

FOSSIL FAUNA FROM RESTORATION POINT, BAINBRIDGE ISLAND

by

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## INTRODUCTION

The purpose of this paper is to make more fully known the fossil fauna which is found in the sandstones, shales and conglomerates outcropping on the beach of Restoration Point, Bainbridge Island, Kitsap County, Washington. This area is a portion of the Type Section of the Blakeley Formation which contains the *Acila gettysburgensis* Faunal Zone and represents the upper Oligocene Period of Washington. This type section, previously described by Dr. C. E. Weaver, (A Preliminary Report on the Tertiary Paleontology of Western Washington. Wash. Geol. Surv., Bul. 15, p. 15; 1912. The Tertiary Formations of Western Washington. Wash. Geol. Surv. Bul. 13, pp. 168, 180-182; 1916.) consists of deposits of interbedded massive conglomerates and medium grained sandy shales, possessing a thickness of at least 9,000 feet. The lowermost strata, which are exposed, outcrop at Orchard Point, and the highest on the north shores of Blakeley Harbor. The character of the fauna and the lithology of the sediments indicate deposition in fairly deep water. The strike of these strata is in a general east and west direction, and the dip is very steep, up to ninety degrees.

The *Acila gettysburgensis* Zone outcrops at various points in and near Seattle, at Georgetown, Columbia City, Alki Point and South Seattle. It is also found at Cathcart, in the New Castle Hills and on the Straits of Juan de Fuca. The species from which the zone derives its name was originally found in the sea cliffs on the Straits of Juan de Fuca, near Gettysburg.

The fauna referred to in this paper was collected on Bainbridge Island only and chiefly at Restoration Point. The list of species given here includes only those forms collected during the

present study. It does not include forms previously listed from this locality which were not found at this time. Of the fifty-six species determined twenty-five are new; twenty-three have been previously listed from Bainbridge Island; seven have been listed from other localities but not from Bainbridge Island.

In order to secure material for this study, some six weeks of time have been spent in actual field work at Restoration Point, on the Straits of Juan de Fuca and in the Cowlitz and Chehalis River Valleys. Material from the three last named sections has been necessary for comparative purposes. The laboratory work has been done at the University of Washington during the years 1923 - 1924.

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FAUNA CLASSIFIED

Phylum Mollusca

Class Pelecypoda

Family Solemyacidae Zittel.

Genus SOLEMYA Lamarck, 1818.

Solemya ventricosa Conrad, 1849.

Family Nuculidae Adams.

Genus ACILA Adams, H. & A., 1858.

Acila gettysburgensis Reagan, 1908.

Family Ledidae Adams.

Genus LEDA Schumacher, 1817.

Leda washingtonensis Weaver, 1916.

Leda restorationensis n. sp.

Leda goodspeedia n. sp.

Genus YOLDIA Moller, 1842.

Yoldia impressa Conrad, 1849.

Yoldia bainbridgensis n. sp.

Family Mytilidae Firling.

Genus MODIOLUS Lamarck, 1799.

Modiolus restorationensis Van Winkle, 1918.

Genus CRENELLA Brown, 1827.

Crenella porterensis Weaver, 1916.

Family Thraciidae Dall.

Genus THRACIA (Leach) Blainville, 1824.

Thracia trapzoidea Conrad, 1865

## Family Anatinidae Dall.

Genus LATERNULA Bolten.

Laternula dallia n. sp.

## Family Pandoridae Gray.

Genus PANDORA Hwass, 1795.

Pandora van winklea n. sp.

## Family Carditidae Gill.

Genus VENERICARDIA Lamarck, 1801.

Venericardia castor Dall, 1909.

## Family Thyasiridae Dall.

Genus THYASIRA (Leach) Lamarck, 1818.

Thyasira bisecta Conrad, 1849.

## Family Licinidae Fleming.

Genus PHACOIDES Gray 1847.

Phacoides scutilineatus Conrad.Phacoides weaveri n. sp.

## Family Cardiidae Fischer.

Genus CARDIUM Linnaeus, 1758.

Cardium lorenzanum Conrad

## Family Veneridae Leach.

Genus MARCOCALLISTA Meek.

Macrocallista vespertina Conrad, 1848.

Genus MARCIA H. &amp; A. Adams.

Marcia oregonensis Conrad, 1848.

## Family Tellinidae Deshayes.

Genus MACOMA Leach, 1819.

Macoma astori Dall, 1909.Macoma bainbridgensis n. sp.

## Family Nactridae Gray.

Genus NACTRA Linnaeus, 1758.

Nactra frustrata n. sp.

Genus SPISULA Gray.

Spisula albaris, Conrad, 1865.

## Class Gastropoda.

## Family Doliidae Adams.

Genus EUDOLIUM Dall.

Eudolium restorationensis n. sp.

Genus FICUS Bolten.

Ficus restorationensis Van Winkle, 1918.

## Family Scaphandridae Fischer.

Genus CYLICHNA Loven.

Cylichna mea n. sp.

Genus SCAPHANDER Montfort, 1810.

Scaphander washingtonensis Weaver, 1916.

## Family Turritidae Adams.

Genus TURRIS Bolten.

Turris kincaidi Weaver, 1916.Turris kitsapensis n. sp.Turris stewarti n. sp.

Genus TURRICULA Adams.

Turricula clallamensis Weaver, 1916.Turricula borgenia n. sp.

Genus SURCULA H. &amp; A. Adams

Surcula shepherdia n. sp.

Genus PLEUROTOMELLA Verril, 1873.

Pleurotomella mcKnightia n.sp.

Family Volutidae Gray.

Genus MIOPLEIONIA Dall, 1909.

Mioleionia indurata Conrad, 1849.

Family Fasciolaridae Dall.

Genus FUSINUS Rafinesque, 1815.

Fusinus landesi n. sp.

Fusinus othringtoni n. sp.

Fusinus McLellani n. sp.

Genus AGASOMA Gabb.

Agasoma clarkia n. sp.

Genus PERSE Clark, 1918.

Perse sunthorni n. sp.

Genus PSEUDOPERISSOLAX Clark, 1918.

Pseudoperissolax kitsanensis n. sp.

Family Chrysodomidae Dall.

Genus CHRYSODOMUS Swainson, 1840.

Chrysodomus hanni n. sp.

Family Epitoniidae.

Genus EPITONIUM Bolton, 1798.

Epitonium saundersi n. sp.

Family Ranellidae.

Genus BURSA Bolton, 1798.

Bursa vancouverensis Clark and Arnold, 1923.



## Family Turritellidae.

Genus TURRITELLA Lamarck, 1799.

Turritella blakelevensis Weaver, 1912.Turritella porterensis Weaver, 1912.

## Family Crepidulidae Dall.

Genus CREPIDULA Lamarck, 1801.

Crepidula wardia n. sp.

## Family Calyptraeidae Dall.

Genus CALYPTRAEA Lamarck, 1799.

Calyptraea excentrica Gabb.

## Family Naticidae Forbes.

Genus SINUM Bolten, 1798

Sinum sponulosum Conrad, 1849.

Genus NATICA Scopoli.

Natica oregonensis Conrad, 1909.

Genus AMPULINA Lamarck.

Ampullina oregonensis Dall, 1909.

## Family Trochidae Adams.

Genus SOLARIELLA Wood.

Solariella kincaidi n. sp.

Genus TURCICULA Dall, 1881.

Turcicula washingtoniana Dall, 1909.

## Class Scaphopoda.

## Family Dentaliidae Grey.

Genus DENTALIUM Linnaeus, 1758.

Dentalium substriatum Conrad, 1849.

Class Cephalopoda.

Family Clydonautilidae.

Genus ATURIA Bronn.

Aturia angustata Conrad, 1849.

Phylum Molluscoidea.

Class Brachiopoda.

Family Hynchonellidae Gray.

Genus HEMITHYRIS d'Orbigny.

Hemithyris astoriana Dall, 1909.

DESCRIPTION OF NEW SPECIES

FAMILY LEDIDAE ADAMS

Genus LEDA Schumacher, 1817.

Leda restorationensis n. sp.

Description--Shell is of medium size, elongate and narrow; dorsal margin nearly straight, but with anterior dorsal margin gently rounded from the beaks to anterior end, and posterior dorsal margin very slightly concave. Surface of the shell is smooth, but showing concentric growth lines. Beaks are low, small, and touching above the hinge. Lunule is long, narrow, clearly etched and sculptured by growth lines; escutcheon is sunken, elongate-lanceolate, extends from beaks to posterior end and is wider and more deeply etched than lunule.

Type specimen is weathered so margins cannot well be described, and the teeth are not exposed. Characteristic of the shell are the smooth exterior surface and the straight dorsal margin, with the very small beaks.

Dimensions--Type form, broken, has length of 23 mm. and altitude of 13 mm.

Leda goodspeedi n. sp.

Description--Shell is of medium size, elongate and narrow; anterior margin sloping slightly upward from the beaks, gently rounded, joining anterior margin with slight angle; anterior margin sharply rounded; posterior dorsal margin almost straight; posterior end narrowed and slightly truncate; surface marked with concentric growth lines, no ribbing; beaks central and not prominent; lunule very narrow,

elongate-lanceolate, extending from beak to anterior margin; escutcheon wider and deeper than lunule, extending from beak to posterior margin; both lunule and escutcheon sculptured by growth lines. A slight depression extends from the beak to the truncate posterior end. Hinge has seventeen anterior and fifteen posterior teeth; chondophore is trigonal and subumbonal.

Named in honor of Prof. G. E. Goodspeed, Jr. of the Department of Geology of the University of Washington.

Dimensions--Length 24 mm.; altitude 9 mm.

Comparison--This Leda differs from Leda lincolniensis Weaver in being more slender and in lacking flat-topped concentric ribbing. It differs also in the number of teeth.

Genus YOLDIA Møller, 1842.

Yoldia bainbridgensis n. sp.

Description--Shell is of medium size, much inflated, subelongate and inequilateral; beaks nearly centrally situated; dorsal and ventral margins nearly parallel; anterior margin short and rounded; ventral margin broadly rounded; posterior dorsal margin very slightly concave, meeting posterior margin with slight angle; posterior margin narrow and truncate; lunule narrow, reaching from the beaks to near the anterior margin; indefinite in adult form; escutcheon wider than lunule and impressed. The surface of the shell is smooth to glossy, faintly showing fine concentric growth lines. The hinge has twenty-one anterior and eighteen posterior teeth; chondophore is subumbonal.

Dimensions--Length 23mm.; altitude 14 mm.; width 9 mm.

Comparison--This form differs from Yoldia dunnei Weaver and

Palmer in having beaks nearly central in place of nearly one third of the distance from the anterior end, and in the relative dimensions; this shell has a greater altitude in proportion to its length.

FAMILY ANATINIDAE DALL

Genus LATERNULA Bolten, 1798.

*Laternula dallis* n. sp.

Description--Shell is thin, of medium size, subnacreous, sub-equivalve, edentulous; surface with concentric sculpture. Valves are of low convexity, the right valve being slightly more convex than the left. Beaks are small, transversely fissured, and centrally placed. Posterior end is broadly rounded; anterior end sharply rounded; posterior dorsal margin slightly concave; neither lunule nor escutcheon discernible. From the beaks a faint depression extends to the junction of the posterior and ventral margins. These shells, though quite numerous, are very poorly preserved so that the hinge plate is not determinable.

Named in honor of Dr. Wm. H. Dall of the Smithsonian Institute. Dr. Dall very kindly assisted in the determination of this species.

Dimensions--Altitude 24 mm.; length 35 mm.

FAMILY PANDORIDAE GRAY

Genus PANDORA Hwass, 1795.

*Pandora gun winkles* n. sp.

Description--Shell is of medium size, thin and with a pearly inner layer; valves closed; left valve is decidedly concave and right is convex; posterior dorsal margin straight; anterior dorsal margin

slightly concave; anterior wing of left valve makes an angle of 45 degrees with the margin, and is marked off with an incised line; posterior wing of same valve defined by a faint ridge, a slight concavity being present on either side of the ridge. The portion between the wings of the left valve is globose and ornamented with raised radiating lines. The corresponding portion of the right valve is similarly ornamented, but the wings are not so definitely marked. Both valves show concentric growth lines over entire surface.

Named in honor of Dr. Katherine van Winkle Palmer of Cornell University, formerly instructor in Paleontology at the University of Washington.

Dimensions--Type, with posterior end broken, has a length of 37 mm.; diameter of 27 mm.

Comparison--This form differs from Pandora washingtonensis Weaver in being larger, with posterior end less extended and more rounded, and in having the decided radial sculpturing on major portion of both valves.

FAMILY LUCINIDAE FLEMING

Genus PHACOIDES Gray, 1847.

*Phacoides weaveri*, n. sp.

Description--Shell is rather large, globose, longer than high, equivalve, inequilateral; beaks acute, slightly anteriorly placed; posterior dorsal margin long, slightly convex; anterior dorsal area short and concave; lunule distinct, depressed, extending entire length of anterior dorsal area, longitudinally striated, and with greater portion of it situated on right valve; ligament prominent, long, extending almost

entire length of posterior dorsal area; anterior margin narrowly rounded posterior truncated; ventral margin strongly arcuate. Immediately below dorsal margin is a decided, wide depression extending to posterior extremity of shell; surface is sculptured with thin reflected, concentric ribs and in the interspaces are fine concentric lines.

Named in honor of Dr. C. E. Weaver, Professor of Geology, of the University of Washington.

Dimensions--Length 44mm.; altitude 33 mm.; width 20.5 mm.

Comparison--this form is larger, more globose and more inequilateral than Phacoides acutilineatus Conrad. It differs from Phacoides inflata Wagner-Schilling in having greater proportional length, in being less globose and in having wider spaces between the heavy concentric ribs.

FAMILY TELLINIDAE DESHAYES

Genus MACOMA Leach, 1819

Macoma bainbridgensis n. sp.

Description--Shell thin, inequivalve, with small, low, pointed beaks, and the shorter posterior extremity bent to the right; length of portion posterior to beaks is to portion anterior as 8 to 12. Left valve is the larger and more inflated, and has an obscure keel bordering the posterior dorsal area; right valve is less convex, has a definite keel bordering posterior dorsal area, and a depression extending the length of the keel and anterior to it. Surface is ornamented with incremental lines, but in general the shell is smooth. Anterior adductor scar is small; posterior large and irregular; palial sinus deep, wide and irregular, extending nearly to middle of shell.

Dimensions--Type:- Height 13 mm.; length 20 mm.

Paratype:- " 16 " " 27 "

Comparison--This form differs from Mascoma calcarea Gmelin in being longer posterior to the beaks, since this measures 8 to 12 as against 11 to 23 of M. calcarea. The posterior end is more pointed and altitude greater in proportion to length. The anterior dorsal area is more extended.

FAMILY MACTRIDAE GRAY

Genus MACTRA Linnaeus, 1758

Mactra frustrata, n. sp.

Description--Shell is thin, subtrigonal, elongate; beaks prominent, central, rather acute; anterior dorsal edge straight; anterior end narrowly rounded; posterior dorsal edge very slightly convex, joining posterior edge with slight angle; posterior extremity obliquely truncated; base broadly and evenly arcuate. An umbonal ridge, which is not very prominent, extends from beak to posterior extremity; area posterior to this ridge is rugose. Epidermis thin and surface marked by concentric growth lines.

The hinge plate is narrow, chondophore deep, apically roofed; cardinals prominent, adhering dorsally. Dentition of right valve:- Posterior lamella thin, adhering to hinge plate from dorsal to ventral margins; anterior lamella heavier and of greater width, adhering less than half the distance between margins, but extending nearly to the ventral edge; posterior laterals or claspers longer than anterior; ventral anterior claspers more prominent than dorsal.

Dimensions--Length 44 mm.; width 31 mm.



FAMILY DOLIIDAE ADAMS

Genus EUDOLIUM Dall

Eudolium restorationensis n. sp.

Description--Shell is large, thin, globose; number of whorls seven; posterior whorls ornamented with twelve large nodes which form a definite shoulder; area above shoulder ornamented with three to six revolving ribs. The suture line is distinct and decidedly sinuous, owing to its location on second row of nodes. The body whorl has three definite rows of nodes with indications of a fourth row; between the first two rows are two heavy flat revolving ribs with one intercalary thread; between second and third, and third and fourth rows of nodes is one heavy rib. Below the fourth row of nodes are five heavy flattened ribs with interspaces equal to width of ribs. The aperture is ovate, outer lip thin and reflexed, and inner lip callused; canal is strongly recurved; three plications on the columella. This form grows quite large, one specimen from Restoration Point measuring 75mm. in diameter.

<u>Dimensions</u> --	Altitude.	Diameter.	Spire.
Type	59 mm.	43 mm.	13 mm.
Paratype a.	28	22	
" b.	98	70	28

Comparison--This form has been referred to Eudolium petrosum Conrad but differs from the latter in having more pronounced nodes, more angulated whorls, and in having three definite, and a fourth more faintly indicated, rows of nodes as against two rows of nodes on E. Petrosum.

FAMILY SCAPHANDRIDAE FISCHER

Genus CYLICHNA Loven

Cylichna mea n. sp.

Description--Shell is minute, external, subcylindrical, involute, truncated posteriorly; spire hidden, sunken, with conical depression; surface slightly glazed. The base of the shell is ornamented with about twenty incised, spiral lines, and about one half that number of microscopic, spiral lines, more widely spaced, appear on the apex. The surface is smooth and shows fine incremental lines which appear to be more a matter of color than of ribbing. The aperture is narrow, widening a little at the base; outer lip thin, straight, and recurving at the apex; inner lip recurved anteriorly, making a slight fold.

Named in honor of Mea Sirjord of the English Department of the University of Washington.

Dimensions--Altitude 4 mm.; diameter 2 mm.

FAMILY TURRITIDAE ADAMS

Genus TURRIS Bolten

Turris kitsapensis n. sp.

Description--Shell is minute, slightly ovate, with six whorls; the middle portion of each posterior whorl is ornamented with a prominent squarish revolving ridge; a minor fold is found each side of the distinct suture; between prominent ridge and anterior suture is a flat area ornamented with two very faint revolving lines. Growth lines, above and on the ridged middle portion of each whorl, show clearly the curvature of the posterior sinus. The body whorl is rounded, tapers into short canal;

there are two revolving ridges, the upper prominent ridge forming the shoulder of the whorl and the lower, less prominent, forming a basal keel and corresponding to the posterior suture fold on spire whorls; seven fine revolving lines show below the basal keel, the end of the canal of the type form being broken. The aperture is elongate, the inner lip callused.

Dimensions--Altitude 8 mm.; diameter  $3\frac{1}{2}$  mm.

Comparison--This species resembles Turris thurstonensis Weaver but differs in having a greater apical angle, fewer whorls, decided folds at suture, and less prominent sculpturing on flat portions of whorl.

Turris stewarti n. sp.

Description--Shell is fusiform, long, and slender, with seven or eight whorls. The whorls are decorated by ten transverse ridges forming slightly oblique nodes on the middle portion of the posterior whorls and making the shoulder of the body whorl. Spiral ribbing consists of eight flat ribs on each posterior whorl with narrower ribs between, and with interspaces about equal to width of narrower ribs. On the body whorl there is less difference in the widths of the two sets of ribbing. The suture is inconspicuous and appressed, more so on the body whorl. Faint incremental lines show position of posterior sinus. The whorls are concave above the noded angle and convex below. The body whorl is flattened below the angle and then curves in to form the canal. The aperture is ovate, the outer lip thin, and the inner lip slightly callused; canal is long and slightly curved.

Named in honor of R. B. Stewart of the Museum of Paleontology of the University of California.

Dimensions--Altitude 31 mm.; diameter 10 mm.; spire 12 mm.

Genus TURRICULA Adams

Turricula borgenia, n. sp.

Description--Shell is turritiform, elongate, of medium size, regular and of a general smooth appearance; suture distinct; type form, with broken apex and canal, has five whorls but other specimen from same locality have seven or eight whorls. Anterior one third of posterior whorls is angulate; posterior portion concave, smooth and glossy, with very faint revolving lines which can be better seen on the body whorl; angulate portion sculptured by two flat, broad revolving ribs. Body whorl angulate with angle at middle of whorl, angle sculptured as on posterior whorls; shoulder above angle carries eight to ten faint to microscopic revolving lines, which show more clearly on a weathered specimen; faint growth lines show characteristics of posterior sinus which corresponds to angle of the whorl; concave portion below angle sculptured by about twenty clearly marked flat revolving ribs with very narrow interspaces; interspaces widen on canal; aperture triangulate; outer lip thin; inner lip with broad callus wash, margin of which is defined by incised line. The canal is open and straight but owing to the fact that the type is broken the length is uncertain.

Named in honor of Mrs. Jennie Borgen Tegland who has been of great assistance to her daughter in carrying out this work.

Dimensions--Altitude 25 mm.; diameter 12 mm.;

Genus SURCULA H. & A. Adams

Surcula shepherdia n. sp.

Description--Shell is small and turreted; whorls seven or eight in number; the lower portion of each posterior whorl ornamented with a wide revolving keel carrying four revolving ribs; ribs are crossed by fourteen nodes, obscure above and below the keel; upper portion of the spire whorls is concave and ornamented with growth lines which show the characteristics of the posterior sinus, but the general appearance of this region is smooth and glossy. The shoulder of the body whorl is formed by the wide revolving keel which corresponds to keel on lower part of posterior whorls; on this whorl it is more evident that the lowermost or fourth revolving rib on the keel is heavier than the three uppermost ribs; below the keel is a series of ribs of varying widths, the first heavy, second lighter, third heavy; next is a series of three smaller evenly spaced ribs with fine intercalary threads, and extending practically to the base of the body whorl; on canal are six small revolving ribs. The aperture is elongate open, and about one third the length of the body whorl; outer lip thin, inner lip callused, with upper half of callus depressed; columella slightly gyrate. The sutures are distinct and channeled.

Named in honor of Mary Shepherd of the Department of Geology of the University of Washington.

Dimensions--Altitude  $18\frac{1}{2}$  mm.; diameter 9 mm.

Comparison--This form resembles Surcula kincaidi Weaver, but differs in having no revolving striae above the angle of the whorl, has four revolving ribs on the keel in place of three, and has fourteen transverse nodes in place of nineteen, and has a greater apical angle.

Genus PLEUROTOMELLA Verril, 1873

Pleurotomella McKnightia n. sp.

Description--Shell is small, thin with six whorls; the three posterior whorls eroded to smoothness; suture distinct and appressed; whorls rounded and ornamented with twelve obliquely transverse ribs which form nodes on middle portion of posterior whorls and on shoulder angle of body whorl. Posterior portion of each whorl is flat to slightly concave. The posterior whorls have fourteen unequal, spiral ribs with very narrow interspaces; there are seven spiral ribs between angle and suture on the body whorl, seventeen below, with two intercalary threads at base of convex portion, and two on concavity which is the beginning of the canal; ribs are flattened with interspaces narrower than ribs; incremental lines on and above the shoulder show position and shape of the posterior sinus, and these lines round broadly to the left on lower portion of body whorl. The aperture is ovate, slightly angulated to conform to anal sulcus, and narrows into the short, very slightly recurved, open canal; outer lip thin and inner lip smooth; pillar slightly gyrate.

Named in honor of E. Thor McKnight of the Department of Geology of the University of Washington.

<u>Dimensions</u> --	Altitude.	Diameter.
Type	18 mm.	8 mm.
Paratype	10	5

FAMILY FASCIOLARIDAE DALL

Genus FUSINUS Rafinesque, 1815

Fusi

Fusinus landesi n. sp

Description--Shell is large, heavy, with about six whorls;

suture distinct; whorls rounded and spirally sculptured; posterior whorls with two pronounced ribs, the upper at middle of the whorl forming a slight angle, and the lower situated half way between angle and anterior suture; between the two heavy ribs is one intercalary thread. Above the angle is a smooth area equal in width to the area between the two heavy ribs, and above this smooth area are five closely spaced spiral ribs. The body whorl is rounded and the angle less evident; the portion of greatest convexity has three of the heavier ribs and one lesser intercalary in each interspace. Below the third of these major ribs are three more closely spaced ribs equal to the previously mentioned intercalaries in size; below these are numerous fine ribs covering area down to the canal. Aperture is ovate, canal short.

Named in honor of Henry Landes, Dean of the College of Science, of the University of Washington.

Dimensions--Altitude 55 mm.; diameter 30 mm.

Comparison--This form resembles Fusus montesanoensis Weaver but differs in having three prominent revolving ribs on the body whorl in place of four and in not having the transverse nodes. F. Montesanoensis also has a more pronounced shoulder on each whorl.

Fusinus ethringtonius sp.

Description--Shell is large, moderately elongate; whorls are seven in number, rounded and slightly angulated by a series of nodes; spire is long, almost equal to length of body whorl including canal; suture is regular and distinct; upper portion of each whorl is slightly appressed but not so pronouncedly as in the genus Perse; the greater

portion of each posterior whorl and the upper part of the body whorl are crossed by fourteen prominent ridges which curve to the right, following the growth lines; the posterior whorls are ornamented with about thirteen and the body whorl with about thirty rounded revolving ribs, with finer intercalary threads. The aperture is elongate oval, narrowing into a slender canal; the outer lip is thin, the inner lip smooth.

Named in honor of Thos. J. Ethrington of the Department of Geology of the University of Washington.

Dimensions--Type:--Diameter 20 mm.; altitude 20 mm.

Paratype:-- " 30 mm. " 50 mm.

Comparison--This form is very similar to Fusinus hannibali Clark and Arnold, but differs in having a greater number of transverse nodes and finer sculpturing.

Fusinus mcLellani n. sp

Description--Shell is long, slender, with nine or ten whorls; whorls ornamented with nine crescentic nodes which curve to the right. The radial ribbing is in the nature of ridges with rounded valleys between; there are six ridges above the angle of the whorl, four more pronounced and more widely spaced on the angle, and four between the angle and the suture on each posterior whorl. The suture is distinct and regular. Incremental lines swing to the right below the suture and sharply back to the left on the angle, giving the nodes their crescentic form. The upper half of the whorl is concave. The crescent shaped nodes and the type of radial ribbing the numerous whorls, and acute apical angle make this form recognizable even though the type specimen



lacks the apical whorls and is minus the body whorl and canal.

Named in honor of Roy D. McLellan of the Department of Geology of the University of Washington.

Dimensions--Type--Altitude 24 mm.; diameter 11 mm.

Genus AGASOMA Gabb

Agasoma clarki n. sp.

Description--Shell is small, fusiform; spire medium in height, being one fourth the length of shell; apex acute; whorls five or six in number; convex portion of spire whorls sculptured by two smaller revolving ribs; nineteen or twenty transverse ribs make nodes where they cross the revolving ribs; transverse ribs extend from suture to suture; on body whorl they begin at posterior suture, turn slightly to the right and disappear on lower portion of whorl; shoulder of body whorl flat and ornamented with six prominent revolving ribs with one intercalary thread in each interspace; of these prominent revolving ribs, the three upper are noded; canal portion carries seven or eight flat ribs with narrow interspaces; aperture oval, narrowing into canal; canal open, slender and straight; outer lip thin; inner lip smooth; suture appressed.

Named in honor of Dr. B. L. Clark of the Department of Paleontology of the University of California.

Dimensions--Altitude 13 mm.; diameter 7 mm.

Genus PERSE Clark, 1918

Perse gunthorpi n. sp.

Description--Shell is fusiform; suture distinct and appressed. Number of whorls five; upper part of each whorl depressed into collar; each whorl crossed by thirteen longitudinal ridges which disappear on lower portion of body whorl. The region of greatest convexity of the body whorl has three heavy radial ribs which form sharp nodes where they cross the longitudinal ridges. Above the upper row of nodes the shoulder and collar form a concave portion, and this area is sculptured by three decided and three fainter radial ribs. The interspaces between the three heavy ribs have three lesser ribs evenly spaced. Lower portion of whorl has thirteen strongly marked ribs, and one faint riblet in each of the interspaces immediately below the last row of nodes. The aperture is broadly ovate, narrowing into canal and into posterior sinus; outer lip thin; inner lip lightly callused; canal open, of medium length and turned slightly to the left.

Named in honor of Dr. H. E. Gunthorp of the Department of Zoology of the University of Washington.

Dimensions--Altitude 20 mm.; diameter 15 mm.

Comparison--This form differs from Perse lincolnensis Van Winkle in having a shorter canal, greater comparative diameter, greater apical angle and more inflated body whorl.

Genus PSEUDOPERISSOLAX Clark, 1918

Pseudoperissolax kitsapensis n. sp.

Description--Shell is small, fusiform, turreted; whorls sharply

angulated by a flattened spiral rib at middle portion; shoulder above angle convex, the portion below straight and with an inward slope. The body whorl is ornamented with a second spiral rib which makes a decided keel; this keel is not shown on the posterior whorls, being just covered by the following whorl. Aperture is triangulated, outer lip simple. The being broken, the length of the canal is not determinable. Shell is smooth and lustrous, faintly ornamented with growth lines which conform to the angle of the whorl.

Dimensions--Altitude  $12\frac{1}{2}$  mm.; diameter 9 mm.

FAMILY CHRYSODOMIDAE DALL

Genus CHRYSODOMUS Swainson, 1840

Chrysodomus hannai n. sp.

Description--Shell is large and robust, with six or seven rounded whorls; posterior whorls ornamented with two heavy flat-topped revolving ribs with interspaces equal to distance from suture on either side; shoulder, base of whorl, and interspace concave; suture distinct; spire a little more than one half the length of the body whorl. The body whorl is broadly rounded and curves into a short canal; the region of greatest convexity is ornamented with four revolving, flat-topped equally spaced ribs; lower portion, including canal, is ornamented with about ten heavy revolving ribs, interspaces equal to width of ribs; aperture is ovate; inner lip smooth; canal short, narrow and slightly recurved. Faint growth lines, closely set, show over the entire surface, but general appearance is smooth.

Named in honor of Prof. Marcus A. Hanna of the Department of Geology of the University of Washington.

Dimensions--Altitude, with spire lacking one or two whorls, and canal slightly broken, 63 mm.; diameter 49 mm.

## FAMILY EPITONIIDAE

Genus EPITONIUM Bolten, 1798

Epitonium saundersi n. sp.

Description--Shell is of medium size, whorls rounded, closely adherent, greatest diameter at about middle of whorl; number of whorls unknown, probably five or six; surface ornamented with fifteen continuous varices which are bladed in form and strongly reflexed; spiral sculpture consists of three low wide adjacent ribs on region of greatest convexity, and these do not affect the varices; body whorl rounded, has a decided basal keel, and on it the varices extend to the aperture; aperture rounded; outer lip decidedly reflexed; inner lip with callus on lower portion, which is same width as outer lip; no umbilicus.

Named in honor of Dr. E. J. Saunders of the Department of Geology of the University of Washington.

Dimensions--Altitude 15 mm.; diameter 11 mm. Spire missing.

Comparison--This form differs from Epitonium condoni Dall in having higher and thinner varices, no callus deposits at junction of varices at suture, having three flat wide spiral ribs in place of ten sharp narrow spirals, in having fewer whorls, and in the greater apical angle.

FAMILY CREPIDULIDAE DALL

Genus CREPIDULA Lamarck, 1801

Crepidula wardi n. sp.

Description--Shell is of medium size, heavy; varying as to convexity, some forms with altitude equal to one half the width, others with altitude equal to width; variation does not depend upon size nor age of shell but seems to vary as to place of attachment. Shells have whorls of about one and one fourth whorls, apex inconspicuous and curved back close to margin of shell. Aperture large, ovate; septum large, covering one half the aperture; margin of the septum extends diagonally across aperture from near apex to anterior margin. Surface is roughened by growth lines.

Named in honor of Alfred H. Ward of the Department of Geology of the University of Washington.

Dimensions--Height of cluster of shells, 40 mm.; altitude 35 mm.

Comparison--This form is larger and coarser than Crepidula dickersoni Weaver and Palmer and is more frequently found in clusters.

FAMILY TROCHIDAE ADAMS

Genus SOLARIELLA Wood

Solariella kincaidi n. sp.

Description--Shell minute, turbinate, with nacreous inner layer; whorls rounded; outer layer of shell calcareous, ornamented with spiral and transverse ribbing giving a cross hatched appearance. The outer layer is removed from most of the surface of the specimen and the inner nacreous

layer exposed. The nacreous layer is ornamented with the same spiral ribbing as appears on the outside surface, but transversely with growth lines only.

Named in honor of Prof. W. S. Kincaid, head of the Department of Zoology of the University of Washington.

Dimensions--Altitude 3 mm.; diameter 3 mm.

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