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CLARK'S TERTIARY MOLLUSCAN TYPES FROM THE YAKATAGA DISTRICT,
GULF OF ALASKA, ALASKA

By

Warren O. Addicott, Saburo Kanno, Kenji Sakamoto,
and Don J. Miller

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Clark's Tertiary molluscan types from the Yakataga

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Warren O. Addicott^{1/}, Saburo Kanno^{2/}, Kenji Sakamoto^{1/},
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Abstract

Forty-six molluscan taxa described and illustrated by Clark (1932)
part of the
from the Oligocene and Miocene/Poul Creek and Yakataga Formations,
Gulf of Alaska Tertiary Province, Alaska, are re-illustrated. One
species from the Poul Creek Formation, Turritella sp., figured by
Merriam (1941) is also re-illustrated. Clark's generic assignments
have been re-evaluated in most cases necessitating changes in the
generic classification of his species. Some of the collections used
by Clark contain mixtures of species from both the Poul Creek and
Yakataga Formations, and therefore the stratigraphic occurrence of
these mollusks has also been restudied.

^{1/} U.S. Geological Survey, Menlo Park, California

^{2/} Tokyo University of Education, Tokyo, Japan

^{3/} Deceased, formerly of U.S. Geological Survey, Menlo Park, California

Introduction

The Gulf of Alaska Tertiary Province, extending in an arcuate belt from near Prince William Sound (lat 60.5° N.) southeastward to the Fairweather Range (lat 58.5° N.) (Plafker, 1967) includes a thick sequence of marine and nonmarine strata that has been divided into two broad units: 1) indurated, strongly deformed rocks of early Tertiary age and 2) less deformed and indurated rocks of middle and late Tertiary age (Plafker, 1971). Marine strata of Eocene through Pliocene age are characterized by abundant molluscan fossils. Although poorly known, these assemblages have provided the framework for age determinations and correlation of the marine sequence of this province (MacNeill and others, 1961; Plafker, 1971).

Descriptive paleontologic documentation of the marine Tertiary sequence is limited to a very few reports (Clark, 1932; MacNeill, 1961, 1965, 1967). Other systematic studies, principally monographs of Pacific coast molluscan genera, touch on one or two taxa from the Gulf of Alaska Tertiary province (Schenck, 1931, 1936; Merriam, 1941; Parker, 1949; Keen, 1954; Smith, 1970). However, the only systematic treatment of Tertiary molluscan faunas was by Clark (1932) who described material from the Oligocene and Miocene part of the Poul Creek and Yakataga Formations of the Yakataga District (lat 60° N.). The collections were made by N. L. Taliaferro (1932) during the course of geologic mapping of the District. A systematic study of mollusks from the Yakataga District, principally from the Miocene section at Cape Yakataga, is being prepared by Kanno. It will treat many, but not all, of the species illustrated by Clark (1932), in addition to several species not previously recorded from the Yakataga District.

Clark's report stands as the principal reference for faunal correlation of the / ^{upper} Oligocene to middle Miocene marine strata of this area. It has taken on added significance during the past few years on account of heightened geological exploration of the Gulf of Alaska Tertiary province by petroleum companies. Yet this unique report has proven to be difficult and in many ways unsatisfactory to use for biostratigraphic work, because of the exceptionally poor quality of the fossil illustrations, and because of the stratigraphic mis-allocation of many of the collections. Many of the illustrations are so poor that the specimens cannot even be determined generically. For example, divaricate sculpture cannot be detected on the figure of "Nucula hamiltonensis" [Acila taliaferroi] Clark (1932, pl. 14, fig. 14). The problem of stratigraphic assignment of collections was what led Clark (1932) to the incorrect conclusion that the mollusks from the Poul Creek and Yakataga Formations represented a single faunal unit or zone, and that none of his species were limited in stratigraphic occurrence to the Yakataga Formation. To the contrary, subsequent biostratigraphic studies have clearly indicated that several distinctive faunal units are indeed represented in these formations (MacNeil, 1957; Plafker, 1971), and that there is a very pronounced faunal change at or near the Poul Creek/Yakataga Formation boundary.

The purpose of the present report is to make available high-quality photographic illustrations of Clark's molluscan types, to place these species in a modern framework of taxonomic classification, and, finally, to indicate as accurately as possible the stratigraphic occurrence of these specimens.

The photography in this report is by Sakamoto; stratigraphic allocation of Taliaferro's (1932) collections is by Miller; and taxonomic revisions are by Kanno and Addicott.

Stratigraphic allocation of collections

Neither Taliaferro's (1932) nor Clark's (1932) reports included locality descriptions. The localities were shown, however, on an index map by Clark (1932, fig. 1) at a scale of about 1 inch = 3 miles. Miller's formational assignments and notes on geographic occurrence of the fossil localities are shown in table 1. According to Joseph H. Peck, Jr.,

Table 1 near here.

Museum of Paleontology, University of California, Berkeley (oral commun., December, 1970), Miller searched Taliaferro's field notes and discussed the problems with Taliaferro during the early 1950's. Miller's comments, therefore, represent as thorough an evaluation as possible of the stratigraphic position of the fossil localities. The localities are from the coastal area between Yakataga Reef, on the west, and the head of Icy Bay, on the east. The geology of this part of the Yakataga District has been mapped by Miller (1957).

Table 1. Stratigraphic assignment of Taliaferro's collections from the Poul Creek and Yakataga Formations, Yakataga district, Alaska (Clark, 1932, fig. 1)

California University

(UC) locality no.

3850	Poul Creek Formation, about 700 feet below top (locality approximate).
3851	Float, probably Poul Creek Formation. Not plotted on map; location of "Salmon Creek" not known.
3852	Float, probably Yakataga Formation; could include uppermost Poul Creek Formation.
3853	Yakataga Formation, lower part (locality approximate).
3854	Poul Creek Formation, about 2,000 feet below top.
3855	Probably Poul Creek Formation. Not plotted on map; locality not given in catalogue. May be field number Y-9, float, Little River?
3856	Float, Poul Creek Formation and/or Yakataga Formation. Not plotted on map; locality indefinite.
3857	Poul Creek Formation, middle or lower part (locality approximate).
3858	Float, Poul Creek Formation and/or Yakataga Formation.
3859	Yakataga Formation, about 350 feet above base.
3860	Poul Creek Formation, upper 50 feet?
3861	Float, Poul Creek Formation and/or Yakataga Formation. Not plotted on map; locality indefinite.

Table 1. Stratigraphic assignment of Taliaferro's collections from the Poul Creek and Yakataga Formations, Yakataga district, Alaska (Clark, 1932, fig. 1)--continued

California University

(UC) locality no.

3863	Probably Poul Creek. Not plotted on map; locality not given in catalogue.
3864	Unknown, Poul Creek Formation and/or Yakataga Formation. Not plotted on map; locality not given in catalogue. Locality is "Lawrence Creek" on Clark's list.
3868	Poul Creek Formation at least in part. Not plotted on map; locality not given in catalogue. Locality is "Lawrence Creek" on Clark's list.
3869	Yakataga Formation? Locality indefinite; as plotted on Clark's map it falls in outcrop of Yakataga Formation, but list of fossils is more suggestive of Poul Creek Formation.
3870	Probably lower part of Yakataga Formation (locality approximate).
3871	Float largely Poul Creek Formation, but may include some Yakataga Formation. Not plotted on map; locality indefinite.
3872	Float, Poul Creek Formation and/or Yakataga Formation. Not plotted on map; locality indefinite.

Biostratigraphic evaluation of collections

Biostratigraphic criteria can also be used to evaluate the stratigraphic assignment of Clark's material. There is a very pronounced faunal change at or near the Poul Creek/Yakataga boundary contrary to Clark's (1932, p. 799) conclusion that all of the species in the Yakataga Formation range downward into the Poul Creek Formation. The diverse, relatively warm-water fauna of the upper part of the Poul Creek is replaced, in the lower part of the Yakataga Formation, by a cool-water fauna of much different composition and of very low species diversity. The faunal change is striking as ^(MacNeil, 1957) relatively few species are common to both formations. This change is attributed to the onset of local glaciation and resultant cooling of shallow water, nearshore marine environments.

Using stratigraphic ranges shown by MacNeil (1957) it seems clear that at least six of Clark's collections (U.C. locs. 3857, 3858, 3864, 3868, 3869, and 3870) contain stratigraphically anomalous associations. In other words, these collections contain species with mutually exclusive stratigraphic ranges. Kanno's unpublished biostratigraphic studies support these inferences. Two of the largest collections (U.C. locs. 3850 and 3854), however, do not appear to be mixed. Both are from the upper part of the Poul Creek Formation. Almost half of the molluscan taxa figured by Clark (1932) are from these two localities. One of the three collections that Clark (1932, p. 799) maintained were from the Yakataga Formation (U.C. loc. 3859) also does not appear to be mixed according to currently known stratigraphic ranges of the seven species listed by Clark.

This form of evaluation is limited, however, by the changing concepts for recognition of the Poul Creek/Yakataga boundary. The boundary recognized by Miller (1957) and MacNeil (1957, 1961), for example, falls within the lower part of the Yakataga Formation as it is now recognized by Kanno and other geologists working in this area (George Plafker, oral commun., October, 1970). The lowering of the boundary places it at or near the lowest occurrence of cool-water molluscan assemblages in the Poul Creek/Yakataga sequence at Cape Yakataga.

Taxonomic revision of Clark's names

Species described and illustrated by Clark (1932) are listed systematically in table 2. One of Clark's (1932) types, Cancellaria

Table 2 near here.

alaskensis (UCMP no. 12395), has been missing from the University of California type collection since 1933 (Joseph H. Peck, Jr., oral commun., October, 1970). Taxonomic revisions are indicated in the right-hand column of the table and in brackets on plates 1-6. Systematic arrangement of gastropods is after Keen (1963); of pelecypods after McCormick and Moore (1969).

Table 2. Correlation of Clark's (1932) names with names used in this report. Species preceded by an asterisk (*) are considered to be restricted, in stratigraphic occurrence, to the Yakataga Formation. Clark (1932) This report

GASTROPODS:

<u>Turricula turbonata</u> n. sp.	<u>Bathybembix turbonata</u> (Clark)
<u>Natica</u> (<u>Cryptonatica</u>) n. sp.	<u>Cryptonatica</u> aff. <u>C. clausa</u> (Broderip and Sowerby)
<u>Polinices</u> (<u>Euspira</u>) <u>ramonensis</u> Clark	<u>Euspira ramonensis</u> (Clark)
<u>Galeodea apta</u> Tegland (pl. 21, figs. 1, 3)	<u>Liracassis apta</u> (Tegland)
<u>Galeodea apta</u> Tegland (pl. 21, figs. 2, 9, 15)	<u>Liracassis</u> aff. <u>L. petrosa</u> (Conrad)
<u>Turritella hamiltonensis</u> n. sp.	<u>Turritella hamiltonensis</u> Clark
<u>Turritella</u> n. sp.	<u>Turritella</u> n. sp. Clark
<u>Turritella</u> cf. <u>porteriensis</u> Weaver	<u>Turritella</u> aff. <u>T. diversilineata blakeleyensis</u> Weaver
<u>Colus rearensis</u> n. sp.	<u>Ancistrolepis rearensis</u> (Clark)
* <u>Neptunea</u> aff. <u>tabulatus</u> Baird	<u>Neptunea</u> aff. <u>N. tabulata</u> (Baird)
<u>Fusinus</u> cf. <u>hannibali</u> Clark and Arnold	<u>Priscofusinus</u> aff. <u>P. hannibali</u> (Clark and Arnold)
<u>Psephaea corrugata</u> n. sp.	<u>Misashia</u> (<u>Miopleiona</u>) <u>corrugata</u> (Clark)
<u>Cancellaria</u> (<u>Progabbi</u>) <u>alaskensis</u> n. sp.	<u>Cancellaria</u> (<u>Crawfordina</u>) <u>alaskensis</u> Clark
<u>Haminoea</u> n. sp.?	<u>Haminoea</u> n. sp.? Clark
<u>Scaphander alaskensis</u> n. sp.	<u>Scaphander alaskensis</u> Clark

Table 2. Correlation of Clark's (1932) names with names used in this report.--continued

Clark (1932)	This report
PELECYPods:	
<u>Nucula (Acila) gettysburgensis</u> Reagan	<u>Acila (Acila) gettysburgensis</u> (Reagan)
<u>Nucula (Acila) gettysburgensis</u> <u>alaskensis</u> n. var.	<u>Acila (Acila) gettysburgensis</u> (Reagan)
<u>Nucula (Acila) hamiltonensis</u> n. sp.	<u>Acila (Truncacila) taliaferroi</u> Schenck
<u>Nucula (Acila) yakatagensis</u> n. sp.	<u>Acila (Truncacila) yakatagensis</u> (Clark)
<u>*Leda fossa</u> Baird	<u>Nuculana (Borissia) olferovi</u> <u>sachalinensis</u> Krishtofovich
<u>*Pecten (Patinopecten)</u> <u>yakatagensis</u> n. sp.	<u>Patinopecten (Lituyapecten)</u> <u>yakatagensis</u> (Clark)
<u>Thyasira bisecta</u> Conrad n. var.	<u>Conchocele disjuncta</u> Gabb
<u>Venericardia hamiltonensis</u> n. sp.	<u>Cyclocardia hamiltonensis</u> (Clark)
<u>Venericardia yakatagensis</u> n. sp.	<u>Cyclocardia yakatagensis</u> (Clark)
<u>Cardium (Serripes) hamiltonensis</u> n. sp.	<u>Papyridea? hamiltonensis</u> (Clark)
<u>Cardium (Laevicadium)</u> <u>alaskensis</u> n. sp.	<u>Nemocardium (Keenae?) alaskense</u> (Clark)
<u>Cardium (Papyridea) brooksi</u> n. sp.	<u>Clinocardium brooksi</u> (Clark)

Table 2. Correlation of Clark's (1932) names with names used in this report.--continued

Clark (1932)	This report
PELECYPods (continued)	
<u>Cardium (Ceratoderma)</u> <u>yakatagensis</u> n. sp.	<u>Clinocardium yakatagensis</u> (Clark)
<u>Macra (Mactrotoma) californica</u> <u>equilateralis</u> n. subsp.	<u>Spisula californica equilateralis</u> (Clark)
<u>Spisula ramonensis</u> Packard (pl. 14, figs. 1, 4; pl. 19, fig. 3)	<u>Spisula ramonensis</u> Packard
<u>Spisula ramonensis</u> Packard (pl. 14, fig. 5)	<u>Spisula aff. S. ramonensis</u> Packard
<u>Schizothaerus? trapezoides</u> n. sp.	<u>Spisula trapezoides</u> (Clark)
<u>*Tellina</u> sp.	<u>Macoma? cf. M. arctata</u> (Conrad)
<u>Macoma cf. secta</u> Conrad (pl. 16, fig. 3)	<u>Macoma aff. M. calcarea</u> (Gmelin)
<u>Macoma cf. M. middendorffii</u> Dall	<u>Macoma cf. M. incongrua</u> (von Martens)
<u>Heterodonax? sp.</u>	<u>Macoma cf. M. incongrua</u> (von Martens)
<u>Macoma cf. secta</u> Conrad (pl. 16, fig. 2)	<u>Macoma (Rexithaerus) sp.</u>
<u>Macrocallista pittsburgensis</u> Dall	<u>Macrocallista pittsburgensis</u> (Dall)

Table 2. Correlation of Clark's (1932) names with names used in this report.--continued

Clark (1932)	This report
PELECYPODS (continued)	
<u>Macrocallista?</u> <u>rearensis</u> n. sp.	<u>Macrocallista rearensis</u> Clark
* <u>Chione securis</u> <u>alaskensis</u> n. subsp.	<u>Securella alaskensis</u> (Clark)
<u>Mya salmonensis</u> n. sp.	<u>Mya</u> (<u>Mya</u>) <u>salmonensis</u> Clark
* <u>Mya truncata</u> Linnaeus n. subsp.?	<u>Mya</u> (<u>Mya</u>) <u>truncata</u> Linne
<u>Schizothaerus nuttallii</u> Conrad n. subsp.?	<u>Mya</u> sp.
* <u>Panomya</u> (<u>Arctica</u>) <u>turgida</u> Dall	<u>Panomya arctica</u> (Lamarck)
* <u>Panomya</u> n. sp.?	<u>Panomya</u> cf. <u>P. arctica</u> (Lamarck)
<u>Saxicava pholadis</u> Linnaeus	? <u>Panomya</u> sp.
<u>Pandora</u> (<u>Konnerlia</u>) <u>yakatagensis</u> n. sp.	<u>Pandora yakatagensis</u> Clark
<u>Thracia schencki</u> Tegland (1933)	<u>Thracia schencki</u> Clark (1932)
CEPHALOPODA:	
<u>Aturia angustata</u> (Conrad)	<u>Aturia alaskensis</u> Schenck
<u>alaskensis</u> Schenck	

Fossil plates

The initial entry on the plate descriptions is the name used by Clark (1932, pls. 14-21). The spelling is as originally used and may contain typographical errors or lapses. If the name is followed by another one in brackets, that name represents our re-evaluation of generic classification and of specific identification. Not all of the species have been assigned to subgenera, in part owing to the poor quality of preservation and, in the case of some pelecypods, to the fact that hinges have not been exposed on most of the specimens. The intent of this report is to provide a current generic classification of Clark's (1932) taxa and not to evaluate the validity of his specific names. Nevertheless, some of the obvious misidentifications and synonyms are indicated by revised specific identifications in table 2. It is recognized that detailed systematic study of his material may prove that some of the other species are also synonyms.

In preparing his plates Clark (1932) cropped the matrix from around many of the photographs of the fossil, and in some cases the resultant outline does not accurately depict the fossil specimen. In the interest of reproducing the type material as objectively as possible, this practice has not been followed in preparing illustrations for this report.

Acknowledgments

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Plate 1

- All figures natural size unless otherwise indicated on plate
- Figures 1, 2, Galeodea apta Tegland [Liracassis aff. L. petrosa 5, 6. (Conrad)].
- 1, 2. UCMP 12404. UCMP loc. 3871. Clark (1932, pl. 21, fig. 15).
- 5, 6. UCMP 12405. UCMP loc. 3871. Clark (1932, pl. 21, fig. 9).
- 3, 11. Turritella cf. porterensis Weaver [Turritella aff. T. diversilineata blakeleyensis Weaver].
3. UCMP 31361. UCMP loc. 3868. Clark (1932, pl. 21, fig. 10).
11. UCMP 31440. UCMP loc. 3858. Clark (1932, pl. 21, fig. 16). A crushed specimen. Clark.
4. Turritella n. sp./ UCMP 31360. UCMP loc. 3871. Clark (1932, pl. 21, fig. 8).
- 7, 8. Galeodea apta Tegland [Liracassis apta (Tegland)].
- UCMP 12392. UCMP loc. 3850. Clark (1932, pl. 21, figs. 1, 3).
- 9, 10, 13. Turritella hamiltonensis Clark.
- 9, 10. Holotype UCMP 30281. UCMP loc. 3850. Clark (1932, pl. 21, fig. 14).
13. Paratype UCMP 30280. UCMP loc. 3850. Clark (1932, pl. 21, fig. 13).

Plate 1 (continued)

- Figures 12, 15. Taricula turbonata Clark [Bathybembix turbonata (Clark)]. Holotype. UCMP 32420. UCMP loc. 3857. Clark (1932, pl. 20, fig. 11).
- 14, 16. Neptunea aff. tabulatus Baird [Neptunea aff. N. tabulata (Baird)]. UCMP 12406. UCMP loc. 3870. Clark (1932, pl. 20, fig. 13).

Plate 2

All figures natural size unless otherwise indicated on plate

- Figures 1, Fusinus cf. hannibali Clark and Arnold [Priscofus 4-6. aff. P. hannibali (Clark and Arnold)].
1. UCMP 31356. UCMP loc. 3850. Clark (1932, pl. 20, fig. 1).
4. UCMP 31358. UCMP loc. 3868. Clark (1932, pl. 20, fig. 2).
- 5, 6. UCMP 31357. UCMP loc. 3868. Clark (1932, pl. 20, fig. 3).
- 2, 3, 19. Colus rearensis Clark [Ancistrolepis rearensis (Clark)].
- 2, 3. Holotype. UCMP 12402. UCMP loc. 3868. Clark (1932, pl. 20, fig. 14).
19. Paratype. UCMP 12401. UCMP loc. 3868. Clark (1932, pl. 20, fig. 15).
- 7, 8. Scaphander alaskensis Clark. Holotype. UCMP 12382. UCMP loc. 3854. Clark (1932, pl. 21, figs. 6, 7).
- 9, 10, 14, Polinices (Euspira) ramonensis Clark [Euspira ramonensis 15, 20. (Clark)].
- 9, 10. UCMP 12381. UCMP loc. 3854. Clark (1932, pl. 20, figs. 4, 5).
- 14, 15. UCMP 12384. UCMP loc. 3854. Clark (1932, pl. 20, fig. 9). Specimen crushed, callus missing.
20. UCMP 12396. UCMP loc. 3854. Clark (1932, pl. 20, fig. 8).

Plate 2 (continued)

Figures 11, Natica (Cryptonatica) n. sp. Clark [Cryptonatica aff.

16. C. clausa (Broderip and Sowerby).] UCMP 31359.

UCMP loc. 3850. Clark (1932, pl. 20, figs. 6, 7).

12, 13, Cancellaria (Progabbi) alaskensis Clark [Cancellaria

17, 18. (Crawfordina) alaskensis Clark]. The holotype of this species is lost.

12, 13. Paratype. UCMP 31353. UCMP loc. 3868.

Clark (1932, pl. 20, fig. 12).

17, 18. Paratype. UCMP 31354. UCMP loc. 3868.

Clark (1932, pl. 20, fig. 10).
Clark.

21, 22. Haminoea n. sp.? / UCMP 12397. UCMP loc. 3850. Clark

(1932, pl. 21, fig. 12).

23, 24. Galeodea apta Tegland [Liracassis aff. L. petrosa

(Conrad)]. UCMP 12383. UCMP loc. 3860. Clark

(1932, pl. 21, fig. 2).

25, 27, 28. Psephaea corrugata Clark [Musashia (Mionleiona)

corrugata (Clark)].

25. Paratype. UCMP 12399. UCMP loc. 3871. Clark

(1932, pl. 21, fig. 4).

27, 28. Holotype. UCMP 12398. UCMP loc. 3850.

Clark (1932, pl. 21, figs. 5, 11).

26. Turritella sp. Merriam. UCMP 15445. UCMP loc. 3854.

Merriam (1941, pl. 40, fig. 6).

Plate 3

All figures natural size unless otherwise indicated on plate

Figures 1, 2. Thyasira bisecta Conrad [Conchocele disjuncta Gabb].

UCMP 30385. UCMP loc. 3860. Clark (1932, pl. 14, fig. 2).

3. Cardium (Serripes) hamiltonensis Clark [Papyridea

hamiltonensis (Clark)]. Holotype. UCMP 30405.

UCMP loc. 3855. Clark (1932, pl. 18, fig. 7).

4, 14, 15. Venericardia yakatagensis Clark [Cyclocardia yakatagensis

(Clark)]. Holotype. UCMP 12409. UCMP loc. 3854.

Clark (1932, pl. 14, figs. 6, 7).

5, 6. Venericardia hamiltonensis Clark [Cyclocardia

hamiltonensis (Clark)]. Holotype. UCMP 12408.

UCMP loc. 3858. Clark (1932, pl. 14, figs. 9, 10).

7. Nucula (Acila) gettysburgensis var. alaskensis Clark

[Acila (Acila) gettysburgensis (Reagan)]. Holotype.

UCMP 30388. UCMP loc. 3871. Clark (1932, pl. 14, fig. 15).

8, 10. Nucula (Acila) hamiltonensis Clark [Acila (Truncacila)

taliaferroi Schenck].

8. Paratype. UCMP 30375. UCMP loc. 3854. Clark (1932, pl. 14, fig. 11).

10. Holotype. UCMP 30376. UCMP loc. 3850. Clark (1932, pl. 14, fig. 14).

Plate 3 (continued)

- Figures 9. Leda fossa Baird [Nuculana (Borissia) olferovi
sachalinensis Krishtofovich]. UCMP 12403. UCMP
loc. 3858. Clark (1932, pl. 14, fig. 3).
- 11, 13. Nucula (Acila) gettysburgensis Reagan [Acila (Acila)
gettysburgensis (Reagan)]. UCMP 30409. UCMP loc.
3871. Clark (1932, pl. 14, fig. 12).
12. Nucula (Acila) yakatagensis Clark [Acila (Truncacila)
yakatagensis (Clark)]. Holotype. UCMP 30393. UCMP
loc. 3871. Clark (1932, pl. 14, fig. 13).
- 16, 17. Pecten (Patinopecten) yakatagensis Clark [Patinopecten
(lituyapecten) yakatagensis (Clark)].
16. Paratype. UCMP 30382. UCMP loc. 3859. Clark
(1932, pl. 15, fig. 8).
17. Holotype. UCMP 30381. UCMP loc. 3859. Clark
(1932, pl. 16, fig. 1).

Plate 4

All figures natural size

- Figures 1. Cardium (Ceratoderma) yakatagensis Clark [Clinocardium
yakatagensis (Clark)]. Holotype. UCMP 30384.
UCMP loc. 3860. Clark (1932, pl. 18, fig. 8).
- 2, 7, 11. Cardium (Serripes) hamiltonensis Clark [Papyridea?
hamiltonensis (Clark)].
2. Paratype. UCMP 30391. UCMP loc. 3850. Clark
(1932, pl. 18, fig. 6).
7. Holotype. UCMP 30405. UCMP loc. 3855. Clark
(1932, pl. 18, fig. 7).
11. Paratype. UCMP 30392. UCMP loc. 3850. Clark
(1932, pl. 18, fig. 10).
3. Cardium (laevicardium) alaskensis Clark [Nemocardium (Keenae?)
alaskense (Clark)]. Holotype. UCMP 30389. UCMP
loc. 3868. Clark (1932, pl. 18, fig. 4).
- 4, 14, 17. Schizothaerus? trapezoides Clark [Spisula trapezoides
(Clark)]. Holotype. UCMP 30374. UCMP loc. 3850.
Clark (1932, pl. 15, fig. 9). Specimen crushed
along posterior dorsal margin.
- 5, 9. Pandora (Kennerlia) yakatagensis Clark [Pandora yakatagensis
Clark]. Holotype. UCMP 30399. UCMP loc. 3869.
Clark (1932, pl. 17, figs. 1, 2).

Plate 4 (continued)

- Figures 6. Cardium (Papyridea) brooksi Clark [Clinocardium brooksi (Clark)]. Holotype. UCMP 30402. UCMP loc. 3850. Clark (1932, pl. 18, fig. 5).
8. Spisula ramonensis Packard. UCMP 32302. UCMP loc. 3850. Clark (1932, pl. 19, fig. 3).
- 10, 13. Spisula ramonensis Packard [Spisula aff. S. ramonensis Packard]. UCMP 30394. UCMP loc. 3861. Clark (1932, pl. 14, fig. 5).
12. Mactra (Mactrotoma) californica equilateralis Clark [Spisula californica equilateralis Clark]. Holotype. UCMP 30390. UCMP loc. 3870. Clark (1932, pl. 14, fig. 8).
- 15, 16, 18. Schizothaerus nutallii Conrad n. subsp.? Clark [Mya sp.]. UCMP 30380. UCMP loc. 3870. Clark (1932, pl. 15, figs. 1, 4).

Plate 5

All figures natural size unless otherwise indicated on plate

- Figures 1, 2. Macoma cf. secta Conrad [Macoma aff. M. calcarea (Gmelin)]. UCMP 30386. UCMP loc. 3854. Clark (1932, pl. 16, fig. 3).
- 3, 12. Spisula ramonensis Packard.
3. UCMP 30404. UCMP loc. 3850. Clark (1932, pl. 14, fig. 1).
12. UCMP 32301. UCMP loc. 3850. Clark (1932, pl. 14, fig. 4).
- 4, 8. Heterodonax? sp. Clark [Macoma cf. M. incongrua (von Martens)]. UCMP 30383. UCMP loc. 3850. Clark (1932, pl. 15, figs. 6, 7).
5. Macrocallista pittsburgensis Dall. UCMP 31345. UCMP loc. 3854. Clark (1932, pl. 19, figs. 1, 2).
6. Tellina sp. [Macoma? cf. M. arcata (Conrad)]. UCMP 31351. UCMP loc. 3859. Clark (1932, pl. 15, fig. 10).
- 7, 13. Mya truncata Linnaeus n. subsp.? Clark [Mya (Mya) truncata Linne]. UCMP 30379. UCMP loc. 3868. Clark (1932, pl. 17, fig. 5).
- 9, 16, 17, Mya salmonensis Clark [Mya (Mya) salmonensis Clark].
- 20, 23. 9, 17. Paratype. UCMP 30396. UCMP loc. 3851. Clark (1932, pl. 17, fig. 4).
- 16, 20, 23. Holotype. UCMP 30397. UCMP loc. 3851. Clark (1932, pl. 17, fig. 3).

Plate 5 (continued)

- Figures 10, Macrocallista? rearensis Clark. Holotype. UCMP 30378. UCMP loc. 3854. Clark (1932, pl. 18, fig. 1).
- 14, 15. Macoma cf. M. middendorffii Dall [Macoma cf. M. incongrua (von Martens)]. UCMP 12407. UCMP loc. 3850. Clark (1932, pl. 16, fig. 4).
- 18, 19. Chione securis alaskensis Clark [Securella alaskensis (Clark)]. Holotype. UCMP 30406. UCMP loc. 3868. Clark (1932, pl. 18, figs. 2, 3).
- 21, 22. Macoma cf. secta Conrad [Macoma (Rexithaerus) sp.]. UCMP 30387. UCMP loc. 3854. Clark (1932, pl. 16, fig. 2).

Plate 6

All figures natural size unless otherwise indicated

- Figures 1, 2, Panomya n. sp.? Clark [Panomya cf. P. arctica (Lamarck)].
4. UCMP 30401. UCMP loc. 3858. Clark (1932, pl. 17, fig. 7).
3. Saxicava pholadis Linnaeus [Panomya sp.]. UCMP 30395. UCMP loc. 3850. Clark (1932, pl. 18, fig. 9).
- 5, 6, 7, 11. Panomya (Arctica) turgida Dall [Panomya arctica (Lamarck)].
- 5, 6. UCMP 31347. UCMP loc. 3858. Clark (1932, pl. 17, fig. 9).
- 7, 11. UCMP 30398. UCMP loc. 3864. Clark (1932, pl. 17, fig. 6).
- 8-10, 12, 14. Thracia schencki Tegland [1933] [Thracia schencki Clark].
- 8, 9. UCMP 31342. UCMP loc. 3850. Clark (1932, pl. 15, fig. 3).
10. UCMP 31341. UCMP loc. 3854. Clark (1932, pl. 15, fig. 2).
- 12, 14. UCMP 30377. UCMP loc. 3850. Clark (1932, pl. 15, fig. 5).
- 13, 15. Aturia angustata (Conrad) alaskensis Schenck [Aturia alaskensis Schenck]. Holotype. UCMP 31362. UCMP loc. 3871. Clark (1932, pl. 16, figs. 5, 6).



1



2



3

x2



4



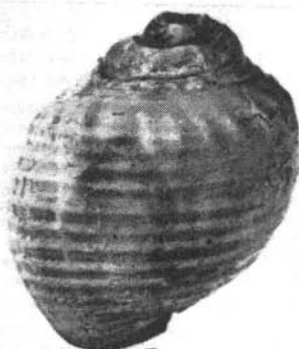
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6



7



8



9

x1 1/2



10

x1 1/2

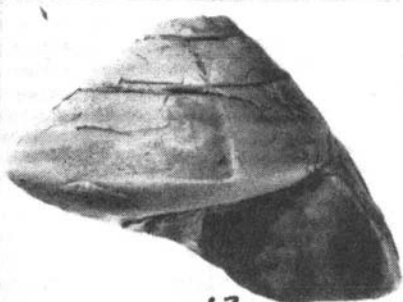


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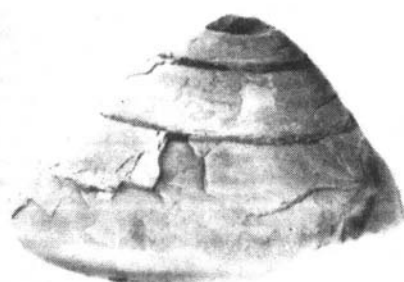
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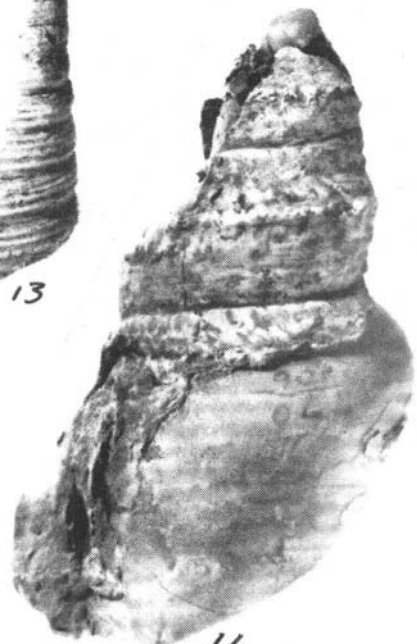
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13



15



16

PLATE I



1



2



3



4 $\times 1\frac{1}{2}$



5 $\times 1\frac{1}{2}$



6 $\times 1\frac{1}{2}$



7



8



9 $\times 3$



10 $\times 3$



11 $\times 1\frac{1}{2}$



12 $\times 2$



13 $\times 2$



14 $\times 2$



15 $\times 2$



16 $\times 1\frac{1}{2}$



17 $\times 1\frac{1}{2}$



18 $\times 1\frac{1}{2}$



19



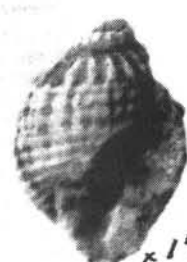
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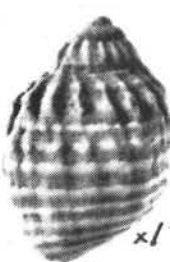
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24 $\times 1\frac{1}{2}$



25



26

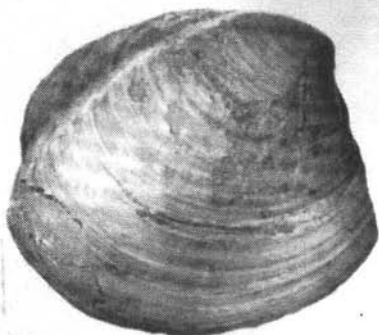


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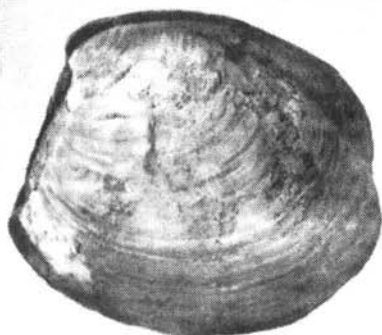


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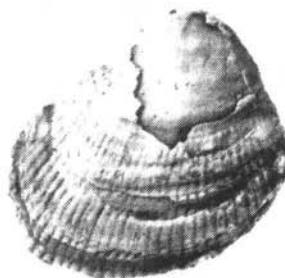
PLATE 2



1



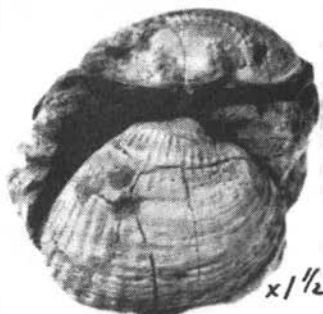
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3



4



5

x1 1/2



6

x1 1/2



7

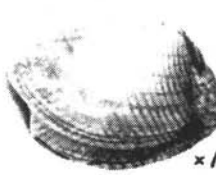


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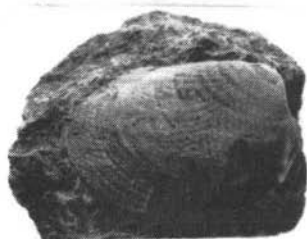
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x1 1/2



11

x1 1/2



12

x1 1/2



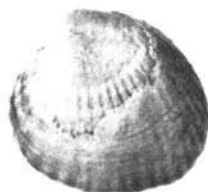
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x3



13

x1 1/2



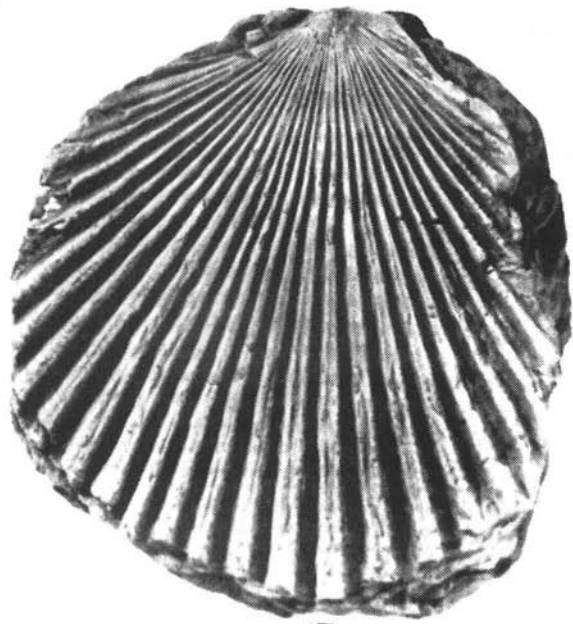
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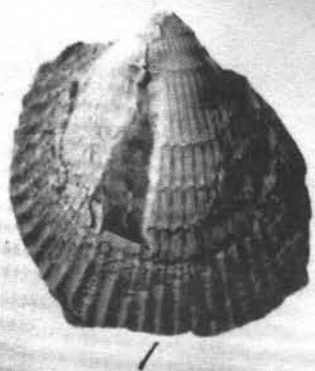


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17

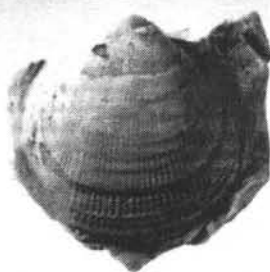
PLATE 3



1



2



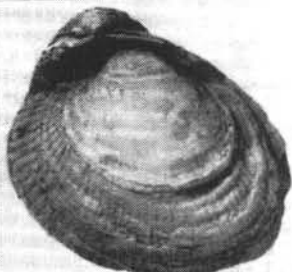
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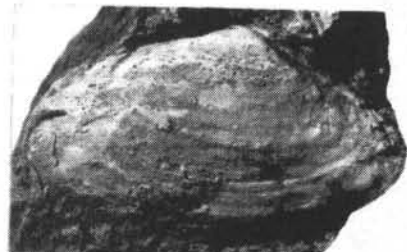
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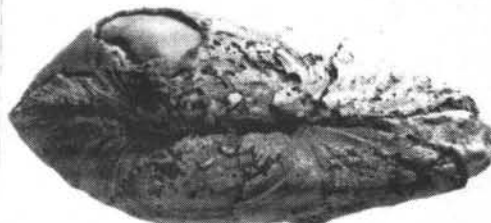
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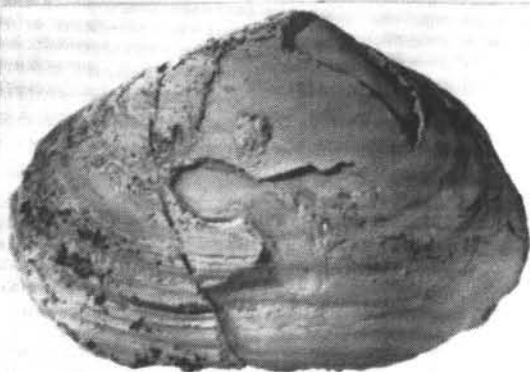
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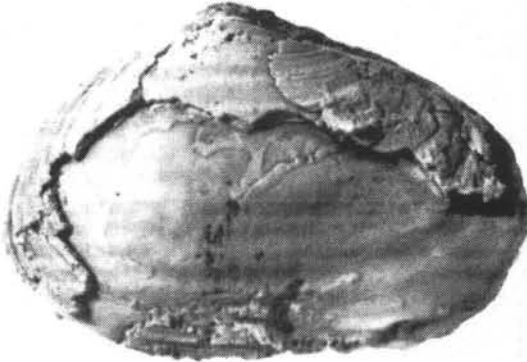
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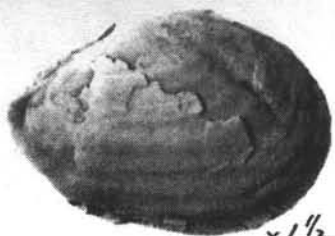


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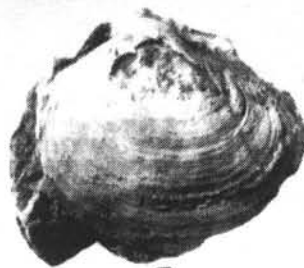
PLATE 4



1



2



3



4



5



6



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8



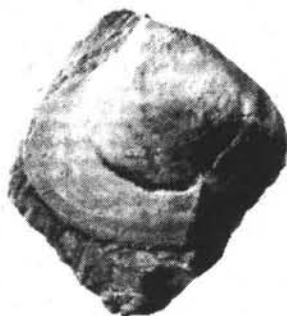
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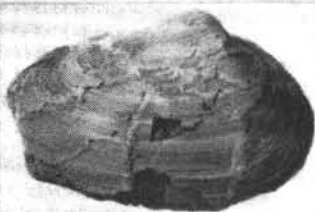
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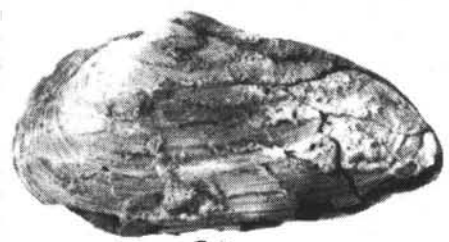
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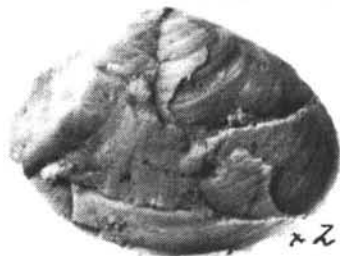
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PLATE 5

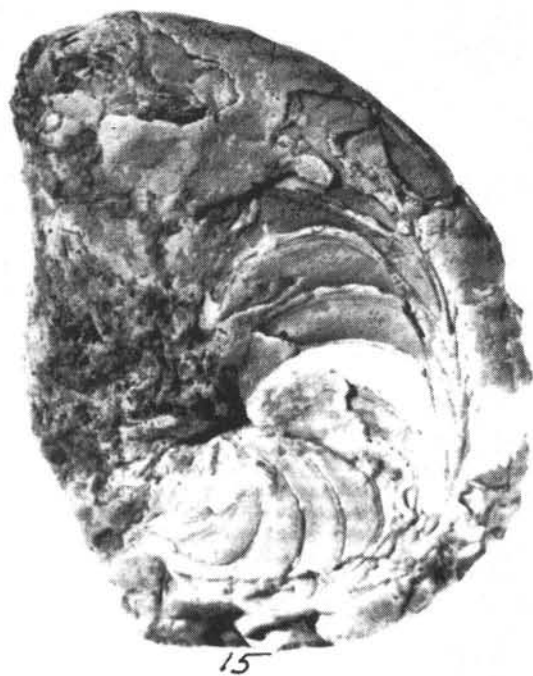
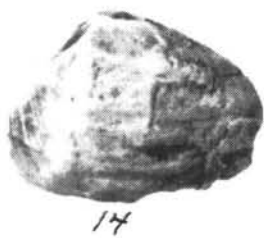
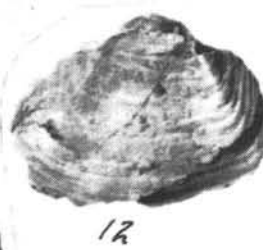
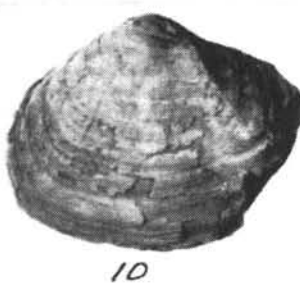
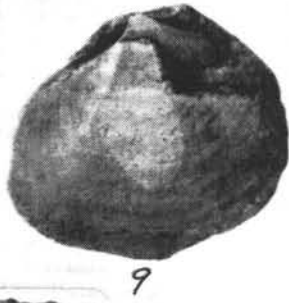
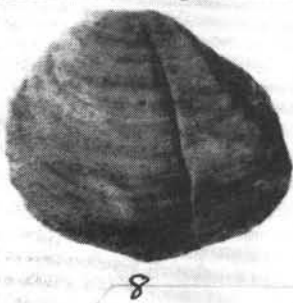
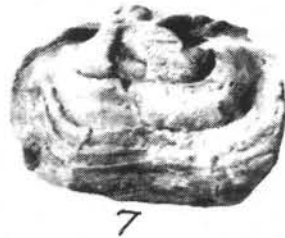
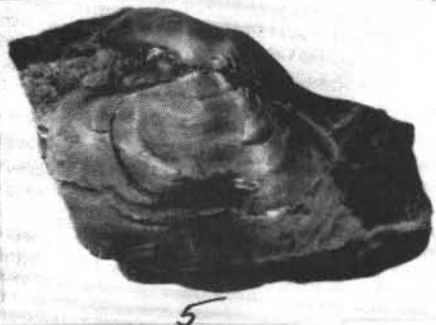
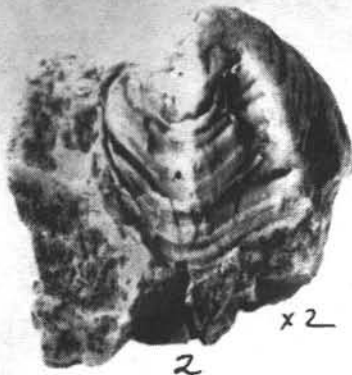


PLATE 6