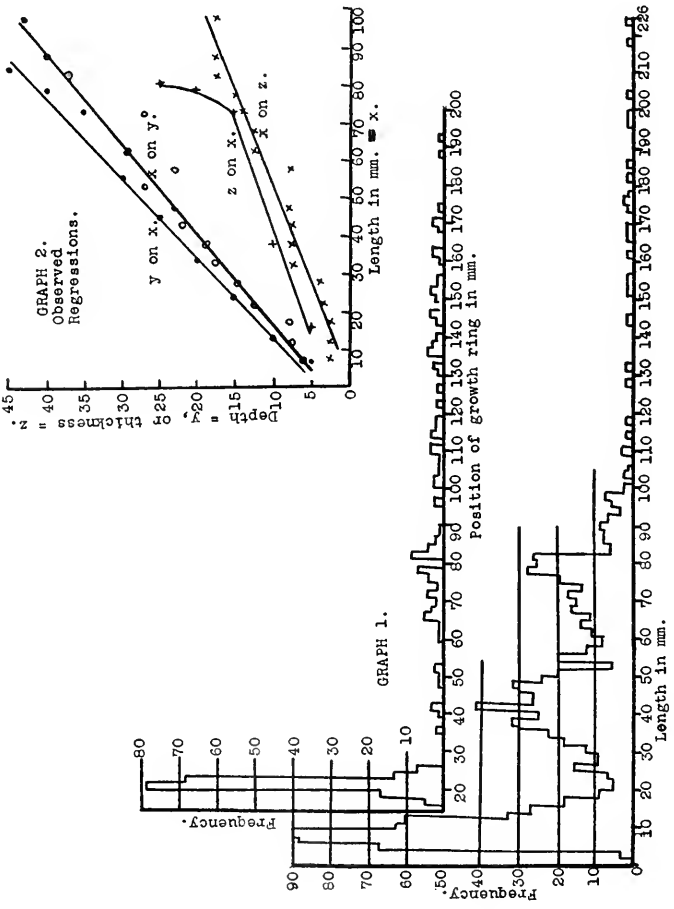
During the first part of July, 1926, over one thousand specimens of *Mytilus californianus* were gathered at random from the point immediately south of the Bird Rocks at the Hopkins Marine Station, Pacific Grove, California. The left valve of each of these animals was saved to be measured as a growth study. The mussels came from three places, each within one and one-half meters of the others and all of the animals at each spot were gathered. These sample spots were about thirty centimeters square. Consequently, these animals are representative of the mussel population on this point and give some indication of the sizes and ages of the animals to be found there. This mussel is not cosmopolitan like *Mytilus edulis* but is confined to the Pacific Coast. It occurs on rocks exposed to the surf and reaches a larger size than *M. edulis*.

The greatest length of the valve, the depth, or dorsoventral dimension, of the shell at its widest part and the thickness of the valve, greatest perpendicular distance to outside of shell at the same place the depth was measured, were all measured to the nearest millimeter on about two hundred of the animals so chosen to be representative of the whole lot. The length was measured on the rest of the animals. Later eighty larger shells were added, taken from the beach, to show the later growth rings. This made in all 1188 valves measured.

The frequency of animals of each length is shown on graph 1. The distance from the umbo to the growth rings was measured on all of the shells showing rings. The positions and frequencies of the rings are also shown on graph 1. As will be seen the population consists mainly of smaller individuals. This fact is of further interest as this point is accessible only at the lower tides and is not typical

of the point frequently raided by the summer tourist.

The growth rings of this species do not show clearly thru the periostracum. The badly worn beach shells show the growth rings somewhat better tho not distinctly. On the



smaller shells the first ring is easily seen but the two year shells begin to show wear near the umbo and older shells are worn so smooth in this region that all external traces of the earlier rings are gone.

The mode of the first growth ring, as is seen on graph 1, falls between the first two modes for total length. As these animals were collected during the summer the first length mode must be from growth from eggs liberated a year ago this spring. Furthermore, very few animals have the same length as the distance of the first growth ring. This information definitely locates the first growth ring.

It is not as easy to place the length of a two year old mussel and still less so for each succeeding ring. A graph not here reproduced shows the curve which seems to the writer to be the best guess as to the growth curve for this mussel from these data. This curve is not the clear cut growth curve like those found for other molluscs and shows that this species is less satisfactory for growth studies because of the great difficulty in locating the growth rings. It seems doubtful if more measurements will permit constructing the complete growth curve of this animal.

The shell seems to be definitely proportioned, for with a sample of 201 mussels the correlation of length with thickness is 0.94 and for length and depth is 0.98. The regressions are plotted on graph 2 as the observed average depth for each length, etc. These regressions are practically linear except for that of thickness on length which changes sharply for the larger animals. Possibly the rounding of the thickness measurements, whose magnitude is small, to the nearest millimeter may explain this irregularity.

Measurements of length, depth and thickness, and of growth rings of 1188 *Mytilus californianus* are presented with their interrelations and distribution as found in a typical mussel population. The mussel was found not to be satisfactory for a growth study owing to the difficulty of accurately locating the growth rings beyond those of the first year.

The writer desires to express his appreciation for courtesies extended to him by Dr. W. K. Fisher, Director of the Hopkins Marine Station and to acknowledge his indebtedness to Dr. F. W. Weymouth for aid and advice in interpreting this rather difficult material.

PUBLICATIONS RECEIVED

NEW SPECIES OF MOLLUSKS OF THE GENUS CORBICULA FROM URUGUAY AND BRAZIL. By William B. Marshall (Proc. U. S. Nat. Mus., Vol. 72, Art. 3, pp. 1-7, pl. 1, 1927). Six new species of the subgenus Cyanocyclas are described and figured.

THE AUSTRALIAN LAND SHELL THERSITES BIPARTITA AND ITS ALLIES. By William B. Marshall (Proc. U. S. Nat. Mus., Vol. 72, Art. 15, pp. 1-16, pls. 1-3, 1927). Two new species and 17 new subspecies are described and figured.

NEW MOLLUSCS FROM VANIKORO. By Tom Iredale. (Records Australian Mus., Vol. 14, No. 1, pp. 73-78, pl. 5, 1927.) One new genus PINGUITELLINA Type *Tellina robusta* Hanley is described.

HIBERNATION AND AESTIVATION IN GASTROPOD MOLLUSCS. By Sundra Lal Hora and H. Srinivasa Rao. (Records Indian Mus., Vol. 29, pt. 2, pp. 49-61, 1927.) An interesting paper on the habits of some of the little known oriental land shells, with figures of the epiphragms, etc.

MANUAL OF CONCHOLOGY 2 ser. part 109, Pulmonata, pp. 1-48, pls. 1-8, Nov., 1927. Strobilopsidae. By Henry A. Pilsbry. This is the first part of Vol. 28 containing part of the family Strobilopsidae. Three new species, two new subspecies, a new subgenus, DISCOSTROBILOPS, type *S. hubbardi* and a new section EOSTROBILOPS, type *S. hirasei*, are described. The illustrations are exceedingly fine, with sections of the shells showing the internal lamellae.

C. W. J.

SOME MOLLUSKS AND OTHER INVERTEBRATES FROM THE NORTHWEST. By Elberta L. Craig (Univ. of Colo. Studies, XVI, No. 1, June, 1927). Records from many localities in the Puget Sound region, Alaska, British Columbia and Yukon Territory, of marine, land and fresh water mollusks collected by Prof. Junius Henderson in 1925.

A CATALOGUE OF PELECYPODA AND BRACHIOPODA. By Hugh C. Fulton. 34 pp., Apr., 1927. The species are arranged according to the latest classification.

TWO FOSSIL SPECIES OF LEPTACHATINA FROM THE ISLAND OF KAUAI. By T. D. A. Cockerell. Journ. of Conch. 1922, p. 117. *L. deceptor* and *L. haenensis,* from the sandhills of Haena.

THE FERTILIZATION PROCESS IN THE SNAIL LYMNAEA STAGNALIS APPRESSA SAY. By Edward Drane Crabb. Biological Bulletin, August, 1927. Dr. Crabb's conclusions are as follows: "From the evidence brought out in this paper it appears that self-fertilization is the normal method of reproduction in L. s. appressa and that in this snail cross fertilization seldom or never occurs. The reasons for concluding that self-fertilization is the normal method of reproduction are as follows:

"1. Both ova and spermatozoa are developed in a single acinus at the same time, and since the ovum soon loses its investing membrane polyspermy usually occurs before it leaves the acinus.

"2. At no time are functional sperms absent from the hermaphrodite gland and duct in normal healthy adults, thus by the laws of chance making competition of foreign sperms unsuccessful.

"3. Free ova lacking a vitelline membrane are usually surrounded by ripe sperms, numbers of which enter each ovum as it passes through the acinus and hermaphrodite duct.

"4. There is no evidence of desquamation of the lining in any part of the reproductive system, as has been described in Helix, or of any other natural process which would cause temporary or permanent unisexuality in L. s. appressa.

"5. Individuals raised from isolated eggs and reared in strict isolation reproduce as abundantly as do those in mass cultures.

"6. There is no evidence of gynogenesis or any other form of parthenogenesis.

"7. Two polar bodies are extruded in eggs of virgins, the first normally loses connection with the vitellus and by the time of the first cleavage has migrated 50–200 micra into the albumen; the second polocyte remains attached to the vitellus, but its chromatin does not return to the egg nucleus.

"8. Ten chromosomes comprise the haploid number as is shown by the first and second maturation divisions and by the number of karyomeres in the mature egg.

"9. Typical male and female pronuclei are formed, and fuse in virgin eggs to form the first cleavage nucleus."—H. A. P.

A PLEISTOCENE FOSSIL LOCALITY ON BIG HOPE ISLAND, PUGET SOUND. By Junius Henderson (Univ. of Colo. Studies, XVI, No. 1, June, 1927). Contains marine mollusks. See p. 77.

NEW WEST AMERICAN MARINE MOLLUSKS. By Paul Bartsch. Proc. U. S. Nat. Mus., Vol. 70, 1927, Art. 11. Species of *Astyris, Opalia, Melanella, Aclis, Turbonilla,* etc. The most interesting form, perhaps, is *Melanella portlandica* from Portland, Oregon, the first of its genus and family reported from an inland locality, far beyond marine influence.

H. A. P.

A MONOGRAPH OF AUSTRALIAN LORICATES [Chitons].—By Tom Iredale and A. F. Basset Hull. 1927. 168 pp., 21 plates.[1] Originally published in parts in the Australian Zoologist, 1923-1927, this monograph has now been issued in a single handsome volume. 161 species and 32 subspecies now known in this fauna are illustrated on eighteen plates crowded with figures. These are among the best chiton illustrations published, and highly creditable to the three artists who produced them.

[1] Royal Zoological Society of New South Wales. Sydnev. Price 5 *s.* For notice of early parts of this work see NAUTILUS XXXIX, 35.

The coasts of extra-tropical Australia are perhaps the richest in the world for these mollusks. The wide range of families and genera represented have given the authors opportunity to make important contributions to the taxonomy of the group. Most of the large old genera are broken up. Thus, *Ischnochiton*, which formerly would have covered 40 Australian species, is now divided into some nine genera. Possibly not so many full genera were needed; yet I believe that anyone who will go over the list with some knowledge of the species cannot fail to see the advantage of several genera standing for definite groups of evidently common ancestry over the comprehensive *Ischnochiton* of former days, in which there was the greatest diversity of shape, sculpture and girdle covering. Likewise, the complex group of Acanthochitons seems easier to grasp as now divided.[2]

It is not possible to take space here to enumerate the new genera and species, the changes in former nomenclature, etc.; and moreover those interested in these details will obtain the work for themselves.

A Permo-Carboniferons species from Bundanoon, N. S. W., is described as *Permochiton australianus*. Its systematic position could not be determined. An analysis of the Tertiary Australian species leads to the conclusion that "the most specialized of our living loricates were fully developed as early as the Balcombian [Oligocene], and at that stage no primitive forms persisted".

An interesting feature of the work is the biographical appendix, containing sketches and portraits of those concerned in the collection and description of Australian loricates from the early voyages to the present time. The personal glimpses of Australian naturalists of the past generation are especially welcome to those of us who knew them only as names. It is no less a pleasure to meet again

[2] The name *Glyptelasma* Iredale and Hull, 1925, type *Acanthochites matthewsi* Pils., is preoccupied by *Glyptelasma* Pilsbry, U. S. Nat. Mus. Bull. 60, 1907, pp. 83, 87. I do not like to filch plums out of Iredale and Basset Hull's pie, but I am allowing myself the pleasure of renaming this beautiful Acanthochitid group BASSETHULLIA.

in these pages the chiton collectors of today, some of whom guided me a few years ago to their choicest collecting grounds.

Only collectors and students of chitons can appreciate the amount of strenuous collecting and patient study involved in the production of such a monograph as this. Australian naturalists have now a better guide for further work on this group than is available in any other country.—H. A. P.

THE MARINE SHELLS OF THE WEST COAST OF NORTH AMERICA.—By Ida Shepard Oldroyd, Stanford University Publications. Vol. I of this work was noticed in our issue of January, 1926. Vol. II, Parts 1, 2 and 3 have been issued during 1927, containing 940 pages, 108 plates, completing the work. As in the volume treating of bivalves, the original descriptions are reprinted or translated, and usually the original figures are reproduced. The classification and nomenclature is that of Dall's catalogue. The great value of this compilation of scattered material to students and collectors will be apparent; it was a huge task, testifying to the tireless industry of the author. It would, of course, have been still more useful if all of the species available had been figured. Thus, in the series of families from Caecidae to Litiopidae, out of 80 species only two are figured; none of the chitons are illustrated.

A useful feature is the location of type specimens. This information is often very hard to trace, and it is natural that some mistakes occur, as in the case of *Thais lamellosa* (*Gmelin*), said to be in the National Museum.

These volumes will doubtless become the constant companions of West Coast collectors. We congratulate the author on the completion of so useful a manual.

NOTES AND NEWS

SINISTRAL CAMPELOMA (correspondence).—Here's our latest "thrill"! I cleaned two Campelomas, the "left

handed" one contained one left and five right, and the right one left and four right. I mounted all in a glass top box so all could see. Early Saturday morning, Oct. 5, I went to the Lagoon in Jackson Park, Chicago, to find a left of my own. The Campelomas were in full sight and I examined a lot of them—but not a left. I brought home 12 and counted the babies, finding they varied in number from 17 to 65, a total of 349, among these were 13 lefts. In one shell containing 43 there were 5 lefts, and in four shells there were no lefts. This was getting interesting, so I went out again to do some real work, but not a Campeloma was to be seen, after hundreds of trials two were obtained. One of these contained 4 lefts out of 50 and the other 1 out of 61. What becomes of all these lefts? —E. E. HAND.

FINDING A LEFT-HANDED CAMPELOMA.—As a hobby I have been collecting shells. The lagoons in the parks of Chicago are full of many different species of fresh-water snails, and it is a pleasure and a novelty to prepare and mount my own specimens. Mr. Hand, our Science teacher at Hyde Park High school, told us of a very interesting thing, a left-handed Campeloma. The shell is usually right-handed, and a left-handed shell is found only once in a thousand shells. About a block east of the 63rd st. entrance to Jackson Park is a lagoon where the Campeloma abounds. Under a bridge leading over to an island where the shade lies most of the day, they are unusually plentiful. On Tuesday, Oct. 11th, I went there and reached down around the bottom of a post. I picked up a handful of shells. There were nine of them, all right-handed, so I threw them in again. The second time I brought up eleven with no success. But the third time I picked up seven and among them was the "left-hander" which I sought. You can imagine the thrill I got when I picked it up. I certainly was lucky, and now I have a unique specimen for my fresh-water collection of snails.—EMMETT MEYER.

VERMONT SHELLS.—While on an automobile trip through the New England states I found two small species in a small stream, the Clyde River, near East Charleston, Orleans Co., in northern Vermont, which may add a new locality for this state,

Anodontoides ferussacianus (Lea).

Alasmidonta undulata (Say). FRANK C. BAKER.

THE NAME *Petrarca* IN PUPILLIDAE (Man. Conch., XXVII, pp. 45, 122) is already in use in the Cirripedia as *Petrarca* Fowler, 1899. For the molluscan group I propose *Senilauria*, type *Lauria fasciolata* (Morelet).—PILSBRY.

TYPES OF *Vortex* AND *Volvulus* OKEN.—I do not find that any type has been selected for *Vortex* Oken, Lehrbuch der Naturgeschichte, I, 1815, p. 314, and would therefore name *V. carocolla* as type. This makes the group a synonym of *Caracolus* Montfort. *Vortex* Beck, 1837, was evidently an independent use of the same term, as he does not mention the earlier author, and introduces it as a new subgenus. *Volvulus* Oken, on p. 313, may take for type the first species, *V. bidens (Clausilia bidens.)* The selection of any other species would involve changing some current name.—H. A. PILSBRY.

FAUXULUS BURNUPIANUS, new species.—The shell resembles *F. capensis* in shape and coloration, but differs by the larger size of the lamellae and folds. The palatal folds resemble those of *F. pamphorodon*, the upper palatal fold being long, laminiform and descending obliquely inward, the lower palatal fold long, entering. A small interpalatal fold is present. Length 6, diam. above aperture 2.8 mm.; 9½ whorls.

Seal Rock, opposite Dyer Island, Cape Province, South Africa. This species, named in honor of H. C. Burnup, of Pietermaritzburg, will be figured on a supplemental plate of Pupillidae in the Manual of Conchology.—H. A. PILSBRY.

PARANERITA Annandale, 1920, was proposed for *Hydrobioides physcus* Annandale. Some African forms were included by Pilsbry and Bequaert. As that name is preoccupied by *Paranerita* Bourne, 1908 (Neritidae), *Parabithynia* may be substituted for Annandale's *Paranerita*—PILSBRY.

THE NAUTILUS.

Vol. XLI APRIL, 1928. No. 4

A REVIEW OF THE NEW ENGLAND LIMPETS[1]

BY CHARLES W. JOHNSON

In my list of New England Mollusca, 1915, I recorded with some misgivings three species of Acmaea. To one collecting extensively for a period of years the question as to the validity of two of these species becomes more and more apparent, notwithstanding the fact that authors have made some anatomical studies of the three forms. *Acmaea testudinalis* (Müll.), was based on European specimens. Dr. Bartsch (1922), on shell characters alone, considers ours a subspecies using the name *amoena*, a name bestowed upon the American form by Say in 1822. When we consider the great variation of the shells in size, form, color, and sculpture, in its range from New York to Labrador, this distinction seems uncalled for, as it is impossible to separate the shells of America from those of Europe. Say gives only the width of his largest specimen which measures 3/10 of an inch. This would indicate a length of about 12 to 14 mm. Jeffreys in 1865 records from Oban and Moray Firth, Scotland, specimens about 30 mm in length.

[1] Read before the Boston Malacological Club, February 7, 1928.

Dr. Pilsbry in 1891 says:—"More than any other shells these must be studied with constant reference not only to habitat geographically, but station as well. For an exact knowledge of the group we must therefore wait until observations on the species are made with special reference to their modes of life and surroundings."

A. testudinalis attains its greatest size in the region about Eastport, Maine. Dr. M. A. Willcox (1905), in her interesting paper on the "Biology of *Acmaea testudinalis*" says: "On the Massachusetts coast a limpet an inch long is a giant but at Eastport they not rarely reach a length of 32 mm. The first explanation of this fact which presents itself is of course that the cooler water presents the optimum temperature for these animals; this is not, however, the only possible explanation. The arctic current is not only cooler but more equable in temperature than more southern waters. At Eastport the maximum yearly variation in temperature of the water is about 12° C. (3.5°—54° F.); at Boston it is nearly 23° C. (29°—70° F.). Limpets living entirely below tide mark would therefore enjoy comparatively equable temperature conditions at Eastport. This would not, however, be true of those living between tide-marks for the annual variation in temperature of the air at Eastport is often as much as 4°—67° F. in a single month. Bathed twice a day by the water, exposed twice a day to the air, such individuals in spite of the comparatively cool places they affect, would be exposed to conditions probably at least as variable as those of the Massachusetts waters. If now we examine their size with reference to their habitat, we find that the limpets of Eastport are large only when living at or near low-water mark of spring tides so that they are rarely or never uncovered by the sea, and that higher up on the rocks the animals though no less abundant are of smaller size, no larger in fact than with us. We find that in Massachusetts there is no marked difference in size between limpets which are continuously submerged and those which live between tide-marks. The conclusion is therefore forced upon us that size in these animals is corre-

lated not necessarily with a low but with an equable temperature."

In this connection I might state that in a series of 30 specimens from Eastport in the collection of the Boston Society of Natural History there are three that measure 47, 43, and 41 mm. in length and 36, 33, and 30 mm. in width. Having thus ascertained the locality and the apparent conditions under which the species attains its greatest size, a study of the species northward from Eastport presents the following variations in size. In a series of 44 specimens from Digby, Nova Scotia, the largest measured 29 mm. In 33 from the west coast of Newfoundland, the largest is 26 mm., while from Labrador the largest is 19 mm. I do not know under what conditions the Digby specimens were taken but those further north are no doubt affected by the much colder conditions.

Going southward from Eastport, we find that in a series of 31 collected at Bar Harbor, Me., the largest measures 38 mm. In a series of 66 specimens from Bass Rocks, (East Gloucester), Castle Rock, Marblehead Neck, and Nahant, Mass., the largest measuring 29 mm. was taken in 20 fathoms off Nahant, while the largest from the rocks at low-tide measures 26 mm. In a series of 80 from Castle Island, Boston Harbor, collected by W. J. Clench and P. S. Remington Jr., in 1915, the largest measures only 18 mm. In a collection of 74 specimens from South Cohasset, Mass., made by Dr. H. Bryant about 1867, the largest measures 27 mm. The shells from the latter place are exceedingly variable averaging about 20 mm. in length, many having the same form and convexity as those from Long Island Sound.

South of Cohasset the gravelly and sandy shores of the Cape Cod section present unfavorable conditions for limpets. From Woods Hole westward along the shores of Long Island Sound where rocky conditions predominate, is found a small form which was named by Wheat in 1913 *Acmaea fergusoni*. He says: "Compared with *A. testudinalis* the shell is smaller, more convex, less elongate and less

variable in form." His two largest specimens have a length of 20 and 19 mm. and each a width of 16 mm. "the average convexity is approximately one-third greater than for *testudinalis*." The radula as figured by Wheat shows considerable variation even in the different rows of the teeth in the same individual. A proper comparison would be with those of a corresponding size, say from Cohasset rather than with those from Maine. Six specimens from Hemstead Bay, N. Y., are mottled with brown like the typical *testudinalis*, the largest being 19 mm. in length and 10 mm. in width. The most interesting series of this form consists of 27 specimens collected in 1920 by Miss E. C. Comstock, at Westbrook, Conn. The largest is 20 mm long and 11 mm. wide. Many have a pink or bluish tinge, with the brown markings obselete or wanting.

With the inequality of temperature of both air and water more marked than even on the Massachusetts coast north of Cape Cod, with weaker tides, currents and waves in the more land locked waters and the water probably less saline, one would naturally expect a marked change in a species living under what are apparently more unfavorable conditions.

Now as to the standing of *Acmaea alveus* Conrad (1831). In collecting on the rocks of the New England coast for the past 25 years I have failed to find a specimen of *alveus* associated with *testudinalis*, although other collectors have recorded it from rocks. Gould in 1841 says: "Found abundantly on eel-grass (*Zostera marina*) to whose narrow leaves its form is exactly adapted." Further on Gould says: "This shell is the very miniature of *Patella compressa*. Mr. Sowerby suggests that it bears the same relation to *A. testudinalis* as *P. compressa* does to *miniata;* in other words it is the same species changed in form from having adhered to a narrow sea-weed instead of a stone." Couthouy in 1839 says: "I have never found *alveus* except upon marine plants." Verrill in 1873 says: "A peculiar narrow form of this shell (var. *alveus*) lives on the leaves of eel-grass." Pilsbry in 1891 says: "Numerous trans-

itions occur between this and the typical *testudinalis*. The narrow form is caused by residence of individuals on seaweed or *Zostera* fronds." Whiteaves in 1907 says: "Specimens of the var. *alveus* (a narrow variety, formed as Dall says, by the 'residence of the individual on a narrow frond of seaweed or *Zostera*') have been found by the writer at low-water in Shediac Bay." [New Brunswick].

On the other hand Stimpson in 1851 under *alveus* says: "Whole coast. At Bird Island, in Boston Harbor, this species occurs abundantly upon stones and shells, still retaining its character; which is sufficient to show that it is not a variety of the last." [*testudinalis*]. Mr. Dwight Blaney (1904,) who found *alveus* at Frenchmans Bay, Me., says: "A few found under beach stones; reported common on eel grass." In 1907 Henry Jackson, Jr. recorded *alveus* at North Haven, Me., as "most commonly found on eel grass which grows in great profusion." He also states that "this narrow compressed form of *alveus* it would seem might have been caused by its being on eel grass which has narrow leaves and might cause a shell to be narrow by lack of space." He made a study of the radulae of the two forms, based on 15 *testudinalis* and 30 *alveus*. Figure 1, plate 2, represents a portion of the radula, the part not mentioned. No variation was observed in the 15 specimens but among the 30 specimens of *alveus* there was considerable variation. We wonder whether the radula of a young *testudinalis* corresponding in size to that of *alveus* would differ as much? We think not, for while the variation of the radula in *alveus* indicates probably immaturity, the number of abnormal radulae in the 30 specimens shows that we are probably dealing with a variety due to habitat and not a valid species.

In 1910 Prof. Edward S. Morse published an interesting paper on "An early stage of *Acmaea*", in which he states that: "I have not yet succeeded in finding the young of *A. alveus* before losing its embryo shell. The cicatrix on the apex of the smaller specimens of *A. alveus* resembles so closely a similar cicatrix on the young of *A. testudinalis* that I am convinced the embryo shell must be identical in the two

species." Further on he says: "In this paper I have dealt with *A. testudinalis* and *A. alveus* as distinct species. At the outset I began the work solely for the purpose of determining the specific value of *A. alveus* and the propriety of its separation from *A. testudinalis*. By the earlier student, the two species were regarded as distinct, but later Tryon, Verrill, Dall and others had come to regard *A. alveus* as only a variety of *A. testudinalis*." * * "So far as I have observed, *testudinalis* occurs in pools at low tide exposed to dashing waves. I have never seen a specimen of this species on eel grass: *alveus* on the contrary lives on eel grass in quiet water and in certain places hundreds may be collected in a short time. It was naturally believed by some observers that the long narrow form of *alveus* had become so by adaptation to its narrow resting place; if so, it is a good example of a species in the process of establishing itself. Whatever may be the case the specific characters are now so firmly fixed that I have never seen a specimen, young or old that the difference between them could not be told at a glance."

"In studying *alveus* alive it is found to move freely on the eel grass, swinging its head from side to side, its tentacles projecting far beyond the lateral edge of the shell: *testudinalis*, on the contrary remains fixed for hours and only in the extreme young have I seen considerable freedom of motion Mr. Dwight Blaney has found *alveus* on the under side of stones on a coarse pebbly beach at Ironbound Island, Maine, and I have observed it in similar situations in Salem Harbor, Mass. In both these instances, however, the creature might have become detached from its usual resting place on eel grass by storms and washed by waves to these unaccustomed places."

To briefly recapitulate, nearly all concede that the true home of *alveus* is on eel grass, and that its occurrence on pebbles and stones (not rock) probably represents an infrequent shift of habitat. Eel grass is a perennial, the creeping stems living throughout the winter, the young leaves appearing in June and disappearing with the autumnal

storms. What becomes of the millions upon millions of *alveus?* Swept ashore on the eel grass they are destroyed and there is not enough of them left to reproduce the millions that will appear on the next season's growth of eel grass. Then where does *alveus* come from? When *testudinalis* spawns in the summer the slimy rocks present comparatively few suitable places for the embryos to attach themselves. On the other hand the young, clean leaves of the eel grass offer an ideal surface for attachment, thus we find that in the vicinity of rocks, the leaves are usually covered with young shells, and when no rocks are near the shells are usually wanting. The young are therefore evidently all *testudinalis,* assuming the form of *alveus* when they attain a size that is affected by the narrow leaves of the eel grass. There is also little doubt, that, when *alveus* reaches maturity its young would be *testudinalis,* these depending upon eel grass to assume the form of the parent.

Dr. Willcox in her paper above referred to says: "The breeding season appears to be a long one. I have taken ripe limpets near Boston as early as the thirteenth of April and as late as the end of July. In Eastport they were still laying during the first week in September. In each place the generative season probably ends a little before the water reaches its maximum heat, which occurs at Eastport in September, at Boston in August. Thus all of a lot of specimens from Nahant in the middle of August had the generative gland empty and the same was true of a considerable part of those gathered at Eastport during the first few days of September. Sexual maturity is probably acquired after the first winter, as I have taken ripe limpets in April which were under a cm. in length."

Conrad's figure which is natural size measures 13 mm. The largest specimen of *alveus* in a series of 14 from Isleboro, Me., is 14 mm. and in a series of 18 from Revere, Mass., the largest is 15 mm., the average size being about 12 mm. There is in the Society's collection a specimen marked "Mass." collected by Couthouy that measures 21

mm. This may be one that had moved from the eel grass to a rock and represents a second year's growth. This brings up a question. Are the specimens that grow on eel grass capable of standing a life on rocks? The muscles of the foot of those growing on the flexible eel grass could not possibly be as strong as those growing on a firm rock while the thinner, narrower, and more elevated shell would also make them more susceptible to their enemies. Thus the inability of *alveus* to adapt itself to a different station than eel grass probably accounts for the absence or scarcity of large specimens of *alveus*. It seems strange that no one has apparently taken a specimen 21 mm. in length since the days of Captain Couthouy. Professor Morse refers to the living *alveus* as moving freely and swinging its head from side to side. Why is it so restless? Is it an acquired motion, due to the undulations of the eel grass in the waves and tides, or is it possible that *alveus* realizes it has made the mistake of its young life in attaching its shells to eel grass instead of a rock?

This paper is written to show that there is still a great deal of work to be done on the biology of this interesting limpet, and also to emphasize the importance of recording the exact conditions under which the shells were collected. Not only the exact locality but the very rocks on which they were taken should be considered, also whether the shells were found above or below low water mark. If dredged the depth should always be recorded. When collected on eel grass the location of the grass in relation to rocks should be noted, and above all the time of the year the specimens were taken. Note the time of the first appearance of shells on eel grass. Some clean rocks should be placed in the grass and the growth of the young shells on the rocks, compared carefully with those on the eel grass.

Oil and harbor pollution is sadly affecting many of the old collecting grounds. It is very doubtful if Clench and Remington could duplicate their collection made at Castle Island in 1915. Miss Comstock in 1920 complained of the

limpets being destroyed by the oil that settled on the rocks at low tide at Westbrook, Conn. Conditions are not improving and the necessity for careful records as to the present status of our fauna becomes more and more urgent.

Bibliography

1822. T. Say. Journ. Acad. Nat. Sci. Phila., vol. II, p. 223.
1831. T. A. Conrad. Journ. Acad. Nat. Sci. Phila., vol. VI, p. 367, pl. XI, f. 20.
1839. J. P. Couthouy. Boston Journ. Nat. Hist., vol. 2, p. 177.
1841. A. A. Gould, Invertebrata of Mass., p. 154.
1851. W. Stimpson. Testaceous Mollusks of N. England, p. 30.
1865. J. W. Jeffreys, Brit. Conch., vol. III, p. 246.
1870. A. A. Gould and W. G. Binney. Invert. Mass., p. 269.
1873. A. E. Verrill. Invert. Animals, Vineyard Sound, p. 307.
1891. H. A. Pilsbry. Manual Conch., vol. 13, 1 ser., pp. 8 and 11.
1901. J. F. Whiteaves. Cat'l Marine Invert. E. Canada, p. 156.
1904. D. Blaney. Proc. Boston Soc. Nat. Hist., vol. 32, p. 37.
1905. M. A. Willcox. Amer. Nat., vol. 39, pp. 326 and 331.
1907. H. Jackson, Jr. The Nautilus, vol. 21, p. 1-2, pl. 2.
1910. E. S. Morse. Proc. Boston Soc. Nat. Hist., vol. 39, pp. 316 and 321.
1913. S. C. Wheat. Mus. Brooklyn Inst. Arts & Sci., Science Bull., vol. 2, p. 17-20, pl. 1.
1915. C. W. Johnson. Boston Soc. Nat. Hist., Occas. Papers, no. 13, p. 85.
1922. Paul Bartsch. The Nautilus, vol. 35, p. 86.

MOLLUSCA IN THEIR RELATION TO THE GEOLOGICAL HISTORY OF SOAP LAKE, WASHINGTON

BY JUNIUS HENDERSON

It is a matter of general knowledge among scientists that the waters of a completely land-locked lake tend to become saline, for the same reason that the ocean is saline. Streams and springs flowing into a lake carry in solution salts of various kinds and quantities, leached from the soil and rocks through or over which they flow. So long as the amount of water received by the lake exceeds the loss by evaporation, the lake will maintain an outlet at the lowest point in its shore line, the surplus water overflowing and carrying away some of the salts, thus preventing their excessive accumulation. If, because of a change in climatic conditions, the annual evaporation comes to exceed annual accession of water, then the water level drops so that there is no longer any overflow. Consequently all the salts brought in by streams and springs are retained and the water slowly becomes saline. This process sometimes continues until the result is a saturated solution, whereupon precipitation of some of the salts begin to form a deposit on the bottom of the lake. Well-known examples of this phenomenon are the Dead Sea and Great Salt Lake, but there are many others, mostly smaller.

It has long been known that there are many saline lakes of various sizes in the semi-arid Great Basin, between the Rocky Mountains and the coastal ranges in the western United States, and that they have been subjected to great fluctuations in the past and to smaller fluctuations in recent years. Some of them, as for example, Great Salt Lake, in Utah, have at times reached depths permitting overflow, the waters becoming fresh and remaining so long enough for fresh-water fauna to become established, then they

have shrunken until they became merely highly-saline remnants of their former extent, all the mollusks being destroyed by the excessive salts, leaving their shells as fossils high above the new water-mark, to tell the story of their former existence and abundance. Thus such shells are often found in the high lake terraces along the borders of Salt Lake Basin. This is also true of many other lakes in Utah, Nevada, eastern California, eastern Oregon and eastern Washington, though but few such lakes have been investigated.

In the summer of 1927, accompanied by Herman Nanney, on an expedition for the University of Colorado, I visited Soap Lake, in Grand Coulee, eastern Washington. There is another lake by the same name in the Okanagan Valley, in the same state. The water of the one we visited is extremely saline. On its shore is a plant established for the purpose of recovering some of the salts for commercial purposes. A few miles north of Soap Lake, in the same valley, is Alkali Lake, also highly saline. No perennial stream occupies the valley in the vicinity of these lakes. No mollusks were found living in either lake and no water was found in the vicinity in which they could live, though a few miles down the valley (north) fresh-water lakes are reported, from one of which (Blue Lake) Dr. Henry A. Pilsbry, in 1903, reported eight species of fresh-water shells.[1]

In passing over the valley floor between Soap and Alkali Lakes we found it thickly strewn in places with fresh-water shells, of the following species: *Valvata humeralis californicus* Pilsbry, *Valvata utahensis* Call, *Pompholyx effusa* Lea, *Planorbis vermicularis* Gould, *Lymnaea* near *traskii* Tryon, and *Pisidium compressum* Prime. These species are all still found living somewhere in the west, showing that the deposit is not older that Quaternary.

Call reported the following as Quaternary fossils at Button's Ranch, Christmas Lakes, Southern Oregon: *Pisidium ultramontanum* Prime, *Lymnaea bulimoides* Lea, *Carinifex*

[1] THE NAUTILUS, XVII, 84, 1903.

newberryi (Lea), *Planorbis trivolvis* Say and *Planorbis vermicularis* Gould.[2] To these Hannibal added *Lymnaea cubensis* Pfeiffer and *Planorbis dilatatus* Gould, both probably wrong, and *Pompholyx effusa* Lea.[3] Hannibal also reported, in the same paper, the following from the Summer Lake Beds, Quaternary, of Oregon: *Pisidium abditum* Haldeman, *Pisidium pulchella* Jenyns, *Planorbis dilatatus* Gould, *Valvata tricarinata* (Say), *Lanx klamathensis* Hannibal, *Pompholyx effusa* Lea, and *Paludestrina protea* Gould. The first four are almost certainly erroneous. His synonymies are not such as to give one the least bit of confidence in his identifications. The other three are not unlikely. Doubtless a general molluscan survey of the lakes and the adjacent lacustrine deposits of eastern Oregon and Eastern Washington would be of great interest.

VENUS MERCENARIA VAR. NOTATA SAY

WILLIAM J. CLENCH

There seems to be considerable confusion between this well-known form of Say's and certain colored forms of *Venus campechiensis* Gmel.

Venus mercenaria notata Say appears usually as a single specimen in a colony populated by *V. mercenaria*. This fact of its thus occurring with the common species precludes any idea of its being either an ecological form or a geographical race. From the evidence at hand, it seems to be a recessive form appearing only as an individual here and there when the dominant factors are eliminated by chance breeding.

[2] Call, Bulletin U. S. Geological Survey, No. 11, 1884.
[3] Hannibal, Proc. Malac. Soc. London, X, 1912.

Its differential characters are in a linkage chain, as its smaller size, zig-zag markings, light yellowish-white interior and more shining exterior (not chalky as in *V. mercenaria*) are invariably associated. DeKay[1] cites the outer bars, in deep water, along the Long Island beaches as its usual habitat, but it is found in protected areas as well.

The color form of *Venus campechiensis*, though superficially resembling *V. mercenaria notata*, can be readily separated when the two are compared.

The following comparisons serve to separate these puzzling forms:

Venus mercenaria Linn.	*Venus campechiensis* Gmel.
Obliquely ovate.	Rounded.
Chalky in appearance. Interior usually, though not always, tipped with bluish-purple, the color sometimes extending along the entire margin between the pallial line and the edge.	Dull, but not chalky. Interior white, never colored bluish-purple.
Disk s m o o t h, concentric lines entirely obliterated over this area.	Concentric ridges extending unmodified across the disk.
Lunule pointed below.	Lunule rounded below.
Escutcheon white.	Escutcheon usually colored brownish or dull purplish, though sometimes white.
V. mercenaria Linn.	*V. mercenaria* var. *notata* Say
Interior color as above.	I n t e r i o r color yellowish white.
Exterior texture appearance as above.	Exterior not chalky but smooth and generally shining.
Exterior not colored.	Exterior with zig-zag markings usually in definite bands along the lower portion of the disk.

The colored forms of *V. campechiensis* differ from the normal only in the presence of colored zig-zag lines. These

[1] DeKay, J. E., Moll, of New York, 1843, p. 218.

lines are most abundant in the umbonal region, though occasional specimens exhibit them over the entire surface of the disk. The angles formed by the junction of these lines are much broader than the angles so formed in *V. mercenaria notata.*

Excellent figures of *V. mercenaria* var. *notata* are given by DeKay (loc. cit.) pl. 27, fig. 278, and Gould, Invert. Mass. 1870, p. 135, fig. 52.

PLANOGYRA ASTERISCUS (MORSE)

BY H. BURRINGTON BAKER

Last summer, I obtained a large series of this peculiar little species near the University of Michigan Biological Station at Douglas Lake, Cheboygan County, Michigan. In this region, *P. asteriscus* is quite common under dead leaves in the strand-line between the water-soaked, *Sphagnum* mats of the arborvitae-spuce bogs and the fringe of low, deciduous trees around their borders. Although it occurs rarely outside of this zone, a very few feet in either direction makes a very remarkable difference in its frequency. Near the shore of Big Stone Bay, Straits of Mackinac (Emmet County), it is also quite common in the damp swales between the low, fixed sanddunes. *P. asteriscus* and *Carychium exile canadense* seem to prefer the deeper layers of the fallen leaves and are seldom found crawling on the surface or in the vicinity of logs. The high, epidermal riblets that characterize the shell of *P. asteriscus* are quite rectilinear in moist (living) specimens, but become wavy when dried.

The anatomy of *P. asteriscus,* which I hope to figure and describe more fully in a later paper, is very similar to that

of *Vallonia*, as described by Steenberg (1918, Vidensk. Medd. Naturh. Förening i Kjöbenhavn 69, fig. 5) or Watson (1920, Proc. Mal. Soc. London 14, figs. 3*b*, 4*d*, 5*c*, pl. 1, fig. 1, and pl. 2, fig. 5). The pallial complex is of the orthurethrous type, although the orthureter is paralleled by a groove which runs posteriad to beyond the apex of the kidney. The prostate is of the short form with digitate lobes. The penis is present in all of the adults examined, while it is usually absent in *Vallonia*. The penial flagellum is externally rather similar to that of *Vallonia*, and consists of three regions: 1) an apical, long-stalked, thin-walled sac, which may be greatly distended by a mass of mucous material; 2) a cylindrical, thick-walled, middle region, with numerous trabeculae internally; and 3) a thin-walled, long-ovoid, basal sac, which contains a large, perforate, verge-like structure. The region of the penis beyond the entrance of its appendix is much shorter than in *Vallonia*, and the penial retractor inserts only at the terminal loop of the epiphallus. The jaw and radula are quite like Morse's account (1864, Jour. Portland Soc. Nat. Hist., p. 24, figs. 52, 53), but the comb-shaped marginal teeth may actually develop as many as 9 cusplets.

Despite the great divergence in conchological characters, I am convinced that *Planogyra* should be placed in the typical subfamily of the Valloniidae. The shell sculpture and texture of *P. asteriscus* are somewhat similar to those in *Acanthinula* and *Zoögenetes*, while the shell form is more like that of *Pyramidula;* probably all of these genera are rather closely related to each other. The Valloniidae should precede the Pupillidae in the Orthurethra.

In a former paper (1927, Proc. Acad. Nat. Sci. Philadelphia 79, p. 233), I tentatively included the Mexican group, *Chanomphalus*, as a subgenus of *Planogyra*. As its type species, *C. pilsbryi*, belongs to the Endodontidae, *Chanomphalus* will have to be regarded as a separate genus. Its distinctive characters will scarcely permit its introduction into either *Radiodiscus* or *Helicodiscus*, which appear to be its nearest relatives.

THIELE'S BRAZILIAN LAND SNAILS

BY H. BURRINGTON BAKER

The principal purpose of this paper is to review the exceedingly valuable data, on the classification of South American pulmonates, which have been contributed by Dr. J. Thiele in his recent paper "Ueber einige brasilianische Landschnecken" (1927, Abh. Senckenberg. Naturf. Ges. 40, pp. 307-399, pl. 26). Incidentally, I wish to include a few additional notes on the nomenclature of the groups discussed in earlier papers of my own: (1925, Naut. 38, pp. 86-89) and (1925a, Oc. P. Mus. Zool. Univ. Mich., no. 156; and 1926, no. 167).

HAPLOTREMATIDAE

Although the radula (cf. Thiele, text fig. 7) in this family also appears to indicate a close relationship with the Zonitidae (rather than with the Achatinidae), the absence of pedal grooves separates it decidedly from the Systrophiidae (see below).

Haplotrema, subg. *Geomene* Pils. (Apr. 22, 1927, Proc. Cal. Acad. Sci. 16, p. 169), author's type *Helix concava* Say. Pilsbry's name is probably prior to Thiele's *Proselenites* (pp. 312, 313; December, 1927?), with the same genotype (now chosen).

SYSTROPHIIDAE

Now that Dr. Thiele has proven the position of *Systrophia*, this family name is much preferable to my term, Scolodontidae, which was founded on an admittedly dubious group.

Systrophia Pfr., s. s. Dr. Thiele (text-fig. 6) shows conclusively that the radula of *S. systropha*, with the formula

25-1-1-1-25 is very similar to that found in the next group. Incidentally, his text-fig. 5 of the dentition of *Polygratia polygrata* (Born) certainly does present a Helicid facies.

Systrophia, sect. *Systrophiella* H. B. B. (1925a). Although I named this group on account of its close resemblance to *Systrophia,* I did not dare approach the two until the supposed relationship between *Systrophia* and *Polygyratia* had been proven false. The thinner and more transparent shells of *Systrophiella* seem reason enough for its retention as a section, at least until more is known of the anatomy of *Systrophia* s. s. Some of the species of this section, for example *Syst. starkei* (H. B. B.), approach rather closely *Happia* s.s. (see below), but differ in their impressed sutures.

Systrophia, subg. *Entodina* Ancey. Thiele says that the radula of *S. reyrei,* with the formula 15-1-1-1-15 is quite similar to that of *Systrophia* s.s., but gives no figure. *S. (Entodina) exigua* Thiele (p. 320) is a species of unknown habitat.

Systrophia, subg. *Punctodiscops* H. B. B. (1925a). This is a very distinct group.

Microhappia Thiele. This generic name, proposed for *M. brasiliensis* Thiele, may also include *Zonites implicans* Guppy, from Trinidad and Venezuela (Cf. 1925a, p. 29).

Happia, s.s. From Thiele's text-fig. 2, the radula of *H. vitrina* is more like that of *Systrophia* than like that of *Happiella.* However, it seems best to retain Thiele's line of division between the two genera until more is known of their anatomy. *H. microdiscus* "Bttg." Thiele is another species without locality.

Happia, sect. *Payenia* Mabille et Rochebrune (1889, Miss Sci. Cap Horn, vol. 6, pt. H, p. 25), monotype *Helix saxatilis* Gld. (1846, Proc. Boston Soc. Nat. Hist. 2, p. 171; 1856, U. S. Wilkes Exp., Moll. Atlas, pl. 3, fig. 33), from Tierra del Fuego. The external appearance of both the animal and shell of *Payenia* (which I missed in my 1925a review), must be similar to that of *Happia* s.s. Until something is known of its internal anatomy (as well as its

exact date of publication), it had best be included in *Happia* Bgt. (March, 1889).

Happia, sect. *Prohappia* Thiele (1927, p. 313), monotype *Helix besckei* Dkr. (1847, Zeit. Mal. 4, p. 81), from Brazil. This group seems to combine a shell and animal similar to that of *Happia* s.s., with a radula (Theile, p. 309) like that of the next group.

Happia, sect. *Happiella* H. B. B. In this group, Thiele gives brief descriptions and figures of his *H. grata* from Brazil and *H. glaberrima* from Venezuela. Unfortunately, he neglects to compare them with any of the previously described species, and certainly presents no chyaracters that will keep *H. glaberrima* out of the synonymy of *H. guildingi* (Bland).

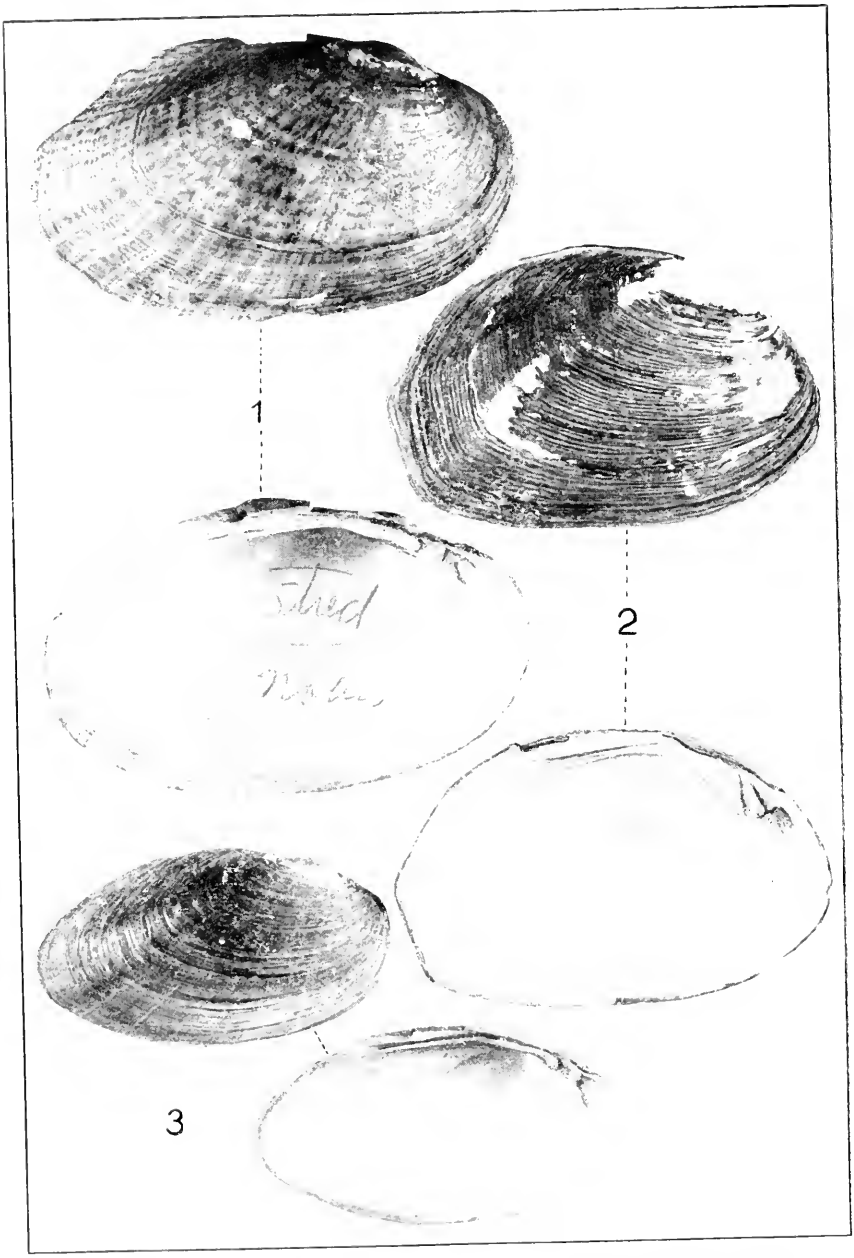
Guestieria Crosse (1872). Thiele uses this very distinct genus as a subdivision of *Happia,* which it antedates by 17 years.

Tamayoa H. B. B. (1925a), with section *Tamayops,* new: type *Happia banghaasi* Thiele (1927, p. 319), from Espirito Santo, Brazil (type locality). The radula (Thiele, text-fig. 4) and general form of *T. banghaasi* are much as in *Tamayoa* s.s. (1925a, p. 34), but the absence of the spiral keel, which constricts the umbilicus of *T. trinitaria* (Smith), would seem to require more than specific recognition. As I have already pointed out (l. c.), the fimbriate laterals of *Tamayoa* immediately separate this genus from any other in the Systrophiidae; *Guestieria* also has multicuspid inner teeth, but they are apparently quite different in form.

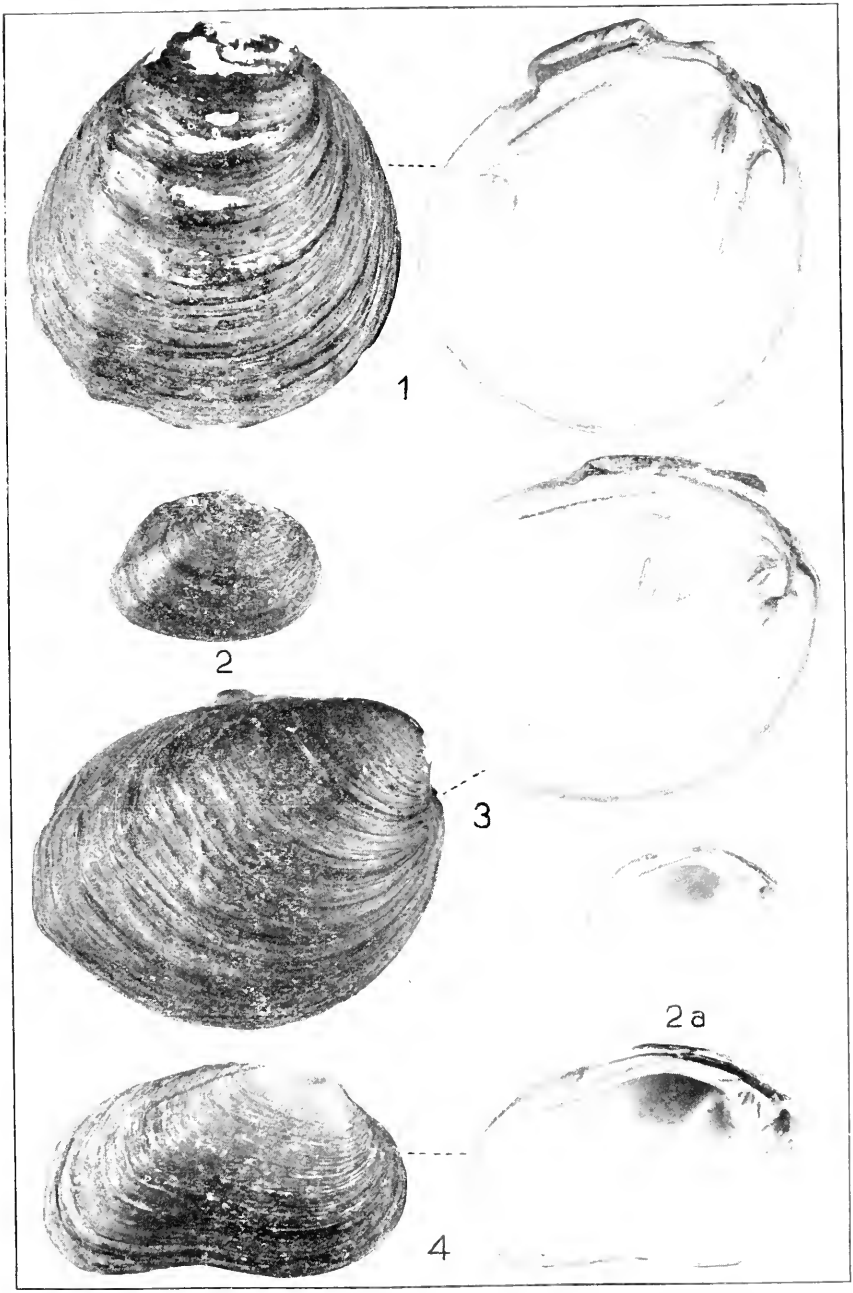
?*Martinella* Jouss. Thiele describes a new species, *M. prisca* (p. 318) from Brazil; the systematic position of the genus still remains dubious.

STREPTAXIDAE

Streptaxis Gray, s.s. Thiele adds two new species: *S. totostriatus* and *S. jheringi* (both on p. 317); the latter is from Brazil.



1. LAMPSILIS STRECKERI Frierson. 2 ELLIPTIO SAJENSIS Frierson.
3 LAMPSILIS WRIGHTIANA Frierson.



1 PLEUROBEMA ALDRICHI Frierson.
2 P. FICTUM Frierson.
3. P. MARSHALLI Frierson.
4. ELLIPTIO HARICOTTI Frierson.

Streptaxis, sect. *Streptartemon* Kobelt. In my 1925a (pp. 16, 39-41) discussion, I placed this sectional name in the synonymy of *Odontartemon* Pfr., on the basis of Ancey's (1884) choice of type for the latter. As shown below, Kobelt's prior type designation saves *Streptartemon* for the South American group of *Helix streptodon* Moricand.

Odontartemon Pfr. (1855, Mal. Bl. 2, p. 172), type chosen by Kobelt (1880—, Ill. Conchylienbuch, p. 209), *S. distortus=Helix distorta* Ph. (1842, Abb. 1-3, p. 48), from Guinea. Apparently, this name must replace *Gonaxis* Taylor (1877) for a genus of African Streptaxidae (Cf. Pilsbry; 1919, Bull. Amer. Mus. Nat. Hist. 40, p. 176).

Odontartemon, subg. *Eustreptaxis* Pfr. (1878, Nomen. Hel. Viv., p. 15) type chosen by Kobelt (l. c.), *Streptaxis nobilis* Gray (1837, Loudon's Mag. Nat. Hist., p. 484), from Sierra Leone (West Africa). In my 1925a review (p. 15), I carelessly treated this group as an absolute synonymy of *Streptaxis.* Attention is called to the appearance of the Pfr.-Clessin "Nomenclator" in parts, between 1878 and 1881. Apparently, title-pages were printed with both the first and last issues, as the copy that Tryon and Pilsbry have used bears the former, while most specimens bear the latter date.

Rectartemon H. B. B. I hope that *Artemon* will be made a nomen conservendum, but still believe that, according to the rules, it is an absolute synonym of *Streptaxis* (Cf. 1925a, pp. 14, 16). Thiele (p. 316) proposes two new specific names (in *Artemon*) : *R. mülleri* from Brazil and *R. martensianus,* type locality Caracas, Venezuela. When one considers the variation between two specimens of *R. jessei* H. B. B. (1925a, pl. 11, figs, A, B) from the same hillside, one doubts the necessity for the separation of Martens' specimen (1873, Binnenmoll. Ven., p. 166, pl. 2, fig. 2) of *R. conoideus* (Pfr.) as a "new species".

?*Scolodonta* Döring. Thiele (p. 308, text-fig. 1) proves conclusively that the radula of "*Scolodonta interrupta* Suter" is Streptaxid, but the systematic position of *S. semperi,* the genotype, is still open to doubt.

Endodontidae

Dr. Thiele, with the description of *Helicodiscus theresa* from Brazil, greatly extends the previously known range of this genus. However, his figures look so much like the form of *H. parallelus* (Say) from Texas and New Mexico (Cf. Pils.; 1906, Proc. Acad. Nat. Sci. Philadelphia 58, p. 156) that one wonders if this is not a case of artificial dissemination.

He also proposes 9 new species of *"Endodonta"* from Brazil: *gordurasensis, jheringi, janeirensis, deliciosa, superba, göldii, clara, discoidea* and *amoena.* Of course, he must realize that none of these belong in *Endodonta,* but apparently is satisfied to use that name as most conchologists used *Helix* in the first half of the last century. However, it is to be hoped that his present descriptions are only preliminary, and that he plans to study this very interesting series of species under a compound microscope, which will enable him to describe fully and figure the details of their sculpture. From his present account, *"E. jheringi"* looks suspiciously like a *Punctum,* while *"E. janeirensis"* might almost pass for my *Chanomphalus pilsbryi,* from Mexico; the beautiful ornamentation in either of these groups would easily escape a cursory examination. Incidentally, *E. deliciosa* should be compared with my *Radiodiscus* (*Radioconus*) *ditzleri; E. göldii* and *E. amoena* apparently belong in *Radiodiscus* s.s.; *E. discoidea* (poorly figured) resembles a *Rotadiscus;* while *E. clara* has somewhat the facies of Pilsbry's group *Strialuna,* from Jamaica. I hope he will pardon the presumption of these suggestions, but one tires of guessing at the identity of minutiae, the types of which are thousands of miles away.

Veronicellidae

I cannot understand how the same author who makes such invaluable contributions to our knowledge of the Systrophiidae could permit himself to add to the synonymy of this family (already almost hopelessly encumbered)

eight, quite useless (or unidentifiable) names. Nothing in the description of either his *Ve. pardalis* or *Ve. brasiliensis* differentiates them from *Vaginulus* (*Phyllocaulis*) *langsdorfi* Férussac, while *Ve. gracilis* is apparently an additional synonym for *Vaginulus taunaisii.* I suspect that his *Ve. ribeirensis* may actually be a new species, although it is not, on the basis of its description, distinguishable from *Vaginulus* (*Angustipes*) *erinaceus* Colosi. *Ve. rosilla* and *Ve. fuscescens* are nomina dubia. The keeled dorsum of *Ve. carinata* tantalizes one's curiosity, but the rest of its description, without figures, leaves even its generic position in doubt. *Ve. discrepans* is probably a member of the group of *Vaginulus* (*Angustipes*) *dubius* Semper. None of these new names are accompanied by descriptions or figures of the female genitalia, which, in my opinion, offer the best characters for the generic determination of American Veronicellidae.

THYASIRA DISJUNCTA GABB not THYASIRA BISECTA Conrad THE RECENT WEST COAST SHELL

BY NELLIE MAY TEGLAND
Museum of Paleontology, University of California

Thyasira disjuncta described by Gabb[1] from the Pliocene deposits of Deadman Island, near San Pedro Bay, California, was later by Dall,[2] thrown into synonymy with *Thyasira bisecta* Conrad,[3] described from Miocene deposits at Astoria, Oregon, and this determination has been followed by all later workers.

In the course of a study of the Oligocene fauna of the state of Washington, in which epoch the genus *Thyasira*

appears in practically all the horizons, it was found necessary to evaluate the two above named species and the result is the decision that *T. bisecta* has so far been found only in the Miocene at Astoria, and that *T. disjuncta* is a distinct species to which must be referred the recent form found living off the Alaska Peninsula and southword to the coast of Oregon.

Thyasira disjuncta was well figured by Gabb[4] and, under the name of *T. bisecta,* by Dall[5], Arnold[6] and Oldroyd[7]. A comparison of these figures, even without the actual material, with those of *T. bisecta* figured by Conrad[8] will show the decided difference in the anterior truncation which distinguishes the two species. *T. bisecta* has the anterior margin below the lunule projecting forward while *T. disjuncta* shows this area as distinctly flattened; quoting Gabb, "anterior end abruptly and angularly truncated".

Examination of a large series of individuals from the Tertiary of the West Coast shows other differences such as in outline and size of adult forms, but the outstanding contrast is the feature just described.

The Oligocene species of Thyasira is closer to *T. disjuncta* of the Pliocene and recent but there are some small individuals which resemble the Miocene *T. bisecta.* I have in preparation a more complete, illustrated, discussion of these relationships and their interpretation.

Bibliography

1. *Conchocele disjuncta* Gabb, Pal. Calif., vol. 2, p. 99, pl. 7, figs. 48, 48*a*, 48*b*, 1869. (Pliocene, Deadman Island, California.)
2. *Cryptodon bisectus* Dall, Proc. U. S. Nat. Mus., vol. 17, pl. 26, figs. 2, 5, 1894. (Recent, off the south coast of the Alaska Peninsula.)
3. *Venus bisecta* Conrad, Wilkes Expl. Exped., vol. 10, p. 724, pl. 17, figs. 10, 10*a*, 1849. (Miocene, Astoria, Oregon.)
4. Gabb, Op. cit.
5. Dall, Op. cit.
6. *Thyasira bisecta* Arnold, Mem. Calif. Acad. Sci., vol. 3, p. 135, pl. 15, fig. 5, 1903. (Plocene, Deadman Island, California.)

7. *Thyasira bisecta* Oldroyd, Ida S., Publ. Puget Sound. Biol. Sta. Univ. Wash., vol. 4, p. 37, pl. 6, fig. 1, March, 1824 (Recent off Brown Island, Washington.) ; Stanford Univ. Publ. Geol. Sci., vol. 1, no. 1, p. 120, pl. 10, fig. 1. (Same figure.)
8. Conrad, Op. cit.

THE DATE OF PUBLICATION OF UNIO DOMBEYANA Val.

BY BRYANT WALKER

This species was published by Valenciennes in Humboldt and Bonpland's Recueil d'Observations &c, II, p. 227, pl. LIII, figs. 1-1*b*.

The date of publication is given by Binney (Bib. Am. Con., Pt. II, p. 6) as 1833 and in this he was followed by Simpson both in his Synopsis and Descriptive Catalogue.

The fact that Valenciennes's paper was referred to by Barnes and Lea in 1828 and 1829 has raised a question as to the correctness of this date in the minds of several American conchologists.

Through the kindly offices of Mr. J. R. leB. Tomlin the question was laid before Mr. C. D. Sherborn, the eminent English bibliographer, with the following result, which definitely settles the matter.

Vol. II of part 2 (Zool.) of the Receuil down to and including p. 256 was issued in 1827. Beginning with p. 257 (where a new signature commences) it appeared in 1832.

Presumably the volume was completed in 1833 and the title page consequently bears that date. Hence the erroneous quotation by Binney and others.

It follows that Valenciennes' species was published four years prior to Lea's *Unio trapezoides* (1831) and therefore takes precedence over it as the proper specific name.

DESCRIPTION OF NEW VARIETIES OF LAND AND FRESH WATER MOLLUSKS FROM PLEISTOCENE DEPOSITS IN ILLINOIS*

BY FRANK COLLINS BAKER

During the summer of 1927 the Illinois Geological Survey carried on rather extensive investigations into Pleistocene formations in Fulton County, Illinois, Dr. Harold R. Wanless having charge of the field work. The animal life in these deposits, consisting almost entirely of mollusks, has been referred to the writer for determination and a paper is in preparation describing the entire fauna, which included material from Aftonian, Yarmouth, Peorian and Early Wisconsin intervals. A large amount of material was collected which has made possible a more satisfactory study of variation among the species of this latest of geological horizons. Included in this material were several species and varieties which appeared sufficiently characteristic to warrant designation in a formal manner. The writer is indebted to Dr. M. M. Leighton, Chief of the Geological Survey, for the opportunity of studying the collections.

POLYGYRA MULTILINEATA WANLESSI nov. var.

Shell differing from recent *multilineata* in being smaller, the body whorl somewhat gibbous, of greater diameter as compared with height, the aperture somewhat narrower, and the base flattened and indented about the umbilical region, which may be narrowly perforate or completely closed. It may be distinguished from variety *algonquinensis* Nason, by its usually larger size, more gibbous whorls, especially the body whorl, and the deeper indentation of the umbilical region. There are faint indications of color lines

* Contribution from the Museum of Natural History, University of Illinois, No. 48.

or stripes on a few specimens, but the majority were probably unicolored as are some specimens of *multilineata* at the present time. Adults are usually imperforate but immature shells appear to be always umbilicated.

Height 13.5; diameter 21.5 mm. Holotype.
Height 13.0; diameter 21.0 mm. Paratype.
Height 12.6; diameter 19.5 mm. Paratype.
Height 11.1; diameter 18.5 mm. Paratype.

Type locality: Fulton County, Illinois, east of Havana, in Peorian loess. *Types:* Museum Natural History, Univ. Ill., No. P2358. *Paratypes:* Acad. Nat. Sci. Phil., No. 144921.

This variety of the common *multilineata* occurs in deposits from Yarmouth to Early Wisconsin time. It is more or less abundant in the loess of Fulton County but has been seen from but one other region, New Harmony, Indiana, in loess believed to be of Peorian age. The variety is named in honor of Dr. Harold R. Wanless, of the Department of Geology, University of Illinois, who collected the material.

GONYODISCUS MACCLINTOCKI nov. sp.

Shell orbicular, with convex, dome-shaped spire; whorls six, slowly and regularly increasing in size, tightly wound, slightly convex, the body whorl typically flatly rounded; sutures well impressed; base flatly rounded, excavated near the widely open umbilicus, which exhibits all of the whorls including the nucleus; sculpture of many close-set, distinct ribs, which become finer on the base, there being usually an almost smooth space in the center of lower part of the body whorl; aperture widely or roundly lunate, arched above where the outer lip joins the body whorl; peristome simple, acute, without parietal callus, the terminations of the outer and columellar lip being widely separated.

Height 3.6; diameter 6.5 mm. Holotype.
Height 3.5; diameter 6.0 mm. Paratype.
Height 3.6; diameter 6.2 mm. Paratype.
Height 3.2; diameter 6.1 mm. Paratype.

Type locality: Peorian loess, 3½ miles east and 1¾ miles south of Lewiston, Liverpool Township, Illinois. *Types:* Museum Natural History, Univ. Ill., No P2367. *Paratypes:* Acad. Nat, Sci. Phil., No. 145108.

Macclintocki is related to *perspectiva*, differing in being smaller, having a more convex spire, a smaller umbilicus, a rounder aperture, and finer sculpture, the ribs being more numerous and closer together, almost disappearing on the base. It has been confused with *shimekii*, which is smaller, has fewer whorls which are wider, and the sculpture is coarser. The spire, also, is quite different. It has been seen only from deposits of Peorian age. As *perspectiva* is not at present known from Pleistocene deposits earlier than Late Wisconsin (at least in Illinois) it is thought that this species may be ancestral to the large, widely umbilicated form so common in Illinois and other parts of the United States in the recent fauna.

GONYODISCUS MACCLINTOCKI ANGULATA nov. var.

Shell differing from typical *macclintocki* in having a more depressed somewhat flattened spire, flatter base and shallower umbilicus, and a subangulated periphery. On the average rather larger than the typical form.

Height 2.9; diameter 6.2 mm. Holotype.
Height 3.0; diameter 7.0 mm. Paratype.
Height 3.0; diameter 8.0 mm. Paratype.

Type locality: Fulton County, Illinois, east of Havana, in loess of Yarmouth age. *Types:* Museum Natural History, Univ. Ill., No. P2359. *Paratypes:* Acad. Nat. Sci. Phil., No. 144922.

This race differs uniformly from the more abundant *macclintocki* of the Peorian interval in its depressed spire, wide umbilicus, and subangulated periphery. This angulated form persisted throughout the Yarmouth interval and died out in the Peorian, a few scattered specimens having been seen among a large number of the rounded-whorled Peorian

form. What the Sangamon form may have been like is not at present known, none being in our collection from this horizon. The species is named in honor of Dr. Paul MacClintock, of the Department of Geology, University of Chicago, a careful student of Pleistocene phenomena.

VERTIGO GOULDII LOESSENSIS nov. var.

Shell differing from recent *gouldii* in being more ventricose, especially on the last whorl, having the apical whorls wider and more obtuse, the outer lip more auricled causing the aperture to have its longest diameter more diagonal than in *gouldii*. There are five denticles placed as in *gouldii*, but more delicate than in the typical form; the palatal denticles are long and subequal.

Length 2.0; diameter 1.3 mm. Holotype.
Length 2.0; diameter 1.3 mm. Paratype.
Length 2.1; diameter 1.1 mm. Paratype.

Type locality: 3½ miles east and 1¾ miles south of Lewistown, Fulton County (Liverpool township), Illinois, in loess of Peorian age. *Types:* Museum Natural History, University of Illinois, No. P2366. *Paratypes:* Acad. Nat. Sci. Phil., No. 145107.

This Vertigo has been listed as *gouldii* but is different from the typical species as living today. It has also been listed as *ventricosa*, and some small, wide specimens do resemble this species. *Loessensis* strongly resembles *Vertigo elatior* Sterki, and Sterki has referred certain forms found in loess at New Harmony, Indiana to this species. They lack the strong palatal callus so characteristic of *elatior* and are the same as the Illinois variety here differentiated. It is probable that the Vertigo listed as *gouldii* by Hanna (Kansas Science Bull., VII, p. 120, pl. xviii, fig. 4) is also this variety. It is found in the Pleistocene from Yarmouth to Early Wisconsin time. The form is here considered a marked variety of *gouldii* but it might be advisable to consider it a distinct species.

SUCCINEA RETUSA FULTONENSIS var. nov.

Shell elongately ovate, compressed, spire long, conic, sutures well impressed; whorls three, somewhat oblique, narrow, the second whorl much swollen as compared with the first whorl which appears above the second whorl as a small knob; aperture narrow, ovate, narrowed above, widely rounded below; columella somewhat incurved.

Height 8.1; diameter 4.0; aperture height 5.0; diameter 2.8 mm. Holotype.

Height 7.5; diameter 4.0; aperture height 4.2; diameter 2.2 mm. Paratype.

Height 7.6; diameter 4.0; aperture height 5.0; diameter 2.4 mm. Paratype.

Type locality: Fulton County, Illinois, 2¼ miles west and ¾ mile south of Lewiston, in deposit of Early Wisconsin age. *Types:* Museum Natural History, Univ. Ill., No. P2368. *Paratypes:* Acad. Nat. Sci. Phil., No. 145109.

This narrow *Succinea* is related to the recent *decampii* Tryon, differing in its smaller size, with less compressed whorls, longer spire, deeper sutures, rounder whorls, and shorter aperture. The presence of specimens resembling small *decampii* indicate that the fossil form is a variant of the recent variety. It is much narrower than *grosvenori gelida* and also larger. It has been seen from the Yarmouth, Peorian, and Early Wisconsin intervals of the Pleistocene and apparently was widely distributed. It has been previously reported from Illinois deposits as both *retusa* and *decampii.* It appears to be ancestral to the recent *retusa* since that species has not yet been seen in Pleistocene strata in Illinois.

VALVATA LEWISII PRECURSOR var. nov.

Shell somewhat larger than *lewisii,* spire elevated, scalariform, the sutures deeply impressed, the whorls notably rounded and set one above another in turban fashion; whorls rather more than four with four full coils visible in front view, the two upper whorls projecting well above each

other; the body whorl high, increasing in diameter as it approaches the aperture; umbilicus wide, deep; aperture large, rounded, entire, the inner lip only touching the parietal wall; sculpture of rather distinct, longitudinal lines of growth resembling tightly wound thread.

Height 4.3; diameter 5.0 mm. Holotype.
Height 4.4; diameter 5.6 mm. Paratype.
Height 4.2; diameter 5.0 mm. Paratype.
Height 3.7; diameter 5.0 mm. Paratype.
Height 4.0; diameter 5.0 mm. Paratype.

Type locality: Fulton County, Illinois, east of Havana, in gray silt of Early Wisconsin age. *Types:* Museum Natural History, Univ. Ill., No. P2360. *Paratypes:* Acad. Nat. Sci. Phil., No. 144923.

This Valvata occurs in this deposit literally by thousands and must have been exceedingly abundant in the stream which it inhabited in Early Wisconsin time. It appears to bear much the same relationship to *lewisii* that *danielsi* Walker, does to *sincera,* both, perhaps, being ancestral to the species as they exist today. The high, pointed spire with its four fully exhibited whorls in lateral view are its chief characteristics.

STUART WELLER

The death of Dr. Weller is a great loss to the sciences of geology and paleontology. He was born at Maine, Broome Co., N. Y., December 26, 1870. At an early age he became interested in geology and with a view of making this science his life work he entered Cornell University in 1891, graduating in 1894, later receiving the degree of Ph. D. from Yale. He had been connected with the U. S. Geological Survey, the Geological Survey of Missouri, the

Illinois Geological Survey, and was paleontologist of the New Jersey Geological Survey from 1899-1907. He became connected with the University of Chicago in 1895, and was professor of paleontology since 1915, and geologist of the Geological Survey of Kentucky since 1920. While engaged in geological research he passed away, August 5, 1927, near Marion, Kentucky. He was the author of many reports and papers pertaining to paleontology and geology.

In a letter from Mr. Edwin E. Hand of Chicago, he says:—"I have not yet recovered from the sudden death of my friend Stuart Weller. I had a most delightful and valuable three weeks with him in July at 'Camp Wrather', St. Genevieve Co., Missouri, the geological camp of the University of Chicago. We lunched together every day, then to Ozora (2 miles) for the mail. Then two or three hours of intensive snail hunting. He was greatly interested in the work and a very efficient collector. In the Ozarkian Mollusca, by Pilsbry and Ferriss, 1903, you will find his name as a collector of many species."

C. W. J.

ILLUSTRATIONS OF UNIONIDAE

BY L. S. FRIERSON

The mussels illustrated in plates 1, 2 and 3 were recently described in the writer's "Classified and Annotated Check List of the North American Naiades".

The types are in my collection. Cotypes have been presented to the Academy of Natural Sciences of Philadelphia.

LAMPSILIS RAFINESQUEANA Frierson, pl. 1, fig. 1 (fe-

male), 2 (male). The type of this fine species is from Moodys, Oklahoma; others are from the Black River, Ark., and Indian Creek, McDonald Co., Mo. It is the western analogue of *L. pectorosa* (Con.), of the Tennessee drainage.

LAMPSILIS STRECKERI, pl. 2, fig. 1, from the Little Red River, Ark., is a handsome rayed species, named for Mr. John K. Strecker of Waco, Texas.

LAMPSILIS WRIGHTIANA, pl. 2, fig. 3, is from Volusia Co., Florida, and is related to *L. amygdalum*. Named for B. H. Wright.

ELLIPTIO SAJENSIS, pl. 2, fig. 2, was collected by Hinkley in the Saja River, Guatemala, and distributed by him under the name *Unio dysoni* Lea, from which it differs by being larger, shorter and more biangular behind.

ELLIPTIO HARICOTTI, pl. 3, fig. 2, 2 *a*, is from Guatemala.

PLEUROBEMA FICTUM Frierson, pl. 3, fig. 3, Check List, p. 43, is from the Cahaba River, Alabama, where it appears to be not uncommon.

PLEUROBEMA MARSHALLI, pl. 3, fig. 3, was collected by the late A. A. Hinkley from the Tombigbee River, Boligee, Ala.

PLEUROBEMA ALDRICHI, pl. 3, fig. 1, from Selma, Ala., is from the collection of Hon. T. H. Aldrich, in whose honor it is named.

NOTES AND NEWS

EUROPEAN LAND SNAILS IN NEW ORLEANS.—For about ten years we have been aware of the fact that *Helix* (*Otala*) *vermiculata* Müll. was established in Jackson Square, New Orleans, which square is opposite the Natural History Building in which we are located. There is also established there *Helix* (*Helicogena*) *aspersa* and *Rumina decollata* L., all European species. The Helices seem to have been imported for food purposes by an Italian delicatessen which was formerly located about one square from Jackson Square. A number of the older residents state that these snails were imported in the hibernating condition for many

years and that occasionally individuals would revive in the warm winter climate of New Orleans and crawl around the neighborhood.

About two years ago, we located *Helix aspersa* in one of the Spanish gardens a few blocks away, and a year ago we found them abundant and quite a pest at a florist's about three miles from Jackson Square. This importation seems to be separate, as this florist, who is a decorator by trade and a florist by hobby, has imported hundreds of plants from all parts of the world.

Rumina decollata seems to have been a separate importation and was abundant all over the city of New Orleans where it was destructive to violet beds. It has decreased and almost disappeared during the last ten years, perhaps due to paving of streets, and consequent better drainage which leaves the soil much drier than formerly, and also to the fact that the hobby of raising violets has practically disappeared in New Orleans and there are very few violet beds any longer. It may have been the abundance of this snail, as well as the difficulty of raising violets in a drier soil, that may have discouraged most people from raising this plant in the gardens. I remember *R. decollata* as a boy.

We are at present raising *Helix aspersa* in cages at our live materials establishment about five miles from this office.—PERCY VIOSCA, JR., Natural History Building, New Orleans, La.

DONAX FOSSOR, NOT DONAX VARIABILIS.—In the interesting study of the Marine Mollusca of Cape May County, N. J., in the April number of this volume, page 10, the author's record for *Donax variabilis* Say should undoubtedly read *Donax fossor* Say, the common species of the New Jersey coast. *D. variabilis* is not to my knowledge found north of Cape Hatteras. A. P. Jacot's Long Island, N. Y., record is certainly based on a form of *D. fossor*.—C. W. J.

THE OYSTER DRILL.—In the *Literary Digest* for Feb. 4, 1928, page 23, under the name of "oyster burglar the periwinkle" and also referred to as the "drill" that infests the

oyster beds of Long Island Sound and Chesapeake Bay the figure given is that of *Thais floridana* Con. (*Purpura haemastoma* var. *floridana* of authors). This species is not recorded north of Cape Hatteras. It is larger than the oyster drill and usually frequents rocks. The drill of the Chesapeake northward is of course *Urosalpinx cinereus* Say.—C. W. JOHNSON.

INTERESTING ADDITIONS TO THE FRESH-WATER MOLLUSCAN FAUNA OF OREGON AND WASHINGTON.—Recently in cleaning the debris from the aperture of a "dead" shell of *Carinifex newberryi*, from Upper Klamath Lake, Oregon, which was received some time ago from Dr. G. Dallas Hanna, I discovered one specimen of *Pyrgulopsis nevadensis* (Stearns). I have found no published report of the finding of this species except at Pyramid and Walker Lakes, Nevada. Last summer, in a pool north of Kelso, Washington, I found 19 fresh-water limpets, which Dr. Bryant Walker has identified as *Gundlachia californica* Rowell. I have no report of the previous discovery of this species except in California. —JUNIUS HENDERSON, University of Colorado.

ALVANIA IN SOUTH AFRICA: A CORRECTION.—It seems that I have twice used the name *Alvania almo*, the first being 1911, Proc. U. S. Nat. Mus., vol. 41, p. 359, for a Californian shell. My second use of the name was for a South African shell published in 1915 in Bulletin No. 91, U. S. National Museum, p. 128.

It was through the kindness of Miss Mina L. Winslow, Curator of the Division of Mollusks, University of Michigan, that this error was brought to my attention, and I take pleasure in now renaming my South African shell *Alvania winslowae* B.—PAUL BARTSCH.

THE RADULA OF LYMNAEA AND BULINUS.—What is the reason for the absence of cones from the central tooth of many rows of *Lymnaea natalensis* Krauss and of many teeth in the anterior rows of this and allied species of fresh-water snails? If it were due to "wear and tear", as in those

species of Mollusca which bore their way through the shells of others to obtain their food and in other species, one would not find the condition in young examples or in the embryonic radula of these species of fresh-water snails. Illustrations tend to be misleading, except in camera-lucida models; as it is impossible to bring the denticles, cones, crown and basal plate into focus at the same time. A careful study of the radula of *Bulinus tropicus* (Krauss), (1) in the early embryonic stage, (2) just before hatching, (3) a few days after hatching has taken place, and (4) in the fully mature examples, would seem to show a gradual development of the cones, as the radula enters more and more into use. From this study it would appear that the absence of cones from the anterior rows is due to lack of development, that the tricuspid laterals are formed as a result of the coalescence of irregular projections from the edge of the crown of the embryonic laterals, and that from time to time the laterals increase in number because of the tendency of the denticles of the marginal teeth to coalesce.

I have counted close on 500 separate teeth in the radula of *Bulinus tropicus* at the time of hatching. Within a few weeks this number has increased to from seven to ten thousand, which number would appear to remain fairly constant throughout the life of the animal. The great number of teeth in these broad radulae would seem to be provided, not, as in some species, to allow for constant "wear and tear", but to enable the radula to cover a large surface of vegetable food.—F. G. CAWSTON, M. D., Natal, South Africa.

SNAILS FROM ROCK BLUFF, LIBERTY CO., FLORIDA.—The following species were taken by Prof. C. R. Crosby: *Polygyra rugeli* (Shuttl.), *Paravitrea capsella lacteodens* (Pils.), *Succinea avara* Say.—E. G. VANATTA.

LIMAX FLAVUS L. IN ALABAMA.—Specimens of this introduced species have been sent from University, Ala., collected by Prof. Emmett B. Carmichael, Head of the Dept. of Physiological Chemistry in the School of Medicine.—H. A. P.

POLYGYRA COLUMBIANA PILOSA, new subspecies.—The shell agrees in shape with typical *P. columbiana* (Lea) except that the last whorl is somewhat less depressed. The umbilicus is much wider than in *P. pinicola* Berry. The surface is densely covered with short curved hairs which in part stand in forwardly descending series. The peristome is moderately reflected and thickened within. The basal margin is somewhat straightened or indistinctly subdentate. A small short parietal tooth is present typically but in many lots there is none, this character sometimes varying in the same colony.

Height 10.4, diam. 14.7mm., 6 whorls.

This race ranges from Alaska to San Francisco Co., Cal. The type is 11142 Acad. Nat. Sci., Phila.; paratype in coll. Univ. of Colo,, from San Francisco.—JUNIUS HENDERSON.

PUBLICATIONS RECEIVED

MOLLUSCAN ASSOCIATIONS OF WHITE LAKE, MICHIGAN: A STUDY OF A SMALL INLAND LAKE FROM AN ECOLOGICAL AND SYSTEMATIC VIEWPOINT. By Frank C. Baker. (Ecology, vol. 8, pp. 353-370, 1927.) An interesting and exhaustive study of the mollusks of a small area.

STUDIES ON THE LIFE CYCLES OF TWO SPECIES OF FRESH WATER MUSSELS BELONGING TO THE GENUS ANODONTA. By Mary E. Tucker. (Biol. Bull., vol. 54, pp. 117-127, 1928.)

CONTRIBUTION A L'ÈTUDE DE LA FAUNE DU CAMERUN, MOLLUSCA, par Ph. Dautzenberg. (Faune Colonies Franc., I, fas. 6, pp. 482-522, 1927.) This part covers the marine species.

A CLASSIFIED AND ANNOTATED CHECK LIST OF THE NORTH AMERICAN NAIADES. By L. S. Frierson. This is one of the most important contributions to systematic Uniology of recent years. The author has been an ardent collector and student of the family for many years and has accumulated

a collection "well nigh perfect as regards the North American forms". His opinions on synonymy, therefore, are entitled to the most careful consideration.

He has always been a strenuous advocate of the rehabilitation of the many of Rafinesque's species which, however, have not always met with general acceptance. But he has "the courage of his convictions" and this Check List embodies his final conclusions on that subject.

Many new subgenera are proposed, unfortunately without diagnoses, the author contenting himself with the designation of a type species, "whose chief characters will forever give such diagnosis".

Sixteen new species are described or differentiated, the latter based on the erroneous identifications of earlier authors.

The Check List should be in the hands of every collector of North American Unionidae.—BRYANT WALKER.

MINUTE MEXICAN LAND SNAILS. By H. Burrington Baker. Proc. A. N. S. Phila., Vol. 79, 1927. A consideration of the anatomy of snails most of which have been included in or confused with *Thysanophora*. In *Pupisoma* (*mediamericanum* Pils. and *comicolense* n. sp.) inferior tentacles are present; it is orthurethrous; penis with an appendix. The author suspects that it is near the ancestral stock of the Vertigininæ. The little group *Toltecia* turns out to belong to *Punctum*. Like that and various other Endodontidæ it has a U-shaped kidney. *Rotadiscus* Pils. is segregated in a new subfamily, Rotadiscinæ, unique in having the apical limb of the modified U-shaped kidney much shorter than that along the intestine. In *Radiodiscus* the apical limb is far the longer, as also in *Helicodiscus* and *Chanomphalus*. In the Thysanophorinæ the following new subgenera of Thysanophora are proposed: *Setidiscus* for *T. hornii*, *Lyroconus* for *T. plagioptycha*, *Miroconus* for *T. paleosa*. *Microconus*, hitherto thought to be endodontid is shown to stand very near *Thysanophora*. A key to the groups concerned is given. *Averellia* (*Trichodiscina*) *cordovana* is the only helicid group dissected. It is "related rather closely to *Leptarionta*." Many difficult points in Mexican malacology are cleared up in this paper.—H. A. P.