

PLATES

(Unless otherwise indicated, all specimens are from the Pollack Farm Site, Delaware)

PLATE 1

- 1, 3. *Diadora griscomi* (Conrad)
 1. Lateral view; VMNH I 533; l. 43.7 mm; ht. 19.2 mm.
 3. Apical view of same specimen.
- 2, 5. *Tegula marylandicum* (Martin)
 2. Apertural view of coated specimen; VMNH I 534; ht. 13.5 mm; w. 19.0 mm.
 5. Apertural view of same specimen, uncoated, showing color on primary spiral ribs.
- 4, 6. *Calliostoma eboreus* (Wagner)
 4. Apertural view of specimen with single carina; VMNH I 535; ht. 15.9 mm; w. 12.5 mm.
 6. Apertural view of specimen with two carinae; VMNH I 536; ht. 11.2 mm; w. 11.7 mm.
- 7–9. *Diastoma insulaeamaris* (Pilsbry and Harbison)
 7. Apertural view; VMNH I 537; ht. 20.5 mm; w. 7.0 mm.
 8. Apertural view; VMNH I 538; ht. 20.5 mm; w. 7.3 mm.
 9. Apertural view; VMNH I 539; ht. 23.4 mm; w. 7.3 mm.
- 10, 13. *Carinorbis dalli* (Whitfield)
 10. Apertural view; VMNH I 540; ht. 12.5 mm; w. 8.9 mm.
 13. Dorsal view; VMNH I 541; ht. 15.6 mm; w. 8.0 mm.
- 11, 12. *Turritella cumberlandia* Conrad
 11. Apertural view; VMNH I 542; ht. 61.0 mm; w. 15.5 mm.
 12. Apertural view; VMNH I 543; ht. 29.4 mm; w. 6.2 mm.

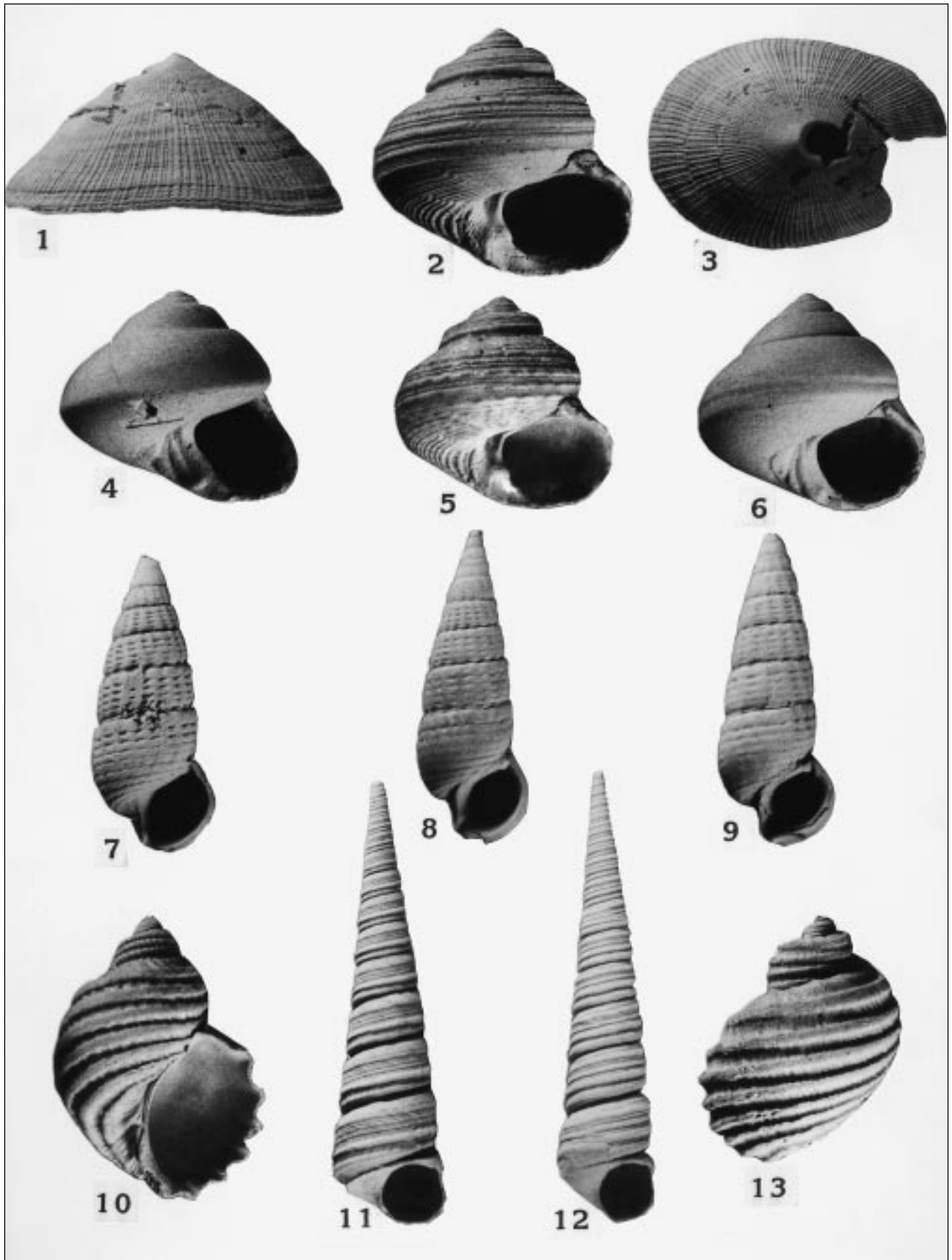


PLATE 2

1. *Turritella cumberlandia* Conrad
Apertural view of an immature specimen; VMNH I 544; ht. 23.3 mm; w. 9.9 mm.
- 2, 3. *Turritella tampae* Dall
 2. Apertural view; VMNH I 545; ht. 41.8 mm; w. 11.9 mm.
 3. Apertural view; VMNH I 546; ht. 77.0 mm; w. 21.9 mm.
4. *Turritella plebia* ssp.
Apertural view; VMNH I 547; ht. 24.4 mm; w. 5.7 mm.
5. *Serpulorbis granifera* (Say)
View of a number of individual with uncoiled whorls intertwined; VMNH I 548. One relatively regularly whorled specimen appears just above center. Height of illustrated specimen group 90.0 mm. Collected by G. Simonson.
- 6, 7. *Crepidula fornicata* Linné
 6. Dorsal view of specimen exhibiting exposed tube-burrows probably of the marine worm *Polydora*; VMNH I 549; ht. 47.9 mm; w. 35.0 mm.
 7. Dorsal view; VMNH I 550; ht. 46.0 mm; w. 33.1 mm.
- 8, 9. *Crepidula plana* Say
 8. Dorsal view of immature specimen; VMNH I 551; ht. 15.9 mm; w. 7.9 mm.
 9. Dorsal view; VMNH I 552; ht. 38.1 mm; w. 31.0 mm.
10. *Calyptraea centralis* (Conrad)
Dorsal view; VMNH I 553; ht. 9.7 mm; w. 21.9 mm.
- 11–15. *Calyptraea aperta* (Solander)
 11. Dorsal view of large specimen; VMNH I 554; ht. 21.0 mm; w. 41.7 mm.
 12. Apertural view of same specimen.
 13. Side view of same specimen.
 14. Dorsal view of incomplete specimen with strongly developed spines; VMNH I 555; ht. 18.0 mm.
 15. Side view of specimen with high spire; VMNH I 556; ht. 16.1 mm; w. 24.1 mm.

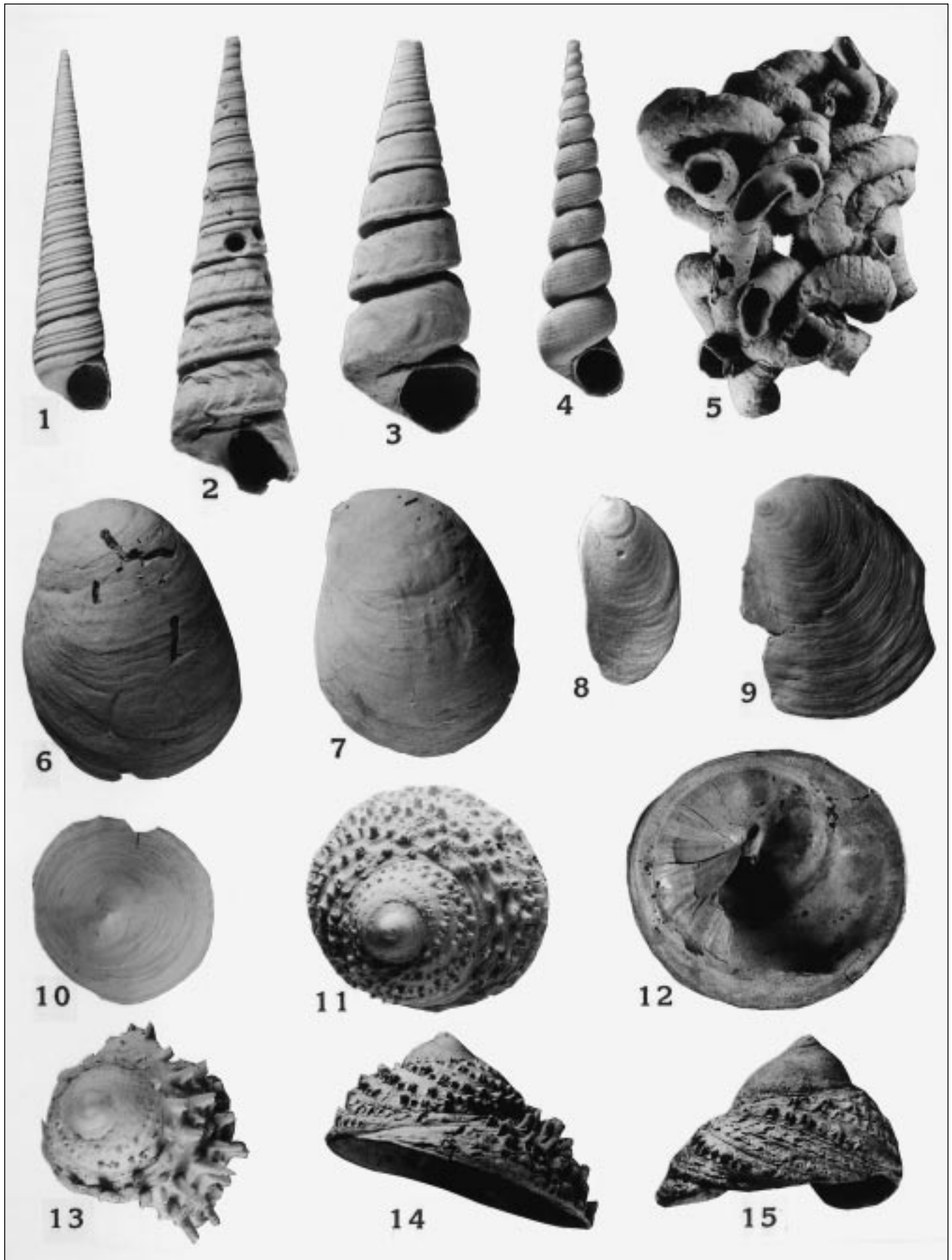


PLATE 3

- 1, 4. *Crucibulum costatum* (Say)
 1. Dorsal view of a weakly ribbed, incomplete, specimen; VMNH I 557; ht. 7.4 mm; w. 21.6 mm.
 4. Dorsal view of a strongly ribbed specimen; VMNH I 558; ht. 6.4 mm; w. 26.1 mm. Collected by G. Simonson.
- 2, 3. *Lunatia hemicrypta* (Gabb)
 2. Apertural view; VMNH I 559; ht. 4.0 mm; w. 3.3 mm.
 3. Apertural view; VMNH I 560; ht. 5.0 mm; w. 4.3 mm.
5. *Lunatia heros* (Say)

Apertural view; VMNH I 561; ht. 48.1 mm; w. 42.8 mm.
- 6, 9. *Sinum chesapeakensis* Campbell
 6. Dorsal view; VMNH I 562; ht. 20.4 mm; w. 18.6 mm.
 9. Apertural view of same specimen.
7. *Polinices duplicatus* (Say)

Apertural view; VMNH I 563; ht. 44.3 mm; w. 43.9 mm.
- 8, 10. *Ficus harrisi* (Martin)
 8. Apertural view of an incomplete specimen; VMNH I 564; ht. 19.5 mm; w. 18.1 mm.
 10. Dorsal view of same specimen.
11. *Epitonium charlestonensis* Johnson

Apertural view of a nearly complete specimen; VMNH I 565; ht. 31.1 mm; w. 17.5 mm.
12. *Murexiella cumberlandiana* (Gabb)

Apertural view; VMNH I 566; ht. 19.1 mm; w. 11.5 mm.
- 13, 14. *Urosalpinx subrusticus* (d'Orbigny)
 13. Apertural view; VMNH I 567; ht. 46.1 mm; w. 31.5 mm.
 14. Apertural view; VMNH I 568; ht. 28.8 mm; w. 16.0 mm.

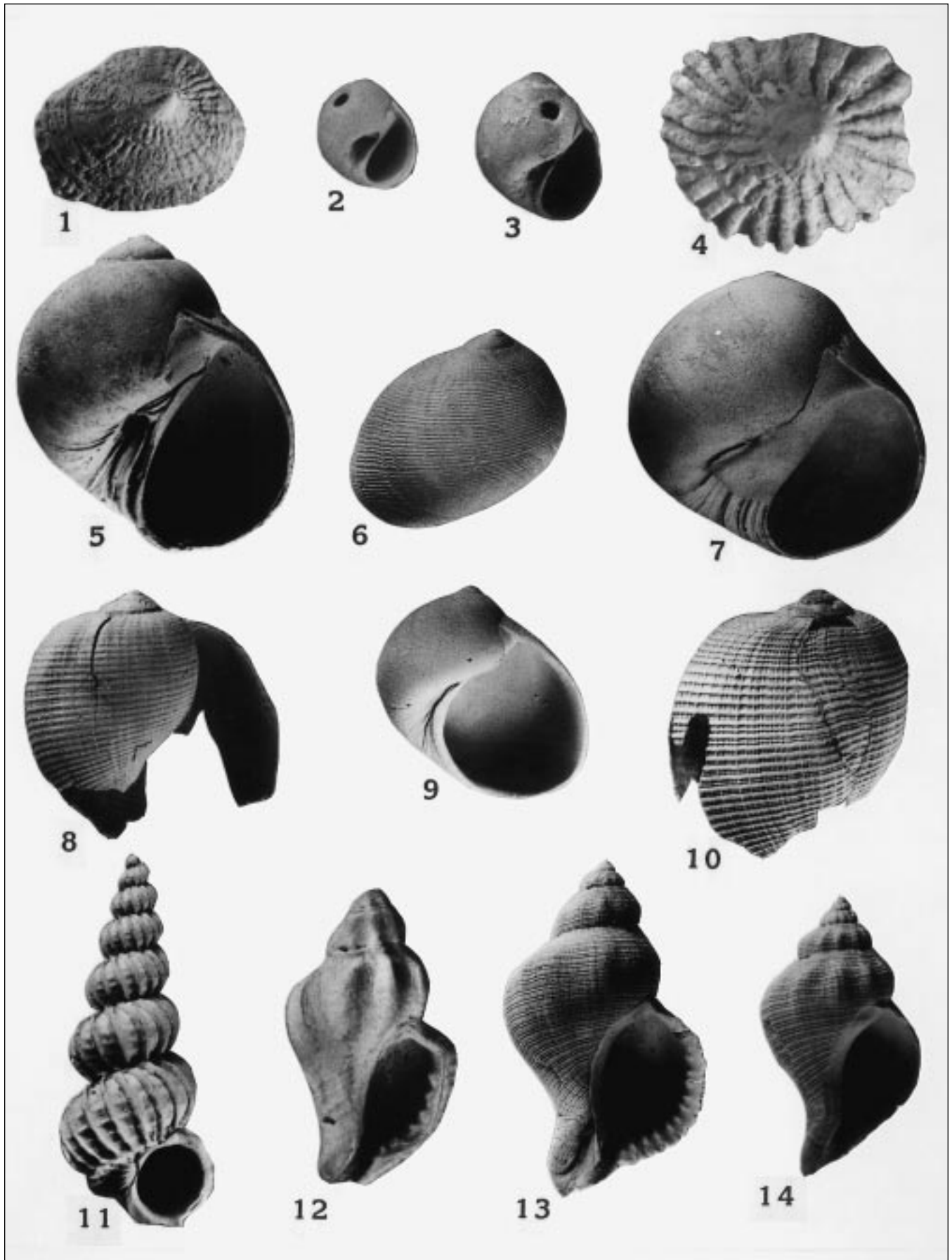


PLATE 4

1. *Typhis acuticosta* (Conrad)
Apertural view of an incomplete specimen; VMNH I 569; ht. 20.4 mm; w. 12.3 mm.
- 2–6. *Cymia woodi* (Gabb)
 2. Apertural view of specimen with strong shoulder and well-developed tubercles; VMNH I 570; ht. 28.8 mm; w. 18.2.
 3. Apertural view of specimen with moderately developed shoulder and weakly defined tubercles; VMNH I 571; ht. 28.2 mm; w. 14.9 mm.
 4. Apertural view of specimen with very weak shoulder and numerous, very weak tubercles; VMNH I 572; ht. 26.0 mm; w. 15.7 mm.
 5. Apertural view of specimen with smooth shoulder and finely reticulate sculpture; VMNH I 573; ht. 27.8 mm; w. 15.7 mm.
 6. Dorsal view of specimen with smooth shoulder and only spiral sculpture in the late whorls; VMNH I 574; ht. 34.5 mm; w. 21.5 mm. This specimen is close in appearance to Gabb's type.
7. *Tritonopsis ecclesiastica* (Dall)
Apertural view of an incomplete specimen; VMNH I 575; ht. 21.3 mm; w. 15.9 mm.
- 8–10. *Ecphora tricostata* Martin
 8. Apertural view; VMNH I 576; ht. 72.0 mm; w. 60.2 mm.
 9. Apertural view; VMNH I 577; ht. 54.4 mm; w. 40.7 mm.
 10. Dorsal view of same specimen.
11. *Chrysodomus patuxentensis* Martin
Apertural view; VMNH I 578; ht. 13.6 mm; w. 8.0 mm.

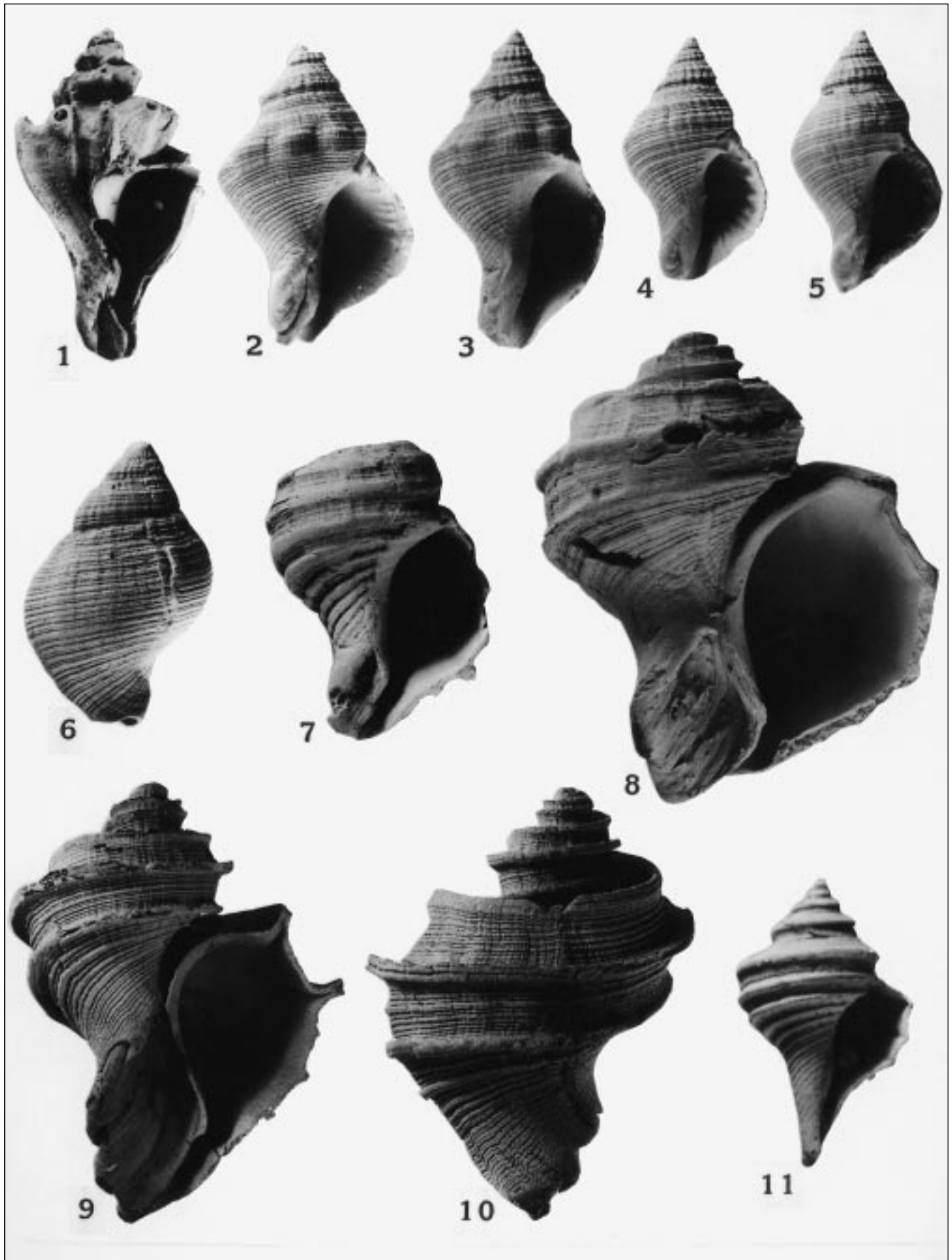


PLATE 5

1. *Siphonalia devexa* (Conrad)
Apertural view; VMNH I 579; ht. 55.6 mm; w. 24.0 mm.
2. *Nassarius trivitattoides elongata* (Whitfield)
Apertural view; VMNH I 580; ht. 11.0 mm; w. 4.5 mm.
3. *Nassarius trivitattoides* (Whitfield)
Apertural view; VMNH I 581; ht. 16.0 mm; w. 8.0 mm.
- 4–6. *Nassarius sopora* (Pilsbry and Harbison)
 4. Apertural view; VMNH I 582; ht. 12.1 mm; w. 6.8 mm.
 5. Apertural view; VMNH I 583; ht. 11.0 mm; w. 6.9 mm.
 6. Apertural view; VMNH I 584; ht. 10.0 mm; w. 5.6 mm.
- 7, 9. *Metula* sp.
 7. Apertural view; VMNH I 585; ht. 30.0 mm; w. 12.9 mm.
 9. Apertural view; VMNH I 586; ht. 34.9 mm; w. 16.1 mm.
- 8, 10. *Busycotypus scalarispira* (Conrad)
 8. Apertural view of specimen with high spire and strong tubercles; VMNH I 587; ht. 140.1 mm; w. 87.1 mm.
 10. Apertural view of specimen with high spire and strong tubercles along a persistent shoulder ridge; VMNH I 588; ht. 133.1 mm; w. 85.7 mm.

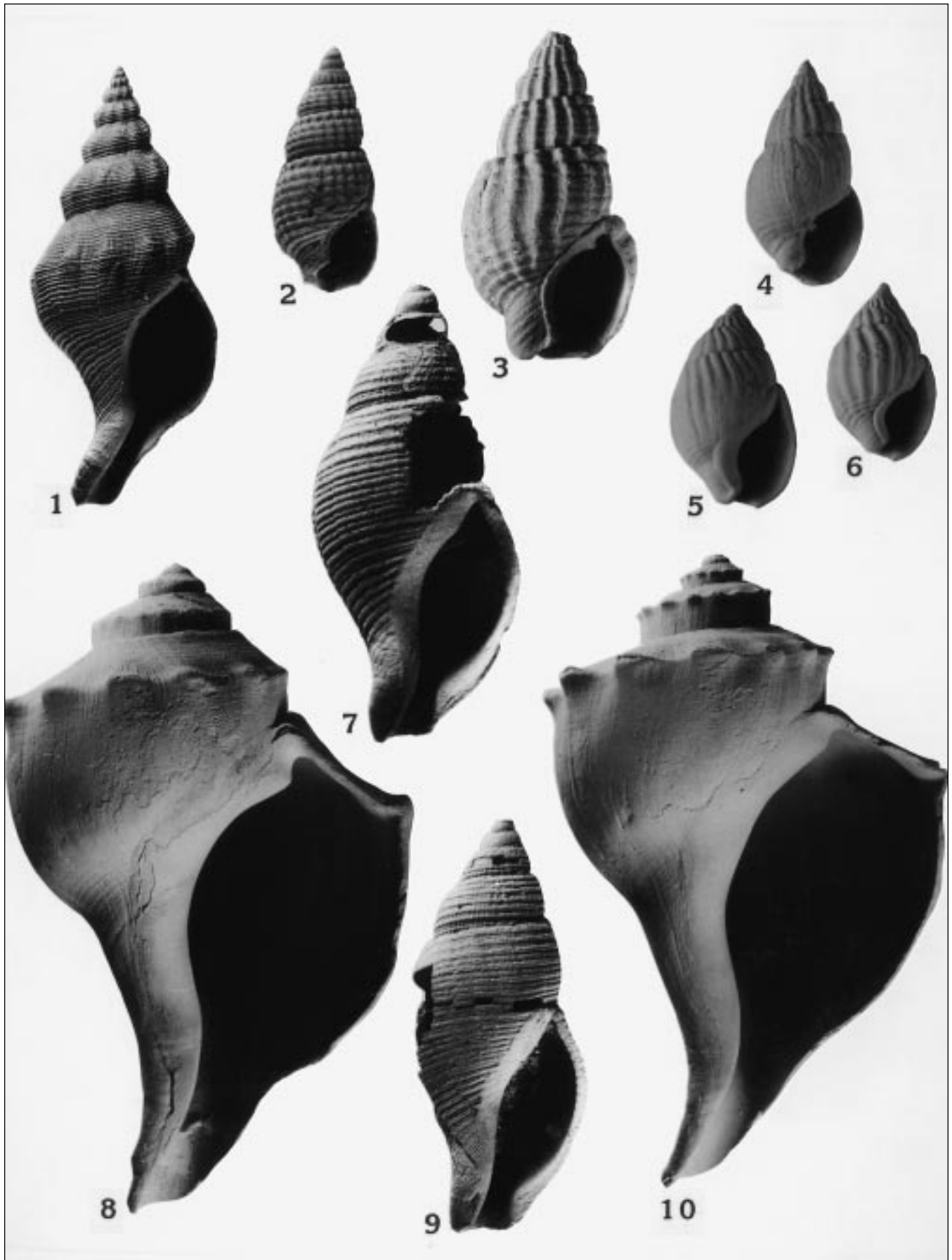


PLATE 6

- 1, 3, 4, 6. *Busycotypus scalarispira* (Conrad)
 1. Apertural view of specimen with low spire and moderately strong tubercles along a weaker shoulder; VMNH I 589; ht. 125.2 mm; w. 81.0 mm.
 3. Dorsal view of same specimen.
 4. Apertural view of specimen with low spire and weak tubercles becoming obsolete along a rounded shoulder; VMNH I 590; ht. 100.6 mm; w. 63.0 mm.
 6. Apertural view of specimen with low spire and devoid of tubercles on a rounded shoulder; VMNH I 591; ht. 70.6 mm; w. 44.4 mm.
2. *Scaphella virginiana* Dall
Apertural view; VMNH I 592; ht. 73.1 mm; w. 37.5 mm.
5. *Scaphella solitaria* (Conrad)
Apertural view; VMNH I 593; ht. 36.1 mm; w. 17.7 mm.



PLATE 7

- 1–3. *Oliva simonsoni* Ward, new species
 1. Apertural view; Paratype VMNH I 594; ht. 37.9 mm; w. 17.2 mm.
 2. Apertural view; Holotype VMNH I 595; ht. 36.8 mm; w. 17.9 mm.
 3. Dorsal view of holotype.
4. *Cancellaria alternata* Conrad
Apertural view; VMNH I 611; ht. 24.8 mm; w. 14.3 mm.
- 5–7. *Trigonostoma biplicifera* (Conrad)
 5. Apertural view; VMNH I 612; ht. 47.3 mm; w. 31.5 mm.
 6. Dorsal view of same specimen.
 7. Apertural view; VMNH I 613; ht. 31.2 mm; w. 22.5 mm.
8. *Cymatosyrinx limatula* (Conrad)
Apertural view; VMNH I 614; ht. 20.0 mm; w. 7.2 mm.
9. *Polystira communis* (Conrad)
Apertural view; VMNH I 615; ht. 28.0 mm; w. 9.5 mm.
- 10, 11. *Leucosyrinx rugata* (Conrad)
 10. Apertural view; VMNH I 616; ht. 30.1 mm; w. 12.1 mm.
 11. Apertural view; VMNH I 617; ht. 32.1 mm; w. 11.6 mm.
- 12, 13. *Inodrillia whitfieldi* (Martin)
 12. Apertural view; VMNH I 618; ht. 23.4 mm; w. 8.8 mm.
 13. Apertural view; VMNH I 619; ht. 23.0 mm; w. 8.6 mm.
14. *Terebra inornata* Whitfield
Apertural view; VMNH I 620; ht. 36.5 mm; w. 9.0 mm.

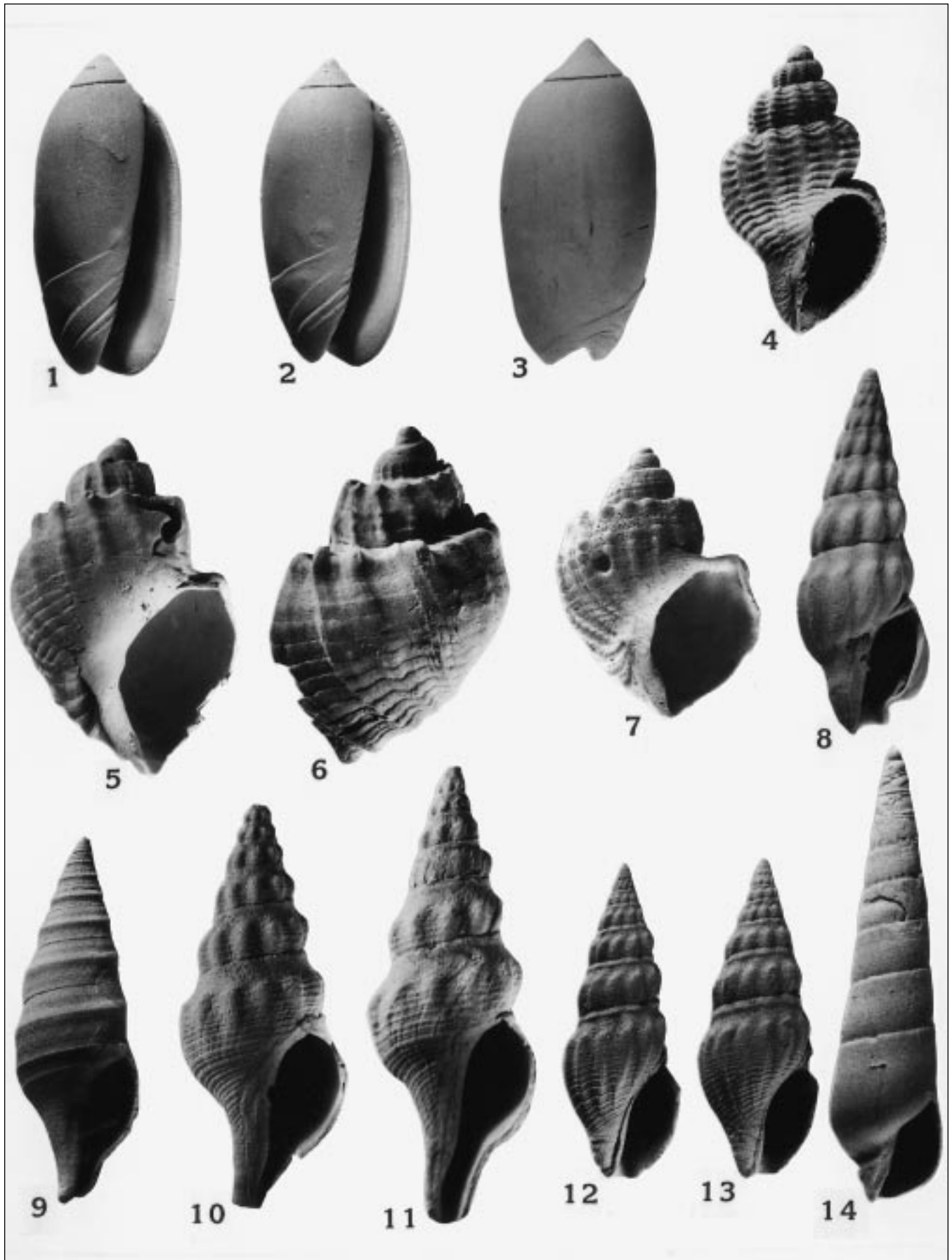


PLATE 8

- 1, 3. *Yoldia* sp.
 1. Exterior view right valve; VMNH I 621; ht. 18.5 mm; l. 42.0 mm.
 3. Interior view of the same specimen.
- 2, 4. *Yoldia* sp.
 2. Exterior view right valve; VMNH I 622; ht. 15.2 mm; l. 34.6 mm.
 4. Interior view of the same specimen.
- 5–7. *Dallarca* (?) *subrostrata*
 5. Exterior view left valve; VMNH I 623; ht. 39.1 mm; l. 52.0 mm. Collected by G. Simonson.
 6. Exterior view left valve; VMNH I 624; ht. 37.2 mm; l. 49.1 mm. Collected by G. Simonson.
 7. Exterior view left valve; VMNH I 625; ht. 33.5 mm; l. 44.9 mm.
- 8–10. *Dallarca* sp.
 8. Exterior view left valve; VMNH I 626; ht. 24.1 mm; l. 34.1 mm.
 9. Exterior view right valve; VMNH I 627; ht. 34.6 mm; l. 48.0 mm.
 10. Exterior view right valve; VMNH I 628; ht. 33.2 mm; l. 45.5 mm.

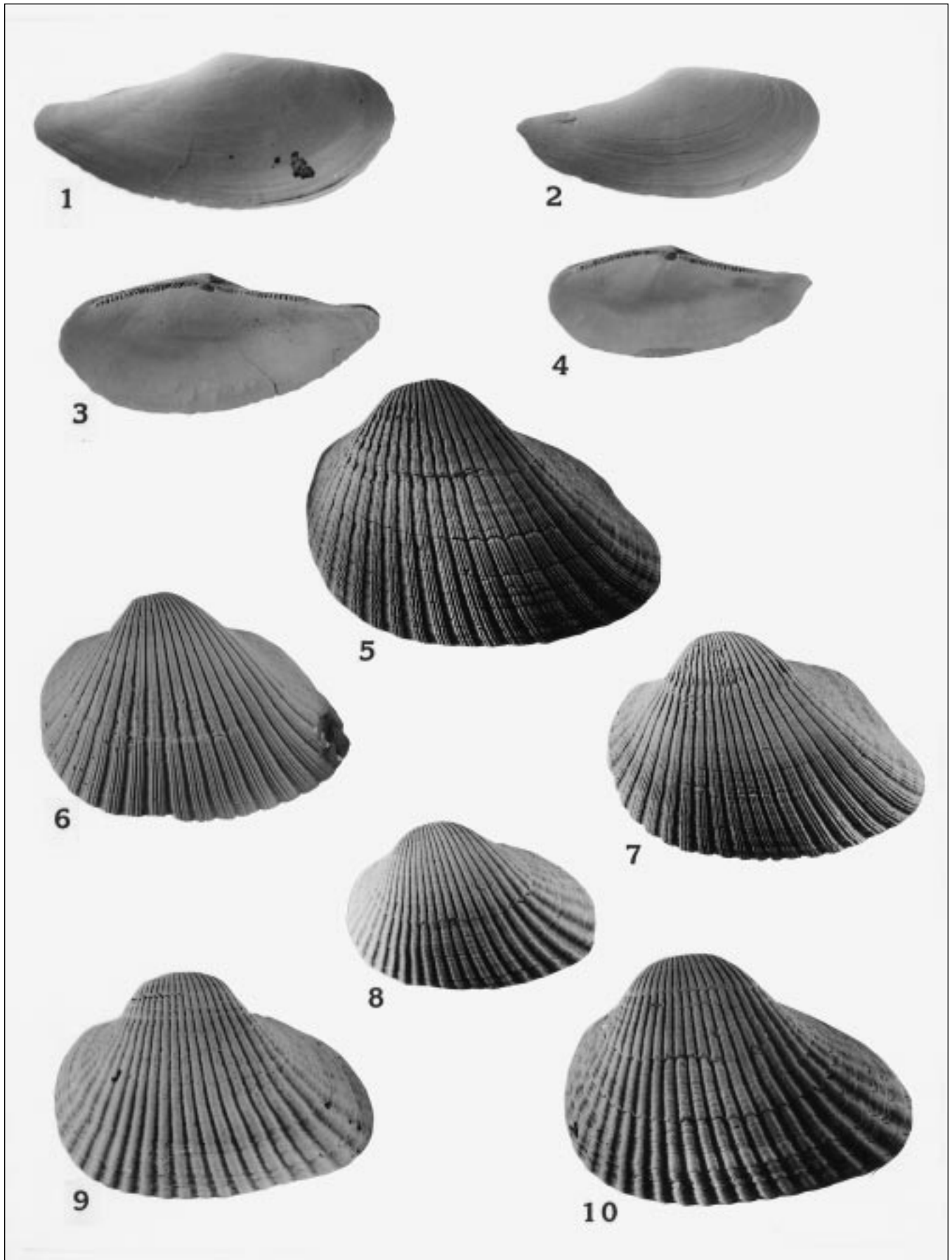


PLATE 9

1, 3. *Glycymeris parilis* (Conrad)

1. Exterior view left valve; VMNH I 629; ht. 75.1 mm; l. 74.3 mm.

3. Interior view of the same specimen.

2. *Modiolus ducatellii* Conrad

Exterior view incomplete left valve; VMNH I 630; l. 52.9 mm. Specimen was photographed uncoated to show characteristic brown discoloration of the shell due to its periostracum.

4, 5. *Mytilus (Mytiloconcha) incurva* Conrad

4. Exterior view left valve of a nearly complete specimen; VMNH I 631; l. 155.0 mm.

5. Exterior view incomplete right valve; VMNH I 632; l. 84.0 mm.

6, 8. *Isognomon (Hippochaeta)* sp.

6. Exterior view of a worn beak; VMNH I 633; ht. 63.2 mm.

8. Interior view of the same specimen.

7, 9. *Glycymeris parilis* (Conrad)

7. Exterior view right valve; VMNH I 634; ht. 44.7 mm; l. 46.0 mm. This specimen has fewer ribs than average specimens but in all other respects appears typical.

9. Interior view of the same specimen.

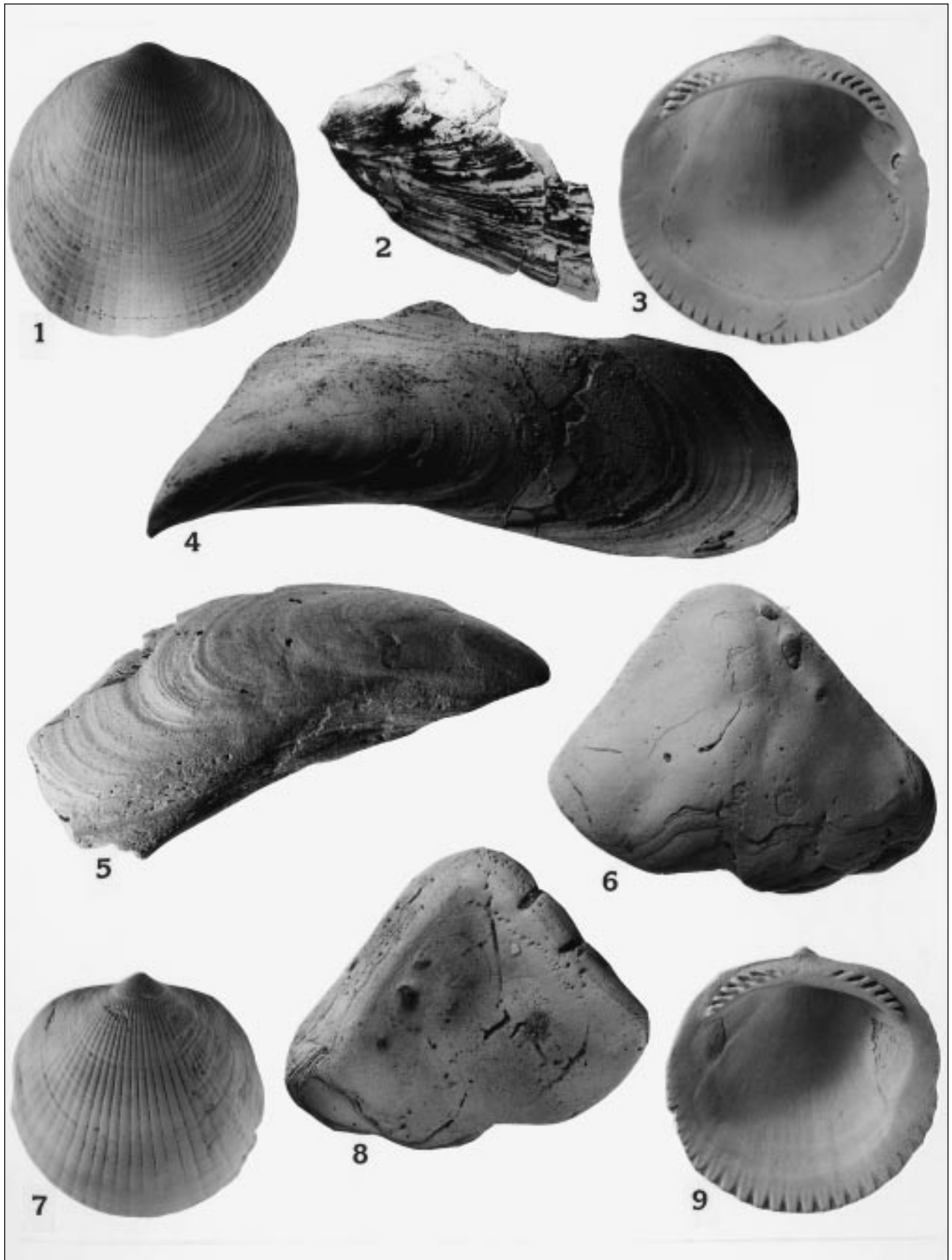


PLATE 10

- 1, 2. *Crassostrea virginica* (Gmelin)
 1. Exterior view right valve; VMNH I 635; ht. 142.0 mm; l. 53.0 mm.
 2. Exterior view left valve; VMNH I 636; ht. 183.9 mm; l. 53.0 mm.
- 3, 4. *Pecten humphreysii woolmani* Heilprin
 3. Exterior view incomplete right valve; VMNH I 637; ht. of fragment 53.8 mm. Collected by G. Simonson.
 4. Exterior view incomplete left valve; VMNH I 638; ht. of fragment 58.0 mm. Collected by G. Simonson.
- 5–8. *Crassostrea virginica* (Gmelin)
 5. Exterior view left valve; VMNH I 639; ht. 115.6 mm; l. 52.7 mm.
 6. Exterior view left valve; VMNH I 640; ht. 149.0 mm; l. 69.0 mm.
 7. Interior view right valve. The same specimen as figure 1.
 8. Interior view left valve. The same specimen as figure 6.

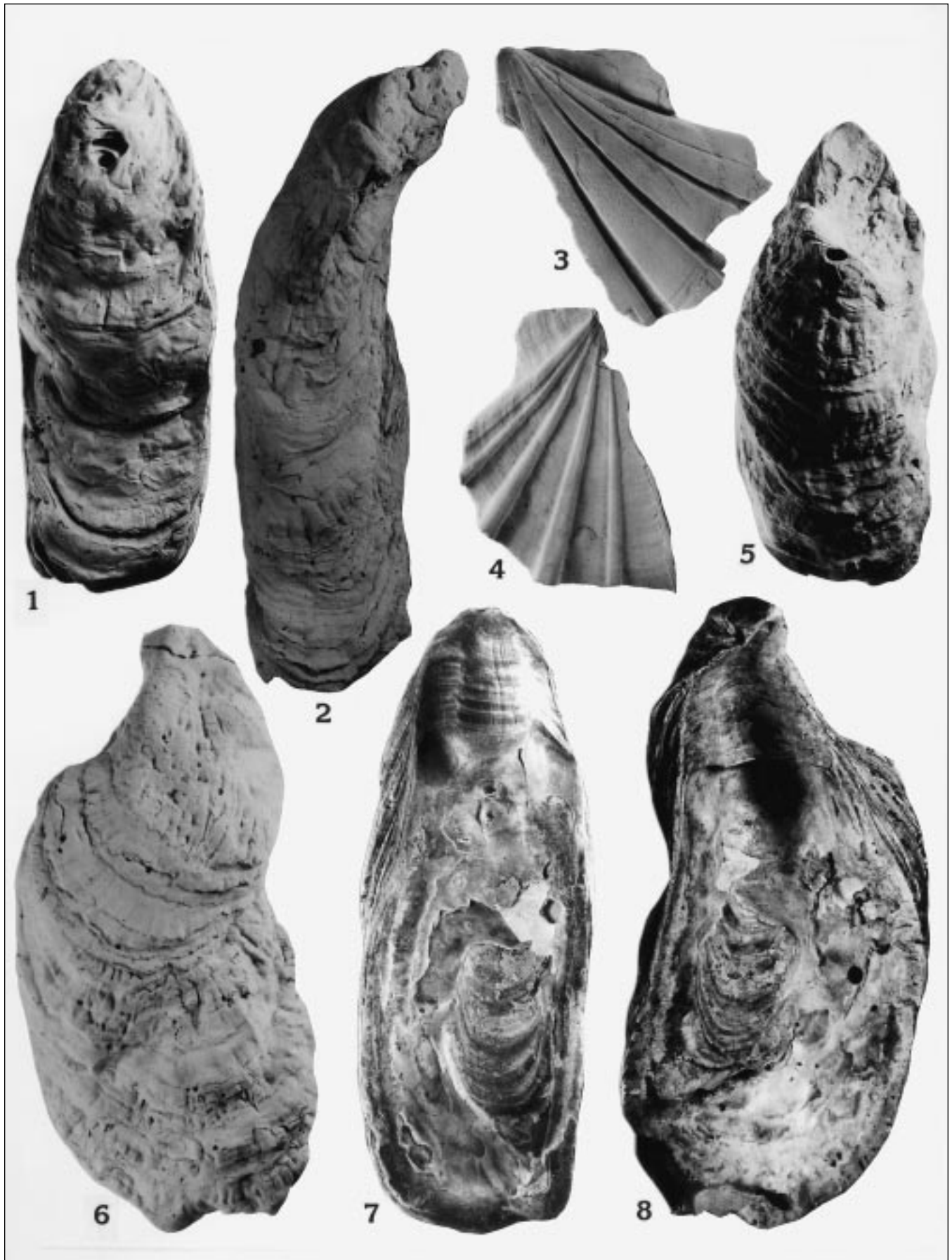


PLATE 11

- 1, 2. *Chesapecten coccymelus* (Dall)
 1. Exterior view left valve; VMNH I 641; ht. 43.4 mm; l. 41.0 mm.
 2. Exterior view right valve; VMNH I 642; ht. 44.3 mm; l. 44.0 mm.
- 3, 4. *Chesapecten sayanus* (Dall)
 3. Exterior view right valve; VMNH I 643; ht. 62.0 mm; l. 60.5 mm.
 4. Exterior view right valve; VMNH I 644; ht. 85.3 mm; l. 84.2 mm.
5. *Chesapecten sayanus* (Dall)

Exterior view right valve; VMNH I 645; ht. 116.7 mm; approximate l. 119.5 mm. Pungo River Formation (lower Miocene) at the Texas Gulf Sulphur phosphate mine, Aurora, N. C.
6. *Chesapecten coccymelus* (Dall)

Exterior view right valve; VMNH I 646; ht. 67.1 mm; l. 68.7 mm. Pungo River Formation (lower Miocene) at the Texas Gulf Sulphur phosphate mine, Aurora, N. C.

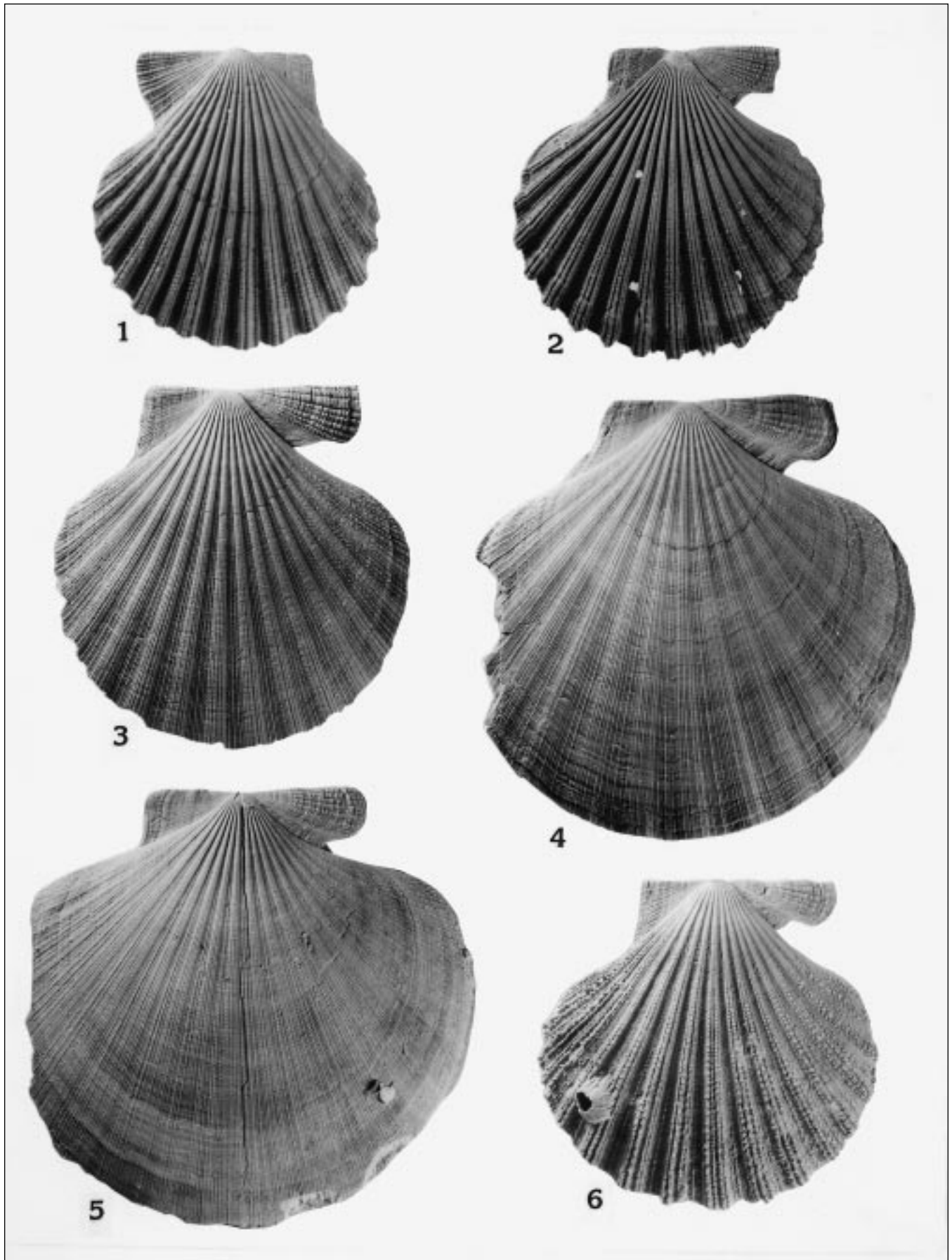


PLATE 12

1–3. *Stewartia anodonta* (Say)

1. Exterior view right valve; VMNH I 647; ht. 45.0 mm; l. 46.1 mm.
2. Interior view left valve; VMNH I 648; ht. 44.8 mm; l. 47.2 mm.
3. Exterior view of the same specimen.

4, 8, 9. *Carditamera aculeata* Conrad

4. Exterior view left valve; VMNH I 649; ht. 27.9 mm; l. 51.0 mm.
8. Interior view of the same specimen.
9. Exterior view right valve; VMNH I 650; ht. 31.1 mm; l. 53.9 mm.

5–7. *Parvalucina crenulata* (Conrad)

5. Exterior view right valve; VMNH I 651; ht. 5.1 mm; l. 5.1 mm.
6. Exterior view right valve; VMNH I 652; ht. 4.7 mm; l. 4.8 mm.
7. Exterior view left valve; VMNH I 653; ht. 4.2 mm; l. 4.6 mm.

10, 12. *Cyclocardia castrana* (Glenn)

10. Exterior view left valve; VMNH I 654; ht. 19.5 mm; l. 20.1 mm.
12. Interior view right valve; VMNH I 655; ht. 21.5 mm; l. 22.1 mm.

11, 13, 14. *Marvacrassatella melinus* (Conrad)

11. Exterior view right valve; VMNH I 656; ht. 40.1 mm; l. 61.2 mm.
13. Exterior view left valve; VMNH I 657; ht. 48.8 mm; l. 76.0 mm.
14. Interior view of the same specimen.

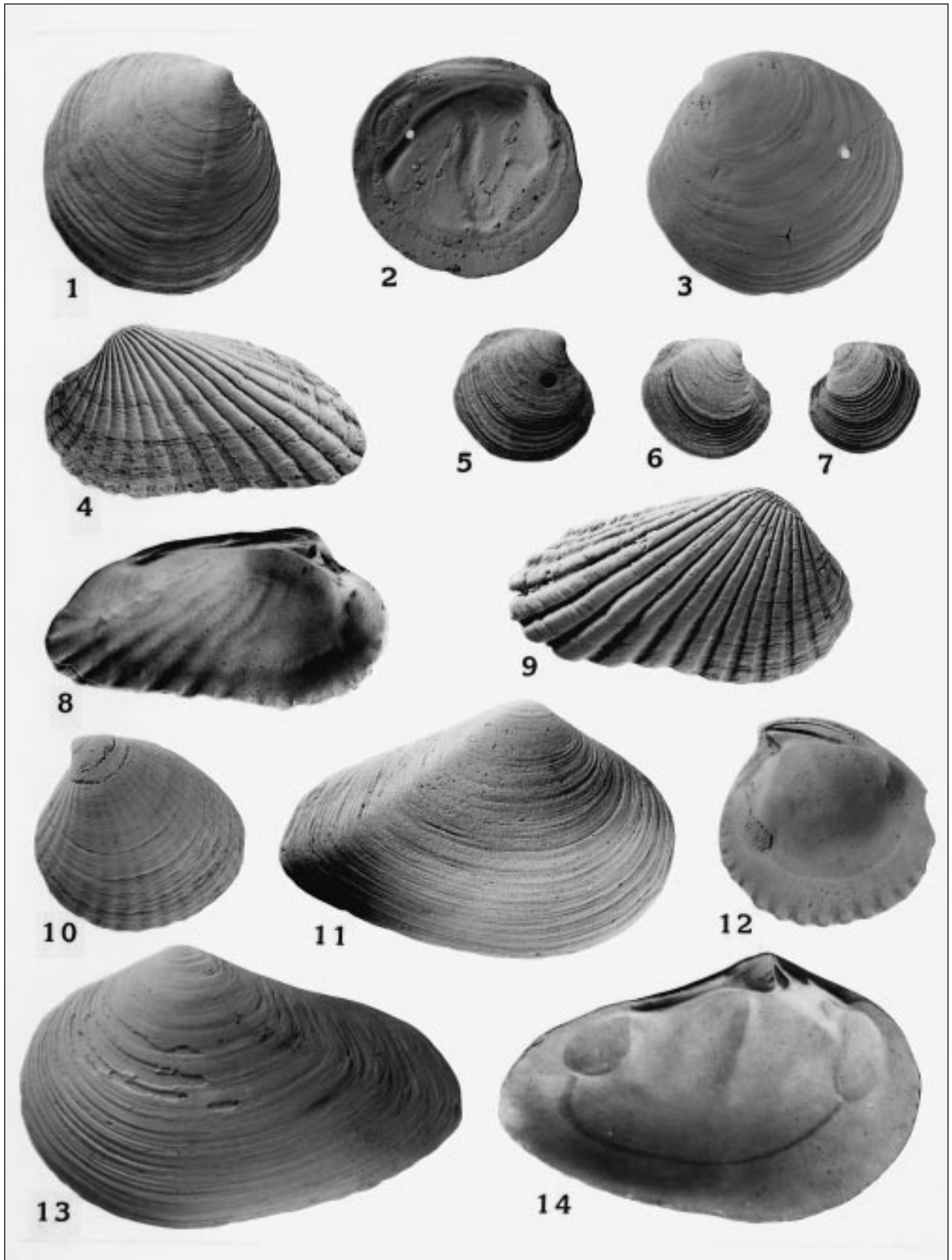


PLATE 13

- 1, 2. *Astarte distans* Conrad
 1. Exterior view left valve; VMNH I 658; ht. 24.0 mm; l. 29.6 mm. Specimen shows well-developed concentric undulations on exterior associated with higher energy, sandy matrix.
 2. Exterior view right valve; VMNH I 659; ht. 24.2 mm; l. 28.9 mm. Specimen with rugose sculpture as in figure 1.
- 3, 6. *Astarte* sp.
 3. Exterior view right valve; VMNH I 660; ht. 18.9 mm; l. 20.0 mm.
 6. Exterior view left valve; VMNH I 661; ht. 18.6 mm; l. 20.8 mm.
- 4, 5. *Astarte distans* Conrad
 4. Exterior view right valve; VMNH I 662; ht. 23.4 mm; l. 28.0 mm. Specimen shows the lower, more rounded, less rugose concentric sculpture associated with finer, more silty sands. Martin (1904) named this morphotype *Astarte castrana*. This specimen came from Bed a at the Pollack Farm Site.
 5. Exterior view left valve; VMNH I 663; ht. 27.0 mm; l. 30.8 mm. Specimen with subdued sculpture as in figure 4.
- 7, 8. *Dinocardium* sp.
 7. Exterior view left valve; VMNH I 664; ht. 63.0 mm; l. 65.3 mm. Collected by J. Beard.
 8. Interior view of the same specimen.
- 9, 11. "*Cardium*" *calvertensium* Glenn
 9. Exterior view left valve; VMNH I 665; ht. 20.4 mm; l. 21.5 mm.
 11. Exterior view left valve; VMNH I 666; ht. 17.0 mm; l. 18.8 mm.
10. *Chesacardium craticuloides* (Conrad)
Exterior view right valve; VMNH I 667; ht. 32.1 mm; l. 37.1 mm.

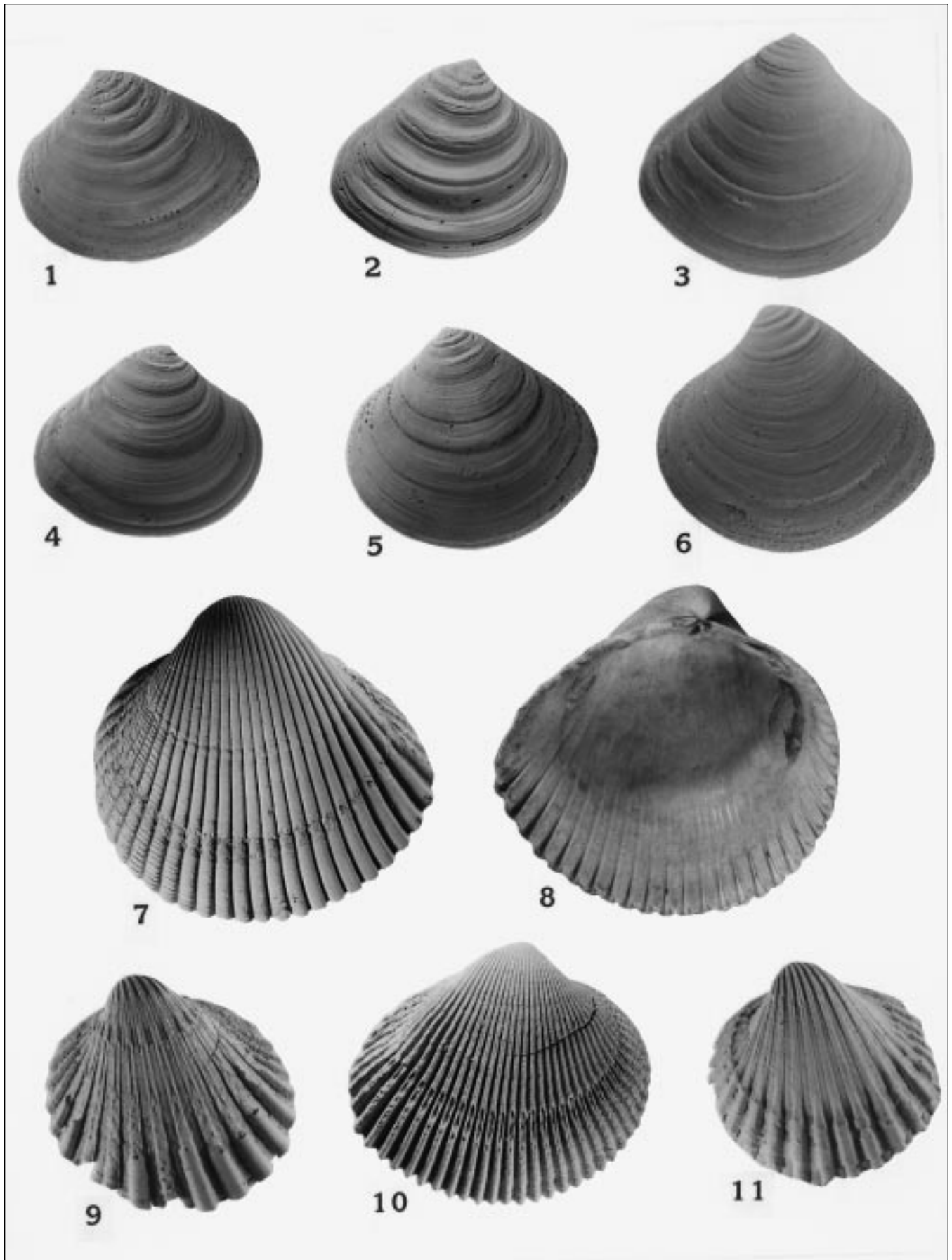


PLATE 14

- 1, 2. *Leptomactra marylandica* (Dall)
 1. Exterior view left valve; VMNH I 668; ht. 51.4 mm; l. 75.8 mm. Collected by G. Simonson.
 2. Interior view of the same specimen.
- 3–6. “*Mactra*” sp.
 3. Exterior view right valve; VMNH I 669; ht. 47.1 mm; l. 63.2 mm.
 4. Interior view of the same specimen.
 5. Exterior view left valve; VMNH I 670; ht. 40.4 mm; l. 63.1 mm.
 6. Interior view of the same specimen.
- 7, 8. *Ensis directus* Conrad
 7. Exterior view incomplete left valve; VMNH I 671; approximate ht. 8.0 mm; l. of fragment 32.6 mm.
 8. Interior view of the same specimen.
- 9–11. *Strigilla* sp.
 9. Exterior view left valve; VMNH I 672; ht. 16.6 mm; l. 17.0 mm.
 10. Interior view of the same specimen.
 11. Interior view right valve; VMNH I 673; ht. 17.0 mm; l. 17.5 mm.

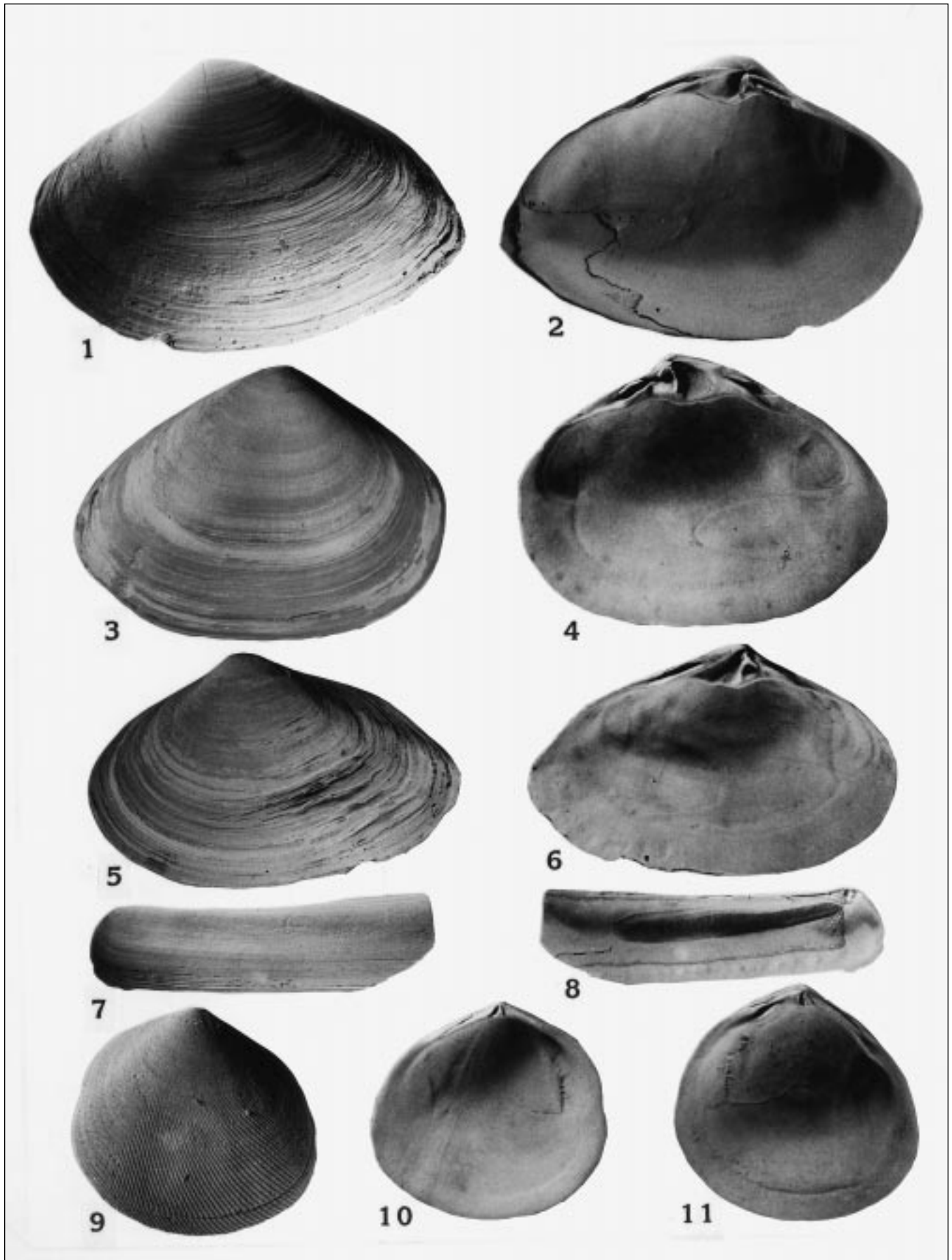


PLATE 15

1. *Florimetis biplicata* (Conrad)
Exterior view left valve; VMNH I 674; ht. 47.3 mm; l. 59.4 mm.
2. *Semele subovata* (Say)
Exterior view right valve; VMNH I 675; ht. 16.1 mm; l. 21.0 mm.
- 3, 5. *Tagelus plebeius* ssp.
3. Exterior view left valve; VMNH I 676; ht. 22.1 mm; l. 66.7 mm.
5. Interior view of the same specimen.
- 4, 6, 9. *Donax idoneus* ssp.
4. Exterior view left valve; VMNH I 677; ht. 17.5 mm; l. 29.9 mm.
6. Exterior view right valve; VMNH I 678; ht. 25.5 mm; l. 43.9 mm.
9. Exterior view right valve; VMNH I 679; ht. 26.8 mm; l. 43.1 mm.
- 7, 8, 10. *Iphigenia* sp.
7. Exterior view left valve; VMNH I 680; ht. 26.7 mm; l. 41.0 mm.
8. Interior view right valve; VMNH I 681; ht. 21.5 mm; l. 36.1 mm.
10. Exterior view of the same specimen.
- 11–14. *Donax* sp.
11. Interior view right valve; VMNH I 682; ht. 9.0 mm; l. 16.1 mm.
12. Exterior view left valve; VMNH I 683; ht. 10.2 mm; l. 18.5 mm.
13. Interior view left valve. The same specimen as figure 12.
14. Exterior view right valve. The same specimen as figure 11.

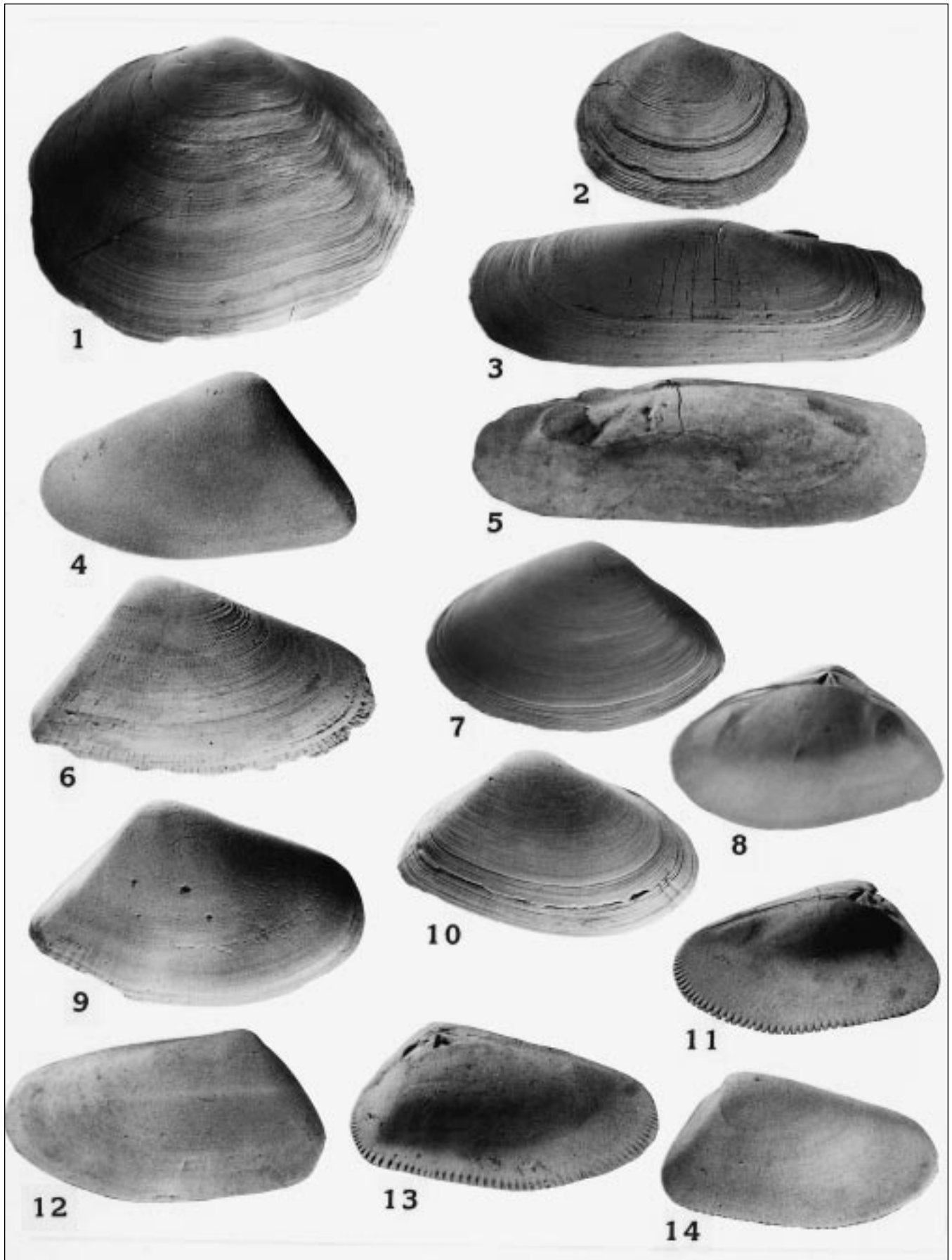


PLATE 16

1–3. *Mytilopsis erimiocenicus* Vokes

1. Exterior view right valve; VMNH I 684; approximate ht. 10.5 mm; l. 26.1 mm.
2. Interior view right valve; VMNH I 685; ht. 9.3 mm; l. 18.9 mm.
3. Exterior view left valve; VMNH I 686; ht. 9.0 mm; l. 21.1 mm.

4. *Glossus* sp.

Exterior view right valve; VMNH I 687; ht. 34.9 mm; l. 45.0 mm.

5, 6. *Lirophora latilirata* (Conrad)

5. Exterior view right valve; VMNH I 688; ht. 16.0 mm; l. 18.0 mm.
6. Exterior view left valve; VMNH I 689; ht. 16.2 mm; l. 18.9 mm.

7, 8. *Mercenaria ducatellii* (Conrad)

7. Exterior view right valve; VMNH I 690; ht. 65.0 mm; l. 81.0 mm.
8. Exterior view left valve; VMNH I 691; ht. 78.0 mm; l. 96.7 mm.

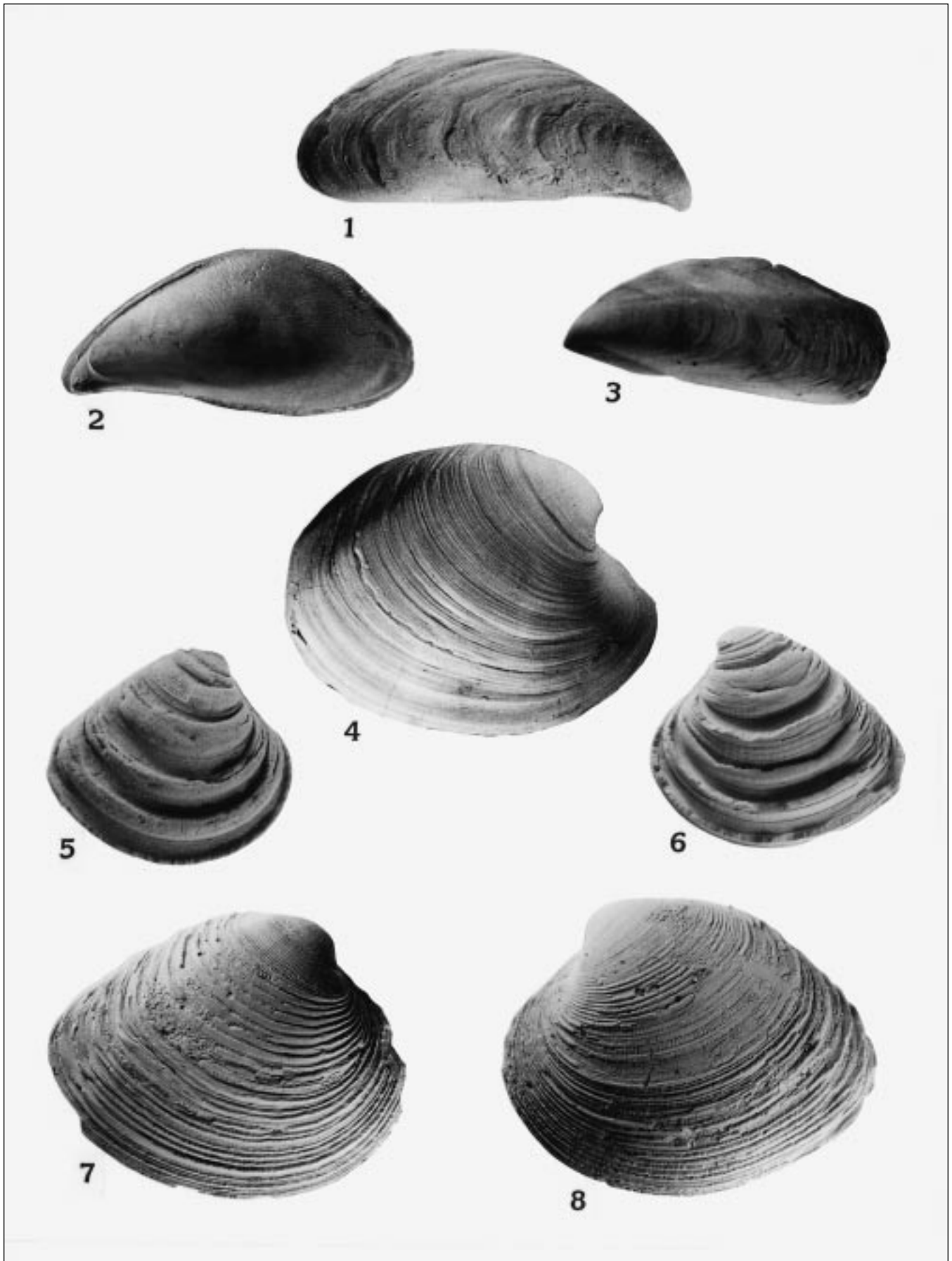


PLATE 17

- 1-3. *Mercenaria ducatellii* (Conrad)
 1. Exterior view right valve; VMNH I 692; ht. 76.6 mm; l. 93.5 mm. *Martesia* are visible in several of the holes bored into the shell.
 2. Interior view right valve; VMNH I 690; ht. 65.0 mm; l. 81.0 mm.
 3. Exterior view right valve; VMNH I 693; ht. 44.1 mm; l. 52.9 mm.
4. *Dosinia acetabulum blackwelderi* Ward
Exterior view right valve; VMNH I 694; ht. 58.1 mm; l. 57.8 mm.
- 5-7. *Macrocallista marylandica* (Conrad)
 5. Interior view right valve; VMNH I 695; ht. 54.0 mm; l. 78.5 mm.
 6. Exterior view left valve; VMNH I 696; ht. 40.0 mm; l. 51.2 mm.
 7. Exterior view right valve; VMNH I 697; ht. 57.1 mm; l. 82.5 mm.

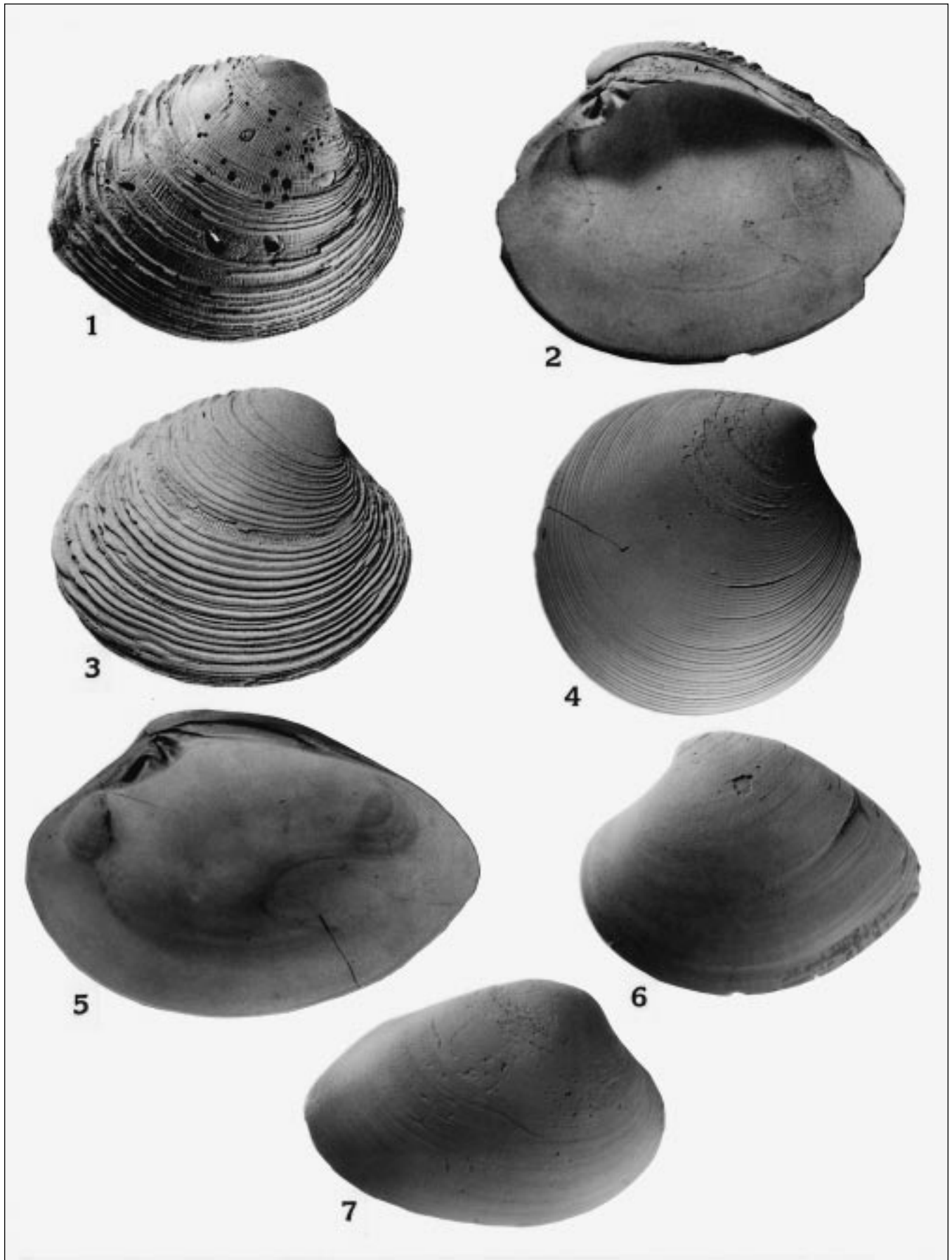


PLATE 18

- 1, 4. *Clementia grayi* Dall
 1. Exterior view left valve of a paired individual; VMNH I 698; ht. 56.5 mm; l. 62.9 mm.
 4. Exterior view of beak of a left valve; VMNH I 699; l. of fragment 42.0 mm. Most of the specimens from the Pollack Farm Site are fragmentary, consisting mainly of the hinge area. They look very similar to one found at Shiloh, New Jersey and illustrated by Richards and Harbison (1942, p. 175, fig. 4).
- 2, 5. *Mya producta* Conrad
 2. Exterior view right valve; VMNH I 700; ht. 52.5 mm; l. 102.0 mm.
 5. Exterior view left valve; VMNH I 701; ht. 36.1 mm; l. 76.0 mm. Collected by G. Simonson.
- 3, 6. *Caryocorbula subcontracta* (Whitfield)
 3. Exterior view right valve; VMNH I 702; ht. 4.9 mm; l. 6.1 mm.
 6. Interior view right valve; VMNH I 703; ht. 4.7 mm; l. 6.0 mm.
- 7, 8, 10, 11. *Bicorbula idonea* (Conrad)
 7. Exterior view right valve; VMNH I 704; ht. 25.8 mm; l. 30.0 mm.
 8. Exterior view left valve; VMNH I 705; ht. 17.9 mm; l. 23.8 mm.
 10. Interior view right valve. The same specimen as figure 7.
 11. Interior view left valve. The same specimen as figure 8.
- 9, 12. *Varicorbula elevata* (Conrad)
 9. Exterior view right valve; VMNH I 706; ht. 8.9 mm; l. 8.8 mm.
 12. Interior view of the same specimen.
- 13, 14. *Caryocorbula cuneata* (Say)
 13. Exterior view left valve; VMNH I 707; ht. 5.5 mm; l. 9.5 mm.
 14. Interior view left valve; VMNH I 708; ht. 5.7 mm; l. 9.5 mm.
15. *Panopea whitfieldi* Dall
Exterior view right valve of a paired individual; VMNH I 709; ht. 53.1 mm; l. 95.5 mm. This specimen was found in living position in Bed a. Collected by J. Beard.
16. *Panopea americana* Conrad
Exterior view incomplete right valve; VMNH I 710; ht. 77.5 mm; l. of fragment 115.0 mm.

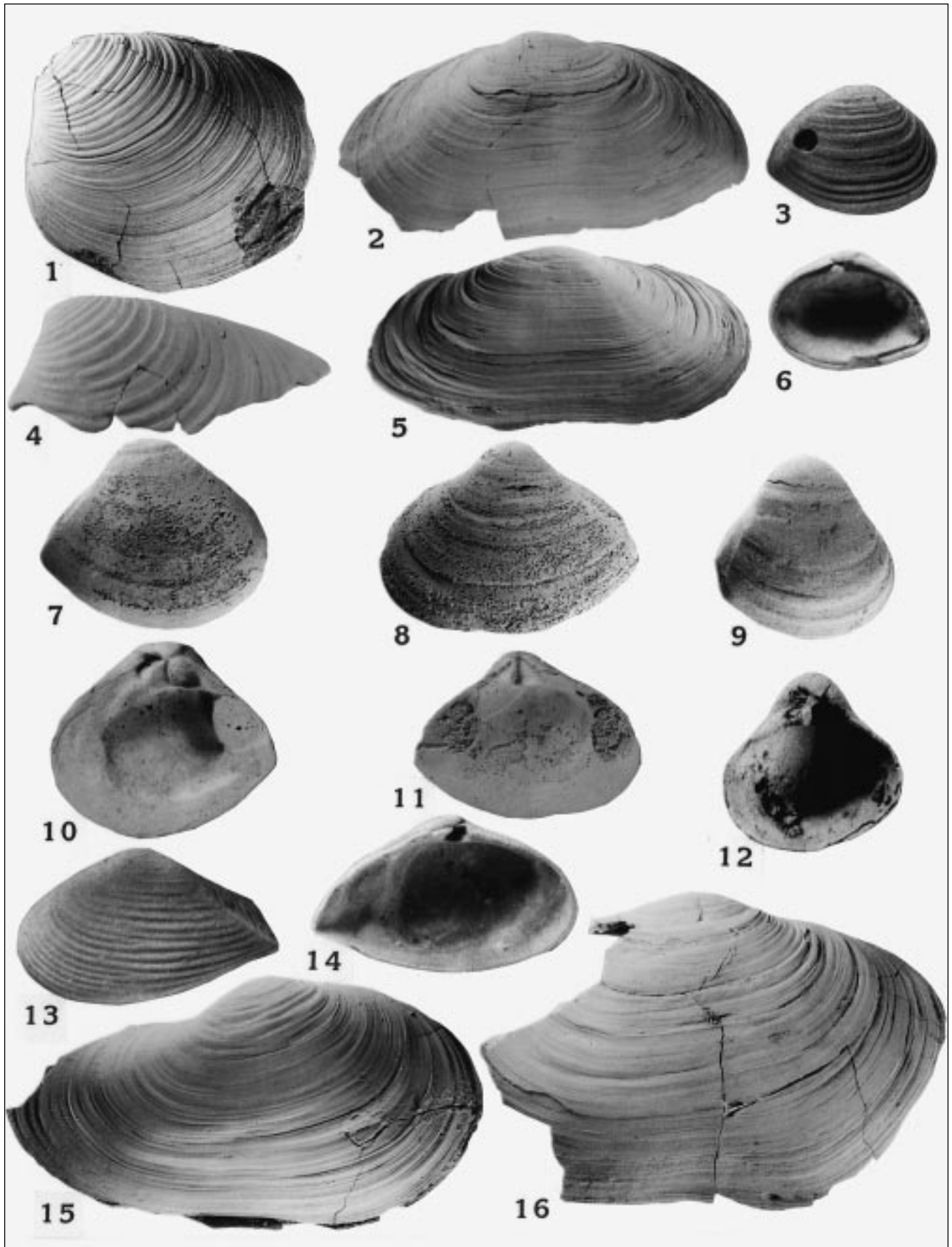
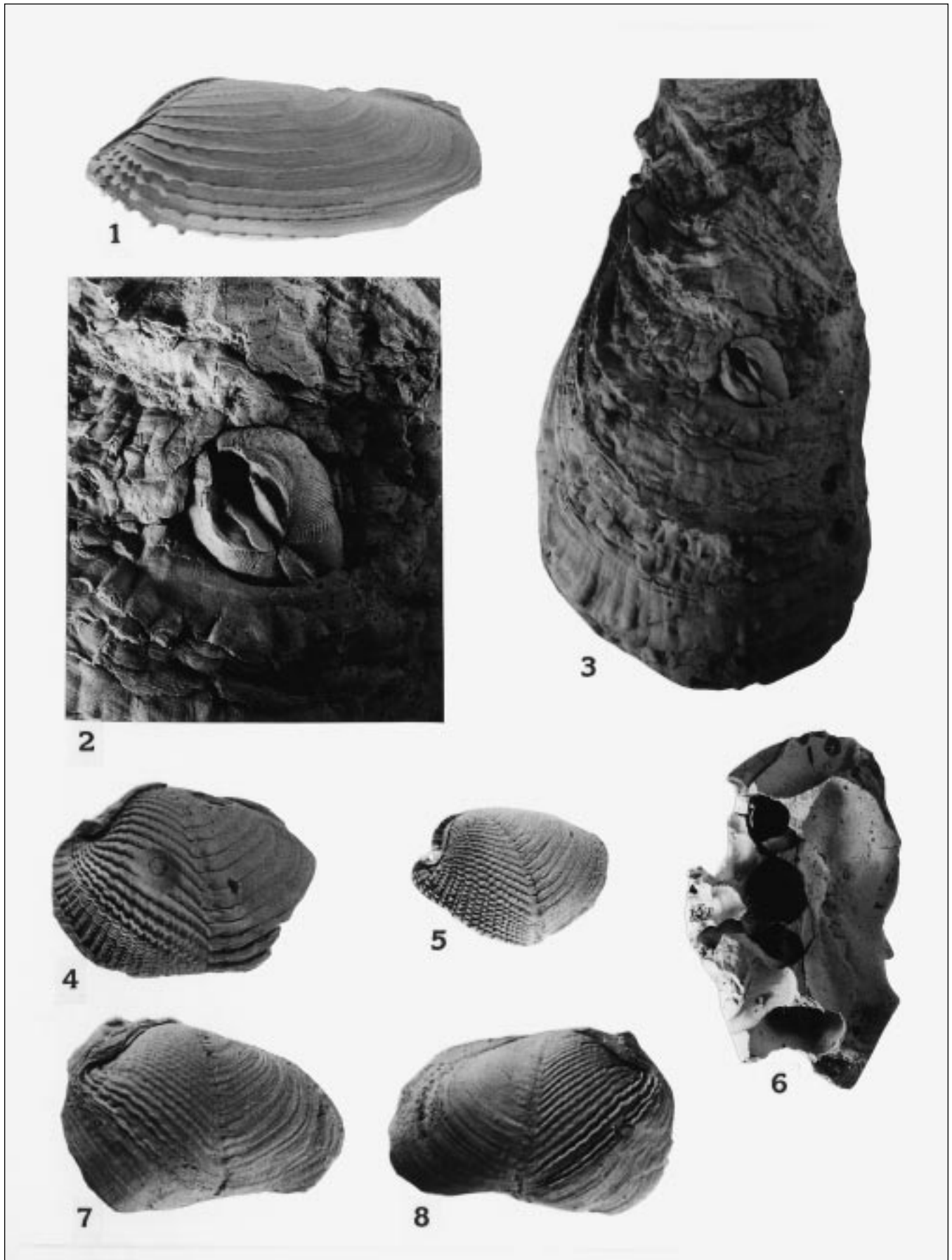


PLATE 19

1. *Thovana* sp.
Exterior view left valve; VMNH I 711; ht. 10.7 mm; l. 25.9 mm.
- 2–8. *Martesia ovalis* (Say)
 2. Exposed hinge of a complete specimen in place in a boring into *Crassostrea virginica*; VMNH I 712. Length of specimen as exposed in boring 22.7 mm.
 3. Close-up view of same specimen in figure 2.
 4. Exterior view incomplete left valve; VMNH I 713; ht. 13.0 mm; l. 18.0 mm.
 5. Exterior view left valve; VMNH I 714; ht. 7.4 mm; l. 9.5 mm.
 6. *Martesia ovalis* borings into a broken *Mercenaria* shell; VMNH I 715. Some valves still remain in place. The heavy infestation probably contributed to the destruction of the host shell. Length of shell fragment 53 mm.
 7. Exterior view left valve; VMNH I 716; ht. 9.5 mm; l. 13.7 mm.
 8. Exterior view right valve; VMNH I 716; ht. 10.0 mm; l. 14.6 mm.



THE EARLY MIOCENE FISH FAUNA FROM THE POLLACK FARM SITE, DELAWARE¹

Robert W. Purdy²

INTRODUCTION

The Pollack Farm Site, a large borrow pit excavated during 1991–1992 for highway construction near Cheswold, Delaware, exposed two stratigraphically separated shelly beds of the Cheswold sands of the lower Miocene Calvert Formation. The lower shell bed was bulk sampled, yielding 30 fossil fish taxa, consisting of 24 cartilaginous and 6 bony fishes. This fauna is almost identical to those found in sediments of equivalent age to the south of Delaware; it suggests that deposition occurred in a subtropical, shallow-water, nearshore environment.

Acknowledgments

I thank Michael D. Gottfried and David J. Bohaska who reviewed this manuscript and Shelton P. Applegate who reviewed my identifications of the sharks.

FAUNAL ASSEMBLAGE

With the exception of the relative abundances of the taxa as given in the list that follows, the Pollack Farm fish fauna is identical to those of the Calvert and Pungo River formations of Maryland and North Carolina, respectively. Unlike the more southern fossil fish faunas, bony fish remains, with the exception of juvenile *Pogonias* teeth, are uncommon. No new species were found.

Except for *Carcharhinus limbatus*, *Dasyatis* sp., *?Raja* sp., *Lepisosteus* sp., and *Lagodon* sp., the Pollack Farm fish taxa are illustrated in Plates 1 and 2. The taxa are being described more fully in a paper by Purdy et al. (in press) on the fossil fishes of the Pungo River and Yorktown Formations from the Lee Creek Mine, Aurora, North Carolina.

Chondrichthyes

<i>Notorynchus</i> sp.	Uncommon
<i>Squalus</i> sp.	Rare
<i>Squatina</i> sp.	Rare
Orectolobid	Rare
<i>Rhincodon</i> sp.	Rare
<i>Carcharias cuspidata</i> (Agassiz)	Common
<i>Carcharodon subauriculatus</i> (Agassiz)	Rare
<i>Isurus hastalis</i> (Agassiz)	Uncommon
<i>I. oxyrinchus</i> (Rafinesque)	Uncommon
<i>Hemipristis serra</i> Agassiz	Very common
<i>Galeocerdo contortus</i> Gibbes	Common
<i>G. aduncus</i> Agassiz	Common
<i>Carcharhinus brachyurus</i> (Günther)	Common
<i>C. limbatus</i> (Valenciennes)	Common
<i>C. perezii</i> (Poey)	Common

<i>Negaprion</i> sp.	Very common
<i>Rhizoprionodon</i> sp.	Uncommon
<i>Sphyrna</i> sp.	Uncommon
<i>Aetobatis</i> sp.	Common
<i>Dasyatis</i> sp.	Common
<i>?Raja</i> sp.	Rare
<i>Rhinoptera</i> sp.	Uncommon
<i>Alopias</i> sp.	
<i>Paragaleus</i> sp.	

Osteichthyes

<i>Acipenser</i> sp.	Uncommon
<i>Lepisosteus</i> sp.	Uncommon
<i>Ictalurus</i> sp.	Uncommon
<i>Pogonias</i> sp.	Common
<i>Lagodon</i> sp.	Rare
<i>Sphyrna</i> sp.	Rare

AGE OF THE FAUNA

With the exception of *Galeocerdo contortus* and *G. aduncus*, the identified fish taxa range stratigraphically from the early Miocene to the Holocene. The two species of *Galeocerdo*, however, range from the late Oligocene to the middle Miocene. The fish fauna, then, indicates an age of early Miocene to middle Miocene. On the bases of microfossils (Benson, 1998), mollusks (Ward, 1998), land mammals (Emry and Eshelman, 1998), and strontium-isotope dating (Jones et al., 1998) the age of the sediments, thus the fish fauna, at the Pollack Farm Site is early Miocene.

PALEOECOLOGY

Among the Pollack Farm sharks, the now shallow-water species *Carcharias taurus* and *Negaprion* sp. are more abundant here than in the other two faunas to the south. The three species of *Carcharhinus* also represent inshore, shallow-water sharks. *Isurus* spp. and *Notorynchus* sp. (now deep-water species), which are relatively common at localities to the south, are rare at the Pollack Farm Site. These differences in relative abundances suggest that the Pollack Farm fish fauna lived in shallow inshore waters.

Concerning climate, *Isurus* spp., *Rhincodon* sp., *Hemipristis serra*, *Galeocerdo* spp., *Carcharhinus* spp., *Negaprion* sp., *Rhizoprionodon* sp., *Sphyrna* sp., and *Sphyrna* sp. are all warm-water taxa. These taxa are common today south of Cape Hatteras, North Carolina, except for *Hemipristis*, which is restricted to the tropical eastern Pacific and Indian oceans, and *Carcharhinus perezii*, which is not found north of Florida (Compagno, 1984). The presence of *C. perezii* at the Pollack Farm Site suggests that the water temperature was warmer than that found in the Carolina Bight today.

¹ In Benson, R.N., ed., 1998, Geology and paleontology of the lower Miocene Pollack Farm Fossil Site, Delaware: Delaware Geological Survey Special Publication No. 21, p. 133–139.

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